Speculative Mobility: Exploring Sustainability-Driven Scenarios for Future Car Owners

Master's thesis in Interaction Design and Technologies

GEOFFREY CHEN, SANTOSH RENUKUNTLA

Department of Computer Science and Engineering
CHALMERS UNIVERSITY OF TECHNOLOGY
UNIVERSITY OF GOTHENBURG
Gothenburg, Sweden 2023

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Supervisor: Mafalda Gamboa, teacher and researcher at Chalmers University of Technology.
Advisor: Sam Andrews, Executive UX Director at AKQA.
Examiner: Palle Dahlstedt, Head of Division, Professor for Interaction Design and Software Engineering, Computer and Information Science at Chalmers University of Technology

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Department of Computer Science and Engineering
Chalmers University of Technology and University of Gothenburg
SE-412 96 Gothenburg
Telephone +46 31 772 1000

Cover image: Partial image of the teaser poster we created for the exhibition using MidJourney.

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Abstract

Purpose

In the rapidly evolving automotive industry, sustainability has become one of the most emphasised topics. This study explored the potential of *Interaction Design* in helping raise sustainability awareness through different experiences. Therefore, we formulated our research question:

- **What forms of experiences could an interactive design exhibition bring sustainability awareness to future car owners?**

Methods

Utilising 3D printing technology, generative AI and other prototyping methods, we created a speculative and critical design exhibition showcasing four different timelines that sprouted from a pivotal sustainability decision. Thirty-four participants were recruited through convenience sampling, visited the exhibition and completed a questionnaire. Additionally, three focus group discussion sessions were also held to collect more profound insights from the participants.

Findings

Our findings showed that interactive design exhibitions, especially speculative and critical design exhibitions, can indeed aid in raising sustainability awareness. Participants praised the interactive, tangible and immersive elements, stating that these attributes helped them resonate with the speculative narratives at the exhibition. The thought-provoking nature of speculative design and the easily noticed theme were also highlighted. However, the feedback also suggested a more balanced approach to creating artefacts for different timelines, adding multi-sensory exhibition design and guided walk-throughs to improve the narrative flow and overall immersive experience.

Conclusion

In conclusion, this study shows the potential of interaction design strategies, and the experiences created could be a great way to foster sustainability awareness, suggesting a probable way to engage first-time car buyers on sustainability issues.

Keywords: Speculative Design, Critical Design, Sustainability Awareness, Interaction Design, Automotive Industry, Exhibition Design, Immersive Experience, Experience Design, Automotive Future, Sustainability Exhibition.

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Special thanks to ***Sam Andrews***, our mentor at AKQA. His expertise, leadership, and feedback throughout our ideation, exhibition design and final review have been inspirational and eye-opening. His support, direction for our design, and guidance throughout the project were greatly appreciated.

Erik Arvedson's knowledge and experience with design methodologies and current trends have been enlightening. His insights and interesting articles shared with us were a great help for our ideation. Similarly, ***Uros Petrevski's***, philosophical insights and unique perspectives have been a strong source of our inspiration. We are thankful for the help and knowledge shared with us.

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A special mention to ***Alejandro Añón Rodríguez*** for his technical assistance in helping us get on board and ensure our equipment was functional during the project. ***Tilde Holby's*** warm welcome and service at the AKQA studio made our collaboration smooth and enjoyable.

To all the IxD classmates who attended the exhibition as well as participated in the focus group interviews - you gave us such valuable feedback along with copious support, which fueled us to keep pursuing this project despite the delays and frustrations. We are grateful for your kind words and your unwavering support. Lastly, we would like to thank ***Thommy Eriksson*** and ***Maryam Navandi Vardeh*** from Chalmers University of Technology. Thommy's assistance with tools at the IxD studio helped us save a lot of time and trouble while making our prototypes. Maryam's support in organising our exhibition location and equipment at Chalmers University ensured our exhibition was held swimmingly.

To all mentioned and those who have been part of this journey in ways big and small, your support and contributions have been invaluable. Thank you.

Geoffrey Chen, Santosh Renukuntla, Gothenburg, 2023-09-20

Contents

List of Figures

1

Introduction

Figure 1.1: Carvana car vending machine in Las Vegas, USA.[1]

With the increasing popularity of e-commerce, car companies are adapting to the ever-changing demands of the buyers and the market. There is an increasing number of people who are looking for interactive experiences online in the comfort of their own homes in parallel with in-person experiences. The increasing shift towards e-commerce presents an exciting opportunity for exploration but also poses a challenge for car retail companies to differentiate themselves and provide unique storefront experiences for customers. While the in-store experiences are important for decision-making with customers, helping the customers make the best decisions for the sake of conscious consumerism and sustainability is just as important. With increased competition for providing better help to customers by various car brands while forming a deeper bond with innovative solutions to their storefronts, it is time for brands to showcase their brand values in their in-store experiences. Take, for example,

[1] https://www.reviewjournal.com/business/carvana-unveils-11-story-car-vending-machine-to-las-vegas-2287856/

Carvana's vending machine (Figure 1.1), where customers can pick out their next car like a snack from a vending machine, making the car buying experience drastically different from what it used to be several decades ago giving the customer a new purchasing channel. There is a high demand for companies to provide memorable first impressions before customers finalise their car purchasing decisions, which makes it the right moment for customers behaviours to make the most informed decisions possible when it comes to using used or second-hand materials.

Brands are more aware of their customer needs in this age of big data and IoT technologies since there is a noticeable impact on the automotive retail industry with increased customer experience, connectivity and personalisation [1]. Brands also have the power to tailor a buyer's experience and manifest buyer needs in real-world physical spaces, and invest in the customers well before car companies to create interactive and engaging storefront needs. All while keeping core company values in mind.

Interaction designers can help car companies create a seamless and cohesive experience for customers to help customers make better environmentally conscious decisions while satisfying customer needs of buying a car they can form a personal connection with. They can design and develop interactive tools and features for customers to use when researching and configuring their entire car or parts of their car using secondhand materials sourced from aftermarket online and create in-store kiosks, digital displays and other innovative and creative interactive features that help customers to engage with and personalise their car shopping experiences.

One major car manufacturer in Sweden has pioneered the online and offline experience of buying their products innovatively, for example, a mixed reality showroom for the customer to have a fully immersive and engaging experience while designing and customising any particular model vehicle. With a strong concern for corporate responsibility to make greener choices, the formerly mentioned car manufacturer is determined to provide its customers with the safest personalised solutions in their retail stores [2].

1.1 Research Questions

1.1.1 Initial Ideas

Through the lens of Critical Design, Speculative Design, and Value Sensitive Design (discussed in sections 3.1,3.2, and 3.3), we will generate various concepts and explore the future of retail spaces in the automotive industry. It was important for us to stay relevant with the themes of *Conscious Consumerism* and *Sustainability*. We started by asking ourselves what we wanted to do for the thesis project within the confines of the automotive retail spaces. We came up with several goals that felt personal and worth exploring. The first goal is: **Make buyers stay connected with their existing cars.** With this goal, buyers can choose not to participate in the ongoing trend of chasing the newly released products that are launched in the market on an annual basis.

For the buyers that want to make sustainably conscious decisions and make environmentally sound decisions while retaining the option of partially renewing their cars, we established the following goal: **Make buyers connect with used materials.** With this goal, buyers can emotionally connect with materials that are repurposed or renewed from other already harvested sources as opposed to newly harvested materials from nature since the latter can be more environmentally taxing in many cases.

Lastly, we wanted the customers or users exposed to our design space to **Be enlightened by an idea or experience instead of purchasing a car.** With this goal in mind, it was important for us to educate the customers that buying a car is not always the end goal unless it is indispensable based on their needs. The customers who will be buying a car with certainty would do so with the most information possible for their decisions if that were the outcome.

With these goals in mind, we established the first research question: **What forms of experiences can a showroom for automobiles manifest themselves in for the future where they highlight sustainability awareness?**

In addition, to better understand the types of interactions that could lead to better decisions in a showroom, we wanted to research the next research question: **What sustainability mindset could impact customer interactions in a showroom?**

Overall, to better understand how Interaction Design (IxD) plays in the future of retail in the automotive sector, we wanted to ask the question: **What is the role of interaction design in motivating a sustainability mindset in a showroom setting?**

1.1.2 Final Research Questions

With the project's development, our understanding of the automotive production, sales industry and market status has deepened. We found that our preliminary research questions and directions are increasingly unable to correctly describe and summarise our ultimate research goals and social values. With this in mind, we took another look into what we genuinely want to study and what we want to contribute to society and drafted our second version of the research question: **What forms of experiences could an interactive design exhibition bring sustainability awareness to first-time car buyers?**

When we started to work on this project, we focused on understanding the potential experiences an interactive design exhibition could offer to raise sustainability awareness for first-time car buyers. However, as the project progressed, the results showed that the scope of our research and the results we found could benefit a bigger demographic than how we started to target, not limited to only first-time car buyers. As a result, we refined our research question the last time:

- **What forms of experiences could an interactive design exhibition bring sustainability awareness to future car owners?**

1.2 Stakeholders

This section covers the stakeholders that will be part of the project. During the master thesis, as part of a branding design agency, we were given various options for better understanding the client project and previous designers who have worked in retail design.

1.2.1 Chalmers University of Technology

Chalmers University of Technology is the university where we wrote the thesis. We compiled the university requirements for a master's thesis, and in return, the university provided a supervisor to assist the students in meeting the academic requirements. The university has also assigned an examiner to approve and grade the thesis. The examiner and the supervisor have been from the program *Interaction Design and Technologies (MPIDE).*

Examiner: Palle Dahlstedt
palle.dahlstedt@cse.gu.se

Supervisor: Mafalda Samuelsson-Gamboa
mafalda.gamboa@chalmers.se

1.2.2 Geoffrey Chen

Geoffrey comes from a software engineering background. He studied software engineering and management as his bachelor and has worked at Volvo for CI/CD-related projects and was a Scrum Master. He was always interested in being innovative and designing user experiences, so he continued his study in the Interaction Design and Technology Master at Chalmers. As a designer, he finds his passion in designing and enhancing users' emotions through different means. Designing a tangible product to embody those emotions or designing something that's not only graphically appealing but also functionally useful is something he finds interest in. He is the co-author of this thesis and its entire design process.

chenge@chalmers.se
www.geoffreychen.design

1.2.3 Santosh 'Sunny' Renukuntla

Sunny comes from a strong engineering background (mechanical and aerospace) but his venture out into Design has been no accident. He has been interested in digital and tangible design for several years which brought him to Sweden and Chalmers' Interaction design program. As a designer, he enjoys working closely to customers and understanding their expectations better before designing products or services. He aims to be a product manager for his next role in the design space where he understands and can better design from a holistic service level point of view as well as in a detailed product level point of view. He is the co-author of this thesis and its entire prototyping process.

santoshr@chalmers.se
www.sunnyrenudesign.com

1.2.4 AKQA

We worked with AKQA, a well-rounded design and innovation agency in Gothenburg. AKQA has partnerships with several different companies and is working on a plethora of projects related to various fields, such as the improvement of user experience, branding, concept design, and many others. One of their innovative ideas is to look further at the retail experience for automotive companies. AKQA will provide the students with resources and assistance to complete this thesis.

Mentor: Sam Andrews
sam.andrews@akqa.com

1.2.5 Automotive Company

One of the major automotive companies (later referred to as "client") is actively looking to improve the retail storefront experiences for their customers, connecting the online and offline buying experience and bringing the customers a different and better experience in the digital era, understanding the customers' need and showcasing the car based on the customers' requirements. The company also realised that it needed to move from the out-of-the-town dealership storefront location to a more easily accessible, more customer-friendly storefront inside the city. How would the retail space look like and how to bring the customers a different buying experience that both fits the customers' specific needs and requirements and, at the same time, new and innovative experiences is what the company is actively tackling with AKQA.

1.2.6 Customers and Buyers

Customers and buyers are an essential stakeholder group in this thesis because they are the primary users of the automotive retail storefronts and the ultimate target of any changes or improvements made. Their perception of the buying experience and satisfaction are crucial in determining the success of the proposed solutions. Additionally, these user-centred design solutions involving customers in the research and development process allow for a deeper understanding of their needs and preferences, which can inform the design of more effective solutions that align with their requirements. It also increases the chance of their acceptance and adoption of the proposed solutions. Furthermore, it allows the automotive company to improve customer service and experience, vital for customer loyalty and retention. Considering customers as a stakeholder group is essential for understanding their needs, preferences and behaviours when buying a car and providing a better, more personalised service that meets their expectations and satisfaction.

1.2.7 Storefront Workers

Even though the design solution was mainly for the customer of the automotive company, one key stakeholder was the storefront workers. The storefront workers were handling the customer requests and were the facade of the automotive company. They were also the operators of the devices and technology used for the new storefront. Therefore, the learnability and usability of the design could have impacted the experience they could provide to their future customers.

1.2.8 Delimitations

As part of the Speculative and Critical design, the prototype fidelity was limited due to the resources provided. Instead, the designers and stakeholders presented the solutions in the best possible way to help the audience envision the future solutions to the best of their capabilities.

Even though we thought it was possible to design solutions close to the envisioned fidelity, we understood that the result, in our case, was more about the learnings of the design process and not about the prototypes alone. As we explored the design space of the future of automotive retail, we planned to refine the framework as we went through the initial phases of the thesis. Based on the resources provided by AKQA as well as Chalmers University of Technology, we designed our prototypes digitally (Figma, Keyshot, Blender) as well as physically (laser cut models, 3D printing, and foam boards).

2

Background

This chapter describes the part of the thesis research area of working within the space of retail spaces and in further detail regarding automotive retail spaces.

2.1 What is a Retail Space?

The history and evolution of *Retail* play a big role in the way the automotive industry has also grown to be the industry it is today. Tracing a few steps back - it was discovered that archaeologists found artefacts and historic relics of commerce that indicated a system of commerce for as long as civilisations have existed [3]. People in these societies have been shown signs of trading, sharing, bartering, selling, as well as consuming resources that were vital for everyday life. The first currency exchange was seen in Mesopotamia in 3000 B.C., and the first retail stores were found dating back to early 800 B.C. [3]. During this time, people in such civilisations with a city-like structure developed and maintained stores and markets where purchasing or exchanging goods was possible. Early ages of Greek cities show such a city structure where people socialised and even participated in government [3]. Moving forward to later times, this infrastructure still remains to some degree where brick-and-mortar retail storefronts have become major physical locations where individuals gather for the purposes of pleasure or for purchasing goods and services. With the onset of the internet, these physical locations have transformed into key parts of the in-person customer journeys when online purchases have been made [3].

2.2 History and Evolution of Retail Stores

The concept of retail stores has evolved drastically in the past several hundred years. To pick a time in history, starting in the 1700s, “mom and pop” shops were the beginning of independent businesses in the United States [3]. Such stores were mainly family-run and were small-scale operations. Eventually, department stores in the early 1800s to mid-1900s gained momentum as the industries supplying oil, steel, textile, and food production increased, providing more jobs to the American people [3]. Stores such as Sears, Macy’s, and Bloomingdales started to establish themselves in major cities such as New York City and Chicago. In the 1920s, the system of credit was introduced to the people. This indicated a level of trust in the consumer market at the time. There was a higher percentage of the population that had a

major disposable income, which allowed many to afford goods and services than ever before. Bank of America was one of the first banks to offer a bank-run credit card system which offered a "buy now, pay later" option to its customers. With the rise of these families with higher disposable incomes and wages, the city centres, eventually sub-urban areas, would start building shopping malls in the 1950s [3]. Similar to the ancient Greeks, where city centres served as congregation centres for economics and conversations, shopping malls analogously became a place where people could take their families to shop and spend leisure time while exploring multiple shops at once. By the end of the 1960s, the United States had close to 4,500 shopping centres, which accounted for 14 percent of all retail stores. This correlates to the growth and rise of the automotive industry as well as more individuals who could afford to buy cars for their families [3]. At the time, malls were envisioned as cultural and social exchange centres where people's lives would feel more enriched.

In 1962, Walmart opened its first big box store, starting an era of big box store retail spaces [3]. Since people enjoyed the various brand options while walking through a city mall, malls as retail spaces still held their ground as viable and profitable retail spaces. With the start of big stores where they offered competitive pricing discounts to their customers, people started to slowly shift their interest towards one-stop-shop places like Walmart or Macy's as both giants started to invest in larger establishments. With the age of big box stores dominating until the late 1900s, Amazon started to knock on the door of the giants, where a warehouse-to-consumer model started to emerge with technological solutions in place paired with the enriched experiences from the internet.

In the 1990s, as e-commerce grew with the help of the internet boom, the customer retail demands started to shift away from brick-and-mortar (physical) stores and started to develop multi-channel and omnichannel (mix of digital and physical) retail spaces and commerce [4]. Along with the increased online presence of Amazon and other major online retailers, Facebook and Google's ad-based revenue channels also started getting traction starting in the early 2000s. With customers getting closer to personalised shopping experiences with the help of social media platforms like Instagram and Facebook, marketers start capitalising on large amounts of customer data being used for unique online experiences for their customers [3]. As of today, it has been calculated that physical retail spaces account for less than 5 percent while e-commerce sales are around 16 percent whereas nearly 84 percent of overall sales take place with the help of omnichannel or multichannel purchasing options [5]. This includes the shift of purchasing behaviours after the pandemic, where consumers adapted to online shopping behaviours with the help of contactless delivery services, where customers heavily relied on well-designed purchasing flows to fulfil their orders.

During the pandemic, Amazon fulfilled a large portion of the orders since their infrastructure allowed them to function at a much higher efficiency. With their well-functioning website that made shopping experiences seamless and their warehouse-to-consumer 2-day door delivery model, they played a major role in defining the omnichannel retail industry.

2.3 Showroom

Showrooms have been an integral part of the car-buying experience for decades. Originally, showrooms were simply places where customers could see and interact with cars in person before they bought them. They were usually located in high-traffic areas and were designed to be grand and spectacular to attract potential buyers. Over time, showrooms evolved into scenes with more interactive elements and showcased brand concepts.

As a traditional and important aspect of the automotive industry, showrooms provide an avenue for car brands to offer potential customers a chance to experience their products before they make their purchase and provide a space for car brands to showcase their latest car models, technologies and features implemented in their lines of cars. Car brands can also use showrooms to give customers a sense of brand identity and value, enhancing brand loyalty[6].

People want to see, touch or experience a product before they buy it, especially if they are interested in buying a large, valuable item. Seeing, touching and test-driving a car cannot be replicated or achieved through online platforms alone.

Moreover, showrooms can provide a more immersive shopping experience for customers to enjoy the car-buying experience more immersively and provide opportunities for face-to-face interaction between customers and salespeople, among other things, who can communicate with and get to know the customer so that they can offer a more personal service to them and be able to address any concerns or problems they may have immediately on the spot.

However, with the rise of e-commerce and online shopping platforms, showroom design may need to respond to the changing needs of customers in a new way. Brands can combine emerging technologies and data analytics to personalise each customer's buying experience and bring that experience into the showroom through emerging technologies, providing a different shopping experience for each customer, just as customers can get different product suggestions based on their past shopping habits and product purchases in different mobile shopping apps today.

2.4 Automotive industry

Whether or not one is familiar with how a car is made or not, it is fair to say that the mere scale of infrastructure it takes to bring everything together is an industrial marvel. The rubber for the tires, sheet metal for the chassis, leather for the interior upholstery and seats, and airbag components are just a few of many intricate components that are examples of the macroeconomics of automotive production today. With the help of industrialisation and specialisation that came with the age of cars, almost everything is sourced from various parts of the world in order to meet quality standards for the end user.

[1] `https://twistedsifter.com/2013/09/exploded-view-of-vw-golf-mk2/`

Figure 2.1: Exploded car view of Volkswagen Golf car into it's individual parts and components[1]

For example, taking into consideration a company such as Johnson Controls that manufactures Heating, Ventilation, and Air Conditioning (HVAC) systems, Johnson Controls has plants, joint ventures, or licenses in the United States, Canada, Mexico, Brazil, Argentina, Venezuela, the United Kingdom, Spain, Portugal, Germany, Czech Republic, Belgium, Austria, Thailand, Taiwan, China, India, Indonesia, Malaysia, and South Africa [7]. Since the company's expertise is in heating and cooling on an industrialised scale, they have the ability to become industry-leading researchers in this specific area which leads to significant leaps in innovation and new technologies with already established global supply chains. This gives Johnson Controls a competitive advantage for acquiring new manufacturing contracts from various industries for producing products or assembly components at various scales while keeping their costs as low as possible for their automotive customers like Ford or GM [7].

Since manufacturing companies have the ability to refine their supply chains based on the materials in each geographic region, there is a higher demand as well as reliance on the global scale of the automotive industry. While the raw materials get processed in various locations across the globe, the materials are transported several times across large distances as they get transformed along the way. From lithium metal from South America to various parts of the European Union (EU) and the United States of America (USA), the materials slowly get transformed into end products such as batteries.

With the globalisation of said supply chains, a car's body and its components get manufactured and assembled in a myriad of global geographic locations before it is delivered to the end user at a dealership. The customers do not completely understand or have the information to comprehend the extensive operations of what it takes for a manufacturer to bring together a car. As mentioned before, since there are several countries and suppliers involved in the car-making process, it would be ideal for customers to learn where their car comes from on a piece-by-piece basis

to truly understand the energy and resources consumed to make it possible. With several tons of iron ore (chassis), aluminium (chassis and instrument panel), copper (wiring), nickel (batteries), cobalt (batteries), and many others harvested for the production of new car components, it becomes more important for customers to understand the implications of their new car buying decisions.

2.5 Sustainability

What is sustainability? Why does it matter in the context of our thesis project? How does it relate to the automotive industry?

These questions had to be answered early on in your project to better understand the goals of the design opportunity we wanted to explore.

"Modern Americans in the mid-1990s daily consumed close to 120 pounds of resources such as coal, metals, oil, stone, and cement..."[8]. Consumption is an addiction which leads to less sustainable harvesting of resources in an industrialised global nation. Choice is one of the most important notions of free will in democratic societies, choice has also led to the overindulgence of consumerism in political and economic contexts. As freedom of personal economies and the growing middle class prospered, so did the industries that profited from the spending power of such people. In other words, there are more people in the market economy who can indulge in purchases than before. This does not include small-scale goods and services such as clothing and taxis, respectively. More people in the United States today can afford to buy cars than ever before.

Sustainability is becoming an increasingly important issue in the automotive industry. As the demand for more sustainable transportation options grows, the industry is facing pressure to develop more environmentally friendly vehicles and adopt sustainable practices throughout the supply chain. This can be attributed to some of the Global Goals established in 2015 - the goal of building sustainable cities and communities with more responsible consumption and production [9] are part of the bigger picture. As part of this sustainability initiative, car companies are also facing more stringent regulations in regard to the way they provide their products to their customers as solutions to mobility.

One challenge is the reliance on non-renewable resources, such as lithium for batteries and metals for chassis, in vehicle production. These resources are finite, and their extraction and use usually show negative environmental impacts [10]. With the lack of a *Circular Economy (CE)* in the automotive sector, this industry faces challenges in developing supply chains, including responsible sourcing of materials, and reducing waste, and emissions throughout the production process. Another important aspect is the disposal and recycling of end-of-life vehicles and their components, which can contribute to waste and pollution. There are also social impacts that need to be addressed, such as working conditions in factories and also potential displacement of workers as the industry is transforming a more sustainable future [10].

2.6 Previous work and projects

Figure 2.2: Carvana contactless vending machine pop-up in a city

SPACE10's Spaces on Wheels is a great example of what it means to have mobile spaces that can double as various multi-purpose environments for customers and users. As shown in Figure 2.4 'farm on wheels' as well as Figure 2.3 'cafe on wheels' is a concept that exemplifies a playful vision where autonomous driver-less mobility can provide opportunities that did not exist before. The concept is inviting for the general public and imagines a future where cafes and farms can come to the users and not exclusively the other way around. Similar to the way Carvana brings vehicle pop-ups to reality in various parts of the city (see Figure 2.2), where customers can interact and visit the new product being showcased, Spaces on Wheels allows for more tangible accessible experiences in the future.

Figure 2.3: Cafe on wheels[2]

Figure 2.4: Farm on wheels[3]

H&M and its project Looop, where customer can bring in their old garments and recycle the material into new garments all in a single location is another concept that allows for a more sustainable solution to shopping. Using the machine H&M has built, the garments are disassembled into fibres, cleaned, and spun into new yarn that is then used for manufacturing new garments. The machine can be used by all membership owners who can bring in their H&M items to completely recycle by 2030. This concept serves as an example of retail as a research centre or mini-assembly line for customers.

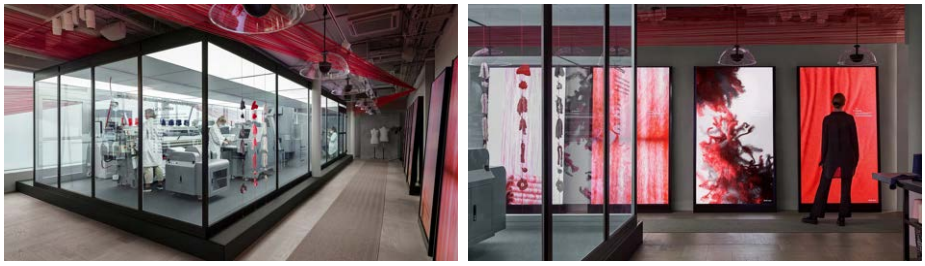


Figure 2.5: H&M, from old to new with project Looop [4]

Tesla's and Polestar's Design Studios (figure 2.6are spaces where customers can experience the premium materials and parts of the car without experiencing the typical car experience. In their respective studio spaces, the brands provide their customers the customisable options in a tactile form factor for their future car [11], [12]. Some of the materials include cloth or leather for the seats, interior wood or plastic accents for the dashboard or doors, exterior body colours, stitching patterns for the steering wheel, headliner colours, or any other brand-specific accessories that are offered in their respective car models.

Figure 2.6: Tesla design studio (left); Polestar design studio (right)

The United Micro Kingdom (UmK) project is a fictional design-based project that explores four separate worlds created by the London Design Museum in 2013 [13]. In this project, four separate worlds were created envisioning the United Kingdom to be in the far future. The society in this future is comprised of four distinct groups of people namely Digitarians, Bioliberals, Anarcho-evolutionists, and Communo-nuclearists. These groups have unique qualities that make them micro-kingdoms based on their collective ideologies.

[3] https://space10.com/project/spaces-on-wheels-exploring-a-driverless-future/
[4] https://space10.com/project/spaces-on-wheels-exploring-a-driverless-future/

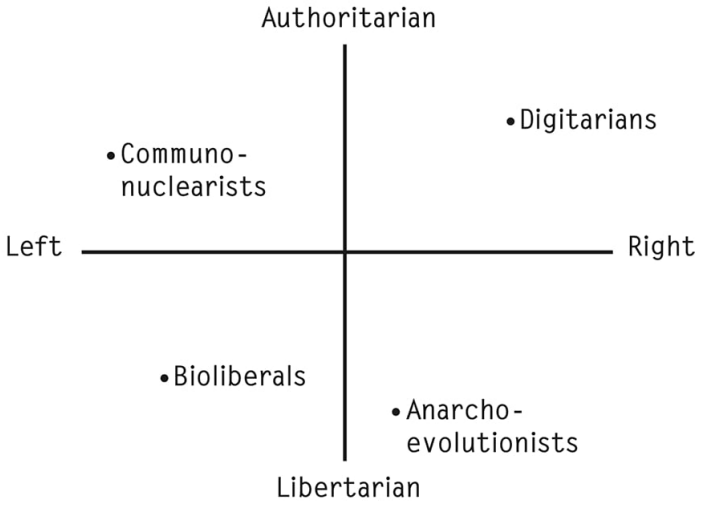


Figure 2.7: UmK societal groups compass

Digitarians are high-technology adaptors who believe in high surveillance, digital tracking, physical tracking, artificial intelligence, and other advancements in technology. In this part of society, A.I. algorithms govern most of the decision making and Digitarians encourage this societal shift in behaviour. These technocrats also believe nature serves them and it exists to be used as intended. As long as everything runs smoothly, no one cares about how it all works.

Bioliberalists are a nature-driven part of society that is most in touch with natural resources and the planet's needs. They are very aware of what the impact of human life has been regarding the mutual relationship with the planet. They advocate for a more organic and sustainable way of life as a result of their shared beliefs. They are also technology-driven but in more harmonious ways with nature while finding inspiration through bio-mimicry and renewable energy harvesting.

Anarcho-evolutionists share the idea of self-governance separate from the national United Kingdom's views on governance. This group of people are known for their individualism and freedom-seeking values which result in traditional ways of political structures of power as well as the DIY (do-it-yourself) culture of problem-solving. They believe in manifesting their own individual destinies for a prosperous future. After abandoning technology or the idea of technological advancements altogether, they prioritise physiological self-improvement as a way to add value to their tasks and challenges essentially taking evolution into their own hands.

Communo-nuclearists are driven by communal living powered by nuclear energy. As the latter part of their name suggests, they are driven by technology as well which is renewable in nature. They strongly advocate for self-driven and self-reliant communities for better resource management. They believe in collective ownership intertwined by living in shared responsibilities. Advocating for a localised lifestyle, nuclear energy serves as their primary source of sustainable energy production.

Each of these societal groups has unique objects and "artefacts" that are unique their their values. One main genre of artefacts is locomotion or the way the various

individuals move around. For example, Bioliberalists use biodigesters for producing gaseous fuel for their lightweight cars while Anarcho-evolutionists use traditional ways of pedalling to power their "Very Large Bike" (VLB) similar to a single-person bike. However, VLB is for a clan or large family with many individuals. This style of design fiction exploration is directly related to this thesis scope since it challenges future concepts and allows the audience to critically question the implications of present decisions on future outcomes.

Figure 2.8: UmK map (left); Communo-nuclearists train society (right)

Alternatively, SuperFlux, run by Anab Jain, is a design firm that experiments with various futures to highlight the issues that humanity could face when particular services or products exist. For example, in a future where gene editing is a commonly used technology for good, Anab and her colleagues think of various scenarios where this technology can cause harm to humans of this futuristic timeline. By creating different visions of the future in her studio, SuperFlux is capable of creating tangible believable prototypes that make the future a reality in the present day. By doing so, the problems from the future can be experienced in the present through a lens of empathy, tangibility, and perspective reality. Anab says that her work is about "...creating tools to connect the present and our future selves to become active participants in creating the future we want. A future that works for us all." [14]

Figure 2.9: Anab Jain on stage at a TED conference, talking about a drone project

Whether it means understanding what it is like to live with drones ubiquitously in a city like 'the city watchman' or convincing investors and policymakers for future green technology spending, SuperFlux takes a unique approach to problem-solving today for the future that is yet to come [14]. Through the prototypes that are made in the SuperFlux studio, Anab and her team allow the audience to touch, perceive, and feel the futuristic scenarios making them more convincing and real. With this, the audience could create emotional connections to the problems at hand. The nature of the prototypes created allows the audience to ask the right questions that would not normally come across in today's world. Through various experiments and practices, SuperFlux bridges the worlds of today and the potentially uncomfortable and uncertain tomorrows through concrete experiences. "We can find optimistic futures. We can paths forward. We can move hope into action...Other worlds are possible" [14]. Anab emphasises this in her TED Talk from 2017 TED conference.

(a) City cubes

(b) Robot companion

348200:3900429 03221:034_031

Revenue & Customs

NHI Contributions
Information and Payment Reminder

348200:3900429 03221:034_031

MR A MANN
55 LOWER CLAPTON ROAD
LONDON
N16 3XY

Issued by
REVENUE & CUSTOMS
CUSTOMER OPERATIONS
NHI32445
PO BOX 730A
NEWCASTLE UPON TYNE
NE98 3YX

Phone number
0845 3000 291

Date of Issue
13 DEC 2022

Tax reference
345/G0890

National insurance number
JN 14 22 09 D

Dear Sir

I am writing to inform you that your quarterly National Health Insurance contribution is due by 31st January 2023. Furthermore please be advised that your contributions bracket has been updated in line with recent changes to our contributions classification system. Your new contributions bracket is: UT6

More information about our updated contributions classification system can be found on the reverse. Information about why you have been assigned bracket UT6 and how it effects your contributions can be found below. Please remember that we charge penalties for late payments. Penalties start at £500 and can rise to £5000 plus 20% of any unpaid contributions.

Your payable amount for this quarter is: £1531.80
Your total payable amount for this year is: £6127.20

7418907210001819

(c) Mr. Mann's insurance notice

Figure 2.10: SuperFlux's design fiction artefacts corresponding to various futures

3

Theory

In the following sections, examples of a figure, an equation, a table and a source code listing are shown.

3.1 Critical design

The concept of critical design has emerged around the late 1990s[15]–[17], and the words "critical design" was first used in Anthony Dunne's book "Hertzian Tales(1999)"[16], and developed by designers such as James Auger[18], [19], Elio Caccavale(see Figure 3.1)[20] and Noam Toran(see Figure 3.2)[21], [22]. It is an approach that aims to challenge, question and critique societal norms, traditional values and conventions through the use of design[15], [16]. It is not only about creating aesthetically pleasing objects but also about using design as a tool or a means of exploring, exposing and subverting the political, social and cultural issues of our times. For critical design to be effective, the audience is usually put in a quandary and has a role in deciphering it. This approach prompts the audience's creativity and intellect, enabling the designer to convey their message effectively[23].

(a) Lab materials (b) Home objects

Figure 3.1: Neuroscope project, linking home objects to lab materials

The main purpose is to make the audience think, critique, reflect and entertain the audience with speculative design. It is there to provoke discussions and conversations by challenging assumptions and preconceptions about the role of products in everyday life. It utilises humour and satire to engage the audience and appeal to their

(a) Things Uncommon Exhibition (b) Après-Coup Exhibition

Figure 3.2: Design works from Noam Toran

imagination. The biggest misconceptions about Critical Design include that it is pessimistic, jokey, and not concerned with aesthetics. Although it borrows heavily from art, it is not considered art but rather a way of looking at design and its possibilities beyond media and market definitions[24]–[26]. Critical Design's future is uncertain, but there is a danger that it may be confused with entertainment rather than critique [24], [25].

Compared to the traditional design which is more affirmative, problem-solving, providing a solution, and the final result is usually a product of some sort, the critical design usually is more about criticising the traditional values, looking for the problem in society, asking questions like *"how the world would be if..."*, creating the parallel worlds to raise awareness, provoke debates with senses of humour, and provocative, ironic design [27]. In this project, we want to create a design that makes people consider their alternatives, and we want to create an experience for the customer that triggers their intellect and thoughts when they walk into the showroom. Giving the customer a chance to re-evaluate their decision to purchase a new car. It may sound controversial for the traditional automotive retail industry, but we would like to emphasise the design on the thought-provoking aspect and focus on promoting sustainability and conscious purchasing. With this said, we believe *critical design* as a design approach, with its thought-provoking, humorous and ironic nature, fits well into the project.

3.2 Speculative Design

Speculative design can be defined as a design practice that employs imaginative design prototypes, scenarios and speculative narratives to explore the potential consequences and impacts of emerging technologies, cultural and social trends and other future scenarios [28]. The discipline operates outside the traditional realm of practical and functional design. Instead, it helps to engage in critical discussion and provoke conversation around the cultural and social implications of existing and emerging technological advances [19], [29].

Speculative design does not aim to produce products that can be commercially sold

or can be put on the market at the moment[29], but rather resulting in outcomes that are often highly imaginative and inspiring, using prototypes, sketches, models, films and illustrations to provide concrete representations of the speculative scenarios being explored.

3.2.1 Temporality

It is impossible to talk about speculative design without talking about the temporality of design. Designers need to have a vision of the future to generate ideas effectively. They need to consider what the future will be when working on their design, what conditions will affect the use of their design, and at the same time, they have to consider what will their design work change those conditions[30]. Designers for speculative design usually consider "what's in the future", "alternative presents", and "why things are like this"[19].

3.2.1.1 Why are things like this?

These questions refer to the past and what happened that is affecting our decision now. There is no single point of view that everyone generally accepts, but rather, these are constructed based on individual experiences and perspectives, what they have been through in their life, what they have learned, and what's influencing their perception could be anything and everything. These influences should be considered since those influences will inevitably affect the designer's perspective and understanding when considering the alternative future or designing for the present [29]. This reminds us that *speculative design* is not a neutral concept, but rather "rhetoric"[29], [31]. Adopting a more conversational and participatory approach to our design could help us mitigate these issues [29].

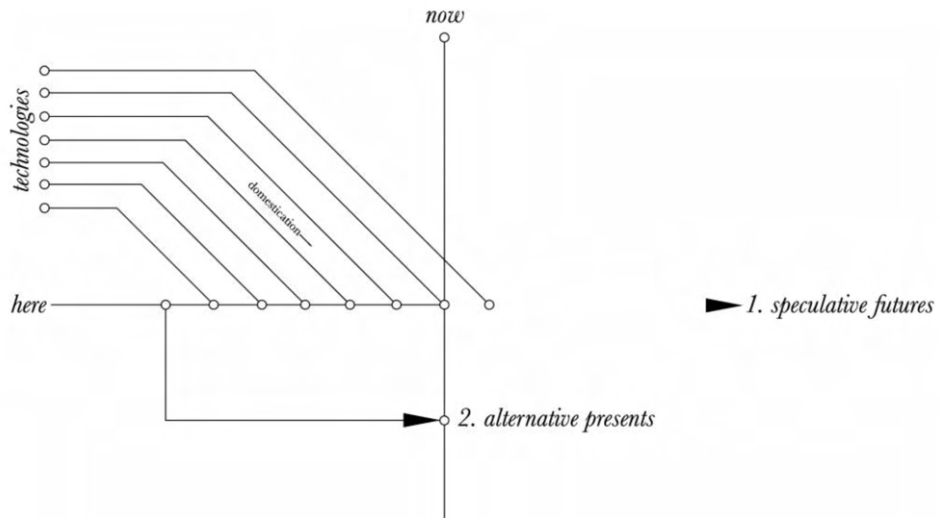


Figure 3.3: Alternative present and speculative future from James Auger[19]

3.2.1.2 Alternative presents?

Speculative design usually makes assumptions of how the future will be and, based on the current technology and its development trends, imagines an alternative present that purposely breaks that development pattern and the current general perception of society, create *alternative presents* or as Auger described *"lost future"* from a historical standpoint to help challenge the development of current technology[19], [29].

In Figure 3.3, Auger described how technologies are entering our daily lives. The newer the technology, the higher the trajectory is located on the graph, the longer it takes to enter our life, and the more challenging it is to predict the influence of that technology on our life and our society [19].

3.2.1.3 What's in the future?

In the book *"Speculative Everything"* Dunne and Raby talked about the concept of *"PPPP"* which stands for the four different alternatives for the future *"Possible", "Plausible", "Probable"* and *"Preferable"*, each represents a version of the future that is developed or imagined based on the current technology and how they serve the needs of our life [32]. A possible future includes everything that one would offer to a

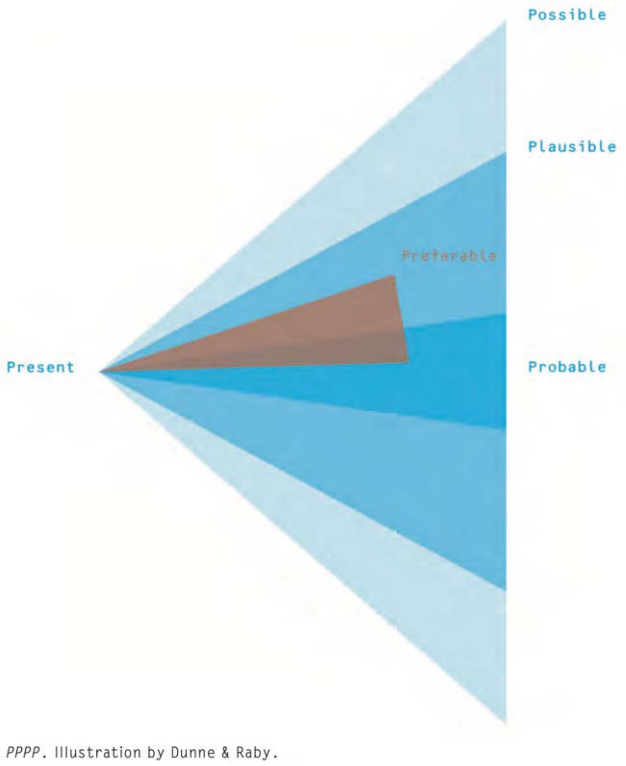


Figure 3.4: Illustration of the Possible, Plausible Probable and Preferable future by Dunne and Raby [28]

situation to solve an issue. It doesn't care how "unlikely" things may happen or how "far away" that future would be. If the likelihood of that future is not zero, then that

falls into this area. This means that some knowledge we categorise as "fiction" or some current "laws of physics" may be broken to get there[28], [29], [32].

In the plausible future, things generally include the future we can imagine with our current knowledge, how the world would be, how the economy may be, and how we would interact in the future. We not only make predictions on how the world could be but also emphasise exploring the possibilities, blending the current reality to envision a plausible future[33], how can we utilise different interactions, technologies and other aspects to create an alternative[28], [32].

The probable future is a future that has the highest possibility of becoming reality. Voros[32] argues that some future events may occur as a flash in the pan, but some other trends are in some way more likely to happen and last for a more extended period. It may be hard to predict what trends and fads may occur at what point and how long they may last, but by analysing the underlying drive of those trends and fads, we can gain insights on how to meet the ever-evolving needs and expectations of the future.

The preferable future covers the future that's most appreciated by the market and the government [28]. It is the future that we want to see happen, and the primary drive is our own personal or collective aspirations and values. It represents what people envisioned, subjectively and emotionally, how the future would be, and it may not contain much cognitive or analytical thinking [32].

There are vast differences between each individual's preferences, values, desires and aspirations, and there could be a significant difference between their preferred futures. One may focus on a desire for a future that satisfies their or their community's goals and objectives. At the same time, another may prefer a future in which social, economic or environmental problems are addressed [28], [32].

3.3 Value-Sensitive Design

Value-Sensitive Design from UW professor Batya [34]. "We shape our buildings, and afterwards, the buildings shape us" by Windston Churchill. This is true for other things, especially with technology.

Value Sensitive design (VSD) is a guide to how designers, engineers, researchers, policymakers, and anyone working in the field of technology on a societal scale can make the most insightful investigations and innovative progress while putting the values of human well-being in the context of the natural world. In essence, VSD provides theory, method, and practice to account for human values systematically throughout the technical design process [34]. VSD, according to Batya and G. [34], also makes commitments to include key propositions that the relationship between technology and human values fundamentally intersect. This is done by analysing not only the direct stakeholders but also the indirect stakeholders.

VSD emerged in the mid-1990s with the emergence of technologies such as the Internet, personal computing, and large-scale commercial computing. Batya also mentions that VSD is technology-agnostic. i.e. whether the technology is a paring

knife that sharpens wood or a power tool that is used to speed up certain tasks. VSD, at its core, can be applied to any technologically advanced solutions despite the fact that a majority of early work using VSD is based in the Information Technology (IT) sector.

VSD is made up of 17 methods that identify various key features for various purposes such as stakeholder analysis, value source analysis, co-evolving technology and social structure, value scenarios, value-oriented semi-structured interviews, value-oriented coding, value-oriented prototyping, ethnographic values and technology, value dams and flows, multi-lifespan timeline with co-design, envisioning cards, and several more [34], [35].

3.4 Design for Spaces

Design for Spaces (DfS) or spatial design is designing environments and particularly interior spaces. When designing such spaces, designers need to consider and understand what makes an environment intimate and culturally relevant with the appropriate context according to Hughes (2015). Hughes strongly advocates for the appearance and interactions in such spaces especially in the realm of exhibition design spaces. It is also important that while this space is accommodating, it is also adaptable to the audience it is designed for. Such spaces invisibly shape influence, and expand the minds of the observers that come into contact. Other attributes that control the overall experiences of the audience, and visitors experiencing such spaces, are materials used, layout of the environment, lighting, forms of media used, and many more [36]. When working with "Interactibles", it is important to understand the target audience well before the execution of the design ideas. This is a multi-faceted approach as technology unlocks so many potential solutions to particular ideas. It is important to let the audience touch and feel the interactions to provide the most immersion for an enriched experience of all participants. It has been mentioned that sound and film can be powerful tools that can unlock memorable experiences as well [36].

In the context of automotive retail spaces, brand values and aspirations can be emulated to enhance the bond between the users and the space while serving as messaging. The brand messaging must be consistent throughout the space - from the colours to graphical styles used in the space [37].

3.5 Persuasive design

Persuasive design is the design approach that utilises design elements and psychological techniques to influence and encourage users to take specific actions or adopt certain behaviours [38]. In this design approach, the goal is to create digital products, interfaces or experiences that persuade users to change their behaviour or perform a different action based on the designer's desire, essentially modifying their choice architecture.

Some techniques used in the persuasive design are derived from psychological phenomena such as societal conformity, scarcity, authority, or reciprocity. The goal is to influence users to make certain kinds of choices[39]. More examples today are from digital applications and the notifications that bombard users to check their phone more often than their average usage to draw them back to the application. For example, Facebook drives its "engagement with users" through local Facebook events or Marketplace activity if a user briefly opens these tabs in the mobile application [40]. The same goes for LinkedIn, where brief interactions with the application trigger application notifications to drive further user engagement to keep users longer on the application.

Researchers like Maier (2019) argue that persuasive design can be manipulative and unethical if it is exploited or misused strongly, which is supported by his research on dark patterns from an end-user perspective. Harmful behaviours and other malicious interactions could be encouraged if it is used falsely. Therefore, we must consider the ethical implications of what we as designers are responsible for in the behavioural outcomes of users and ensure that we are not violating the users' privacy, autonomy or well-being. Correlating these practices to critical design helps us better design products and enables users to challenge and question such ubiquitous design practices.

A strong example of a persuasive design technique is Nudging.

3.5.1 Nudging

Nudging is a persuasive technique introduced and popularised by Thaler and Sunstein[41], [42]. It utilises subtle and indirect cues to influence an individual's behaviour and affects their decision-making. The idea is to steer the individuals towards making a decision that is considered to be one of their best choices without limiting their freedom of choice[41]. There are many different forms of nudging, this includes visual or auditory cues, setting the desired option by default, utilising social norms, and incentives and giving positive feedback on performing the desired action etc.

Nudging has been a big part of the design and has shown quite remarkable results on behavioural changes. Hansen and Jespersen categorise the nudging technique based on two variables it's tapped into the automatic mind or is it more related to our reflective mind (e.g. having default option set [42]), and whether it is transparent or not (e.g. would the user notice the intention of nudging and the reason behinds it) as shown in figure 3.5. Caraban, Karapanos, Gonçalves, *et al.* gives an example of replacing candies or sweets next to the cash register in the supermarket with fruits results in more people buying fruits[42]. Designers have also been redesigning some symbols in operating systems to make people more aware of giving out their system's privilege to applications[44]. Some restaurants moved the vegan or more environmentally-friendly options on the menu to be shown first or on top of their menu(s) to promote sustainable meal options. Furthermore, a recent study on women's likelihood of performing a pap smear test after receiving a text message that is crafted by using 4 different kinds of nudging techniques has shown that the likelihood of participants taking a pap smear test after getting the message has increased significantly and 87% of the participants have shown positive attitudes on

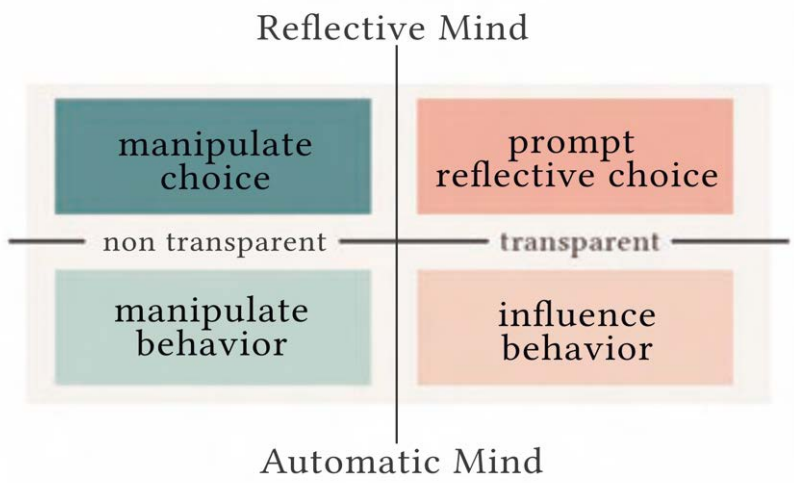


Figure 3.5: Four categories of nudging, Concept by Hansen and Jespersen[43], image from "23 ways to nudge"[42]

receiving the messages[45].

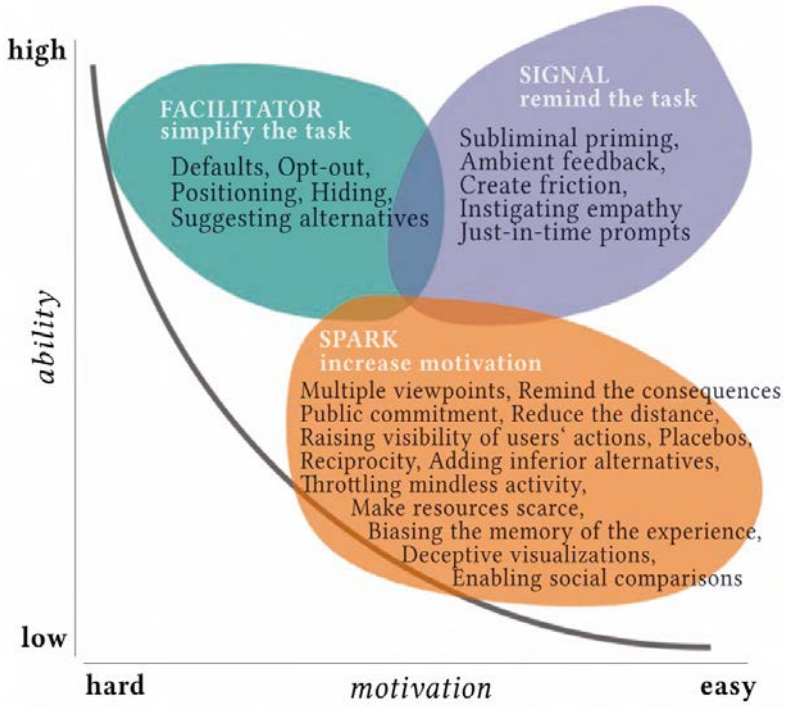


Figure 3.6: The 23 nudging mechanisms in 3 types of triggers, by Caraban, Karapanos, Gonçalves, *et al.* [42]

Caraban, Karapanos, Gonçalves, *et al.* categorised 23 different nudging techniques into three types based on three triggers (see figure 3.6). Those three triggers refer to Fogg's *Behaviour Model*, which suggested that there are three different triggers for

an individual to change their behaviour, *"Motivation", "Ability" and "Effective"*[38].

4

Methodology

In the following section, we present various methods and methodological approaches to support the design process of this project.

4.1 Process

The following section describes the various methods that we are planning to apply during the project.

At the end of this chapter, we thoroughly describe design research approaches such as Speculative design, Critical design, as well as Value Sensitive Design. We also plan on discussing the learning from the various methods and how they plan to contribute to our learning.

4.1.1 5-phases of Design Thinking

Design Thinking provides a "solution-based approach to problem-solving" for unique and *Wicked problems* as mentioned in **.....** [46]. With the help of *Design Thinking* and its five stages, complex problems can be solved in a more methodical and iterative manner. Using various techniques in the appropriate states, designers can creatively map out what the problem space entails to form the best solution possible through an iterative process similar to the *Double Diamond* method. The five stages of *Design Thinking* are as follows:

1) Empathy - this phase focuses on user-centric research. We try to step into the shoes of the users and research their needs.

2) Define - we have empathised with the users, it is time to define our problem statement and design opportunity.

3) Ideate - during this phase, we generate as many creative ideas in order to challenge the norm of existing solutions. Various methods can be used in this phase based on the needed outcome. Brainstorming is commonly used in this phase.

4) Prototype - based on the ideas generated, we prototype at various fidelities, such as low-fidelity paper prototypes or high-fidelity prototypes that include digital wire-frames or physical models. The best solutions are readied for the next phase.

5) Test - the last phase is where the chosen prototypes are tested and evaluated with the users or with the users in mind. Putting the chosen designs to test and gathering valuable user feedback allows the iterative process to refine the products efficiently.

In practice, the five stages are part of an iterative cycle where each stage can be accessed by designers at any point in time (as shown by the arrows in Figure 4.1). Through multiple non-linear process improvements, solutions can be highly tailored to the users, creating the most empathetic user-driven results possible. This process allows for innovative ideas to come to life by creating a more collaborative environment between users and designers [46].

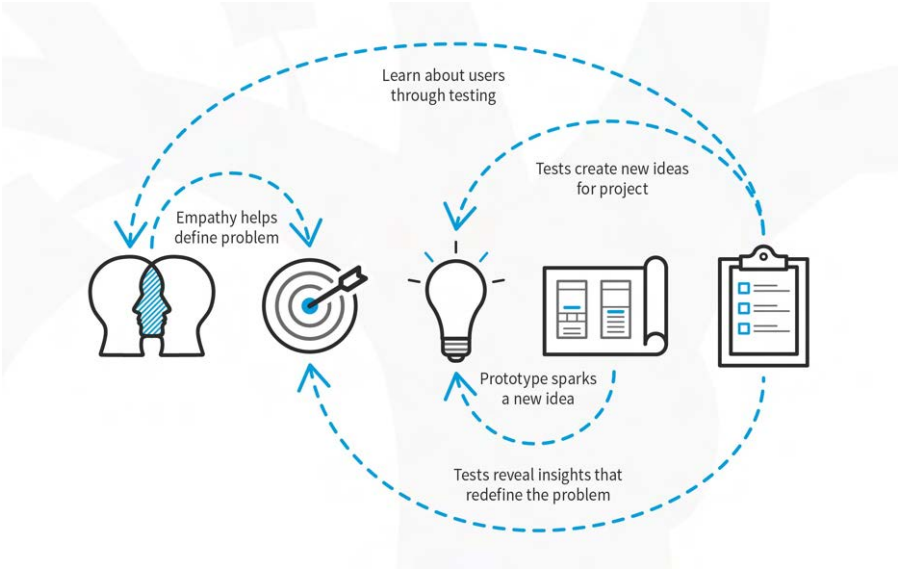


Figure 4.1: Design Thinking methodology illustration[1]

4.1.2 AKQA's 4-step Design Process

AKQA follows a 4-step process where they tackle tough industry problems and design opportunities through an iterative cycle. The four phases are as such - *Learn, Envision, Plan*, and *Create* see Figure 4.2.

In the initial phases of *Learn*, designers can understand the problem better through various techniques including market research. This is a phase where designers also define the problem after empathising with the end-users or clients they are catering to. Next is the *Envision* phase where designers form insights into how the problem can be solved in creative ways through prototyping and exploratory concept generation. This is a highly iterative phase and the most time-consuming. In the *Plan* stage, the insights gathered from the previous stage phase can be used to truly form design directions and strategies for solving the problem that started the whole process. In the final phase of *Create*, designers deploy a high-fidelity prototype or product that addresses all the issues that were identified in the previous stages so the final

[1] `https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process`

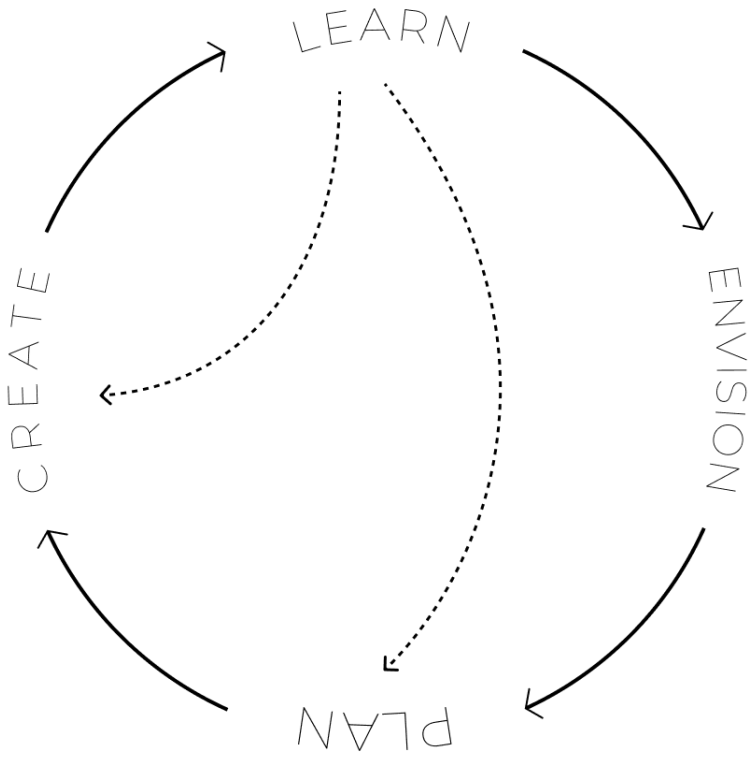


Figure 4.2: AKQA's 4-step design process

concept is market-ready for deployment. Create also includes making a business case and finding market fit before product deployment. The first two stages, Learn and Envision, will be the main phases that we will be working under for this thesis project. In an ideal situation where resources and time are not constrained, we would deliver a strategy for market deployment but as discussed with AKQA, this is not necessarily part of the thesis.

4.1.3 Double Diamond

The *Double Diamond* process (as shown above in Figure 4.3) has been part of the iterative design process for several years. It allows designers to diverge and converge with ideas in order to make sure of the designers' creativity. The four phases of the method can be defined as *Discover, Define, Develop*, and *Deliver*. In each phase of this method, designers deep dive into the problem or challenge from the beginning to the final outcome after several iterations of problem-solving. In the *Discovery* phase, designers concentrate on the important aspect of the chosen design problem through a divergent approach. This phase is followed by the convergent *Define* phase where we hone in on defining the problem space. In the *Develop* phase, we develop again by diverging and expanding our minds to form creative solutions. In this phase, based on the problem space, the solutions are best when they are the wackiest. Lastly, the convergent *Deliver* phase narrows down on the myriad solutions we ideate on and consider picking concrete directions in which we would work for the best solution(s) possible.

The *Double Diamond* is a classic method to use in design since it is not considered a linear approach to problem-solving. Certain phases can lead to other phases as needed through various iterations and cycles for the best results [47].

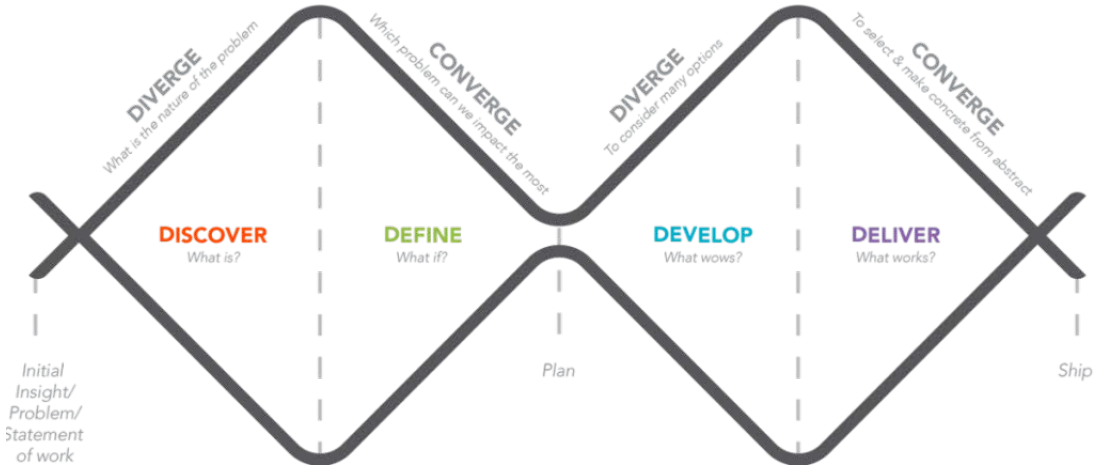


Figure 4.3: Double diamond method illustration[2]

4.1.4 MoSCoW Prioritisation

The *MoSCoW prioritisation* is a method that allows us to grade requirements of tasks which we think are important, especially for the features of a product or prototype and its purposes.

It refers to *"Must have"*,*"Should have"*,*"Could have"* and *"Would have"*. *"Must have"* features or tasks are usually the ones that one needs to implement to meet the Minimum Viable Product (MVP) requirements. They have to be fulfilled to ensure the product or the result is doing what it intended to do.

"Should have" are the tasks or features that are to some extent essential to the product but they won't affect the vital functionalities of the product and the design. Those tasks or features can be scheduled to be "developed" or "implemented" in a future release.

"Could have" refers to the functions or tasks that are good to have, but they are not, in any way, affecting the core functionality of the product or design. If they are being left out, they should have very small effects on the product or design.

Finally, *"Would have"*, in some format, also referred to as *"Won't have"*. It includes all the features or tasks that, for the current time frame, will not be included. As the name suggested, some tasks and features would be included and prioritised sometime in the future.

[2] `https://uxplanet.org/quick-steps-through-the-double-diamond-cf2e00b22ba7`

4.1.5 KJ Technique

KJ Technique helps the team to reach a consensus and prioritise requirements, tasks and concerns in an effective, time-efficient and hopefully, less biased way. It started by asking the individual team members to identify concerns and issues on their own, write them down on a sticky note, and then categorise similar concerns and issues, eventually, everyone from the team should have a better understanding of a shared understanding of the issues and concerns the team has. All of this should be done in silence[48].

4.1.6 Documentation

In order to capture all the data throughout the exploration and design process, we plan on documenting it in various ways.

4.1.6.1 Design Diary

A *Design Diary* was used to document the entire process and all minuscule details during the thesis project. This method of documenting was helpful for past group projects during the Interaction Design programme at Chalmers. Therefore, we picked this method to record all our finds, interests, inspirations, links, resources, sketches, photos, videos, interview notes, weekly meetings, and almost everything else. We use the tool *Notion* will be discussed further in the next section.

4.1.6.2 Journal

Journal is a way for us to assess how we feel about the progress of the thesis project and how it is taking shape. This helped us understand how we feel on a high-level week-to-week basis. At the end of every week, we plan on recording our thoughts on the project and the progress we make during the course for the next several weeks of the semester.

4.1.6.3 Notion - Task management software

Notion is a great tool we have been using from the beginning of the thesis project. We used it when we were brainstorming and collectively considering what topics to work on even before the thesis had begun. *Notion* has a wide variety of tools to choose from which can also be tailored for the user's task. For example, engineering, design, or project management. The calendar view card is one of our favourites so far; we have been using it for the *Design Diary* and *Journal*. This automatically allows us to see all the notes and contents of the gathered knowledge in a timeline or calendar format. *Notion* has been a great tool for project management and task allocation as well. We plan on using it to a fraction of its capabilities since it is a powerful content management tool with collaborative features for all project members.

https://www.notion.io/

4.2 Understanding the Field

4.2.1 Expert Interview

Expert interview is one type of interview (discussed in section 4.5.1) that puts emphasis on the participants being an expert who works in the field of the study. The purpose of the expert interview is to open up the vault of insider knowledge, the rules and experiences from within the field[49]. This method can serve as one of the main data-gaining methods used to collect diagnostic and prognostic operational knowledge[50]. It is also a great method to gain information about a specific field quickly and gather relevant information efficiently[49].

4.2.2 Observation

Observation is a research method that allows the researchers to be in the environment and observe and document different phenomena, interactions, environment designs, people's behaviours and other relevant artefacts. The researcher could have a set of predetermined questions and guides to lead the observation, but for this study, we plan to conduct a semistructured or casual observation[48].

4.2.3 Stakeholder Maps

Stakeholder Maps is a great tool to visualise and identify the stakeholders and their connections towards the design. It is usually done at the beginning of the design project. Listing out everyone that potentially has some kind of interest towards the design solution. This helps the designers to understand better their target audience and their relationship with the design outcome, set the foundation for user-centred design[48].

4.3 Ideation

4.3.1 Seriously Silly Workshops

Seriously Silly Workshops, coined by University, Blythe, University, *et al.*, are workshops focusing on "imagining future scenarios for specific technologies" [51]. With the use of deliberately flawed partial solutions to complex problems, we can facilitate critique and discussion in participatory design sessions helping participants produce solutions in a highly creative manner. The premise of these workshops is not to gather the best solutions but to ideate and spark conversation about solutionism and the value members of society put on solution-based problem-solving. Some of the basic principles of these workshops are based on the Japanese tradition of Chindogu [51] where amateur enthusiasts solve a serious problem by creating bigger problems.

For such workshops, participants are given a context and asked to not look for the perfect solutions. The idea is to formulate a solution to a problem that solves the

[5] `https://www.wpp.com/featured/work/2021/04/akqa-and-universal--h_m-looop`

problem while forming a deep connection with technology in the future.

4.3.2 Worst Possible Ideas

Worse Possible Ideas (WPI) is an experimental method of brainstorming and generating ideas that work well with Speculative design. WPI can also serve as a great icebreaker to the actual problem solving during a brainstorming session we feel like [52]. For this method, participants are given context and also the problem space to solve. It is necessary to mention that the participants let their imaginations wild and think of the worst possible solutions possible before the session begins. A time limit, e.g. 10 minutes, for the brainstorming phase is recommended [52]. Afterwards, participants can take turns sharing their thoughts and ideas but also explain or defend why their ideas would be considered WPIs. Sharing in a context where everyone has terrible ideas is an excellent way to form bonds and create safe spaces for participants to share their ideas with lower inhibitions.

4.3.3 Future Scanning

Future Scanning is an ideation method where designers, in a workshop setting, imagine how the world would be within the confines of the provided context. This exercise can align quite well with Speculative design thinking or serve as a warm-up exercise to expand the workshop participants' minds. The idea is to pick a number from any sector out of the 150 to create future scenarios [53]. If the participants want to go deeper, they can pick two or more and then combine the scenarios to develop deeper narratives or in-depth scenarios that tell a story.

4.3.4 Mood Boards

Mood boards are a great visual communication tool for designers. They allow for a rich context-driven, informal, multidisciplinary, and coherent design approach to the process [54]. Mood boards also allow for conceptualisation and aesthetic generation within the context of the designer's expectations. They allow us to create without being divisive, with inspiration and create influence and imagery in a single place. By building a vision, designers take advantage of the curated knowledge and keep the project's ideation on track [55].

4.3.5 Collage

Collage is an inspiration tool for the participants to visually express their ideas, feelings, thoughts and desires when some of them are a bit hard to express with words. It allows the participants to express themselves by cutting off images and visual content from newspapers, magazines, coloured paper, or any other materials and glueing them on a board to visualise those feelings, thoughts etc[56]. Collage sessions are usually openly instructed to inspire the participants to express their ideas and thoughts on a pre-determined theme. It could be challenging for the designers to find the correct amount of content (papers, newspapers etc.) for the participants to choose from or the correct level of detailed images for the participants to use.

Although finding the right area of content for the participants to choose from is essential, it is also worth paying attention that the words, images or the content to make the collages won't bias the participants[48].

4.3.6 Crazy 8

Crazy 8 is an ideation or brainstorming method that is usually used in design thinking and to generate ideas. This method asks the participants to prepare a piece of paper and fold it into 8 different blocks, set a timer for 8 minutes and during that 8 minutes, the participants are encouraged to generate as many ideas as possible within a predetermined theme by sketching or writing down some keywords on the paper. After the timer runs out, all participants should share their thoughts and sketches and talk about ideas they are interested in. The core idea of Crazy 8 is to generate as many ideas as possible without worrying about their quality or feasibility[48].

Crazy 8 could be very useful for the project because each person would have their own version of alternative presents and different views on the possible future (previously talked about in section 3.2), and therefore would generate additional ideas.

4.3.7 6-3-5 BrainWriting

6-3-5 brainwriting is a brainstorming technique used to generate many ideas in a short amount of time. The method requires the participants to write down 3 of their initial ideas that fit the theme on a paper within 5 minutes, then pass it along to the next participant, and the next participant will develop the three ideas on the paper by adding a few more details to each idea. This process will repeat until all participants have reviewed and contributed to all ideas. Participants should then share their final results and narrow it down to a few ideas the group can focus on [48]. It is a very straightforward method where all participant's backgrounds are respected and included in the idea generation since each participant can contribute to the ideas based on their knowledge. It also gives everyone an equal opportunity to contribute without feeling overpowered in a conversation.

4.3.8 Conversational Composites

Conversation Composites is a method that was developed by Chalmers Interaction Design faculty members, Mafalda Samuelsson-Gamboa and Sara Ljungblad in partnership with Miriam Sturdee from Lancaster University. In this method, after a design prompt is provided, layered sketching and illustrations are used to ideate through a process where participants build their creativity layer upon layer. Using Conversational Composites, participants can have fun while documenting their thoughts through tangible ways of interacting with materials and various forms of media based on their choosing. The method consists of 3 stages where media such as pens, watercolours, pastels, coloured pencils, and others can be used during the first two stages of ideation. Layer one is done on an opaque layer, such as a sheet of paper or watercolour paper that can hold the appropriate media. The second is a mostly transparent the tracing layer, allowing participants to see through to the first later.

The last stage is a digitised version where a tablet can be used upon flattening the first two layers for further illustrations and sketching. The sketch during each layer can take any shape or form, and the following person can interpret it in any way possible, which is what makes this method imaginative and fluid. Upon completion of all layers, participants are asked to annotate various parts of the illustrations. Lastly, participants have an open conversation about their interpretation(s) and what they thought about their internal thought process to be able to add to each layer respectively in a playful, enjoyable, and intuitive way [57].

4.3.9 The Thing From The Future

The Thing From The Future is a game that allows designers or participants to ideate into the future by challenging the players' imagination. It is a collaborative and competitive game where many futures are envisioned and objects are described in high detail in their respective set futures. The hypothetical objects are envisioned in near-, medium-, and long-term futures based on the four cards drawn as part of the prompt. The ideal number of players for this game is 2-6 players with 108 game cards. It is encouraged to also add extra challenges into the mix with blank cards for players to use at their will. The types of cards consist of - *Arc* cards, *Terrain* cards, *Object* cards, and *Mood* cards. Four cards from each of these categories are drawn at a time for each round [58].

Arc cards are of four types - *Grow* (where a future with everything and everyone is growing). For example, population, production, consumption, etc. are all growing in the span of time ranging from 7 years to 1000 years based on the card chosen. *Collapse* is the opposite of Grow, where everything decreases. *Discipline* is when things are carefully managed by humans and things plateau. Lastly, *Transform* is when a future scenario profoundly transitions into something different [58].

Terrain cards contain the contexts, places, and topic areas in which the future exists. The terrain can be conceptual or physical. For example, Grandma's House or Socialism are both options.

Object cards are the actual objects being envisioned in the future. This can be a basic form or advanced, completely left to the player's imagination. For example, Relic or Machine are options.

Mood cards describe the overall emotion of the imagination of the object being envisioned. This can have many outcomes but the player should try to evoke a certain emotion compared to the present. For example, Nostalgia or Satisfaction are options.

Once the players have exhausted all the cards in the main deck of cards, the game is considered to have ended, and the player with the most cards is considered a winner. However, the real motive for the game is to provide creative ideation of certain objects within the context of any of the cards. This can help designers design objects far out into the future. Players can also choose to vote on their top ideas that can be used later in the ideation process or design iterations. These ideas can then also be paired with other brainstorming methods as needed.

4.4 Realisation of ideas

4.4.1 Prototyping

Prototyping is a common way to prove a concept or idea in design for further development. Many designers and engineers have used this method to conceptualise and bring their imagination to a higher fidelity [59]. There are many different ways of tangible and intangible forms of prototyping. Some types may include paper, wire-frames, storyboards, mood boards, foam, cardboard, clay, Legos, textiles, foil, or even videos. Prototyping may seem limited by the resources researchers are given, but the results can be magnified by using multiple mediums. The fidelity level of all prototypes varies, and it is strictly up to the designers to determine this based on their needs and the users they would like to test them with. Prototyping, similar to the design process, is highly iterative and can evolve greatly along the process with a fee cycle, making them come in all shapes and sizes [59].

4.4.2 Sketching

Coming from a Speculative Design perspective where the designs can range from probable to possible, see Figure 3.1, sketching can be greatly liberating for expressing ideas for a designer. "Drawing, like dancing, can be a form of the exploratory, sense-making process..." according to Mäkelä, and Nimkulrat. For many, sketching can be a real-world manifestation of one's imagination depicted on a piece of paper. By tapping into mental imagery, designers can materialise their ideas and mentally offload their creativity to further exploration. In the design process, sketching plays a significant role in the collaboration process of concept sharing with other designers.

We will be communicating our ideas with AKQA designers to allow the transfer of inspiration to enable a compounding effect to out-of-the-box thinking and ideation as part of the 5 phases of Design Thinking discussed in Section 4.1.1.

4.4.3 Wizard of Oz

When the design of the project is somewhat speculative, and the designer lacks the technology or resources to make the design high fidelity or the lack of time to make the prototype packed with functions and features so it's intractable, or simply if the researcher wants to test out a proposed solution but doesn't want to invest their resources in yet, *Wizard of Oz*(WOz) could be one method to use to help resolve some of the obstacles. WOz allows the researcher to "act out" some of the functionalities of the prototype. Hence, the participants feel like the system they are interacting with appears to be the natural and functional system[48].

4.4.4 Video Prototype

Video Prototypes serve as scenarios where designers can showcase how users could interact with the future concept or prototype in real life. Using video prototypes, designers can engage with viewers and gauge their reactions and feelings to refine

their concepts better [61]. Designers should consider video prototypes as moving illustrations that show how users interact with a new system instead of just sketches. Such prototypes are beneficial since they are relatively affordable, can be made early in the design process, and are rich in information communication for users to receive feedback on [61]. Some video prototypes can have a narrative or voice-over to direct the storytelling for the users and make the scenario more realistic and detail-oriented based on the context of the design process.

4.4.5 3D Modelling

3D Modelling is a process where designers can create or draw 3-dimensional objects to scale or free-form. These drawings can be done through precise measurements or entirely conceptual with free-form moulding clay in a virtual environment where designers "sculpt" a blob of pixels. Various software allows for 3D Modelling - they all have pros and cons based on the designers' goals and end-result requirements. 3D Modelling can be a powerful tool for visualising a concept using the depth dimension even though concepts are generated on a 2-dimensional screen. Generated models can also be later manufactured using tools like 3D printers, where the 2D objects can be touched and manipulated as proof of concept in real-world scenarios. With the help of 3D Modelling, concepts can be generated beyond just a vision in a designer's head. Like video prototyping, 3D models can communicate rich information for users and can be implemented early in the design process for creating proofs-of-concept [62].

4.4.6 Generative Artificial Intelligence

The Generative Artificial Intelligence (generative AI) field has proliferated during the project. AI tools such as MidJourney, ChatGPT, Dall-E and stable diffusion have all been pushed to the market and have created a sensation. Generative AI is a machine learning algorithm that can use existing content, such as audio files, images, text and other mediums, to create new content. Generative AI enables computers to learn underlying patterns related to input and then use this to generate similar content. For example, it takes an input (usually referred to as a prompt) in the form of text, audio, images or other means, and the algorithm will output a generated outcome as requested in the input (prompt). See figure 4.4 for more information.

4.4.6.1 MidJourney

MidJourney is a text-to-image generative AI tool developed by a self-founded independent research lab that allows users to generate images based on the prompt the user enters. It was tested for the first time in July 2022 and was officially launched as a server on Discord in March 2022. Due to time constraints and none of us are good at making illustrations, using MidJourney could help visualise and bring the concept and ideas to life quickly.

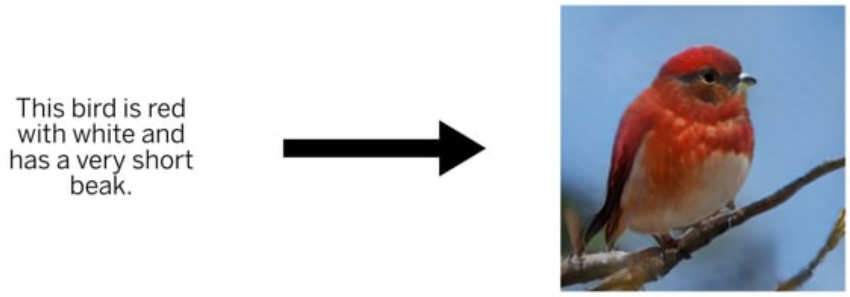


Figure 4.4: Illustration of Generative AI

4.4.6.2 ChatGPT

GPT(Generative Pre-trained Transformer) is a deep learning model developed by OpenAI for text generation trained based on internet data. It is used to answer questions, summarise texts, translate texts, have conversations, code generation, etc.

4.4.7 Limitations

The field of Artificial Intelligence is developing rapidly. This means different and more advanced models or tools will emerge quite rapidly. From the time we accessed the AI tools used in the study to when this report was written, we have both had Major improvements and updates. ChatGPT has released an update for their subscriber, GPT4, which has demonstrated a huge improvement when compared to their free to the public version, ChatGPT 3.5, scoring almost doubled the accuracy on medical exams, and showing higher reasoning capabilities[63], [64]. MidJourney undertook a similar update, from MidJourney V4 to V5. This update drastically improved the model's ability to understand the prompt's meaning. Also, it improved the capability of generating a more realistic and believable image; see 4.5,4.6.

Figure 4.5: MidJourney V4 (left) VS MidJourney V5 (right) with the same prompt "pov shot of 3 cats watching you" [65]

Because of the advances in our understanding and use of this emerging tool, coupled with the development of AI tools, the results will be different if we are given the

Figure 4.6: V4 (left) VS V5 (right) with the same prompt "eye bird view shot of a white sand beach, ocean wave foam" [65]

same task and use AI tools with the same goal. It is also possible that generated results and prototypes made from previous results may cause different responses from our participants.

4.5 Evaluation

Most of the primary qualitative and quantitative data collection and evaluation methods will be discussed in this section.

4.5.1 Interviews

The interview is a data-collecting method of conversing between the researcher and the participant. It is to obtain in-depth information from the participants about their thoughts, knowledge, experiences or feelings. In the context of our interviews, the participants could be either other designers at AKQA, future customers, or employees at showrooms since we are designing for such spaces.

Interviews can be carried out in different ways, such as over the phone, face-to-face or through online video conferencing software. Interviews are usually categorised as structured, semi-structured and unstructured interviews. A structured interview usually requires the researcher to prepare predefined interview questions and stick to those questions throughout the interview process. A Semi-structured interview usually means the researcher has prepared more open-ended questions and will have various follow-up questions based on the participant's answers. And lastly, an unstructured interview allows the participants to lead the conversation[48].

4.5.2 Focus Groups

With the help of *Focus Groups*, designers can test and evaluate their prototyped concepts in a conversation-rich feedback environment. By facilitating a safe, judgement-free space, users can discuss the concepts being refined and allow for honest feedback to help designers iterate on the design process, improving the final version of the product or service. Focus group assessments aim towards understanding subjective aspects from a product design satisfaction level, opinions, beliefs, attitudes, and other quantitative data [66]. It is recommended that focus groups be conducted in smaller groups (8-10 individuals[3]) for the best results, but we plan on conducting with 4-6 individuals. In addition to the users evaluating the final prototype, it is also recommended that an interviewer facilitate the conversations among the group and a note-taker. The setting is recommended to be a quiet area where all participants and hear each other clearly without any distractions.

It is highly encouraged to record the entire session for post-processing, such as future transcribing for thematic analysis (Section 4.5.4), in case the note-taker misses any details during the sessions. Recordings should only occur after receiving permission and consent from all participants.

4.5.3 Stakeholder Walk-through

A stakeholder walk-through is a great method to bring all necessary parties together to review the early prototype and give their feedback and thoughts to improve it for the upcoming design iteration. This method brings the end user to the picture quite early (since they are evaluating early prototypes). All participants (other stakeholders) must remember that the end user is the priority in this scenario. All participants should view the prototype from the end user's perspective. Due to the heavy emphasis on the end user, this could create a more user-centric culture and design[48].

4.5.4 Thematic Analysis

Thematic Analysis (TA) is a qualitative research method. This method can be used in many fields and applications. In design research, it is applied to the answers to research questions received by the users when testing out a product or service. TA allows for applying themes to subjective feedback from users and their experiences, views, and representations. It is worth noting that the thematic framework needs to match the researcher's wants - what is it that they are trying to learn from the users [67]. In TA, researchers familiarise themselves with the data, generate initial codes, conceptualise themes, review themes, define/name themes, and finally produce the report with the results as a qualitative summary. Themes are not topic summaries or a collection of user experiences, benefits or barriers. Instead, they are meaning-based patterns.

All data studied in the TA method can be derived through 1-on-1 interviews, focus

[3] `https://www.ccsu.edu/oira/assessment/files/FocusGroupsHints.pdf`

groups, or other forms of in-person opinion-based data-gathering methods. Coding and applying themes can be done meticulously by hand or using software tools (e.g. nVivo Pro or Atlas.ti). As part of the analysis, researchers sometimes also calculate the *Validity* and *Reliability* of the data to validate their hypotheses further. However, we will not be calculating this since the final exhibition did not address specific research questions that talked about dependent and independent variables.

NVivo Pro is a great tool as it gives students access through the university software website with a student license.

5

Process

This section briefly describes the way in which we conducted the data-gathering methods we have outlined previously. This section covers expert interviews, field trip(s) observations, brainstorming with Chalmers as well as AKQA, and concluding with how the artefacts were prototyped.

5.1 Expert Interviews

For these interviews, we wanted to understand better what kind of work had already been done in the past at AKQA. Since there are various types of design roles at the agency, it was helpful for us to know the diverse perspectives and what shapes their experiences. We considered the individuals as experts since they have worked in the space of automotive retail in the past or have been exposed to a project at the agency.

As designers of the thesis project, we also wanted to understand better the scope of our problem statement as well as find design opportunities through expert insights. The questions we asked the experts were open-ended and thought-provoking and were answered in an informal setting.

As part of the knowledge transfer phase of the interview process, we also asked the experts about past research or work that had been done on the topic. The experts included a senior user experience director, an associate user experience director, and a senior design strategist.

5.1.1 User Experience Director

This expert interview is done between us and a User Experience(UX) director *(Expert 1 or 'E1')*. We started the conversation with some icebreaker questions and then asked about this UX director's role and experience in AKQA. Then, we began to ask about her point of view and opinions on the future of retail spaces and showrooms. E1 expressed her thoughts and opinions on the importance of customer experience and how it is changing with the advent of digital technology. She sees that there is a rising challenge for companies to sell their product due to the raising of digital platforms. More and more customers are looking into the connections and relations of a product with their personal life. Therefore, showrooms and retail spaces need

to adapt to those changes and provide related experiences and information for the customer.

> *"... nowadays customers you know customers are changing so much because they're exposed to digital so much ... I think it's not just about you go and you know, find out like a for example, a car or TV you just like purposefully going there and then, you know, here we go, I'm going to buy the product. It's more complicated they have to understand, and they have to trust, and then they want to know whether the product is actually related to me. And how can I, you know, adapt it to my personal life? So I think retail spaces and concept service has become quite close. It's like becoming almost one thing, like provide the how people can really, truly experience with the brand and product and then you know kind of they can check out like whether this is a relative to me otherwise I think it's harder and harder to sell the product"*

E1 talked about her experience working at Samsung and Hyundai. She mentioned that the brands are trying to create a new conceptual space where the brands let the customer experience the products and brand cultures more impassively compared to the traditional showroom settings.

> *"...kind of concept to house in New York and ... but... people can go and ... eat and meet people and experience about the product. So I think more and more that concept is getting quite important because the people have to be experienced with the product, ... not just about buying products..."*

In E1's opinion, this kind of retail or showroom design emphasises the social impact of retail stores or showrooms, where people can come together, exchange information, hang out and learn about other aspects, such as sustainability while experiencing the brand.

> *"you can still go and hanging around with your friend and then drinking coffee. It's almost like an experience and breathing about the ... brand. And in that in that way, I think people getting more interesting and getting more friendly and, you know, involved we don't have product and brand."*

Moreover, E1 advocated that companies should create more showrooms with an emphasis on creating an experience rather than a more "goal-oriented" showroom setting. Giving customers a chance to experience the product in a different location or environment. She gave an example of having the customer "test drive" a Volvo car in Gothenburg for a tour since Gothenburg is the hometown of Volvo Cars.

> *"... so test drive could not be just functional test driving, so the customer can feel the beautiful Gothenburg and ... and how this environment and experience the EV kind of engine and the batter of the car could be good for this kind of environment..."*

Throughout the conversation, E1 elaborated on the importance of cultivating retail spaces that foster a sense of comfort and mitigate consumer anxiety. She stated:

> *"I think at the end of the day, we want the future to be more safe and...comforts us..."*

E1 accentuated the role of designers in making conscious decisions to address these concerns. It underscored the necessity of prioritising educating the customer on the knowledge they need to make a good decision over mere product sales.

> *"quite often what I found is like when you're interviewing customers or when you do like this or the user testing people always keeping you what you wanna hear."*

> *"People are clever enough. If you try to sell them stuff, they will notice. Like they feel very betrayed by the brand. I think even me ... when I go to every shop, if every people gonna say 'this product is great, buy it.' I would never buy them.*

She stressed the value of offering customers a conscious purchasing experience, empowering them to make decisions based on the provided information. This approach, she believes, would lead to a more fulfilling and empowering customer journey.

> *"the being super conscious on purchasing site and then you make your own decision"*

Additionally, E1 discussed the need for establishing an ecosystem where customers feel interconnected and supported by robust partnerships with service providers. She proposed the seamless integration of technologies and services, which she believes would result in a superior customer experience.

> *"...I think it's about the ecosystem as well, like how the world is connected...for example, if I'm using Netflix or Spotify, then when I use their car, or other product that company provide, for example Volvo, then I have to register Spotify in a separate, or have Netflix in a separate (device) and that's painful. So, instead if the company have a super good partnership relationship, ... it's not just about selling the car but it's about service provide in a world connected, I think that would be a really important aspect...*

This interview highlights the importance of understanding customer needs and incorporating conscious decision-making in design strategies. It's not enough to ask customers what they want; designers must observe their habits and lifestyles to generate innovative ideas. Additionally, creating seamless experiences across different service providers is crucial for customer satisfaction. Innovation should focus on creating an overall experience, not just selling a product.

5.1.2 Associate UX Director

This expert interview was done with a Senior Product Design Manager also referred to as *Expert 2* or *'E2'* for short in this section. The interview structure remained the

same as E1 - ice breaker questions in the beginning, topic introduction, open-ended questions, and final thoughts.

E2 can be characterised as a very practical person who tries to be a conscious designer to increase convenience for themselves and the customers they design for. E2 brings up a lot of the ethical questions that are societal in nature when it comes to the responsibilities of designers and companies. As a designer, they are aware that consumers can only do so much, and companies have a much higher responsibility when it comes to the way brands represent themselves and what they choose to stand for.

> *"As a corporation, "the bigger you are, where, like, the more wealthier you are, the bigger responsibility you have... e.g. they (Volvo) like for every 100 car they sell, they build a new park or like school"*
>
> *"...always try to create a design solution that makes it the easiest for people to do their best." (this includes for recycling, repair, etc)... Every decision they can make that it should be the easiest and most incentivised to make the best decisions... over-consumption is an issue"*
>
> *"Every decision they can make that it should be the easiest and most incentivised to make the best decisions."*

The main points she wants to deliver for customers as a designer are products that allow for "convenience, reassurance, and curiosity". She also wants to allow people to "connect the products to a real-life problem" so there is a direct impact. For E2, design for spaces even if it's a pop-up, needs to purpose-driven and have functionality.

> *"...(design should be) rooted in reality and not just like this wishful design thinking... it is important to be designing for accessibility...empathetic design and norm breaking design..."*

E2 also mentions that they personally like design where one can get multiple things done at the same time. They appreciate the efficiency and try to bring that into their design approach when designing products. Unlike E1, E2 wants more than just an experience. They want more convenience if the effort of going to a space is an option.

> *"E.g. you go there and then do your business at the same time. If that (designed) experience while you're doing that business or whatever you want to do that there gives you some extra information or added benefits that would be great."*
>
> *"It's like going to a food market like I can buy a bottle of wine. I can buy like a piece of fish and I can buy, you know, veggies at three different stalls"*

They also mention the way certain products are designed and what kind of data is used to form a baseline for many products today. They understand it is changing but more work is to be done when it comes to the design becoming more inclusive and accessible.

"Whose data is gonna be... the benchmark?"

E2 also wants smaller companies or shop owners to behave as a collective and care for one another (to build robustness through times like the 2020 pandemic) and offer customers various options by *"co-living" and "co-existing"*. For cars, the space for retail does not need to be a meet-up for coffee or deep talks. They want a retail space to be what it was originally designed to be - a place where products are showcased including materials for a tactile feel.

This interview with E2 highlights the importance of company responsibilities and the need to provide experiences that are efficient, approachable, and accessible all while being inclusive. It is necessary to work together, perhaps even more closely with customers to build design spaces for cars or other products than ever before to build a sense of community. As designers, it is our job to make better ethical decisions to shape the future of retail, and not just care about the bottom line in large industries. E2 can be categorised as an empathetic realist and would like to keep pushing for change with strong design ethics in mind.

5.1.3 Senior Design Strategist

This expert interview was done with a Senior Design Strategist from AKQA, also referred to as *Expert 3* or *'E3'* for short in this section. The structure of the interview remained the same as E1 and E2 i.e. ice breaker questions in the beginning, topic introduction, open-ended questions, and final thoughts.

Throughout the interview, E3 talks about the relevance of the omni-channel presence of retail where customers can have access to online as well as in-person experiences. For them personally, a store serves a form of *"reassurance"* of what they learn online in a physical form in-store. The tactile sensation for clothes and make-up is more important to them.

"...try on lipstick. It wasn't the same shade"

They believe retail spaces are still relevant today but also based on the product.

"...it depends on the product and like how much on the risk and how you perceive the risk (of having a physical store)"

They mention how brands that have gained their trust can allow them to buy items online. E.g. a jewellery maker that makes good expensive jewellery can be bought online too. Similarly, they also prefer the tactile experience of picking out their own vegetables and fruit even though there is a more convenient (according to others) online shopping option. Even if they use *"paper bags during the rain"* which "can be inconvenient" they say.

"I don't go to physical pharmacy to buy, you knowm like beauty creams and stuff and stuff. I always order them online"

Buying creams for a product they know has a good reputation and consistency is easier to buy online for E3. They also bought a blanket recently that they *"...can see it's 100% wool. It's all going to be fine."*

They have not personally thought about buying a car so they could not answer the question about the largest purchase that can be life-changing per se. However, E3 says the last purchase that was significant was a phone that costs a lot of money. *"Not a big of a spender"* they describe themselves. When they bought the phone, they did want to know what it felt like in their hand before deciding to buy it online and which model of (Apple) phone.

As a strategist, *"I'm really pro-customer centric research"* they said. *"...I think that the split is like 50/50 at least after Corona..."* where people buy online versus in-person.

They again mention the omnichannel presence regarding their perspective in the automotive space from a strategist perspective.

> *"Experience the car. Make sure, especially with the sizing. For example, sizing is a huge."*
>
> *"Think for people with kids or for people with hobbies like cycling, you know, fitting in huge bicycles and stuff like that..."*

The adjectives or phrases to describe future retail spaces, mention - physical embodiment, customer-centric experiences, very connected, and personal assistance. The forms in which customers can be attracted from a strategist's point-of-view (POV) - E3 mentions pop-ups, and meetups close to where people are dense like office areas or city centres. Suburbs can also attract large families for buyers.

> *"Get them connected to the brand...Really consider the purpose of the space"*

On the topic of sustainability :

> *"right now, is such a sort of is becoming sort of this hygiene factor like everybody's obsessed with it?"*

E3 says everyone is currently obsessed with sustainability and how that can be part of the brand culture. *"...of course make a retail space sustainable. That would be nice."* They (companies) are not worried about people buying more under the theme of consumerism. They see customers returning rather than over-consuming because the product is good and well designed with *"seamless omnichannel experiences."* E3 says they are not sold on *"convincing customers to get a car if they (customers) didn't need one"*

In all this, the role of technology in the automotive retail space is -

> *"...something that could make the experience more fun and more interactive, like more magical... (technology) could make the experience better. It depends on like what do you want to achieve with that technology"*

At the end of the day, it's about *"...what emotion are you trying to evoke in the customer?"*

For personalised experiences where large amounts of data need to be collected -

> *"I'm not against them collecting me personally... If I know that in the end, I would get this, like, cool experience. No. So I think it's for a person to decide if somebody is like... gonna spy/enemy and stuff like that. Then they just say no and they don't get any personalised experience."*

E3 is ok with it if the experience is *"enhanced"* with the collected data. But if there is no data, the customer receives the *"generic"* version where it isn't personalised. This does not mean it is worse. It just means it is not customised.

> *"for example. Hello, Sunny. Welcome here. Or... it would be just. Hello."*
>
> *"I don't see that as like minority who has this super bad experience something like that. It wouldn't be worse. It's just wouldn't be personalised. That's it."*
>
> *"Customer-centric experiences are always.. a trade off... (and) reciprocal"*

When working for the client, it does not mean there is loss of freedom. It is more -

> *"Find some new opportunities. Let's try to do something like cool and maybe even disruptive if we find things like that"*
>
> *"I'm obsessed with reality and what is actually happening. I truly believe that this is something that makes a difference."*

In this interview, E3 highlights various aspects of their version of consumerism and how they approach well-designed consumer services. Similar to E2, E3 also appreciates the tactile experiences at a physical location during the buying experiences for them personally. They are aware of the importance of an omnichannel commercial presence that caters to people on a large variety of scales. These channels depend on the type of customer as well as the product being sold. They also value highly connected experiences with data collection for enhanced experiences as opposed to generic ones as long as the data is handled securely. E3 seems to be optimistic about the future of retail overall; therefore, is looking forward to a more innovative future.

5.2 Field Trip and Observations

We went on a field trip to most if not all the automotive showrooms in Gothenburg city. We visited 6 establishments, some of them are more traditional showroom settings and some are more retail-oriented. Here is the summary of the showroom visits notes and takeaways.

Some of the questions that helped us guide the conversations in this discovery phase were as follows :

1. When you first see a customer walk into this space, how do you approach them?
2. Why do customers enter the showroom?
3. How long do customers typically stay in this space?

4. How do you know what they are looking for?
5. What are some of the questions they ask you about?
6. What kind of (follow-up) questions do you ask the customer to better understand what they are seeking?
7. What does (company name) stand for according to you?
8. What do you tell customers about the company if they don't already know?
9. What are some key aspects of what customers ask for most (or care about) from your past experience working at this showroom?
10. Are the questions about the car or the brand?
11. Are customers interested in the sustainability aspects of the brand? If so, in what way?
12. In this showroom space, what do you like the most? Why?
13. How does this space make you feel?
14. How would you make this space better based on the way you see people interacting with various things?
15. What about working for your company excites you?
16. Where in this space can you educate customers more about the brand and its contribution to sustainability?
17. Tell me more about your products here? Why do customers like the company brand in your opinion?
18. In a future where sustainability impact is huge, how would you design this space differently?

5.2.1 Polestar Showroom

(a) Polestar display cabinet

(b) Polestar car display

(c) Conversation room

(d) Polestar showroom panoramic view

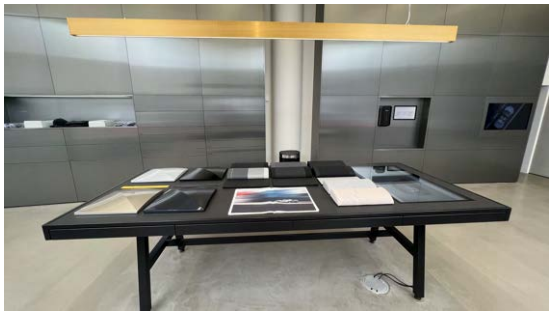
Figure 5.1: Polestar showroom

The showroom's staff aims to minimise the time it takes for customers to be greeted upon entering. They welcome everyone for coffee or a conversation about cars and actively encourage test drives. While there is a mix of customers with and without prior knowledge of Polestar vehicles, the showroom focuses on showcasing the cars rather than conducting transactions, as there is no transaction terminal installed.

The AR Experience (see figure 5.2 for the Polestar 3, which uses an iPad to overlay a skin on the Polestar 2 car model, is an interesting addition but not always reliable, causing occasional embarrassment for the workers. Company culture is displayed on the walls, highlighting the brand and its focus. Interactive drawers are built into the showroom's walls, and customers are encouraged to explore them for more information. Sustainability is not explicitly showcased in the showroom, but it is mentioned when discussing materials used in the car, such as recycled plastics and fabrics. For further details, customers are directed to the website. The supply chain information is also available online. Odd questions from customers touch upon privacy, information security, connections to China, and recycling of materials such as Cobalt.

(a) Polestar AR Experience

(b) Polestar showroom front



(c) Polestar Material Display Table

(d) Polestar Car Display

Figure 5.2: Polestar showroom

Showroom staff express no concerns about AI taking over jobs, as they believe human interaction is irreplaceable. They also appreciate the brand and its non-aggressive sales approach. Polestar collaborates with bike company Cake and occasionally hosts pop-up events to display cars in city centres, offering test drives and information. Although the brand has higher demand than production capacity, no cars are stored in garages. Polestar also sells pre-owned cars. Regarding recycling of car materials, the staff has no information on where these materials go. However, Polestar has launched a "Zero Project" with the goal of producing 100% recyclable cars before 2030.

5.2.2 NIO Car Showroom

(a) NIO ET5 car display

(b) NIO Showroom front view

(c) NIO Customer Conversation Area

Figure 5.3: NIO showroom

NIO is a new brand in Sweden, known for its swappable batteries and Scandinavian design. The showroom tends to attract more visitors on weekends, with weekdays experiencing higher foot traffic before lunch and between 3-6 PM. As NIO is new to

the Swedish market, the showroom is also newly built, and located in a quite central location in the city. Visitors typically arrive with some prior knowledge of the brand or its cars, they are often car enthusiasts, engineers, or EV company workers. They are generally attracted by the Scandinavian design and spend around 20 minutes exploring the showroom. The showroom's design reflects the car design language, making it a cohesive experience. Common questions from visitors revolve around car models, specifications, test drives, and the cost of the cars. The showroom sometimes hosts events with different themes, such as sustainability, mainly for educational purposes. Test drive cars are stored in their garage and are available for interested visitors. The showroom heavily focuses on showcasing their cars but also includes a small corner dedicated to their Blue Sky Lab project, which emphasises creating circular economy for car parts. Blue Sky Lab recycles and reuses three vehicle-grade fabrics - seat belts, airbags, and Haptex leather in automobile manufacturing to create fashion apparel and accessories.

(a) NIO Blue Sky Lab display (b) NIO Blue Sky Lab introduction

Figure 5.4: NIO Blue Sky Lab display

5.2.3 Tesla Dealership

Figure 5.5: Tesla dealership front

We have visited the Tesla dealership as well. Customers visiting the dealership are mainly interested in purchasing a new Tesla or looking into financing a new Tesla. Some of them have already placed an order for a vehicle but still wanted to test drive the car in person because Tesla only takes orders from their website. Some customers come only for test drives before they place an order, this is booked online through Tesla's website. A significant number of customer questions revolve around financing the car, different charges for owning a Tesla, charging infrastructure, and other related topics, as most customers want to own the car. Other questions include energy consumption and the environmental impact of EVs, and other sustainable aspects of the company are seldom mentioned. The dealership recently relocated from the old city centre to a new location. The original city centre showroom was a marketing strategy, aimed to raise awareness of Tesla coming into the Swedish market. However, the company believed that Tesla is now a more well-established brand, so the company decided to relocate to a more spacious and practical location, which is located quite far from the city centre. This allows the dealership to store more in-stock Tesla units in their storage space for a shorter delivery time and they can bring more customers to their new dealership for test drives and other activities.

(a) Cars displayed in the customer centre (b) Tesla dealership customer centre

Figure 5.6: NIO showroom

5.2.4 Hedin Bil/MG

The dealership sees around 15 customers per day, with their inquiries primarily focused on car prices, booking test drives, and checking specifications. Contrary to a showroom, Hedin Bil is centred on car sales, operating on a heavily commission-based model. It is important to note that the workers at the dealership represent Hedin Bil, an automotive retailer, rather than a specific brand like MG. Their focus is on selling cars from various brands rather than promoting a single brand's values or vision. Sustainability incentives are not present at the dealership. Hedin Bil maintains a large number of in-stock units of cars in their garage, which is located outside of the city. This allows customers to have immediate access to vehicles, as their goal is to sell more units, rather than showcasing a brand's value.

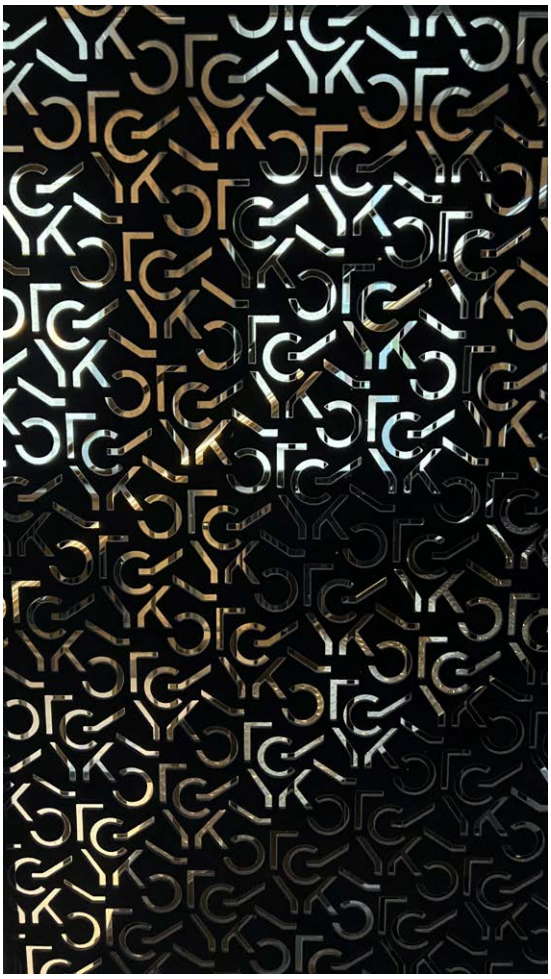
(a) Hedin Bil/MG Cars displayed (b) Hedin Bil/MG Cars displayed 2

Figure 5.7: Hedin Bil, MG Dealership store

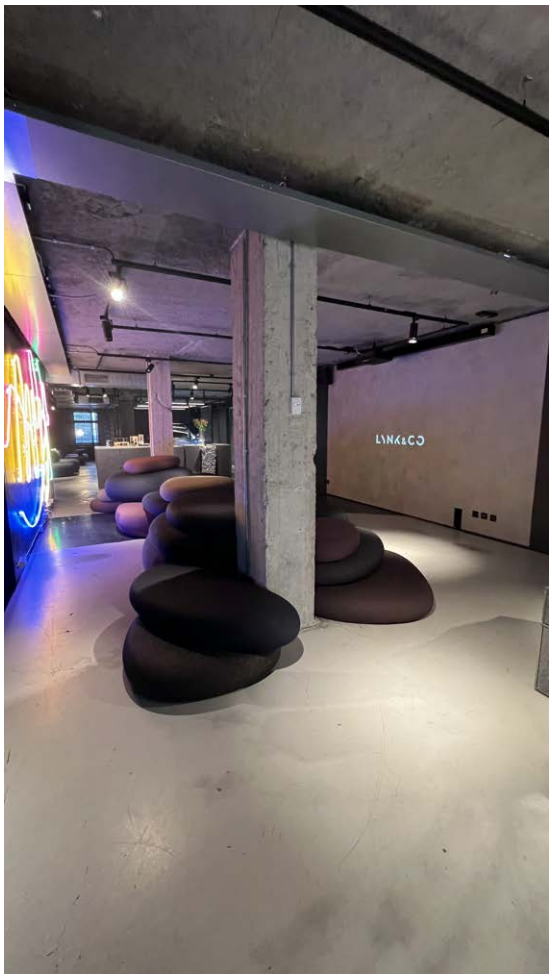
5.2.5 Lynk & Co. Club

We also took a field trip to Lynk & Co., a unique automotive brand that refers to its showrooms as "Clubs". These Clubs are customer-centric, aiming to create a cool and inviting atmosphere. Their employees are trained to understand customers' needs by observing customers' body language and interacting with the customer. The space is open to anyone, regardless of their intention to buy a car. The Gothenburg Club location also serves as a co-working space, with comfortable seating and a café.

Figure 5.8: Lynk & Co. Club Panorama



(a) Stare Screens with Lynk & Co. logo



(b) Lynk & Co. Projector area

Figure 5.9: Lynk & Co. Club (part 1)

According to their employees, the Gothenburg Club encourages people to come in and read work, have a conversation or just have a cup of coffee, while the customer enjoys the space and the comfort the club provides, and gets to know about the brand. The car is strategically placed at the back of the showroom as a marketing tactic, similar to milk in a grocery store. Lynk & Co. is determined to change the traditional car showroom concept by hosting a variety of events and employing staff without prior automotive experience. Each Club is built to have specific city

(a) Lynk & Co. Car Display Corner (b) Lynk & Co. Car Display

Figure 5.10: Lynk & Co. Club (part 2)

characteristics, such as Amsterdam, Berlin, and Copenhagen. The Clubs showcase numerous recycled and reused materials and products, emphasising sustainability. Items sold in the Gothenburg club range from sustainable yoga mats, backpacks and self-care items to outdoor gear and fashion items. Some of the decorations and furniture used in the showroom are made from used car parts for pedestals and used materials like newspapers and sawdust for displaying tables. The brand adheres to car recycling regulations based on Swedish law, and secondhand cars are sold to customers after the car has been used for a certain amount of time or driven for certain kilometres.

(a) Third party sustainable products (b) Pedestals made by recycled cars

Figure 5.11: Lynk & Co. Club (part 3)

The Clubs cater to a wide range of customers, who often research online before visiting to clarify details about leasing prices and inclusions.

(a) Conversation area (b) Furry room door (c) Furry room (d) Sauna-like room

Figure 5.12: Lynk & Co. Club (part 4)

The toilet design is quirky and unique, aiming to leave a lasting impression on visitors. Lynk & Co. focuses on changing the perception of car ownership and promoting the idea of a car as a mobility service rather than a product.

(a) Lynk & Co. Club Toilet design (b) Toilet monitor closeup

Figure 5.13: Lynk & Co. Club (part 5)

5.2.6 Bang & Olufsen Retail Showroom

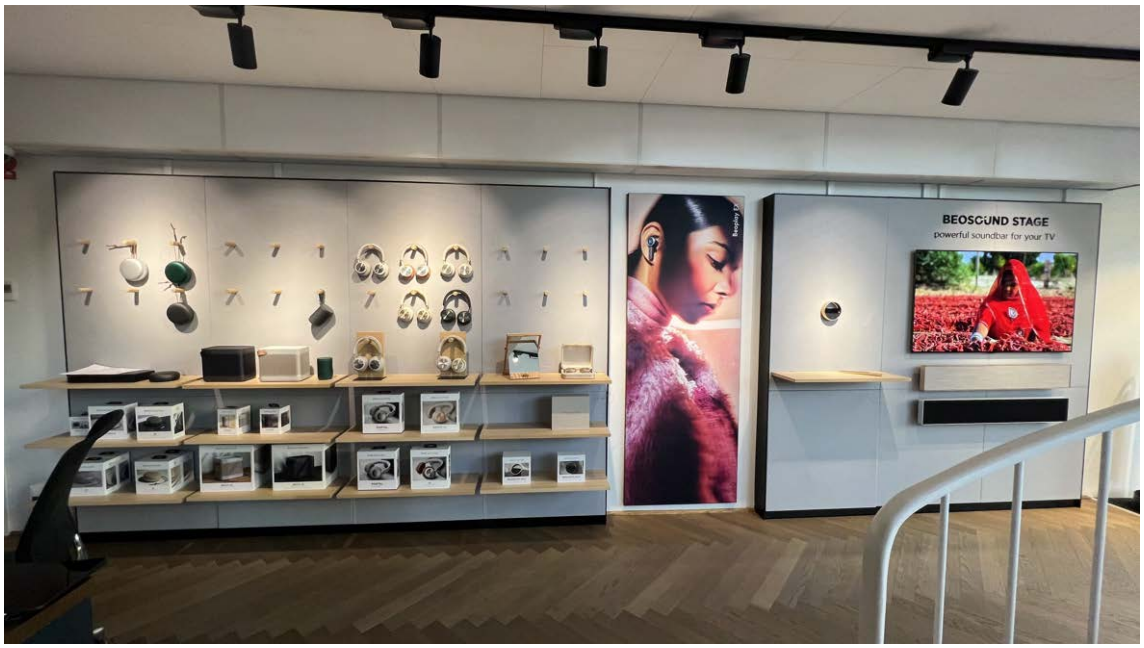
Besides the traditional Automotive showrooms, we also visited a showroom in town, the Bang & Olufsen (B&O) retail showroom. This showroom focuses on selling high-quality audio products and design solutions for home audio systems. The staff at the showroom were very approachable and were actively encouraging customers to try out different audio solutions. The aim is to allow the customer to fully immerse themselves into a predesigned audio experience to showcase their brand offerings. The showroom not only functions as a space to showcase B&O products but also serves as a pickup location for customers.

(a) B&O showroom corner

(b) B&O speaker material wall

Figure 5.14: B&O Showroom (part 1)

One of the remarkable aspects of B&O products is their long lifespan. The modular-designed product contributes to the second-hand market (of speaker parts and customisation of speakers) driven by customers. In addition to selling B&O products, the showroom offers integrated audio solutions and design packages for living spaces.



(a) B&O product wall

(b) B&O Living room setup

Figure 5.15: B&O Showroom (part 2)

The B&O showroom combines the sale-focused approach with a heavy emphasis on the experiences the brand could offer, including the high-end audio solution and their brand's value.

5.2.7 Conclusion

Based on the showroom and dealership visits, it is quite evident that most of these locations do not emphasise the importance of sustainability in the car buying process. Lynk & Co. and NIO partially highlight the use cases of what it could be like but there is no direct correlation between what happens to a potential buyer's old car when the buyer is considering a new car whose decision-making process could be based on either wanting an additional vehicle or keeping the old vehicle along with the new.

With this, the question of material retention is similar to the problems smartphones face today face. "What really happens to peoples' old products when buying a new one?" "What can make a buyer think about the sustainability of owning a car before committing to a purchase?" "How can they also have an impact themselves rather than leaving all of the responsibility onto the automotive company?"

Based on such similar questions that came to mind, we decided to move forward with adding a new (preliminary) research question in mind that was heavily based on the new learning - "what kind of space would enable potential buyers to think about sustainability before buying a car?" This question later matures to become the final research question that was listed in section 1.1.2.

5.3 Brainstorming

The brainstorming session was an essential part of the research process, designed to encourage creative thinking and foster innovative ideas. A structured approach was employed, incorporating a mixed-methods approach using both the *6-3-5 brain-writing technique* and a novel method called *Conversational Composites*.We held a brainstorming session with fellow Chalmers University Interaction Design and Technology student designers.

5.3.1 Participants

The participants for the brainstorming session were conveniently selected from *Chalmers University of Technology*. These students were selected based on their background in the *Interaction Design and Technologies* program or having taken courses from the program.

The choice of participants from the Interaction Design and Technology program ensured that they had the necessary knowledge and skills to effectively engage with the design prompt and provide meaningful ideas. In total, six participants contributed to the brainstorming session.

Before the brainstorming session took place, all participants were informed and gave consent(See Appendix A.1) that they would be recorded audibly for the entire brainstorming session, and they also informed that we would be collecting their brainstorming results for further analysis, and they are also informed that their identity will be kept anonymously and the recording will be destroyed after the study.

5.3.2 Procedure

5.3.2.1 Material

Here is a list of the material used in the brainstorming session and what type of ink/pen we provided to use for that drawing material.

1. A4 paper
   - Pens
   - Pencils
   - Coloured pens
   - Copic markers
2. Tracing paper
   - Pens
   - Pencils
   - Copic markers
3. Laminating sleeve
   - Permanent markers
   - Copic markers

5.3.2.2 Warm-up

To initiate the brainstorming session, participants were encouraged to think creatively by proposing the worst possible ideas in response to the question, "If you were to travel from A to B in the future, how would you do it?" This activity served to loosen up the participants and stimulate their imagination before diving into the main design prompt.

Several interesting ideas were generated from the warm-up session.

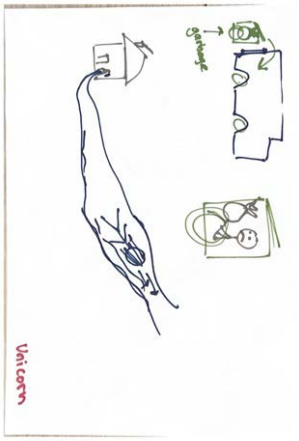
5.3.2.3 Prompted Ideation

We first handed out the equipment needed for the brainstorming session and introduced them to the procedure of using both *6-3-5 brainwriting technique* and *Conversational Composites*. Since not all equipment works on all types of drawing materials, we gave them a quick introduction on what pen/ink can be used on what material during each phase of the brainstorming.

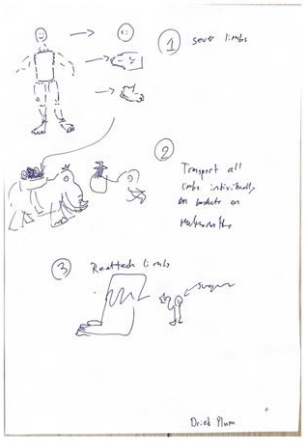
5.3.2.4 Methods Used

During this session, as mentioned previously, the 6-3-5 brain writing method was combined with Conversational Composites. A slight alteration was done, participants were asked to generate different ideas in 5 minutes and pass them along to the next person, who would then build upon the previous ideas. This process was repeated 3 times.

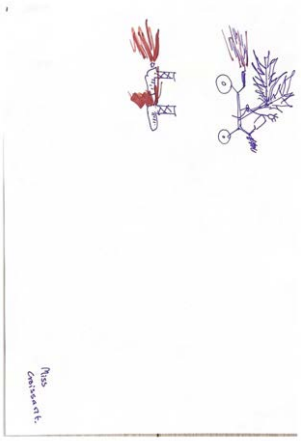
In addition to written ideas, participants used Conversational Composites to visually communicate their concepts. All participants drew on a piece of A4 paper first(see Figure 5.17a), and the next participant layered a transparent tracing paper on top(see Figure 5.17b), continuing the drawing by adding details or new elements, then eventually passed to the next participant and add the first two layer into the laminating clear sleeves and add the final touches on the sleeve(see Figure 5.17c). Since we used the laminating sleeve, it allowed us to eventually laminate all three



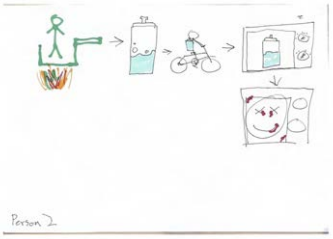
(a) Shooting pipe



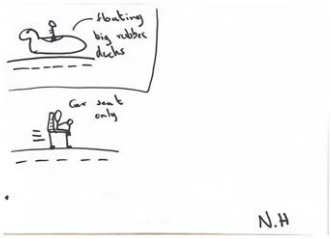
(b) Disassemble human



(c) Rocket shoes



(d) Boil down and reassemble



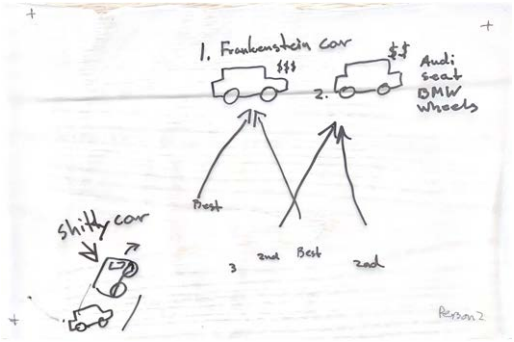
(e) rubber duck, etc.

(f) Human Launcher

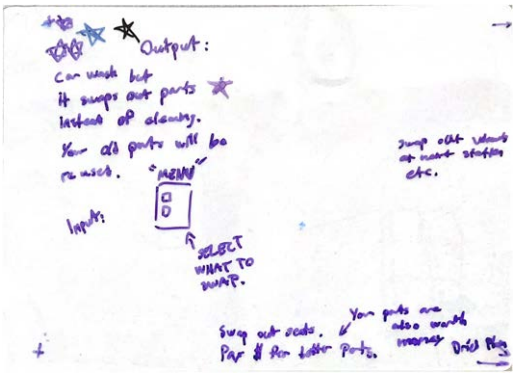
Figure 5.16: Results from the Worst possible ideas

sketches together(see Figure 5.17d). This technique allowed for seamless integration of ideas, fostering a collaborative and iterative approach.

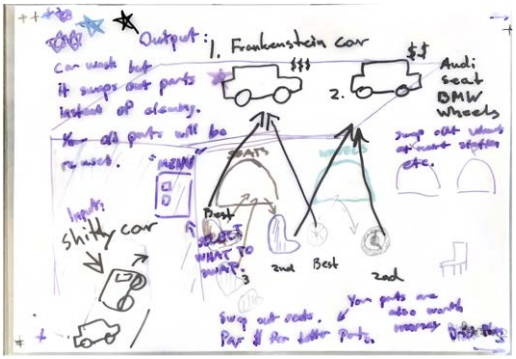
(a) Sketches on paper



(b) Sketches on the tracing paper



(c) Sketches on the Laminating sleeve



(d) All sketches put together

Figure 5.17: Drawing and sketches on different papers from different phases

5.3.2.5 Participant Group Discussion

Following the completion of the *6-3-5 brain-writing technique* and *Conversational Composites* exercises, participants engaged in a general discussion to share their ideas, reflect on the concepts generated, and identify potential areas of improvement or further exploration.

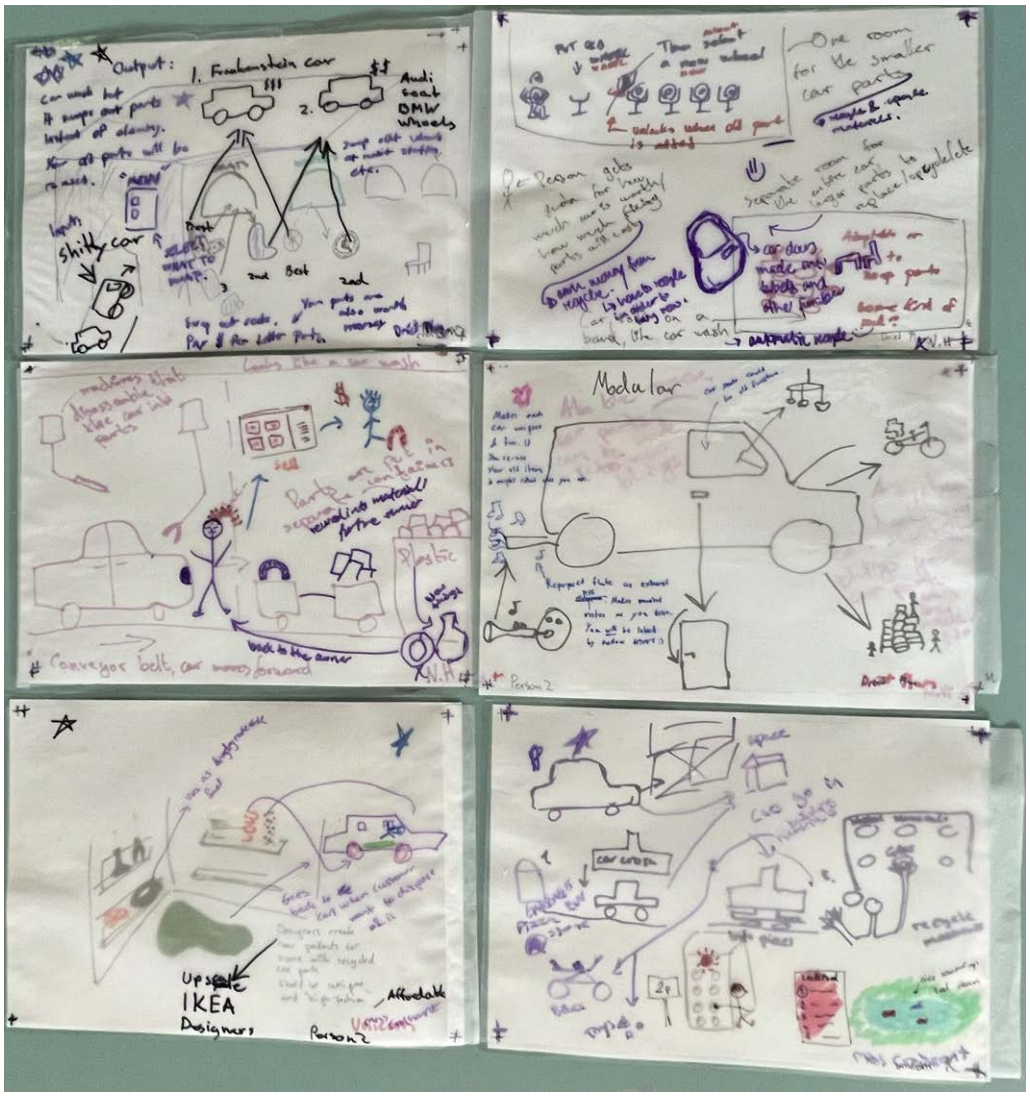


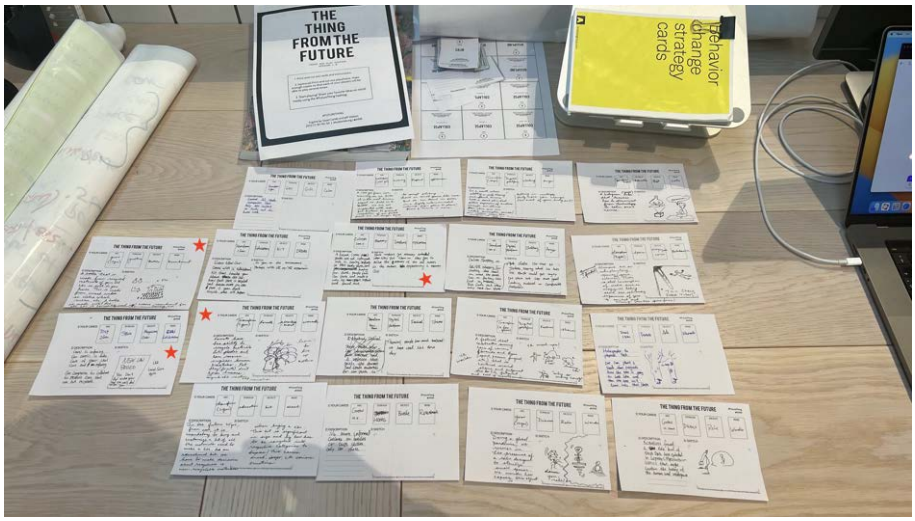
Figure 5.18: All of the results from the brainstorming session

5.3.2.6 The Thing Of The Future Ideation Session

Using the method from section 4.3.9, we were able to generate several ideas between just the two thesis students Geoffrey and Santosh.

(a) Thing From The Future cards

(b) Thing from the Future ideation



(c) Thing from the Future ideation

Figure 5.19: Thing from the Future ideation session

5.3.2.7 Results

Here are all of the results from the brainstorming sessions.

For the purpose of clarity and simplicity, here we will list out the top 4 ideas that got the most votes. The first idea describes a facility where the owner can drive their old car to get it disassembled. The idea shows that a company can take responsibility for their products at the end of their life cycle just as much as their production - a cradle to grave full cycle solution. This allows consumers to offload their responsibilities while only waiting to order a new car until all of the parts of the old car have been properly distributed back into the materials ecosystem. Consumers can get credit for their return while manufacturers receive reusable materials that lower their overall cost of production.

The second idea describes a logistics model where the car manufacturer sends the seller of the old car back to their apartment in the shape of a bottle or any other relatable everyday object. This object is mailed to the previous owner of the car even after the new car purchase. It shifts the responsibility of fast car trading programmes that make it difficult for companies to enforce. In this sales model, the owner is sent a bottle of their “old” car until all the materials have been used. For example, a

mini 2-seater car might have 200 bottles delivered in 200 days versus a pick-up truck that makes close to 400 bottles of recycled materials. This idea can bring light to the post-consumerism life cycle of a car to the owner as well as the company that sells their customers new cars; this breaking the cycle of fast consumerism.

Third, specially engineered forests have the ability to re-absorb the manufactured materials from old products like cars or clothing. When disposing of any old items, owners transport the unwanted item to a nearby forest that slowly bio-digests all the ingredients of an unwanted product. However, it takes a noticeable amount of time for the materials to be re-absorbed by the greenery. Therefore, each forest has a maximum capability of how much it can absorb at any given time. This can change with seasons or time of the year as well as the actual disposal of old materials.

Lastly, a couple of generations from today, the EU passed a regulation that enforces the manufacturing of highly recyclable vehicles. These car parts can and must be reused in some form or another to reduce the materials exploited by nature. In order for this to happen, all manufacturers have to talk to each other and be on board for this to happen, along with helping the governments write the necessary regulations. It's a mutual understanding that could benefit all parties involved and overall better for the planet.

5.4 AKQA Brainstorming Sessions

Moving forward from these results, though we had a better understanding of the direction in which we wanted to go, it still felt quite ambiguous to take the next step. This is where AKQA helped with the design process and further brainstorming into creating a narrative. For the first part of the world-building, we had come up with four initial worlds that AKQA designers could vote on, with a dominant vote coming from us, the thesis students.

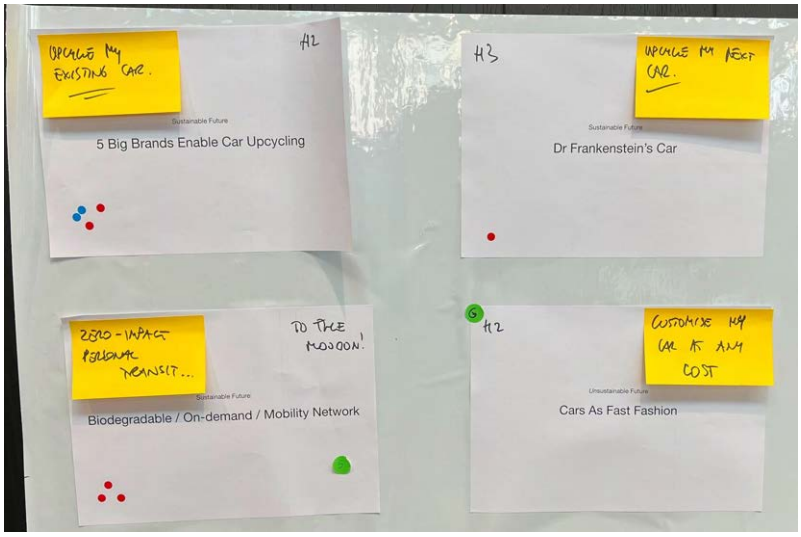


Figure 5.20: Voting worlds during AKQA ideation session

As shown in figure 5.20, the initial thought process was to have options for worlds that coincided with the various horizons speculative design allows designers to shoot for i.e. H1, H2, H3, or H4 where H4 is the far future horizon events that are the most ambitious. The worlds are as follows -

- 5 Big Brands enable car upcycling (H2)
- Dr. Frankenstein's car (H3)
- Bio-degradable/On-demand mobility network (H4)
- Cars as fast fashion (H2)

The 5 Brands enabling Car Upcycling is an idea that was formed based on Sweden and the big players in the industry that can actually help with the building of this far future world. In this world, each company would play a major role in the way the typical car would be processed at the end of its life. It was discussed that in the city of Gothenburg, H&M would find alternative uses for all the fabrics that are used in a car including any insulation. Stena Recycling would be in charge of all the plastics and metal from the interior as well as the body of the vehicle where a high percentage of upcycling is within a closed loop of circular economy. This includes the larger batteries that would be used in future electrified vehicles. It is highly possible Volvo Cars would also play a role in the upcycling process along with Stena. Ericsson would use the computer chips and electronics from the vehicle for other alternative purposes, such as data mining or computations. Lastly, Ikea would help with the logistics of the entire process due to its massive success in the industry for home decor and innovation despite not being located in Gothenburg.

Dr. Frankenstein's car was an idea that was about a car that could be highly modular and can be brand agnostic or multi-brand compatible. It is no secret that brands today thrive on proprietary knowledge in order to please their user base as the car enthusiast community grows in numbers. As a juxtaposition, the highly modular vehicle would allow users or this Frankenstein "brand" can make parts from various manufacturers and brands cross-compatible without compromising the basic purpose of the car - to be able to get a person from one place to the next. It was briefly also discussed that Volvo Cars could drive this entire operation within their brand since they have the most expertise with engineering and industry manufacturer partnerships. Due to the modularity, these cars would be noticeably cheaper for the end user which can reduce waste and drive up public interest.

Bio-degradable on-demand mobility networks could be considered the most ambitious world we were trying to build in the sense that it was the only H4 world out of all the worlds. This could be due to the bio-biodegradability aspect that was important for this concept to work. The idea here was to have a network of vehicles managed by one entity and the users use this network of vehicles on demand. We understood that this concept would require a lot of vehicles in its fleet for deployment as well as maintaining the quality of service. One of the learning points from the showroom visit to Lynk & Co., covered in section 5.2.5, was the uncertainty in the way the car that has been in an accident is handled. The company left it entirely up to the state and Swedish law for how the materials need to be handled which felt ambiguous and

abdicated company responsibilities that provided the product. We wanted it to be a cradle-to-grave process and the biodegradability aspect made this possible.

Cars as a fast fashion was an idea that is closer to what users currently do to their cars in the present with accessories and personalisation. This world would take this and maximise the possibilities creating an unsustainable way of consumerism. This angle was chosen on purpose and would work well with critical design and speculative design since there is a lot to highlight and uncover in such a world. In this world, cars are also very modular and components in a car can be easily modified with the help of automation. For example, imagine driving into a customisation centre and you can change the exterior car colour, similar to a present-day car wash, within minutes and drive away with a brand new-looking car. Changing the car seats or interior accents could be as easy as getting one's nails painted. There is high accessibility and convenience built into this world and this is what we wanted to highlight.

Upon certain deliberation and consideration, everyone in the room was able to vote using dot stickers (seen in figure 5.20). Biodegradable on-demand mobility network and so did the 5 brand upcycling collaboration. From here, we continued to better understand the target audience. We understood that it was potential car buyers were the ones we wanted to target. However, this category of people includes many. We separated these buyers into the following -

- Generation Y (current classmates)
- Generation Z (new graduates and older)
- Buyers with a non-progressive mindset
- Buyers with a progressive mindset
- Buyers working in the automotive industry
- Leaders of industry

Based on these set target users, we proceeded to define the needs that need to be addressed with the solutions -

- Wanting a car
- Wanting a mobility solution to get around
- Considering a 'new' car
- No interest in a car at all

As shown in figure 5.21, there were several steps before we ended with the solutions listed. The way we wanted to get to the outcomes and solutions was the brainstorming that was necessary since various designers have various approaches to how they would like to get there. For the solutions, the best one was chosen based on a democratic voting system where 'Joining a conversation' won the most votes with 'Creating public awareness' won the close second. Here are all the outcomes listed before voting began -

- Eco-terrorism

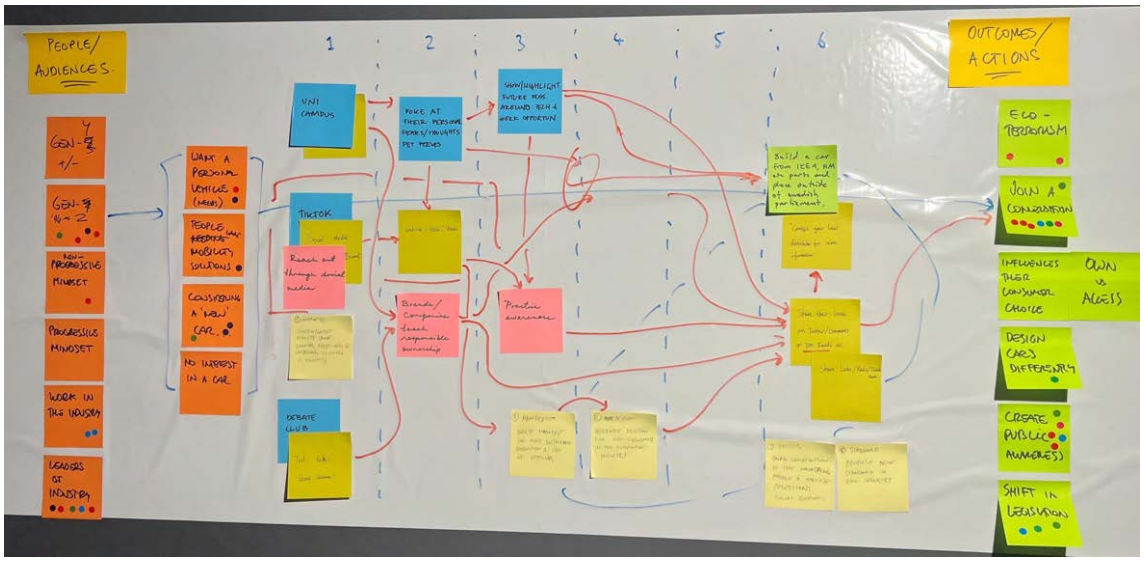


Figure 5.21: AKQA voting on outcomes during ideation session

- Join a conversation
- Influence consumer choice/ i.e. ownership vs. access
- Design cars differently
- Create public awareness
- Shift in legislation

Further along in the time-limited brainstorming session, all opinions and suggestions from the room were posted on the wall. By building some connections between the suggestions the target users, the needs being addressed, and the chosen outcome were connected (see figure 5.20). With this path established, the second part of the ideation session was where future strategies were discussed. Some of the questions that were asked in order to move in the relevant direction were "where are we engaging the target users?""How do we plan on engaging the target users?""How to contact and where?"

During this phase, with the help of our supervisor, we discovered SuperFlux (section 2.6) and United micro-Kingdoms (section 2.6) as highly inspirational work. As we researched more into the various worlds that were produced in both of these design fiction approaches to speculative design, we felt more comfortable with the idea of prototyping similar artefacts in order to connect our target users (future car buyers) to the type of world they would rather live in which could influence their car buying decisions from a more sustainability framework. To do so, we wanted to first explore our own worlds in more detail.

Throughout this particular phase, we were conflicted on picking a specific world that addressed specific traits that were we wanted to highlight in these worlds such as upcycling, reusing, recycling, biodegradability, social change, cultural disruption, conscious consumerism, and many more. The ideal world we wanted to pain could

not fit into a single world. We wanted to split the worlds into at least two worlds and show a positive outcome and a negative outcome until we found Umk. We then decided that we could actually utilise the axes that UmK also used making the worlds a mixture of various qualities (see figure 2.7). Inspired by creative writing genres of fictional novels, we then explored the axes of "Life" and "Technology" since these two qualities commonly arose in our discussion with the initial ideation session with our classmates and the ideation session with AKQA while all along keeping an eye on how we would evaluate our creations in the later stages.

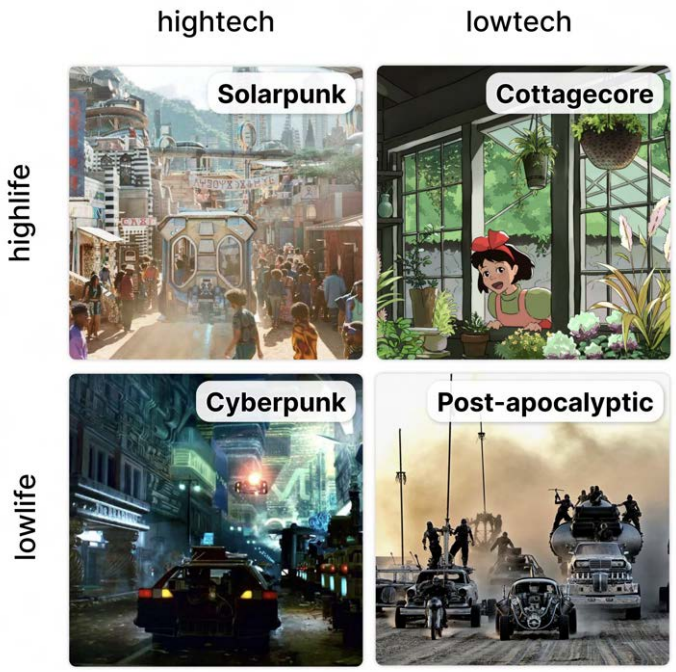


Figure 5.22: Worlds shown on a Technology vs. Life axes[1]

By this point, it was more clear to us what we were doing. We were -

1. Designing speculative future(s) by exploring concepts within each world
2. Communicate this future to the target audience or future car buyers in the form of an exhibit where they experience the future(s)
3. Connect with the audience attending the exhibit in the form of tangible artefacts for deeper immersion

At the end of the last ideation phase with AKQA, we started with our creative writing with the help of the emerging A.I. tools such as ChatGPT and Midjourney [68][69]. We worked on specific instances or scenarios and started writing short stories about "what-if" moments that would paint a vivid picture for any reader, including ourselves. We invested in various design fiction (seen in Appendix B.1). As we generated highly realistic probable future scenarios, we also considered how

[1] `https://www.reddit.com/r/Cyberpunk/comments/owulhc/a_scifi_alignment_chart/`

some of the items or "artefacts" could be used in their respective scenarios. We then generated images that best describe what we imagined these artefacts could look like for immersive storytelling.

The list of initial scenarios were -

1. How might a car owner come and biodegrade an old car part they no longer need that is damaged or needs repair?
2. How might a car owner change the design of their car?
3. How might a person who does not own a car become convinced to own a car?
4. How might the returned element or car component get recycled/composted/ reused/upcycled/etc.?
5. How does A.I. play a role in assisting the car owner of the future?

All scenarios can be found in the Appendix B.1.

5.5 Artefacts

"Artefacts" are what we have chosen to call all the various objects, tangible or digital, that connect the user to the experience in each world. Many artefacts were created throughout the process of prototyping during the project. However, the most important artefacts are the ones used during the exhibition since these experiences and interactions are the ones that were evaluated through the questionnaire and the focus groups. Here are all the world artefacts that were created -

- All | News article with EU regulation
- All | 4 A4-sized table posters for each world
- Solarian | car keyfob and delivery box
- Solarian | growing keyfob day 1
- Solarian | growing keyfob day 100
- Solarian | sprouting car Reddit post
- Solarian | traffic citation for sprouting car
- Solarian | autowalkers advertisement pamphlet
- Cyberworld | customisation summary report
- Cyberworld | scannable black-market invite card
- Cottageville | relics map
- Cottageville | upcycling/re-purposing blueprints
- Dystopia | fresh air canister
- Exhibition | brochure

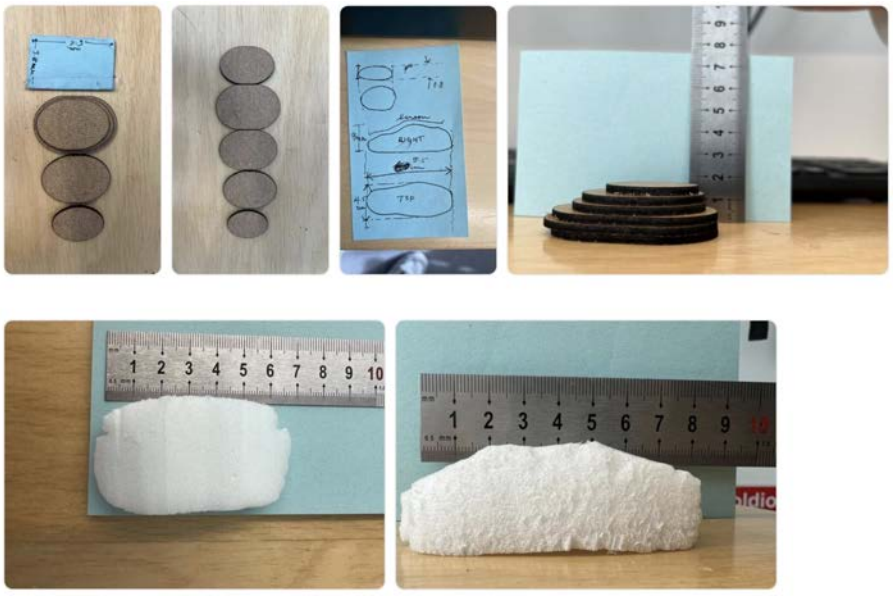
- Exhibition | teaser poster

5.5.1 Physical Prototyping

The prototyping for physical objects consists a lot of trial and error and getting comfortable with failure. This means that we have a lot of initial prototypes that do not necessarily look like the final prototype. The original idea mostly begins with someone we already had in mind based on prior knowledge or experience. In some cases, finding inspiration through a mood board similar to 5.5.2. As shown in the evolution of the keyfob, the original design started with rough dimensions of what could feel right in the palm of a person's hand. It slowly evolved to laser cut templates, then to a foam body for a 3-dimensional look and feel. Finally, it was 3D printed using PLA compostable filament. Some of the physical prototypes also included digital prototyping tools like Figma to work with digital assets before printing, for example, the upcycling/re-purposing blueprints from Cottageville (see Appendix 6.12b).

5.5.2 Digital Prototyping

Prototyping for digital artefacts usually started with some inspiration on Figjam where pictures were collected and an over theme was selected. Then certain design traits that fit the world were matched to the typography and colour scheme as needed. Throughout the iterative process of making mock-ups and wireframes of the designs, we make minor changes while keeping the overall essence of the design consistent after the mood board creation.



(a) Initial forms of keyfob

(b) 3D prints of keyfob

Figure 5.23: Evolution of keyfob prototypes

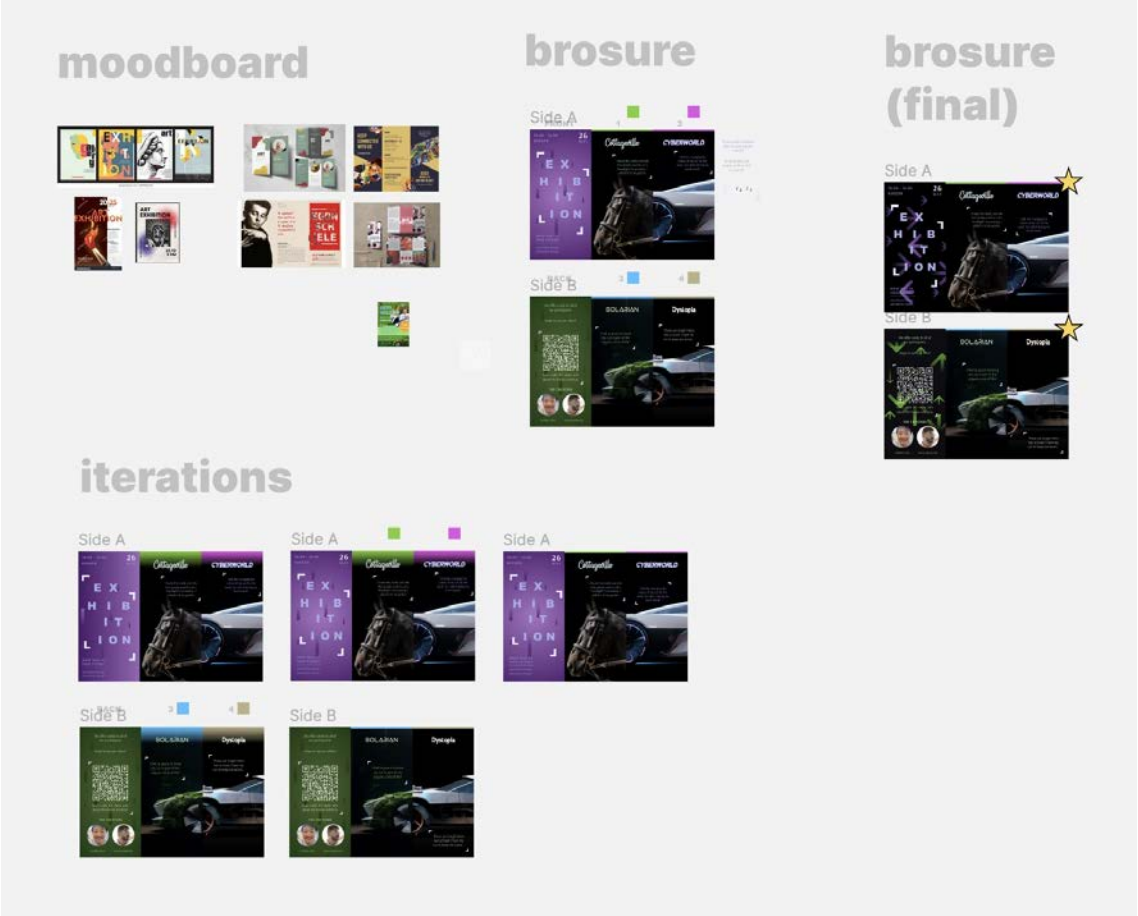


Figure 5.24: Exhibition brochure design process

6

Results

In this section, we list out the outcomes from different components of our research, the artefacts that we created for the exhibition, the design of the exhibition itself, the feedback we gathered from the questionnaires and insights from the focus group.

6.1 Artefacts and Creations

For each world that was created, artefacts were also created. To make the world more graspable and immersive through interaction, each world received artefacts based on their realities. For example, Solarian has a car keyfob that degrades over time, where the resources return to nature. This serves as a reminder that unlike today's world, where plastics have polluted the planet for centuries, things that are made in this world remain in balance with the world they exist in.

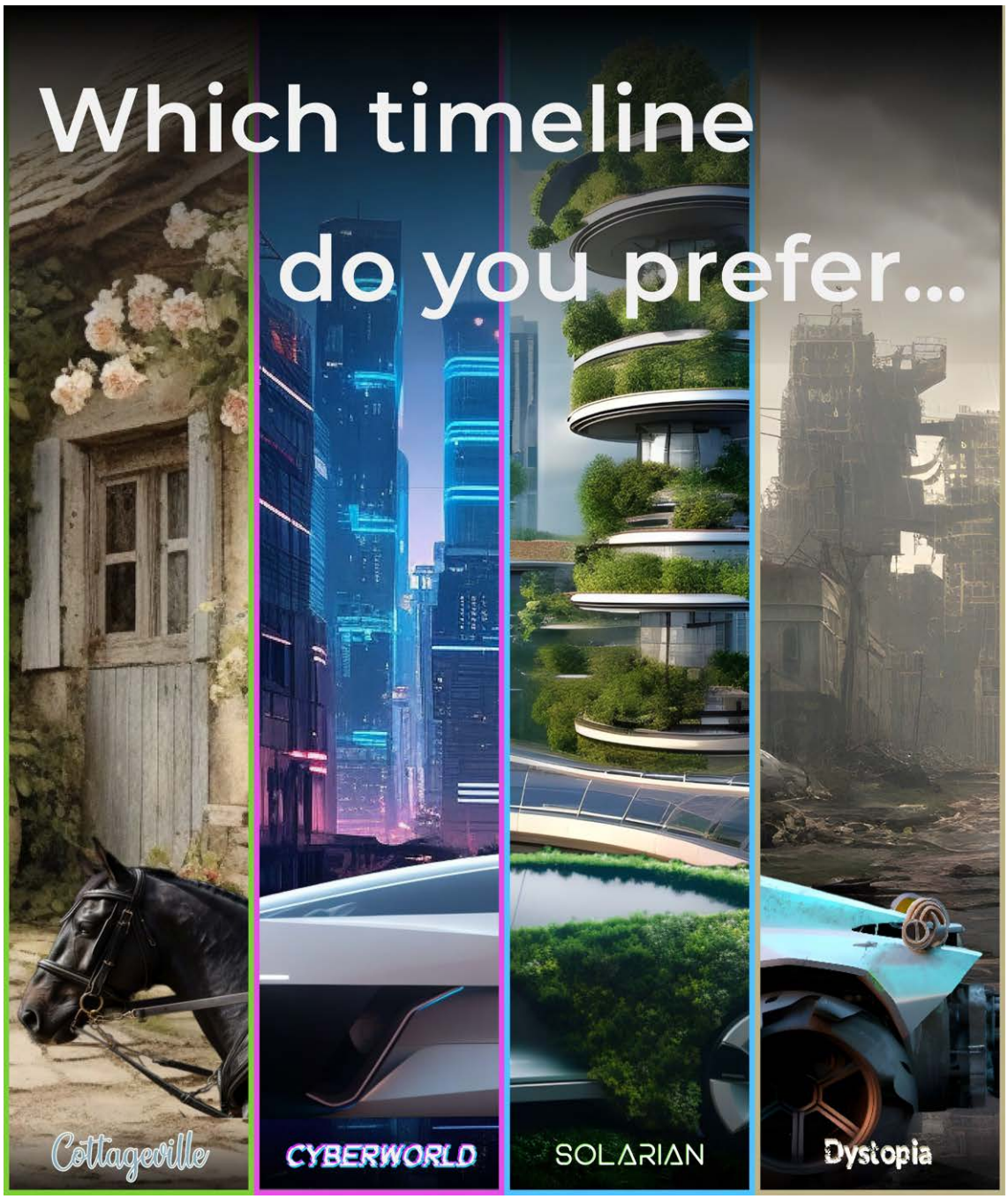


Figure 6.1: Exhibition teaser poster. Each colour highlighted was designated to each world to portray the mood of each.

Figure 6.2: News article

Figure 6.3: Poster design layers for each world. Layers include 1) background image (Midjourney AI), 2) world synopsis text (refined using ChatGPT), 3) graphics and accents.

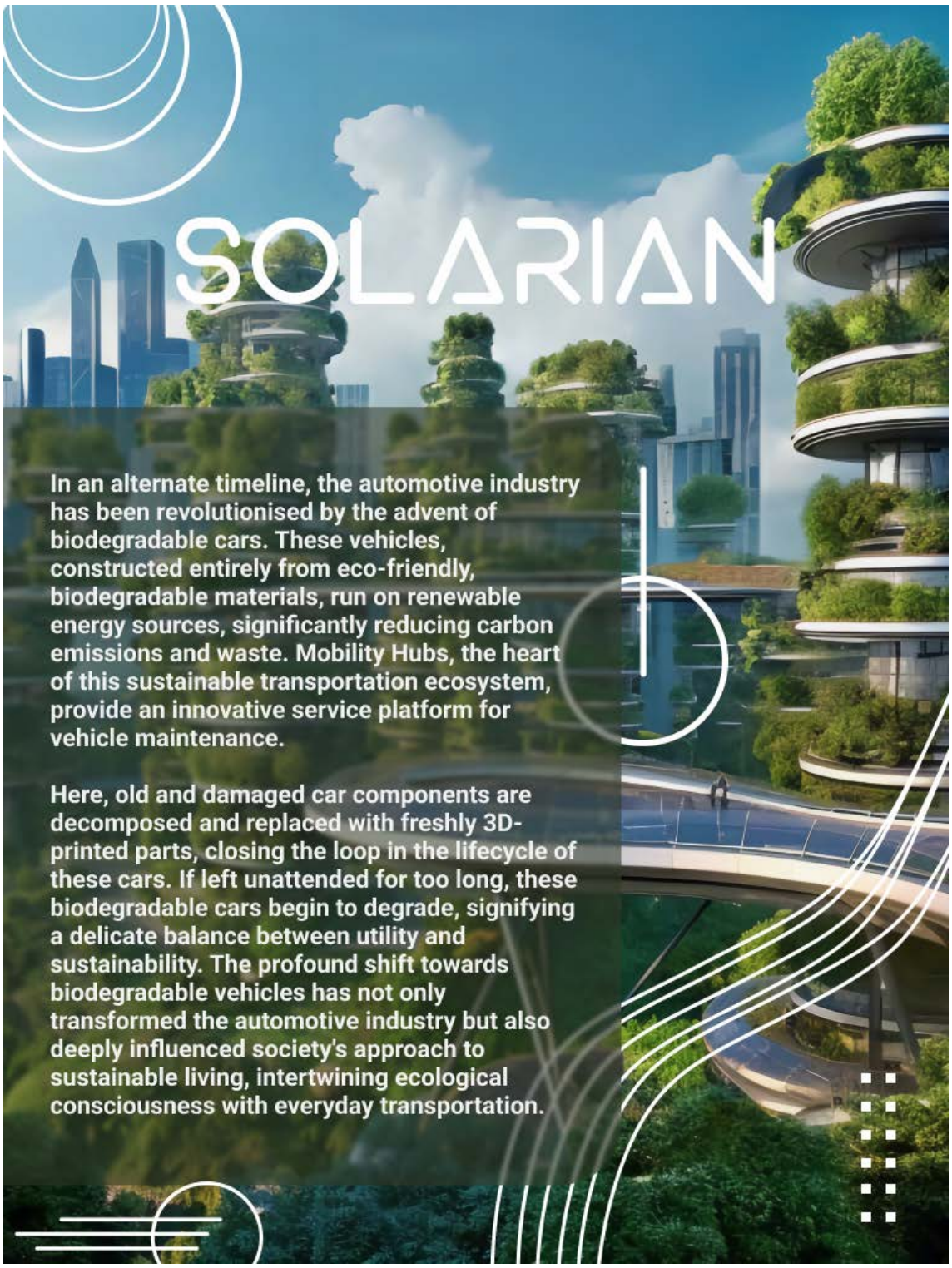


Figure 6.4: "Solarian" timeline poster displayed at the exhibition

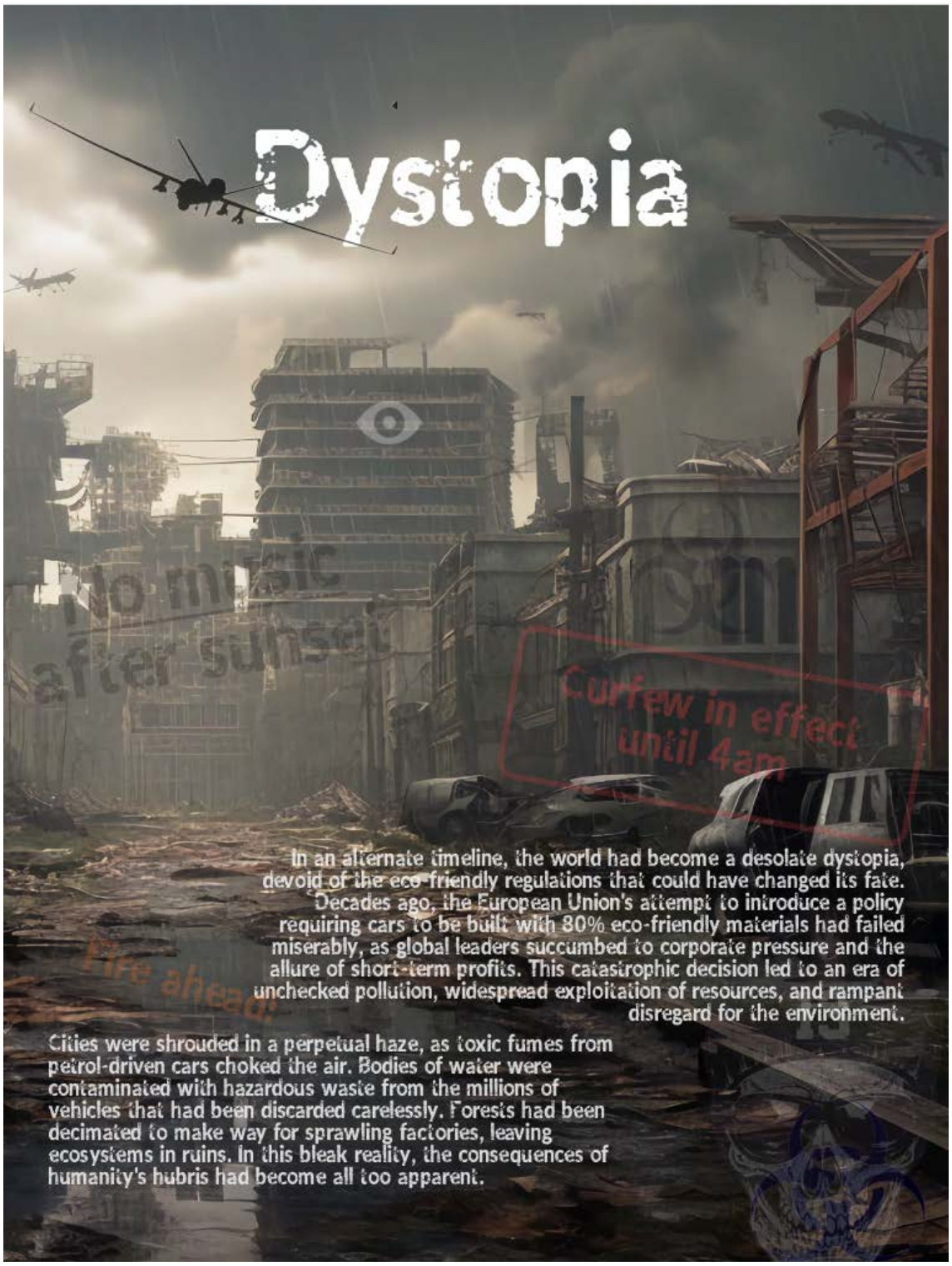


Figure 6.5: “Dystopia” timeline poster displayed at the exhibition

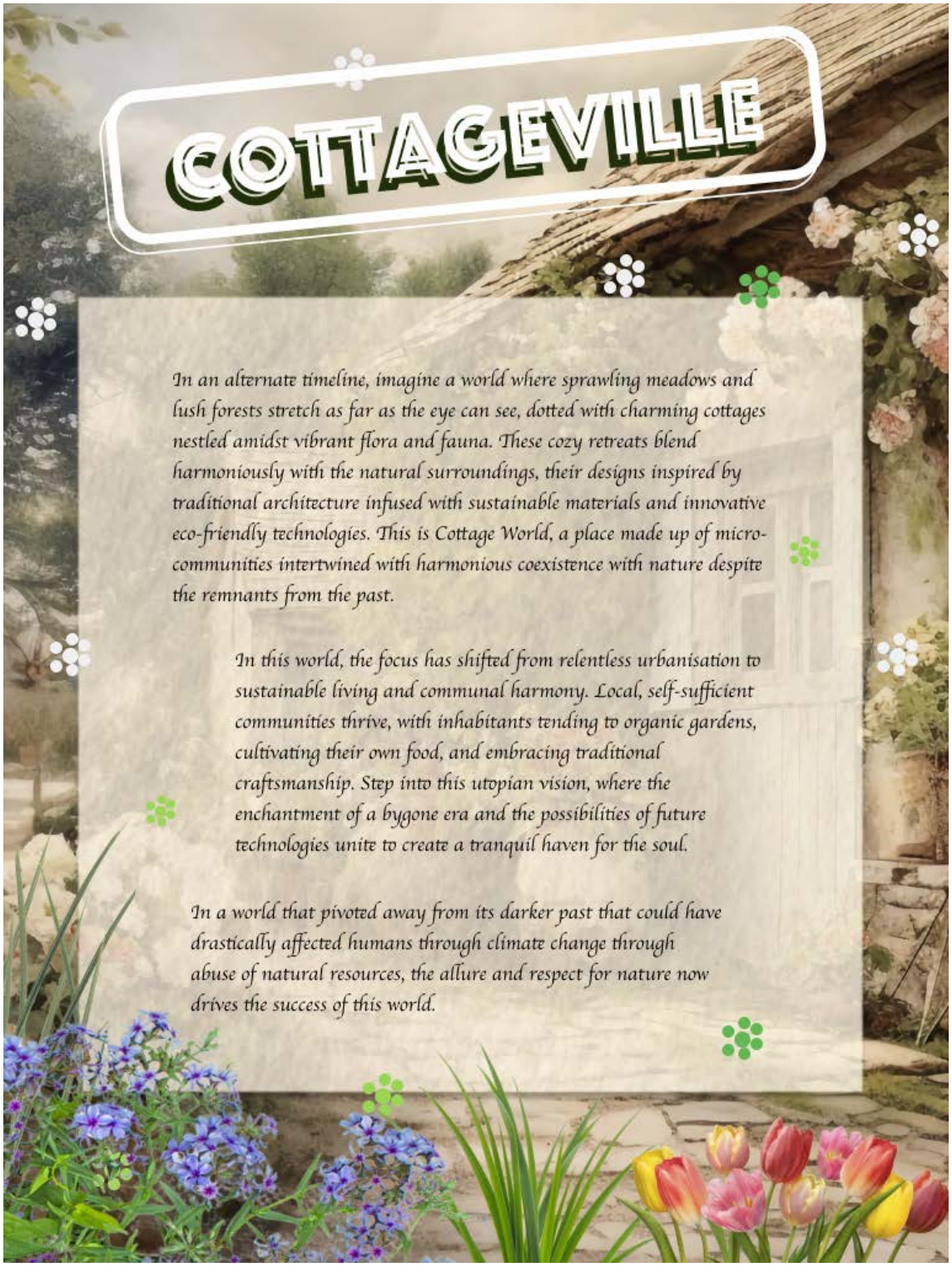


Figure 6.6: “Cottageville” timeline poster displayed at the exhibition

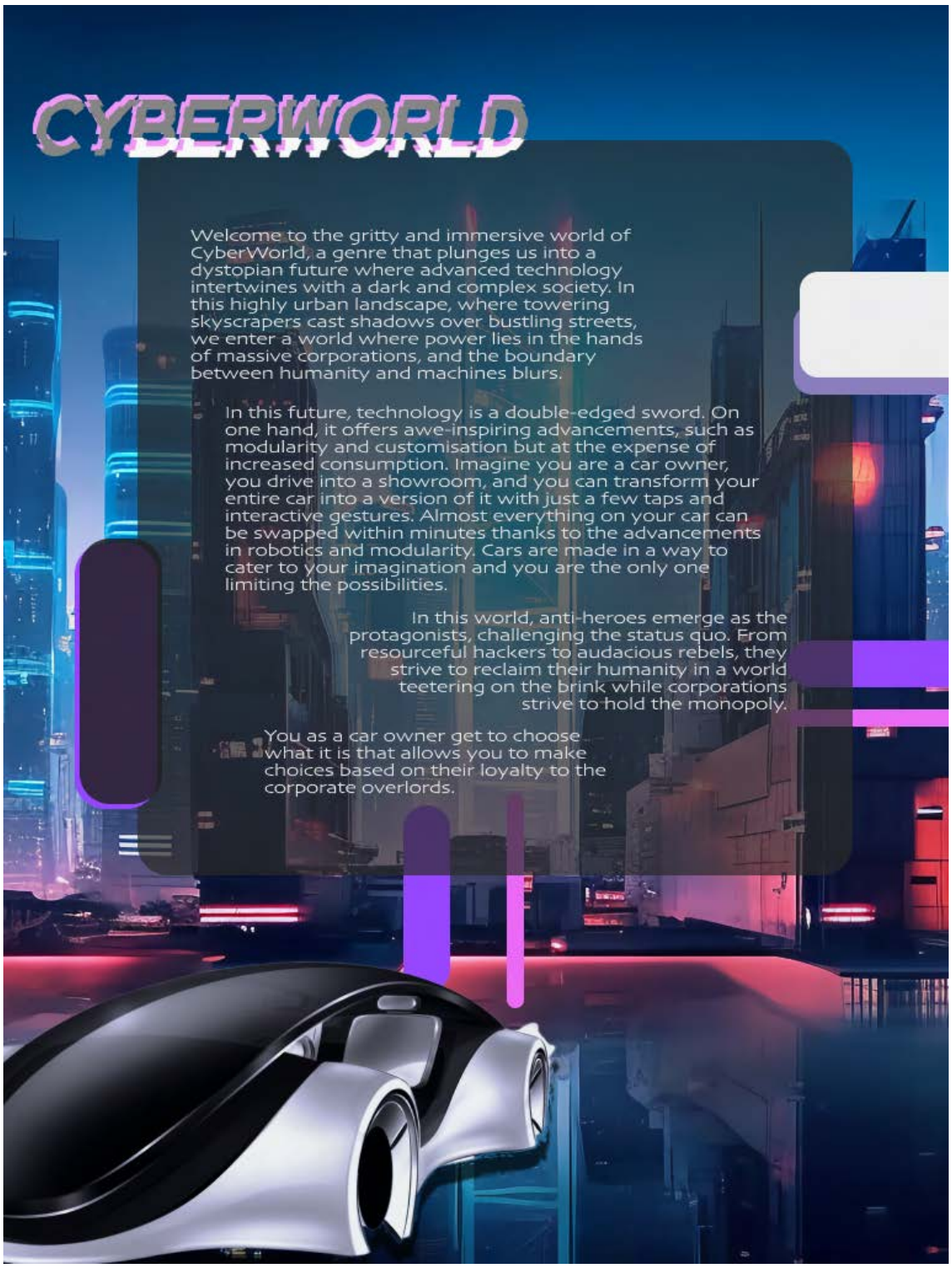


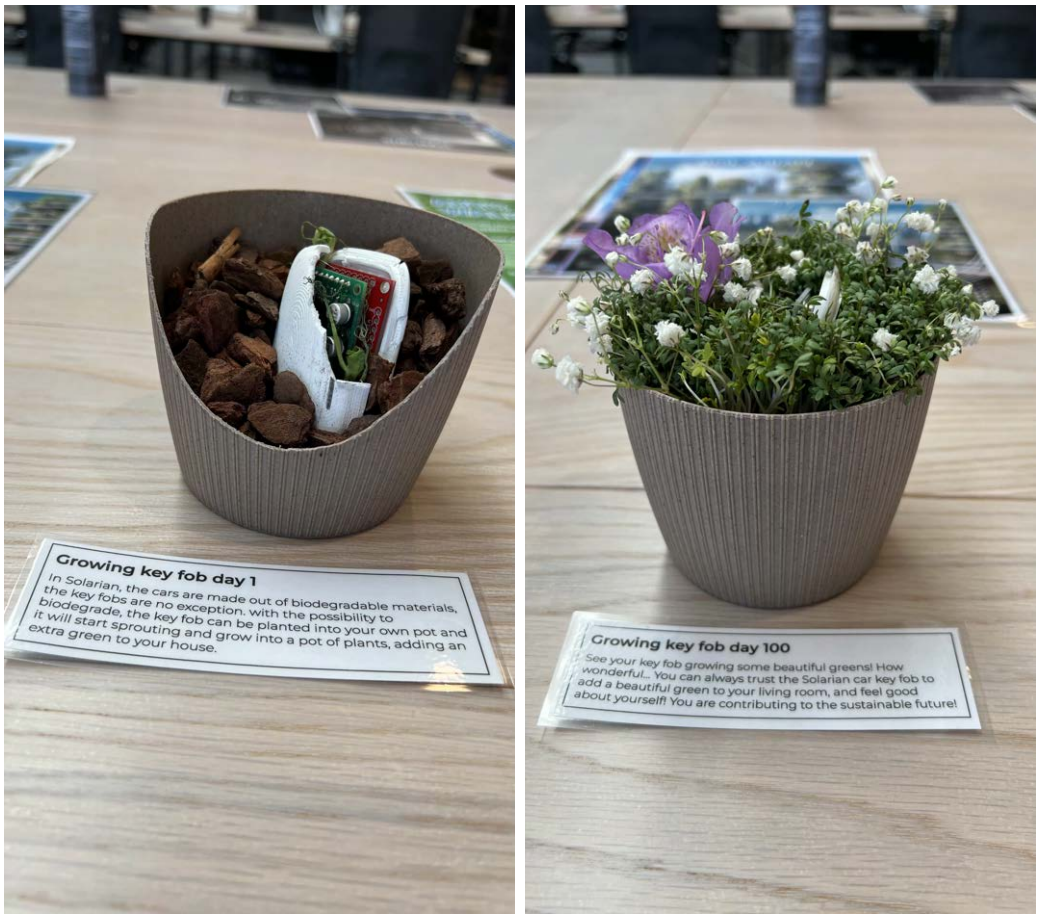
Figure 6.7: “Cyberworld” timeline poster displayed at the exhibition

(a) Car Keyfob (boxed)

(b) keyfob box open

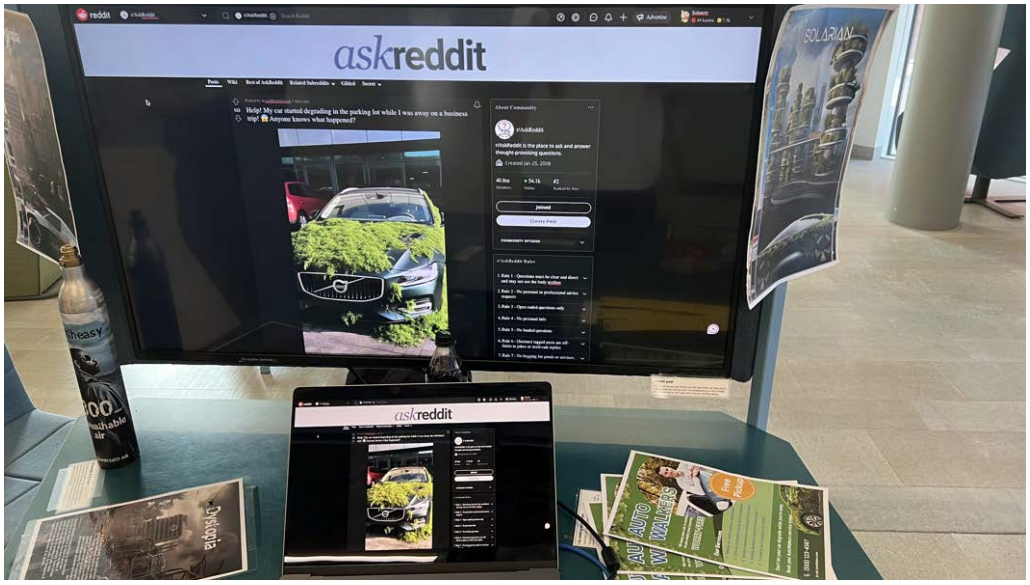
(c) keyfob fabrication evolution

Figure 6.8: Bio-degrable keyfob that grows and sprouts over time

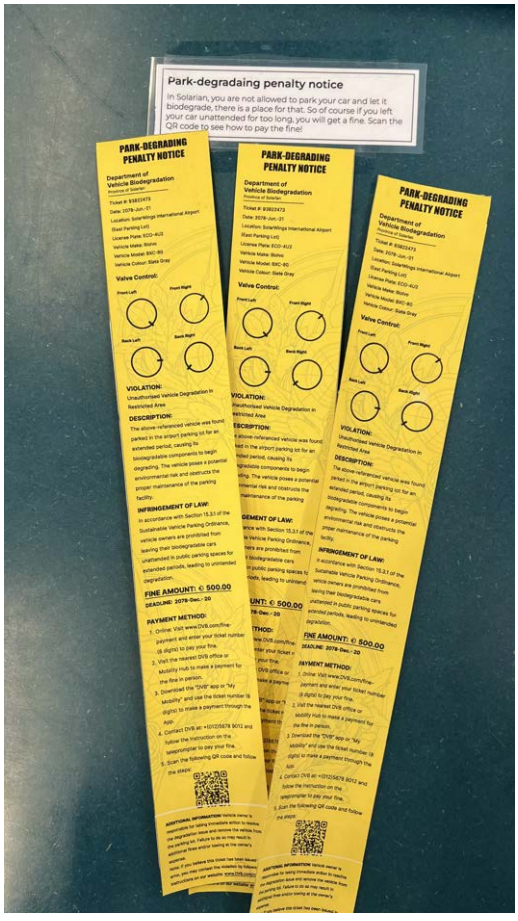


(a) Car keyfob (day 1) (b) Car keyfob (day 100)

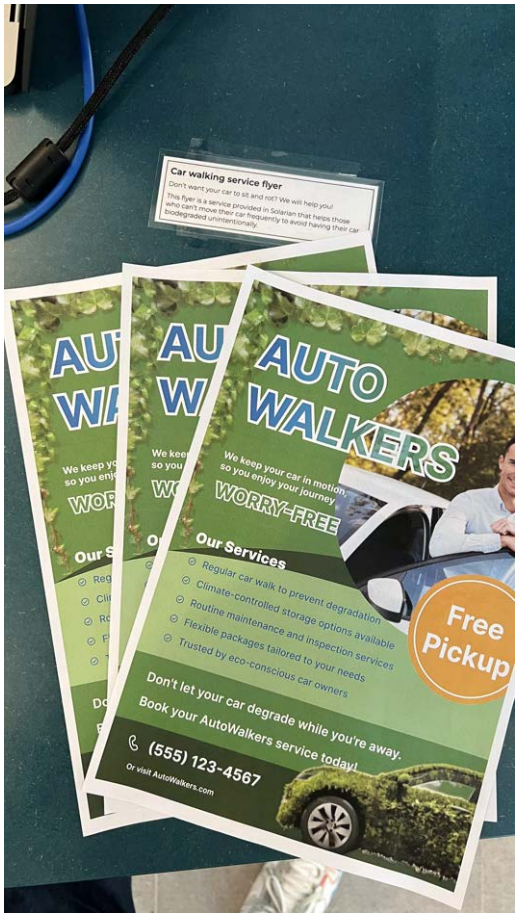
Figure 6.9: Bio-degradable keyfob that grows and sprouts over time



(a) Sprouting car Reddit post

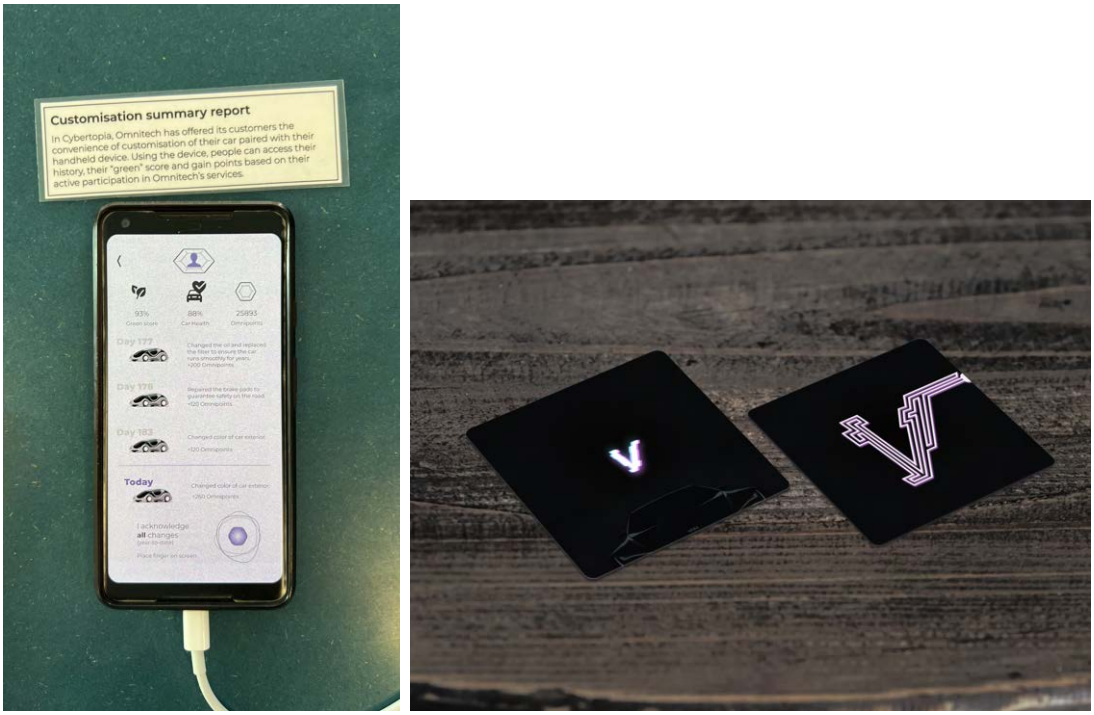


(b) Traffic ticket for sprouting car



(c) Auto Walkers advert pamphlet

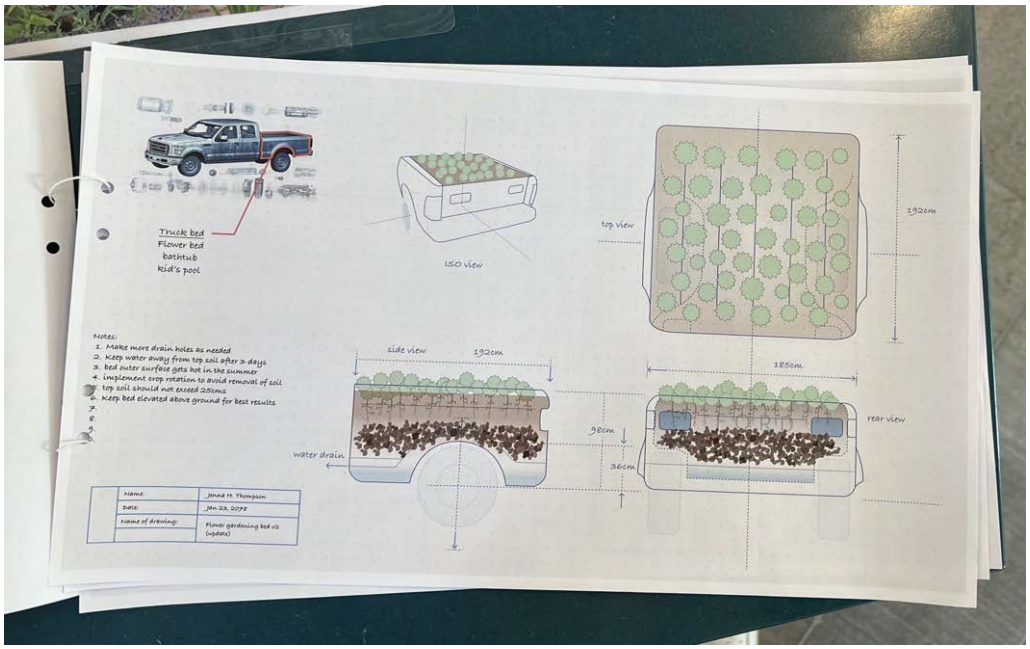
Figure 6.10: Artefacts of Solarian where users have to deal with sprouting cars and creative services that address the new problems in this bio-degradable world



(a) Customisation report (b) Scannable black market invite card

Figure 6.11: Cyberworld artefacts that allow users to be part of or remove themselves from the grasp of Omnitech, a mega corportation, with the help of a rebel group, Vaportech.

(a) Relics map



(b) Re-purposing technical blueprints

Figure 6.12: Artefacts at the exhibition from “Cottageville”

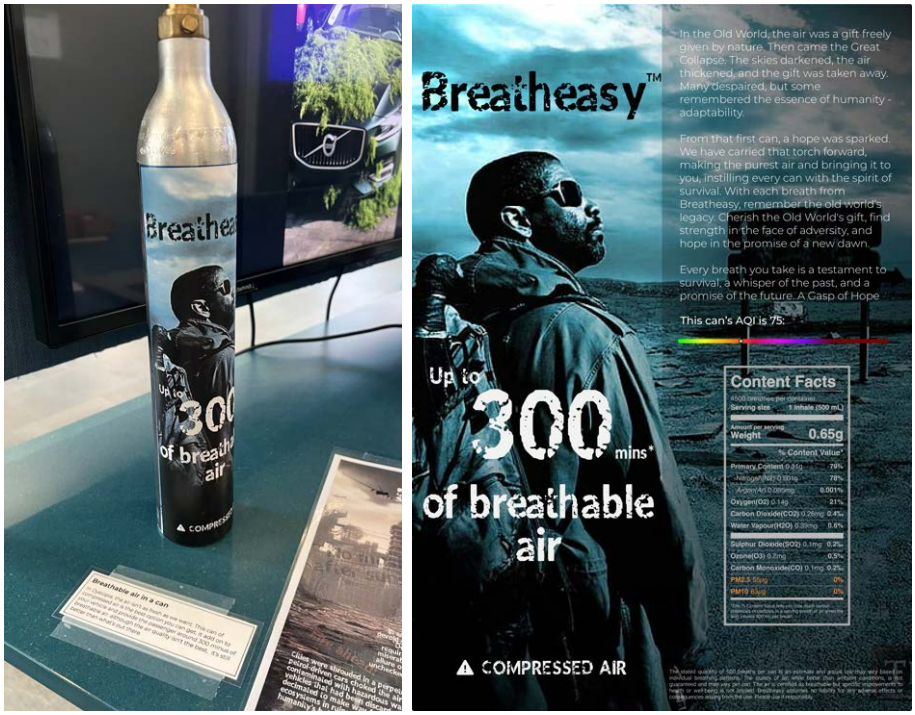
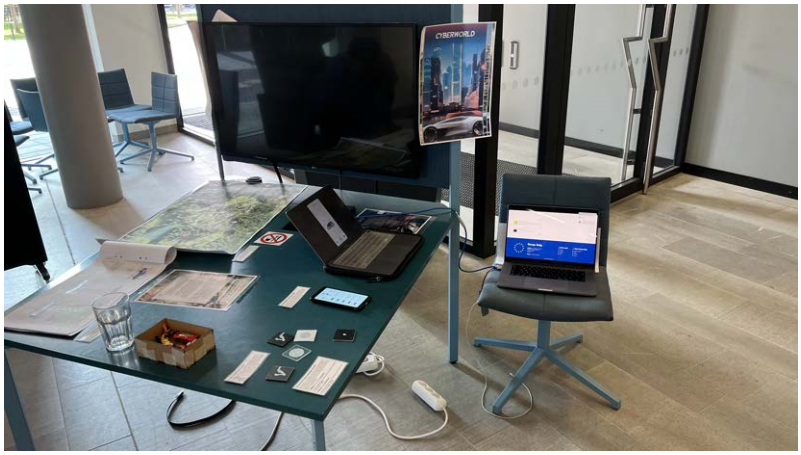
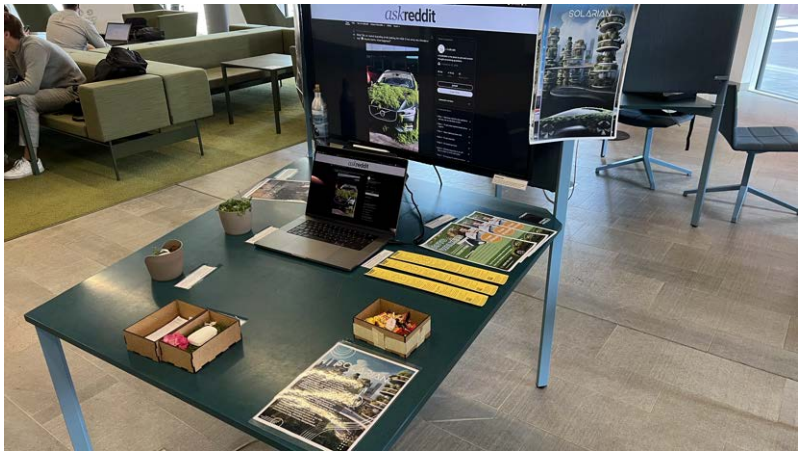


Figure 6.13: Dystopia where the need for better air gives rise to products such as canister of fresh air available for purchase for one's car

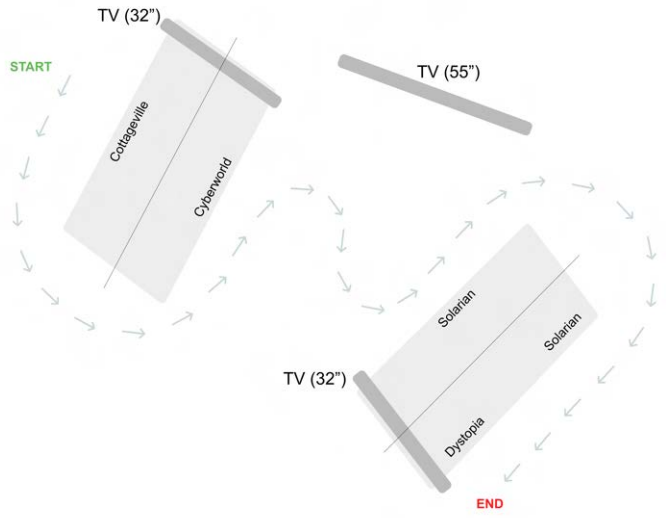
Figure 6.14: Exhibition brochure design



(a) Cottageville and Cyberworld



(b) Solarian and Dystopia



(c) Exhibition layout

Figure 6.15: The exhibition tables and artefacts in Kuggen library building at Chalmers Campus Lindholmen

Figure 6.16: The exhibition attendees who filled out the questionnaire. Some were also interviewed in focus groups after the exhibition day.

6.2 A.I. Generated Images and Their Midjourney.ai Prompts

Image title	Image prompt
Solarian background	solarpunk city view, a lot of trees and green plants on the building, very blue sky –ar 16:9 –v 5.1
Cyberworld background	white neon lights on the building, cyberpunk style city view, –v 5 –ar 16:9
Cottageville background	A cottagecore village view, shabby chic, French Vintage, floral, vintage, prairie, farm, Nature, tranquillity and euphoria –ar 16:9 –v 5.1
Dystopia background	dystopic world, post-apocalyptic, city view, buildings dirt, broken, grime, smog, cloudy, overcast, hopeless, –ar 16:9 –v 5.1
Solarian car	side of the car, plants and greens are growing from the car and covering the entire car body –ar 16:9 –v 5
Cyberworld car	futuristic white car with white and blue neon –v 5 –ar 16:9
Cottageville car	horse carriage, flat right side view, black background, majestic horse head held high, –v 5 –ar 16:9
Dystopia car	mad max, Frankenstein style car, DIY, post-apocalyptic, scrappy, dirt, grime, broken, flat right side view of the car –ar 16:9 –v 5.1
Pickup truck blueprint of parts	paper blueprint poster of a year 2000s pickup truck and its parts, how they can be upcycled or reused, photorealistic –ar 16:9
Relics commune map image	map of commune in a forest, modern design, photorealistic, 4k resolution –ar 16:9
Crest for Solarian	A crest emblem design for a Solarpunk society with green and plants as elements, Simple outlines, line weight, line drawing, 8K, black and white –v 5
Line drawings of tire swings	swings made from car tires line drawings

6.3 Questionnaire

After the participants visited the exhibition, they were asked to complete a questionnaire (refer to Appendix C.1). The questionnaire included a few questions based on the Likert scale to assess their general feelings towards the exhibition, the theme of the exhibition and how engaged the visitors were at the exhibition, then followed up with some questions to query their opinion and their preference towards the artefacts, or timelines (Solarian, Cyberworld, etc.) and finished with some open-ended questions to capture their thought on why certain artefacts or worlds have left the strongest impression on them. A total of 33 questionnaires were filled out.

6.3.1 Structured Questions

The result from the first section shows that the participants are generally engaged (more than 90% of the participants) with the exhibition and managed to understand the exhibition quite well(more than 80%) as shown in fig 6.17, including the theme/topic of the exhibition, the artefacts and the different timelines.

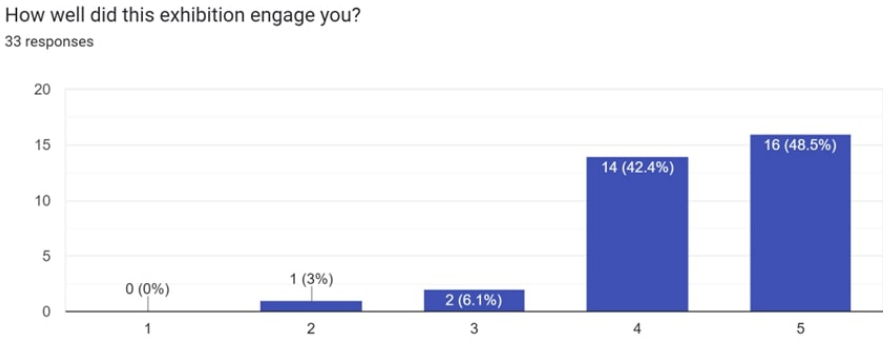


Figure 6.17: Questionnaire result about exhibition engagement

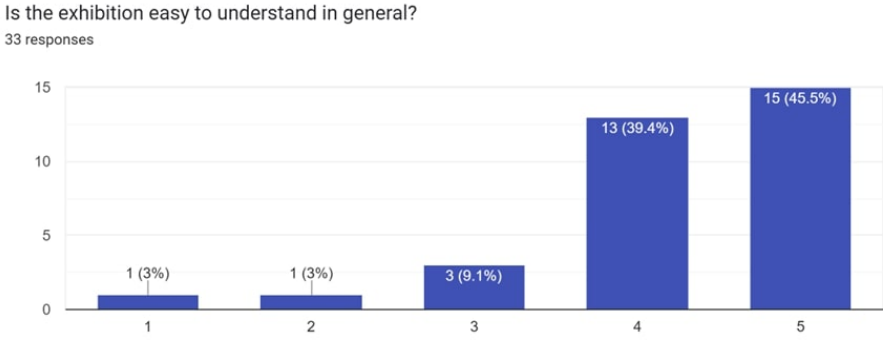


Figure 6.18: Questionnaire result about exhibition understandability

Almost all participants thought the topic/exhibition was thought-provoking since no one marked less than “3” on the question, more than 90% of the participants marked more than “4” and more than half (57.6%) of the participants marked a “5” on the rating scale see Figure 6.19.

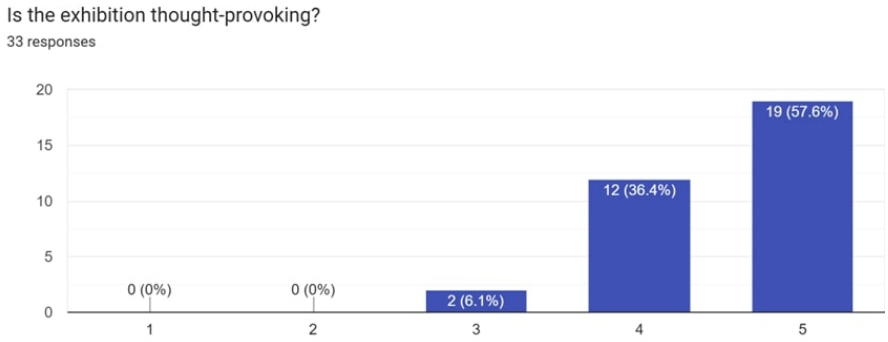


Figure 6.19: Questionnaire result about thought-provocation

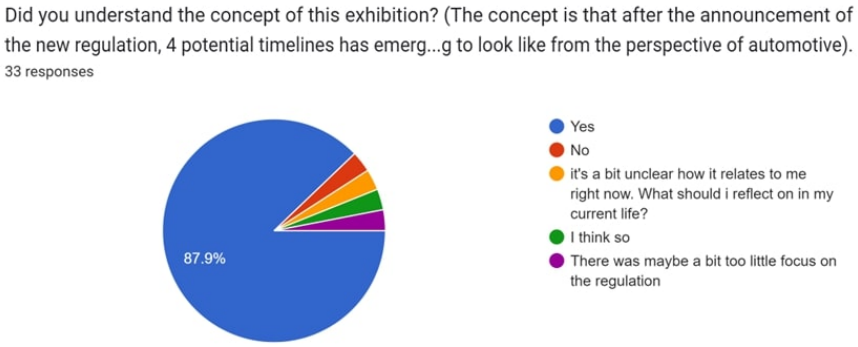
Q4 and Q5 further confirm the intelligibility of the exhibition and the topic from the questionnaire. Q4 confirms that the participants understood the concept of the exhibition, the significance of the different artefacts and how they connect - the result confirms that more than 90% (including “yes” and “I think so” etc.) and Q5 shows more than 80% of the participants think they understand the deeper meaning of the exhibition. Due to some technical issues, “Option 1” was selected instead of “Yes” which was displayed for two questionnaires, but was later confirmed that the participants wanted to select ’“yes” as an answer (refer to figure 6.20). More than 50% of the participants think that they relate to the “Solarian” timeline the most, 24.2% of the participants liked “Cottageville”, 18.2% preferred “Cyberworld”, and 6.1% found they resonated with “Dystopia” timeline. See figure 6.21.

6.3.2 Open-ended Questions

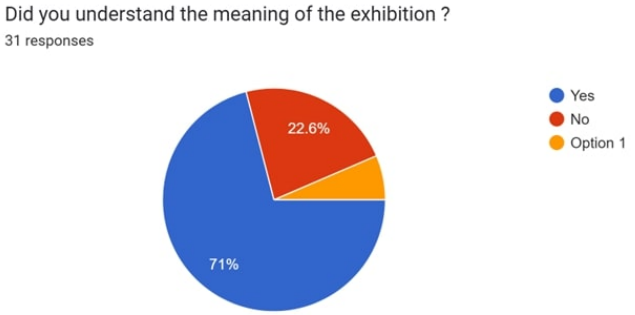
The open-ended section of the questionnaire focuses on querying the participants’ thoughts on which timeline they liked the most and why, which artefact left them with the most memorable impression and why. The results can be categorised in the following sections. Thematic analysis was used to process the answers from the questionnaire.

6.3.2.1 Theme: Resonance With The Timeline

Participants strongly connected with the timelines with sustainability in mind or the combination of sustainability and technology, namely “Solarian” and “Cottageville”. The “Solarian” timeline was appreciated, especially for its integration of technology and sustainability mindset, facilitating an optimistic view of the future to the participants.



(a) Q4: Result regarding the Concept intelligibility



(b) Q5: Result regarding the deeper meaning of the exhibition

Figure 6.20: Question 4 and 5 Results

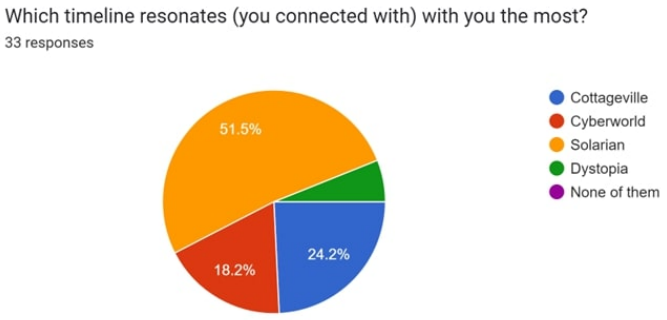


Figure 6.21: Questionnaire result about preferred timeline

"One gets optimistic when future scenarios describe opportunities of how technology can be a good thing if utilised correctly"

"It seems very much in line with nature, without being too "old" like the cottageville"

"Solarian makes me imagine the vivid world the fastest and makes me immediately have some reflection on living in a world that is kind of

aggressive towards greenness."

"I like the integration between tech innovation and sustainability etc. looks really attractive and utopian. Best of both worlds."

The "Cottageville" timeline was picked by the participants for its representation of community living, slower lifestyle and nature immersion. Participants also pointed out the dystopic aspect of the timeline.

"I feel since everything is starting to be more local I can see cottageville as a nice consequence of this policy, that it is not too utopian but also not extremely dystopian."

"It seems like the most reasonable and real solution. I think technology can only take us part of the way but it won't save us unless we change the way we live."

"The idea of cottageville is essentially how I would love to live if there were no structures of society holding me down. I like the idea of repurposing everything into what feels like a very sustainable, nature immersive, and positive wellbeing life. I like how Sarah was able to use everything in a creative way. I like the idea of living in small communities."

A small portion of the participants did express their resonance with "Dystopia" and "Cyberworld". Concerns were expressed that those timelines would be what the real-world society is heading towards, especially about a future where the society is dominated and controlled by corporations or the basic needs of breathing fresh air were commercialised.

"It seemed like the most possible future, where society is going"

"I resonated with this because I am very interested in dystopian stories and I find it to be the most thought-provoking one."

"This one felt like a future that actually could happen. "

6.3.2.2 Theme: Memorable Artefacts

The last two open-ended questions gathered some insights from the participants regarding their preferred artefacts from the exhibition. Most participants have filled out this section. 23 participants picked artefacts related to the timeline "Solarian", 15 of them preferred the "Keyfob" artefacts, 5 thought "Solarian" in general was quite interesting. The next appreciated artefacts were from "Cottageville". 3 of the participants such as the "blueprint" artefacts. Other notable artefacts included "the Reddit post", "the sprouting car parking ticket" and the "fresh-air canister". Participants prefer the artefacts made with a combination of technology and nature, especially in more tangible forms. They tend to make the participants feel more realistic and interactive.

"It looks like nature winning over technology."

"Probably because it was the most attractive and intriguing option and felt somehow realistic."

"Cool, beautiful, provoking"

"The biodegrade car looked really cool and the breakdown of how it happens was eye opening."

"I think I liked both because of the greenery and sense of sustainability and nature oriented design that really drew me to them. I was also thinking about how well the key would survive with me given how often I lose things or accidentally wash things in my pocket. And I wouldn't be able to find it because it would be a patch of grass somewhere. I'm already wondering how easy it would be to get a new one."

"It was really cool, tangible and shows multiple steps of being degraded. Seems like much effort was put into it!"

"I thought it was an actual law that had been implemented recently"

"I could see all the stages of the key growth, it felt super real!"

Some participants also expressed concerns about the longevity of certain artefacts (e.g. keyfob), and how to maintain the usability of the keyfob.

"As a customer, feels pretty troublesome to have a key that will disappear in two years"

"It makes me feel annoyed if I have to care for a growable car key."

6.4 Focus Group

Thematic analysis was also used to analyse the data collected from the focus group interviews. A total of 6 themes were extracted from the data. The full coding and theme data can be found in Appendix. D.2.

6.4.1 Theme: Genre/Topic of the Exhibition

Participants expressed their feedback on the exhibition's theme or topic and gave their general reactions towards the exhibition.

6.4.1.1 Theme Clarity

Participants can recognise the significance of the automotive industry to the environment, reinforced by visual aids (such as the poster for the different timelines) and tangible artefacts (e.g. the keyfob and parking tickets), participants and can clearly identify the proper theme of the exhibition.

"I think so. I think it was pretty clear, especially ... like the poster that you had with the car and the horse head, kind of like the four different worlds... So this is the course or the vehicle is very like central to this."

"Maybe environmental thing that makes something bad like that makes them very bad. So I think that's really good to pick the car."

"Thingy so and also the car keys, parking tickets and so on. To me it was pretty pretty clear."

6.4.1.2 Reaction to Exhibition

The data also indicates that the participants thought the exhibition was thought-provoking. They generally enjoyed the experience of exploring different timelines at the exhibition and are generally happy to see a different variety of outcomes after a sustainability decision made by the big organisation on the impactful industry.

"I feel like I was. It was like 4 different books and. You were like. In like the first few chapters where you like trying to understand the world."

"Make you think of other way, not just in one way of like this scenario is the most probable, but have multiples, isn't it also very valuable to not say it so it can make us discuss on how like things could go in that direction to get our perspectives on it rather than feed us with one linear thought."

"It made you think, really... in a way."

" You have like one way in mind of how it will affect things ... It's not the only scenario. It can go very many different ways depending on like different other factors like how people will react to them and how would the whole society that would."

Overall, the data from this theme shows that the choice of the automotive industry as the exhibition's theme was clear to the participants and was well received. The exhibition managed to engage the participants with different forms of artefacts (tangible and digital) and scenarios (timelines), giving the participants a thought-provoking experience and allowing them to reflect on sustainability in the automotive context.

6.4.2 Theme: Artefact Engagement

This theme focuses on capturing the participants' feedback on their engagement with the artefacts presented in the exhibition. The feedback highlights participants' preferences among various artefacts.

6.4.2.1 Artefact Disconnection

Participants have expressed their concerns about the practicality of the biodegradable car. Although intriguing, concerns about the car deteriorating due to misplacement were raised during the interview.

"I imagine like having a car like this ... I missed to pay my bill or whatever and I get the ticket and when I returned to it ... The wheels are no longer works and ... I would be so mad if I will have to buy a new

wheel for you just because I forgot to buy a ticket. It feels ... the penalty of ... [mistakes like this] would be so hard."

Participants also find the parking ticket has details that might not be reasonable. Having a QR code on a parking ticket to scan for fine payments seemed unrealistic for what the participants believed in "the far future" where that timeline should take place.

"Because do we still have to use the QR code all the time?"

There was feedback also towards the "Fresh air canister" artefact, suggesting that this artefact is less interactive, participants noted that they did not engage with it as much.

"I felt like maybe wasn't as interactive like you can kinda just read it, but didn't really engage me as much. But I also didn't really take as much time to read it, so could also have been my fault for not actually looking at it."

6.4.2.2 Artefact Preference

Artefacts that were more interactive or painted a more realistic picture were more positively received. Participants generally resonated more towards artefacts that were made closer to the current reality or potentially could appear in a near-future scenario. Participants appreciated the **immersive nature** of the Reddit post and also felt it adds more context to the scenario.

"I also really liked that you made the like Reddit post on the screen. I thought that was really nice."

"I really like what you did for Solarian, coz you put a bit more extra context outside the car, like the Reddit post, and car walker services, and cyberpunk is more car-focused. "

"There were also super well done, so I think those two. In particular, were like made it more immersive"

The Customisation Summary Report was highlighted during the interview for its **interactive capability**.

"Your phone with the customization of the cars cause I really like to interact. If it was and like especially with the car one and was really neat to go through and like see all the different options."

The Black Market Invite was perceived as **realistic**. Participants pointed out this artefact captured the human nature of finding ways to cheat the system or seeking alternative solutions.

"I feel like ... chip thingy with Omnitech... Because it feels like something that humans in that kind of society would do. And like being able to go and cheat the system in a way and cause we're resourceful and I feel like

> *in whatever society, there's gonna be some ways that people will try to take and a shortcut..."*

The Key Fob was the popular choice among participants for its **tangible quality, innovative attributes** and its **positive undertone**. Participants also expressed their liking towards this artefact due to the additional sensory experience, smell.

> *"Key fob. because it gives me hope."*

> *"It kind of makes me feel excited that I want things to act like that. Yeah, I like the idea. And that it one element has more functions like this question in general."*

> *"I really enjoyed the sprouts in the Solarian thing, just the additional smells help a lot."*

> *"Would like to see how it might actually be, like how can i repurpose the car parts, and some others you can really feel touch and even smell in the solarion one."*

In conclusion, this theme suggests that while some artefacts effectively engaged participants with their immersive, innovative design and their connections to reality, participants also raised their concerns about their practical implications. The data indicates that the participants desire a more balanced approach between being innovative in artefact creation and the feasibility of artefact design.

6.4.3 Theme: Feedback on World(s) Creation and Future Prediction

This theme aimed to gather feedback on the participants' preferences for the different worlds (timelines) created and used for the exhibition.

6.4.3.1 World Preference

Participants especially resonated with the "Solarian" timeline, especially those from an environmental engineering background. Other factors that the participants particularly liked about this timeline could be because this timeline was packed with the most artefacts. Participants also felt the "Solarian" timeline had the most effort invested.

> *"But personally, coming from like an environmental engineering like. Green design kind of background. I really liked both the Solar-topia and the cottagecore. I know I'm not getting his name's right, but I really like those because I really liked the fusion of like design and clean living with like nature, I guess cause that's personally what I think, especially in my field of industrial ecology. It really feels like that's what we're going to or like, that's like kind of the vibe of everyone in my class anyway, so."*

> *"It kind of makes me feel excited that I want things to act like that. Yeah, I like the idea. And that it one element has more functions like this*

question in general."

"It felt like some are more worked on, and some had only one thing, it would be great to see if you can really flash out everything, and Solarian really stuck with me because there are more artefacts. "

"I want to say that the Solarian is quite connecting because I immediately started to imagine how the car wheels are marked because I saw that on the tickets."

Some participants have also preferred "Cottagecore" for its green and non-technology lifestyle.

"I see the cottage core as the best life. Like I agree with that. It's unlikely, but I want it to go that way."

Participants also imagined alternative timelines that are outside the four timelines exhibited. In this aqua-themed alternative, all the "vehicles" will be a variant of nowadays boats and the world is submerged in water.

"I thought about that for the first question as well that these four scenarios that you came up with, I don't think that's how I visualise how the future will go. In my head it's more like everything is underwater, we're flooded..."

6.4.3.2 Future Prediction and Dystopian Realities

Participants have also mentioned their hope that society will move towards a future like "Solarian".

"I think Solarian, that one is like the least social changes, it's still a car that you own but just with different questions. but I think the car might just melt instead of sprout, like the car just becoming a mush"

"Personally, that really felt like that was more of what we. We think of when we envision the future, especially the solar utopia one."

"I think Solarian, that one is like the least social changes, it's still a car that you own but just with different questions. but i think the car might just melt instead of sprout, like the car just becoming a mush"

Some participants, however, had a more pessimistic view of how the world is developing. They believed the "Dystopia-like" future where the environment is degraded, and monopolistic corporations control the society is where the current society is headed.

"I guess it's also the dystopian world and like the everything is kind of dead and the world is like all smoked up or fogged up or whatever. And it's also pretty likely, I would say."

"Maybe people gonna have to go back to a bit more like a nomad life where we in the summers live somewhere in the winters, we live somewhere where they."

Participants recognise the "problem" of big corporations controlling society as a plausible future and draw parallels to the current monopolistic corporations like Apple or TikTok.

> *"I felt like the Cyber Topia...that one was kind of felt most relevant to the present cause. It really reminded me of like Apple and TikTok and all these like big corporations kind of becoming monopolies over our lives. And that was very interesting."*

> *"But I mean the one that is the greatest possibilities, probably like Omnitech because it's quite like capitalistic and people want to profit in the name of an environmental."*

Some participants believe that the likelihood of the future being one out of the four timelines created for this exhibition might be small. A combination of different properties from different worlds might be more plausible. And it is too complex to predict exactly how the world will be.

> *"The likelihood of it being one of the four is quite small... and even a combination of all like I mean we have so it. It's too complex to say that this is gonna be the future. I mean as [another participant's name] said, it can be the one she envisioned it can be completely different..."*

To sum it up, participants have shown a diverse vision of how society might develop in the future. Based on the feedback and comments, participants showed their hope to have our society in a more sustainable state mixed with technology similar to the "Solarian" world envisioned but also expressed their concerns if there are no changes to how the current society operates, i.e. the monopolistic corporations and environmental issues, we might be headed towards a dystopic future. Participants particularly resonate with timelines where they can draw parallels with their personal and current realities.

Participants acknowledged the complexity of predicting the future, based on the exhibition, suggesting that the outcome of how the society is actually heading might be a mixture of various scenarios or something completely unpredictable.

6.4.4 Theme: The Exhibition Design

This part of the data focuses on capturing participants' experiences and feedback regarding the design of the exhibition, the layout of the exhibition, the experience the exhibition brought to the participants and the feedback and suggestions on how the exhibition could improve.

6.4.4.1 Exhibition Setup and Flow

Some general feedback was brought up by the participants suggesting that if we were always present to guide them through the exhibition or to give the participants enough attention. This could therefore lead to confusion on the context of the exhibition and what section showcased which timeline.

> *"We were assuming there are, they might be people who don't get the kind of attention that other people might have gotten, cause there's only two of us. So there's no discarding, if anything maybe."*

> *"One comment I have is that you kind of guided us around and that was very nice and you kind of introduced us to this. But you also said that, OK, if you want to read a little bit more about this world, we have a paper here with some texts, and I kind of wonder how this like exhibition would play out if you weren't there. If it was like an open thing, could I understand without spending too much time and reading all of the stuff, could I understand what was going on and so on."*

> *"But I think I would have went from one place to the other in the wrong order. If you wouldn't have been there guarding it and maybe a moment to arrive like to have more time in the beginning to really set the scene and get into the topic would have been good for me. And I don't. I think I was just thrown into it a bit too fast and that."*

Participants express their desire for a more linear and clear progression through the exhibition, suggesting a walk-through guide or a suggested viewing order. Some participants suggested is to focus showcasing one timeline at a time, emphasising the immersive experience for each timeline before they move on to the next timeline. The idea of a "walkthrough" is mentioned multiple times, indicating that the participants would want a guided experience with the current setup, especially if the guide could provide more context to the timeline and answer questions participants might have giving them immediate attention.

> *"And I know that this is like maybe outside, like too big for the time that you have. But maybe to put it like in a bigger context like just not an exhibition of all four (timelines)... more focus on one at a time ..."*

> *"I also agreed that the walk through was a bit confusing, but was good to have you there."*

> *"I think that would be cool. I should like to have the work through like you said, like... [another participant] said the work through would be nice because. It was kind of, I know that the situation is that you had to do it in a very quick pace and quick manner but(having a walk though) would be nice so that you can actually go through a more of a storytelling. Kind of. It would be easier for you to tell the story as well."*

Participants also suggested a walkthrough design to bring the visitors back to the centre of the tilt point, "The European Regulation" so that the visitors are constantly reminded of what could have started the various timelines in the first place.

> *"What you can do and kind of set up, but I think that if this was like a larger exhibition, you could kind of play with having like maybe four different paths or maybe first encounter one world and then they come to this regulation sheet again okay and it's like OK, now we rewind back time or something and you walk through this next World kind of or something.*

It's like ohh yeah, you know, so you you go down one path, you see this regulations and then you can kind of go into the different worlds."

6.4.4.2 Enhancing Immersion through Interaction Design

Participants have generally pointed out the importance of letting the visitor feel more immersed in the timeline/world.

"Like if you if you do it like how do you immerse the people in the world and so on."

Participants felt that the exhibition could benefit from adding different sensory experiences to enhance immersion. Sounds and music were frequently mentioned as potential tools to set the mood and facilitate the visitor(s) connection more with the world from a more personal point-of-view.

"But one in the context in another way, like maybe music or like if you understand like more build feeling around maybe want to reflect by like you yeah, something like more going into one. One future in at a time ... like they focus on that one and really immersed (with) the (timeline) yeah."

"I also think like sounds could play a massive role, just like having some background sounds and what really helps you immerse better to worlds."

The introduction of smell was also suggested during one of the focus group interviews. Participants argued that certain scents could evoke strong emotional reactions and allow the visitor(s) feel more immersed in the scenario and the timeline more tangible.

"My idea was to add. This is obviously something you couldn't do either, but smell."

*"Cause that would affect like where do I want to live? And you know that in one of the worlds you would have to have this breathing tube. But I mean that would probably be a real ughmm don't wanna go around there and smell that s**t probably. But in the Cottage Vale might be smelling like flowers and the spraying you know."*

The concept of a "first-person perspective" was also brought up. Participants suggested designing an artefact or installation that lets the visitor take part in a first-person view or a timeline that showcases how the world would react to the visitor's behaviour.

"Yeah, we talked about immersive making, but actually making the first point of view of the user like I am feeling like I'm in this world in some sense."

"One thing I kind of about how to present these different worlds and so on and kind of how to compare them. One thing that could be fun is to kind of set up scenarios and then kind of how would this world answer this question?"

To summarise, while the exhibition succeeded in presenting multiple timelines of what could happen after an industry-changing regulation is announced, there is still room for improvement regarding the exhibition design, the immersion, the clarity of each timeline and balancing the numbers and quality of the artefacts (effort or labour towards artefact fidelity) put into each timeline. Including multi-sensory experiences providing the visitor with more apparent narratives and a more logical viewing flow could contribute to a more affective and memorable experience.

6.4.5 Theme: General Praise

General praises were collected under this theme.

6.4.5.1 Tangibility and Interactivity

Many participants expressed their appreciation towards more tangible artefacts from the exhibition. They generally appreciated the opportunity to touch, smell, and interact with the artefacts. These tangible interactions factor into helped them understand the timeline they were viewing during the exhibition and aided them to feel more connected and resonate with that timeline.

> *"I think it was pretty good that you had a lot of like artefacts and prototypes, that tangible stuff that we can could kind of (touch and feel)."*

> *"I really have to agree with the artefacts as well that they already helped a lot to understand better the world that they're kind of props of, yeah."*

> *"Yeah, ... it presented the settings in a good way. When you have something to actually touch and feel or see kind of, not just read."*

> *"As I said before, I think that the tangible objects help you kind of connect with the worlds."*

6.4.5.2 Quality and Detail

The quality of the artefacts and the overall exhibition design and setup were also praised. Participants noted that some artefacts were polished, and suggested that a lot of effort and attention to detail was invested into the creation of them. The level of detail in some artefacts was also seen as impressive, exceeding the expectations of some participants.

> *"Super well polished and like you could see a lot of work just put into it. So I really enjoyed it."*

> *"I was really impressed with the level of detail in the artefacts. I don't know if I told you when I was there, but I was expecting, just like a few posters. I was not expecting to see all the actual artefacts. So for me that was really cool. And I think it was really well done."*

To conclude, the tangible artefacts were generally applauded. They helped the participants connect with different timelines and have a deeper understanding and a

closer look into the speculated worlds. The attention to detail and the quality of the artefacts not only enhanced the participants' experience at the exhibition but also accomplished the goal of reframing the expectations of each world despite being fictitious.

6.5 Back to the Research Question

At the beginning of our study, we proposed our research question, "What forms of experiences could an interactive design exhibition bring sustainability awareness to future car buyers?" We attempt to address this question through our findings from the exhibition, questionnaire and focus group interviews.

6.5.1 Form of Experience

Our findings from the questionnaires and focus group discussions showed that an interactive design exhibition with a speculative and critical design theme can allow visitors to get in touch more with sustainability awareness. Data from the thematic analysis of the focus group indicated that tangible and interactive artefacts played a significant role in enhancing the participants' understanding of the topic or the theme of the exhibition. It also suggests that artefacts made with more effort were perceived as more resonant and have been shown to improve the engagement of the participants.

6.5.2 Immersion and Engagement

Participants have suggested improvements to creating a more immersive exhibition design. By incorporating different stimulations and interactive elements that utilise other senses, e.g. smell and sounds, the exhibition could upgrade the experience. Helping visitors to connect and immerse in different timelines presented in the exhibition. This type of multi-sensory, rich experience design would potentially engage the visitors and can be a powerful way to foster sustainability awareness, encourage them to imagine and envision a future and allow them to connect, emotionally and personally, with their version of a sustainable future.

6.5.3 Connect to the Reality

Artefacts like "the Black Market Invite Card" or "the Reddit Post" have had the participants resonate more due to their connections to reality. Participants have expressed that they could imagine those artefacts to become a reality in a near-future scenario. This connection and association allowed the participants to understand and reflect on sustainability issues. Creating an experience that is more relatable and, in some way, grounded to reality could be necessary to enable visitors to engage with the exhibition and have the opportunity to reflect on the potential possibility of the exhibition-envisioned timeline becoming a reality.

6.5.4 Creating A Personal Timeline

The exhibition tried to encourage participants to reflect on the sustainability issue, providing four different alternative timelines to start the ball rolling, hoping to deepen the visitors' understanding and awareness of the sustainability issues in the automotive sector. Although the participants appreciated the thought-provoking nature of the exhibition, which encouraged them to consider the future from different perspectives, we could have taken an extra step by pushing them to create their version of the timeline. This kind of pro-reflection exhibition challenges visitors to think critically about sustainability issues. It could be an effective way to raise sustainability awareness and encourage individuals to think about how their actions could ripple into the future.

7

Discussion

In this section, we discuss the various aspects of the evaluation process and the results from the exhibition participant focus groups. We also discuss some of the decisions made along the design thinking cycle and how they benefited or hindered the overall progress of the thesis project. We briefly discuss the ethical concerns regarding using speculative design-based research projects and potential future work.

7.1 Speculative Design as A Design Practice

As we planned on using Speculative Design as a design practice to imagine various aspects of this thesis project, we allowed for a lot of freedom while we followed the various design phases in Design Thinking as outlined in figure 4.1. With this freedom, we were also uniquely capable of incorporating the new design tools in the brainstorming and ideation phases, along with part of the prototyping process.

Since the main focus of Speculative Design is not to focus on the production of products that are commercially relevant but rather outcome-facing, this design practice helped us find the inspiration in the work we set out to create i.e. scenarios, prototypes, future trends, etc. An exhibition based on speculative and Critical design helped the participants engage in conversations that generally would not be possible with typical design projects. Questioning the future, considering alternative outcomes, and hypothesising why specific feelings get triggered by certain futures or artefacts were the solid basis to our entire project. All the while staying within the context of the automotive industry and sustainability.

Based on the outcome of the exhibition, it was clear that the participants were looking for a better future. This healthier, more environmentally conscious future is aware of the growing problematic trends of consumerism and convenience-based economy. Considering the Probably, Plausible, Possible, and Preferred futuristic scenarios, the exhibition was evaluated through the lens of Critical Design from an unbiased perspective, allowing the participants to decide the kind of future they prefer.

7.2 Design Exhibition as An Approach to Stimulate Conversation

After creating all the various artefacts that were connected to various futuristic worlds, participants of the exhibition were able to experience a piece of the future (so to speak). According to the results from the thematic analysis, most of the participants enjoyed the experience despite not having attended a Speculative Design-based exhibition previously. During the exhibition, many engaged in deeper conversation about the exhibition's content and talked about topics around the main focus subjects, such as the future of automotive intertwined with sustainability-minded purchasing decisions. The exhibition provided a safe space to experience and, in turn, dream about various future timelines that catered to each individual's needs. Though we, as designers, exhibited our work of what we think is important for the future, the exhibition was a place to listen and observe what the participants had to say about our perspective and creations.

As a master thesis, the exhibition was smaller than we could have achieved with more time or effort. However, it was a significant step forward towards what could be achieved to evaluate the topic of exhibition design with speculative futures.

7.3 Limitations and Restraints

7.3.1 Time constraints

The duration of the study posed significant limitations, considering that this research is conducted to evaluate a rather intricate and complicated topic of sustainability and by using speculative design as well as critical design as a framework. This was showcased in the form of an exhibition. Even though we have conducted questionnaires and focus group interviews to evaluate whether we have reached our goal by checking the participants' engagement and whether they think the exhibition is thought-provoking or not, the actual effect of whether the exhibition has left some long-term imprint on the participants' attitude towards a sustainability mindset in the automotive sector remains uncertain.

Participants have repeatedly mentioned during the questionnaire and the focus groups that the quality of the artefacts (prototypes) and the details of the artefacts are significant aspects of the exhibition and have a rather big impact on making the visitors connect to the timeline/scenarios we have designed. Remarks were also made during the focus groups: some artefacts are more carefully crafted than others, and some timelines have gotten significantly more artefacts than others. Limited time also affected the quality of some artefacts. We have put in more effort and time on crafting some artefacts that were made earlier, i.e. artefacts from "Solarian" and "Cyberworld". These limitations may have led to participants noticing more positive attributes towards the "Solarian" or "Cyberworld" timelines due to the number of artefacts and the more finely crafted artefacts. Thus leading them to resonate more with these two timelines than the others, i.e. "Cottageville" and "Dystopia". The

constrained time frame for this project could also be considered a limitation to the iterative design processes, i.e. 4.1.1 5-phases of Design Thinking and 4.1.2 AKQA's 4-step Design process. It is essential to iterate through feedback, refinement, and re-evaluation processes for a better final design. However, due to time constraints, we only completed one full iteration. By missing out on a new iteration to refine our design based on the qualitative feedback we have collected, we also missed out on the opportunity to verify some of the results we have drawn more thoroughly.

7.3.2 Resource Limitations

The prototypes created for the exhibition were limited in terms of type, quality, and fidelity due to a lack of resources. The materials and tools used were primarily from Chalmers University's Interaction Design and Technology Studio, which included wood, power tools, a PLA 3D printer, medium-density fibreboards, and a laser cutter. However, for certain items, such as the "Key fob" or the "Fresh air canister", we had to use alternative materials and methods. Furthermore, since the exhibition aimed to showcase a timeline where technology has developed further than the current world, we were limited to showcasing certain artefacts or ideas as to how they should be showcased. For example, the "customisation summary report" was meant to be showcased on some handheld device with a bit more futuristic touch, but due to the limitation, we had to showcase it on a computer with Figma along with an older smartphone. This might have impacted the experience of the visitors and have affected how they resonate with the timeline. The design of the exhibition's artefacts included using AI-generated images from MidJourney. Some of these images were the foundation for various designs, such as the posters for each timeline and the "Solarian Crest". However, our access to the free version of MidJourney was restricted due to changes in their policy. As a result, we could not refine our generated design assets to their full potential. Additionally, because AI-generated art and MidJourney are relatively new technologies, there is a lack of educational materials available to aid in creating believable and practical artwork.

7.3.3 Sampling Method and Participant Diversity

We used a combination of convenience and random sampling methods in this study. Our participants were mainly from the Interaction Design and Technology program(IxD) at Chalmers University in Gothenburg. Although we did reach out to individuals outside the program, most of our participants were from the same program. The convenience sampling method allowed us to find participants relatively quickly, but it limited the diversity of our participants. Our research focused on "first-time car buyers", but we might have only been able to reach a specific subset of this demographic ("master program students from Chalmers University studying IxD in Gothenburg, Sweden, considering the subject of car ownership in the relative future") due to the limitations of our sampling method. To increase the generalisability of the study findings, it is important to broaden the range of participants from different genders, ages, and educational backgrounds. This allows us designers to explore how various factors influence the results and ensure our findings are more relatable to

people with different backgrounds[70]. Participants in this study are mainly from Sweden, which is considered to be one of the most sustainable countries [71]. 76% of the population in Sweden supports stricter governmental regulations to improve the climate situation [72]. As the participants already have a sustainability incentive, they will likely react more positively towards an exhibition with sustainability as the theme. Furthermore, cultural and socio-economical differences can significantly influence participants' perspectives and understanding of the importance of sustainability and the role of interaction design in promoting this social goal. Countries ranked higher on the SDG (Sustainable Development Goals) effort ranks have put in more support for SDGs than those who ranked lower on the list, as countries ranked lower might be facing other issues to prioritise differently due to poverty, health inequity, education inequality, etc., before they can reach sustainability efforts[73]. Additionally, our participants are not necessarily classified as true "first-time car buyers", but rather "future car buyers". Participants from those two demographics may consider different things while visiting the exhibition, i.e. proper car buyers may pay more attention to practical issues while purchasing a car and, therefore, may pay more attention to the inconvenience or convenience a specific timeline car development may bring. In comparison, future car buyers may pay more attention to the implications that such industry changes may cause to the environment. With the above-mentioned limitations, we might have missed out on these nuanced perspectives. In future studies, a stratified or purposive sampling method could be more appropriate since it ensures that specific sub-demographics will be represented and, therefore, provide a more adequate research result.

7.3.4 Participants' Bias

During this study, focus group discussion was used as a data collection method. While it allowed us to gain qualitative insights into how the participants perceived the exhibition and provided us with an opportunity to ask follow-up questions to discuss further specific topics participants brought up during the discussion, there are still limitations. First, the group dynamic during specific sessions was potentially overshadowing participants, specifically since we had 6-7 participants per focus group discussion, and each session ran for 30-45 minutes, not including the ice-breaker questions. Some participants spoke noticeably less than others. This could be because they might feel the need to save some time for those who express themselves more during the discussion, or they think that other participants have already covered some of their thoughts or opinions to not be redundant by repeating themselves. It is possible that some participants had differing views about specific topics during the discussion but were afraid to voice them out because they didn't want to stand out from the other participants. It's also worth mentioning that the majority of the participants were from the same university program and were working on their master's thesis in Interaction Design, which could potentially lead them to guess the topic or direction of the study. Additionally, since we are all friends with the participants, there is a risk that they may provide results that align with what they think we're looking for, further introducing the possibility of bias in their responses.

7.3.5 Researcher Bias

We want to acknowledge researcher bias since we were involved in every stage of this study, especially during the exhibition and the focus group discussion as moderators. Firstly, we were directly involved in the exhibition, as we were there to explain each timeline or world, what happened that caused each world, and the artefacts from each. Even though we tried to provide a clear, unbiased description each time for the participants, we might have inevitably introduced certain emotions, preferences, and inclinations while introducing each world or artefact. These subtle differences may influence the participant's perception of the exhibition and cause them to believe certain timelines or artefacts are more critical than others. Moreover, there might be an observer effect due to us participating in the exhibition closely. Participants might have changed their behaviour because they thought we were observing them during the exhibition during their interactions with the artefacts. Secondly, there may be bias during the focus group discussion. As we were the moderators during the discussion sessions, participants may be influenced by our reactions (verbally or non-verbally) and our responses to their answers. As discussed earlier, they may have adjusted their responses to fit our expectations. To reduce these biases, introducing a third party to hold the focus group discussions could be a potential solution to mitigate this in future studies. Additionally, changing the exhibition format from having us standing amongst the participants and interacting with them to a somewhat more "independent" self-run exhibition, relying on written or other means to present the exhibition artefacts and worlds, could give the participants a more standardised and unbiased experience.

7.4 Generalisability to Other Fields

Our project findings show the possibility and potential of using tangible, physical and digital prototypes and creating immersive experiences to encourage individuals to critically explore sustainability issues, eventually hoping to raise conversations and provocative thoughts among visitors. The interactive design exhibition we held for this project was initially created to raise sustainability awareness among future car owners, but we realised from the results, methods we used and insights we have gathered that there is potential that we can generalise the findings into other fields and industries that are also concerned with sustainability. For example, the fashion and clothing industries, dealing with significant sustainability challenges, could benefit from a similar strategy by creating a similar exhibition to demonstrate sustainable fabrics, recycling processes and the life cycle of garments in speculative and critical settings, what their day-to-day life could look like while wearing this type of sustainable clothing, what the potential annoyances or benefits it could bring with sustainable clothing options could be, encouraging visitors to think about their choices when purchasing certain clothes or fashion items. With the same principle, this format could be applied to industries such as food production, housing and technology manufacturing. Thus, while our research is rooted in the automotive industry, the insights generated and methodologies used could have proposed potential applicability in other fields and offer a promising playground for raising sustainability

awareness across various sectors through interactive design exhibitions in the form of speculative and critical design.

7.5 Engagement with AKQA

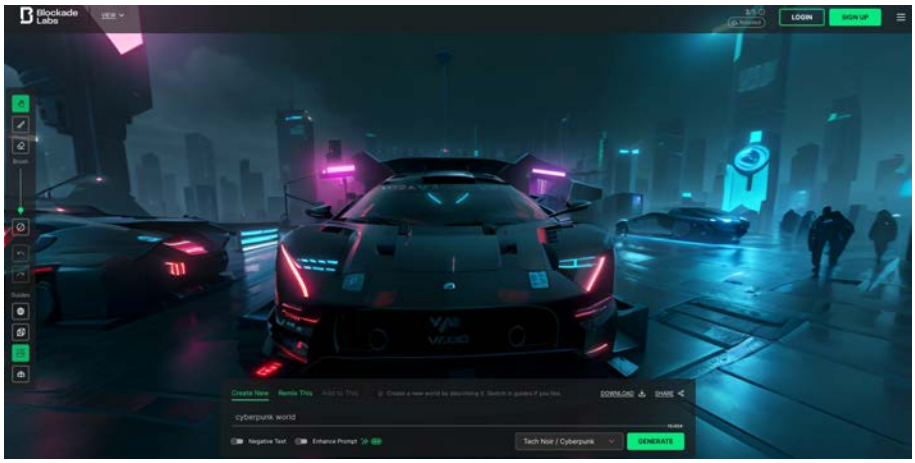
During our collaboration with AKQA, a renowned agency with a strong focus on creating designs and innovation for product promotions and branding, we need to navigate through a more complicated landscape created by the tension derived from the nature of speculative design and the commercial objectives of AKQA's initiatives. Speculative or critical design, characterised by its open-ended narratives and exploratory nature, tends to go in a different direction from commercial design solutions and their main goals. Therefore, it does not necessarily aim to create compelling and marketable design narratives to promote brand engagement and drive sales. Our project, however, is based on speculative design, which meant that our goal and motivations did not necessarily align with AKQA's business interests where our creations (the artefacts, exhibition) and research findings may not be as marketable as their design solution for the initial automotive client we were supposed to work with. Furthermore, the project aimed to raise sustainability awareness while touching upon capitalism and promoting conscious consumerism. This type of speculative design narrative may be rich in foresight and imagination but may lack the plausibility and feasibility of being translated into a marketable product or service. This could potentially create a dichotomy between the research-natured academic project and the results-oriented commercial design. Hence, this dichotomy was not just the source of tension, but it could also be a great learning opportunity as we tried to keep this delicate balance between the business side of expectations and requirements with the integrity and exploitative spirit of speculative design. This forced us to find common ground between each world, find boundaries for each side, and re-evaluate to what extent we can stretch the speculative approach before it loses its resonance in the commercial context.

7.6 Future Works

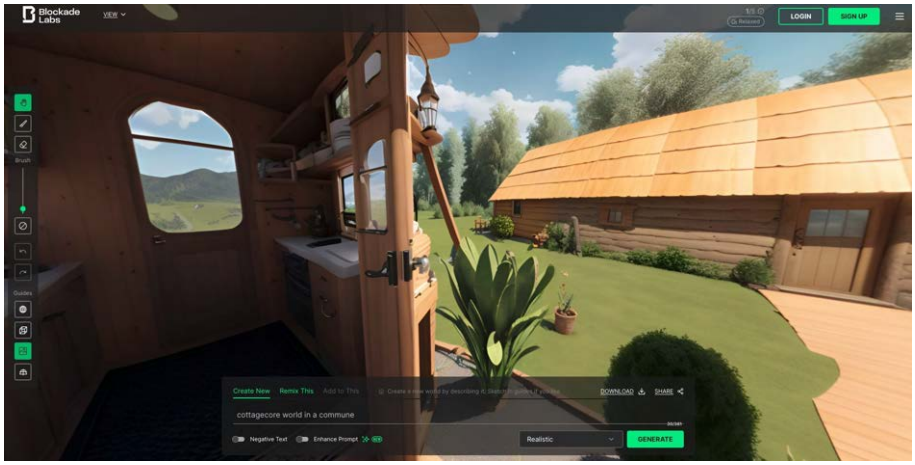
With the emerging trends of an ever-expanding universe in virtual reality, it could have been entirely possible for us to build the worlds we have envisioned with the help of Virtual Reality (VR) headsets. This could have provided the exhibition attendees with a different perspective and type of engagement in the speculated future worlds. Using tools such as Skybox created by Blockade Labs ([74]), we could have made many hyper-realistic views with specific intentional scenarios. This could be the entire exhibition on multiple VR headsets if we chose this approach. However, based on the results of the evaluation phase, participants appreciated the mixed artefacts, i.e. digital as well as physical interactions. Perhaps Skybox could have added another immersion aspect as the focus groups wanted sound-based interactions to be part of the next exhibition improvement.

Using Skybox as an environment-building tool where users can draw minimal line

(a) Skybox generated Solarian



(b) Skybox generated Cyberworld



(c) Skybox generated Cottageville

Figure 7.1: Photo Sphere photo (360deg) images created using Skybox

drawings and create entire scenes or worlds would be highly appealing for a Virtual Reality-based experience. With the help of such technology, users can also quickly

switch from one world to the next for an enriched experience. Though the current VR headsets are not universally compatible with everyone (causing nausea and dizziness in some), this part of the VR experience can be an opt-in section of the overall exhibition. Higher resolution screens with newer product releases can promise a more realistic portrayal of the world in future installations as well. It was noticed by a few focus group members as well as the exhibition attendees that the number of artefacts was not balanced throughout the worlds, which could have caused biased views towards some more than others. This was a valid concern for us as designers before the exhibition was set up. A way to mitigate this effect on participants of the exhibition would be to have four different rooms where each room has a world theme where the room is the experience themselves. As long as the overall experiences are rich, there might be some leniency on the importance placed on the dependency on the discrete number of artefacts. It was discussed with the AKQA designers that the exhibition can have two areas: a “priming zone” and an “experience zone”, separated by a wall. Imagine the current exhibition with all the artefacts showcased as the priming zone where visitors can interact, touch, feel, or observe them with their hands. All of these artefacts describe and extend their respective world(s). Visitors are given a token corresponding to a distinct artefact they want to know more about for the next room. The experience zone would be where the visitors, in select numbers, walk into an enclosed room and experience one world at a time based on the chosen token. The visitor with the token is also given some simple tasks to complete. People can actively gather and react to the information presented for a more direct "cause and response" interaction with the artefacts of choice. This immediately serves as a more first-person perspective of experiencing the artefact within a storyline portrayed by the exhibition designers. This switch from third-person to first-person perspective is based on the feedback received in our focus groups. However, the limited amount of time did not allow us to consider the option, but adds a lot of value for the future iteration of the exhibition. As a more thorough study of the long-lasting effect of the exhibition and the sustainability mindset of the exhibition visitors, we as designers, wanted to consider the option of a much longer time frame for the research part of the design process. We tried to follow up with the attendees until a prolonged point in the future to see if the exhibition has impacted their car purchase decision. This timeline can be considerably unpredictable since some may buy a car soon after the exhibition day or wait for several months or years before making a car-buying decision, however far out that may be. This would require far more resources than what a master’s thesis project can provide, but it is an extended project path to be considered.

7.7 Ethical Concerns

7.7.1 GDPR

The General Data Protection Regulation (GDPR) is a European Union regulation that sets rules for any party, regardless of location or business type, that collects and processes individuals’ data within the European Union (EU). GDPR’s purpose is to allow individuals to have more control over their information and to regulate

all organisations on what and how they collect from individuals and how to use and protect the data[75].

With all the methods and fields of design we have chosen, there are possible ethical issues we must keep in mind and navigate accordingly. The thesis project involves collecting personal data from many participants in the various methods we collect based on our understanding of the users. It is of the highest priority to us that all users are provided with a disclosure of how their data will be used for the thesis project in the context of AKQA or its automotive company client. All data will be handled and compliant with GDPR. All recordings, audio, video, and data collected from participants during the thesis project will be anonymously transcribed and will not be used beyond this thesis project.

7.7.2 Speculation

Regarding the ethical concerns of Speculative design, we know the problem space is selective. Since we are shooting into the future, there are concerns about not accounting for foreseen issues with the chosen problem space of automotive retail space design with conscious consumerism and sustainability in mind. We aim to create situations and allow future buyers, as well as AKQA's clients, to consider the slippery slope of some of the future design solutions. It is worth mentioning that the entire design problem space is relatively prevalent in highly developed nations where consumerism is an issue. This means that the speculative design solutions address certain pockets of local populations rather than a more global scale in all countries, including the developing ones. Given the topic of the study, most of the design solutions from this project might not be a physical installation. They might not be able to be set up in real-world scenarios to test the ethical impact of retail spaces on society or the environment. There is a possibility that there is no need for intervention in conscious consumerism in the automotive industry. It could be that we, the designers in this thesis project, are overemphasising the concerns of consumerism in general. This is concerning in the sense of designers steering the lens used for this project, assuming a position of power that comes with great responsibility. In the context of this thesis project, we are designers or researchers with our thoughts, feelings, opinions, biases, and many other influential humanistic attributes. It is helpful for us to reflect often to be as effective as possible during the design process, especially according to Donald Schön's book *The Reflective Practitioner* [76].

Another concern lies in the speculative design itself. Speculative design, by nature, tries to explore the possibility of the future by taking inspiration from the current trend. In our study, we have envisioned four different alternative timelines after the EU regulation was announced. Those four different alternative timelines represent the imagination of Utopian and Dystopian futures. Visitors may perceive imaginary alternatives as deterministic narratives, leading to hopelessness or complacency. It is important to stress to the visitors that those alternatives are merely a mirror for reflections of the current world situation, not a concrete prediction of future events. Moreover, creating a sustainable future is not solely the responsibility of

the policy-making organisations (as in this study, the hypothetical EU policy). It is a shared responsibility that lies on all of us, and we all must take action. This means that the design needs to clearly demonstrate the speculative nature of the exhibition, encourage critical thinking, and eventually communicate the purpose of the exhibition to the audience.

7.8 Related Work(s)

As mentioned in section 2.6, work by Anab and her design studio SuperFlux has had significant moments of inspiration for us during this thesis project, especially during the prototyping phase and how we as designers can broaden our visions and make even the silliest of ideas a reality. It allowed us to keep our inhibitions low by entertaining all options and giving even the far-fetched ideas a chance. SuperFlux, as an award-winning creative design studio, works closely with Speculative design-based futuristic solution building. They tackle many of the more significant societal issues such as climate change, data science or data mining, inclusion through architecture and urban planning, connectivity or lack thereof, and so on through design research and art practices [77][14]. Introduced in section 2.6, Dunne and Raby's United micro-Kingdoms was a commissioned project for the London Museum of Design [13]. Working with fictional futures was what inspired us also to consider alternative timelines or worlds where we, as designers, can explore the spaces of consumerism and sustainability. UmK experiments with the idea of economy, governance, culture, and overall ethical impact through the exploration of tangible artefacts and design fiction. UmK also challenges the idea of new technologies being introduced to societal groups analogous to how we explored the balancing act of technology and life in the far future worlds.

8

Conclusion

As our surroundings become ever more technologically advanced, new problems are created while solving essential solutions. The car industry is no different. With ever-growing cities and increasing distances between them, connectivity becomes an ever-growing problem to solve. While solving the problem of mobility allows many to access freedom and convenience, it also comes at the cost of higher energy consumption as well as unsustainable material usage practices while creating mobility solutions of today's standards. Our thesis research aimed to investigate the potential experience of an interactive speculative/critical design exhibition that could help foster sustainability awareness among car buyers. Through the data collected from both questionnaires and focus groups, this study has revealed insights that could potentially answer the research question: *"What forms of experiences could an interactive design exhibition bring sustainability awareness to future car buyers?"* and point the direction for future investigations and research on interaction design and sustainability.

We are aware of the pivot of our original research questions from exploring showroom spaces and the design of experiences in such spaces to exhibition design. We still believe they are more related than disconnected. With sustainability in mind, we wanted to still connect the target users of first-time buyers to have a deeper understanding of their decision-making from a less commercialised point-of-view all the while still maintaining a sense of creating interactive experiences that could be built on the chosen themes: future of automotive, speculative design and consumerism.

Our design process indicated that the data collected from the questionnaire and the general feedback from the focus group showed that the exhibition was a success in engaging the audience. Over 90% of the participants, as shown in section 6.3.1, felt that they were actively engaged with the exhibition and found the exhibition to be thought-provoking, which could be an indication that a well-designed interaction design exhibition could be a potent medium to communicate an abstract and intricate concept, such as sustainability, especially when it's coupled with day-to-day industry, e.g. the automotive industry.

8.1 Tangibility and Interactivity

As we experimented with the effectiveness of what prototypes or artefacts appeal to users more, we realised that tangibility plays a significant role is an important

attribute that is of high value in this day of digitisation. We observed that a mixture of digital and tangible objects that are well designed (i.e. high fidelity) can really help with the immersion of any speculative design experience. We also discovered that more engaging and interactive prototypes would be preferred over ones that are more built for idea delivery that is aesthetically pleasing. As we have mentioned before, for various reasons, the fidelity varied across the prototypes created, buy the ones produced with a higher level of intricacy were much more appreciated and admired. Thus further increasing the chances of a longer lasting impression of the exhibition and the main aim of the exhibition - sustainability in the decision-making of buying a car.

8.2 Conclusion

In conclusion, speculative and critical designs allow designers to explore boundlessly and creatively while providing a structured approach to many degrees of freedom. Various prototypes can hugely complement the design process, making fictional futures and scenarios more believable. With newer technologies such as the AI tools utilised in this thesis project, additional dimensions of creative thinking can also be explored within the defined problem space. Though these AI tools might not help with the physical prototype generation, it is highly possible to utilise them in various parts of the 5-stage design thinking process.

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A

Appendix 1

A.1 Informed Consent

Informed Consent - Ideation

Purpose

This workshop is only for ideating on the topic discussed during the introduction and to brainstorm ideas in the ideation and discovery phase of the design process.

Participants' Rights

I understand that my responses will be kept in the strictest of confidence and will be available only to the researcher. No one will be able to identify me when the results are reported, and my name will not appear anywhere in the written report.

I also understand that I may skip any questions that I do not wish to answer. I understand that the consent form will be kept separate from the data records to ensure confidentiality. I may choose not to participate or withdraw at any time during the study without penalty.

I agree to have my verbal responses audio-recorded as back-up and note taking with the understanding that my responses will not be linked to me personally in any way. After the study is completed, the recordings will be destroyed.

I understand that upon completion, I will be given a full explanation of the study. If I am uncomfortable with any part of this study, I may contact any of the researchers from the group, students from IxD program year 2023, course DATX05 **Master's thesis in Computer science and engineering.**

I understand that I am participating in a study of my own free will.

Consent to Participate

I acknowledge that I am at least eighteen years old and that I understand my rights as a research participant as outlined above. I acknowledge that my participation is fully voluntary.

Print Name: _____

Signature: _____ Date: March 9th, 2023

B

Appendix 2

B.1 Design Fiction Scenarios

As part of the prototyping phase, we chose various instances or scenarios where a user could be taking part of an interaction in the chosen future. With the help of AKQA, we were able to pick a future while not restricting ourselves to just a single future. We chose the biodegradable future though it wasn't the majority choice. The initial futures that were discussed with AKQA were as follows -

- 5 big brand collaboration
- Biodegradable car with mobility network and made on-demand
- Car customisation as a fast fashion
- Frankenstein's car

In these futures, the first two were the favoured options while 5 brands collaboration was the winner based on majority votes. We also used a new design method that was introduced by AKQA called "Design End?". <add into methods section>

During the subsequent ideation session with AKQA, we were able to map out what was important for our thesis as well as realign our intentions i.e. working with Speculative design futures, communicating this chosen future to the selected audience, and connecting audience to the future through various artefacts such as exhibitions or experience.

By the end of this session, the design fiction scenarios that were formulated were as follows -

1) How might a user with a car come and biodegrade an old damaged component and replace it? For example, if a user took a component, no matter how big or small, how can they physically take care of it.

2) How might a customer change the design of their car? For example, assuming the car design is modular and parts are instantly swappable, how does a user accomplish this task.

3) How might a non-customer become a customer? For example, if a user is not familiar with a service or product, how can they be convinced of growing loyalty towards said service or product and start using it after.

4) How might the returned element (biodegradable/recycable/re-usable) be refurbished for extended use? For example, if the elements can be turned into compost for farms to grow coffee beans or veggies, etc.

5) How might A.I. based personal car care assistant suggest what components need the most care or suggest components refurbishment based on immediate need? For example, if a user wanted to take their car for a camping trip, how does a rook rack be installed? Or if the user wants to go to the beach or on a skiing trip, how can the car be modified accordingly?

B.1.1 Scenario 1 - Biodegrading an old damaged component

In the year 2045, driving had taken on an entirely new meaning. All vehicles were now assembled using biodegradable materials and renewable energy sources, a far cry from the days of burning fossil fuels and creating a seemingly never-ending stream of waste. The Mobility Hubs, once rare facilities, had become a ubiquitous part of the urban landscape, providing a space for vehicle owners to decompose old parts and obtain replacements as needed.

Dana, the owner of a sleek, algae-powered convertible, had been noticing some peculiar noises coming from the undercarriage of her car. Knowing it was time to visit the local Mobility Hub, she climbed into the driver's seat and asked Care-AI to navigate them to the nearest Mobility Hub facility.

Upon arrival, Dana's personal car care assistant, Care-AI showed up at the screen at the Mobility hub and greeted her. The Care-AI then directed her to the diagnosis bay, where a team of robotic attendants was waiting. They were designed to resemble Solaria's native fauna, with sleek, organic forms and solar-panel feathers that shimmered as they moved. A graceful bird-like attendant approached, extending a gentle mechanical arm to examine the damaged component, as the Care-AI has already exchanged the information about Dana's usage of the car and the potential broken parts. The attendant expertly detached the damaged part, and Dana followed it to the Decomposition Chamber. This space was like an alchemist's lab, with a large bio-digester at the centre, filled with a proprietary blend of enzymes and microorganisms designed to break down the biodegradable car parts rapidly.

As they waited, the attendant explained how the bio-digester was designed to recycle the nutrients and energy from the decomposed parts. The energy generated will be used to supplement the solar panels as the power source, powering the Mobility Hub, and potentially sell back to the electricity grid. These byproducts would then be used to create new, sustainable materials for future vehicle components. Dana marvelled at the efficiency of the system – not only was it helping to reduce waste, but it was also supporting the ongoing production of greener vehicles.

As the damaged part decomposed, another attendant emerged from the Component Repository, carrying a freshly 3D-printed replacement part. This facility acted like a library of sorts, housing a vast array of biodegradable car components. The walls were lined with shelves, where components were displayed like works of art, each one created from sustainable materials like bioplastics, algae-based composites,

and natural fibresAlan, Sarah's grandfather, owned a Omnitech car that he used sparingly. But unfortunately after his passing, Sarah inherited it through a very seamless process that was arranged by the car company, Omnitech. Alan had only owned the car for a couple of years and so it was practically brand new after a few visits to the local repair centres. When Alan passed, Sarah merely inherited the key-fob that her grandfather left behind that she kept away with a few other knick-knacks in a box. Though this box was put away when Sarah was grieving the loss of someone she truly cherished, she never truly inherited the car after Alan's death since she never thought of using it.

One day, while the car sat in her garage, Sarah decides to go through the box of nostalgic things after a long day of work. She takes the car key-fob into her hands and with a quick chime, the screen on the key slowly fades the text "Hello! It's been a while". Then the text fades to "Shall we take a ride?" Sarah enters the garage and the lights in the car come on as she approaches it with the key-fob. Instantly, as her hand approaches the driver's door, the door clicks open while she effortlessly pulls the door open wide enough for her to enter the vehicle. It was a cold winter evening but the car had turned on the seat warmers and almost imperceptibly contours to her body while closing the driver door after she sits inside. The screens on the centre console fade in with the text warmly welcoming Sarah accompanied by a voice asking her - "Hello! I see that you are not Alan. May I ask who this is?" Sarah replies - "Uhhh.. This is Sarah, his grand daughter." [pause] The lights slightly dim in the car to a warmer tone of white. "I am terribly sorry for your loss. He was a great owner of this car and he must have been a caring person." The car takes a moment and replies to her. "Hi Sarah. It is a pleasure to meet you. **I know I wouldn't completely understand your loss but I can try to empathise with you.** I have something I want to share with you. If it is ok with you, I would like to play a video message for you from Alan. It's a recording from when he sat in the car for the first time. Would you like to see it? Sarah's heart starts racing. She was not ready for this but enough time had passed by now and she felt ready enough after a few deep breathes. Hesitantly, she whispers, "yes".

The car dims the interior lights further. Alan's face is now on the centre console screen. He looks excited and distracted while he looks around at the interior of the car. He is feeling the materials and he plays with the knobs, the buttons, and the screen gestures. All the while, Sarah notices he has a grinning smile on his face the entire time. Without her knowledge, she finds herself smiling too seeing Alan once again. Through watery eyes she reaches for the screen to touch Alan's face. The video memory ends and the car's voice resumes to speak to her. "Alan has been a good owner of this car, Sarah. Omnitech and I wanted to wait until you were ready. So here it is - your grandfather has arranged for you to inherit the car if you please. All transactions on the car have been paused after his passing. Of course, they would resume once you choose to take ownership but that is only if you are ready to take that step forward. You do not have to do that now and only when you feel ready to do so. If you choose not to, I will arrange for a car pick up at your current location tonight. You are welcome to hold on to the key-fob which has the video memory I just played for you saved on it for as long as you keep it. However, if you are ready

to keep the car, I can go over a few details with you that take about 2-3mins to truly inherit Alan's car.

Sarah needed time to think about it and voiced what she thought about her decision. The car confirmed and the door clicked opened after a gentle "have a good night for now, Sarah. Talk to you soon." The screens dim to black again. Later in the week, Sarah's old car broke down yet again, she realised that it was time for a new car. She had been hesitant about buying a new car due to the high cost of repairs and maintenance, but after her encounter a few nights ago with the car and learning about her inheritance she gave it another thought. The next day she noticed Omnitech cars adverts during her commute to work from her local bus stop more than usual. Sarah felt like she noticed Omnitech more than she did a week ago. She finally decides to learn more about the car and the company so she once again sits in the car while the car assistant welcomes her back. Sarah tells her she wanted to learn more about what she would be signing up for. The car was happy to help but first wanted to direct her to an Omnitech showroom and books a tour for Sarah later that day. Sarah visited an Omnitech showroom the same day and was immediately impressed by the sleek, modern design of the cars as well as the level of automation at the showroom. Upon entering the showroom, the car's assistant explained what the company stands for and more more features about the highly modular cars; meaning that the various components could be easily removed, replaced or refurbished through environmentally friendly ways. The car assistant also shares more information on the how the majority of the car is made up of biodegradable components that are recyclable and reusable. As Sarah approaches an Omnitech specialist, they greet her and she gets out of the car. "Sarah, this is Roger. He will help you while I am away. I will see you shortly after he gives you a tour of the facility." Roger walks Sarah to a station with many screens and with a few presses and swipes, he shows her an example of how the seats can be changed with the help of a customising station. He walks her over to where the micro repair centre uses various bacterial enzymes to not only break down old seats but also grow new ones. With a few voice consent agreements, the robots take a newly grown seat, mold it to the desired shape, swapped the approved changes to another car in real time. Meanwhile, Alan's car was being washed and cleaned near a booth close enough for Sarah to see.

Sarah was intrigued by this and asked how the new biodegradability affected the car's performance. Roger explained that the highly modular design allowed for easy upgrades and customisation, ensuring that the car would always be up-to-date with the latest technology i.e. if she chooses to keep it that way. He insists that she does not have to but the options are available for owning pre-owned or refurbished certified parts left behind by other customers for a heavily discounted price if she chooses to be thrifty and environmentally conscious. He briefly shows her the wall of compostable components the robots are actively shelving and organising based on the needs of the other customers and is proud to present the zero-waste options that are compatible with Alan's car.

The car's user-friendly design also impressed Sarah. She had always struggled with the complicated controls and systems in her old car, but the Omnitech car had a simple, intuitive interface that made driving a breeze. Especially with the voice

initiated assistant she is now familiar with that all Omnitech cars are equipped with as a complementary feature.

Sarah also appreciated the advanced safety features of the Omnitech cars. The cars were equipped with sensors that could detect obstacles and prevent accidents, and most of the interior was designed to keep her safe and uninjured. She briefly thought about how Alan felt when he first learned about his car and its features. The accident prevention system would keep the car on the road and in her possession for as many years as she chooses. Sarah also witnessed the efficiency of the repair and maintenance process. Unlike her old car, which had required frequent repairs and maintenance, the Omnitech car was designed to be low-maintenance, with most repairs and upgrades handled through automated repair processes and upgrade specialists like Roger. Thanks to the real-time predictive maintenance data that was analysed for every drive.

Overall, Sarah was thrilled with what she saw at the Omnitech showroom. She excited to be part of the Omnitech ecosystem, just like her grandfather. Rogers escorts her back to where they first met and Alan's car approaches them both with a faint door latch clicking open. "Please don't hesitate to ask me any questions if any. For now, your car assistant will help you with whatever you need. Have a good one, Sarah. It was a pleasure to show you around and once again, sorry for your loss. Hope to see you again."

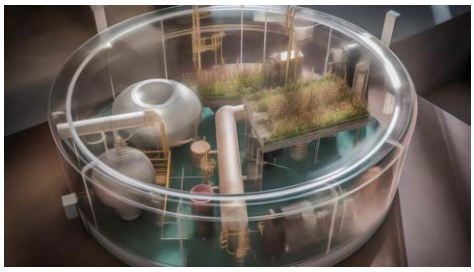
Sarah sits in the car and the car assistant waits for her to initiate the conversation. "I'm ready," Sarah says after a deep breathe to take some of the weight off of her chest. She wanted to keep her grandfather's old car and she needed one too. She had many reasons for why this was a good decision. The car proceeds to walk her through some questions and with just a few steps, the car transfers and confirms ownership of Alan's car into her name. Sarah sees the key fob's screen flash to get her attention. She sees "Hello, Alan!" change to "Hi, Sarah" on the key fob. This made her emotional yet lightened a lot of the burden Sarah was feeling. Sarah asks what she can do with her old car since it isn't even running.

"I can send a specialist over to check it out and Omnitech can arrange for a buy back option if you are certain you would like to no longer drive it. Would you like for me to arrange that for. . . " (after a pause) "early next week? You will talk to Mathilda who can answer all other questions about the process." "That would be great! Thank you so much," Sarah says. "Here to help. Would you like to go home now?" "Yes please."

[pause] "Please follow the directions on the screen. You will be home in 17mins." Sarah feels like she has owned this car for years and so connected to the car. She feels like she will be a loyal customer of Omnitech, just like her grandfather. . They were parts that were taken down from other cars for customisation purposes, but haven't reached their decommission period.

The bird-like attendant carefully placed the damaged component into the bio-digester, where it would be decomposed into its basic elements, leaving no trace of waste. Within minutes, the once-solid car part had vanished, transformed into nutrient-rich

compost that would be used to fertilise the plants within the Mobility Hub, and of course, powers the Mobility Hub and act as materials used to build car parts for others.



(a) Biodigester, inside the building[1]

(b) Biodigester building unit[2]

Figure B.1: Cyberworld artefacts that allow users to be part of or remove themselves from the grasp of Omnitech, a mega corportation, with the help of a rebel group, Vaportech.

B.1.2 Scenario 2 - User changes car design

As Sarah drove her modular car into the automated repair centre, she was excited to see what new upgrades and changes she could make to her vehicle. Upon entering, she noticed that the automated repair centre had a futuristic feel to it - with sleek metallic surfaces and robots whizzing about. As she stepped out of the car, she was greeted by a friendly yet anonymous computer-generated voice that displayed all the basic information about her car, including the components that were recently installed and suggestions for changes that could save her future hassle with preventative maintenance along the walls of the corridor she was walking in near the entrance of the micro repair centre.

Sarah began to browse through the available options, scrolling through the different modules that could be easily swapped out and customised to her liking. Sarah was impressed by how user-friendly the interface was, and how easily she could navigate through the different options. She selected a new set of wheels, upgraded headlights, and a sleek new infotainment system that caught her eye which wasn't needed but she wanted the latest tech in her car. With a few taps on the interface assisted by voice commands, she placed her order and waited for the micro-factory style component swapping centre to get to work.

Within a short time, the micro-factory style component swapping centre got to work, and Sarah watched through the XR goggles as her car was disassembled and the new components were installed. The 3D virtual model of her car in full colour showed her exactly what the changes would look like in real time, allowing her to make any additional tweaks and changes as needed. She saw her car being disassembled in front of her eyes and the new components being installed with precision and care. She was amazed at how quickly and efficiently the robots worked, and how the entire process was automated, from start to finish. Her car was ready and waiting for her after a short while and she experienced it transform into its new form. She climbed

back into the driver's seat, eagerly testing out her new upgrades and enjoying the customised feel of her "new" vehicle. With the help of the friendly interface and the automated repair centre, Sarah had created a car that perfectly fit her current needs and preferences, all without needing to be an expert in car mechanics. Before leaving the micro-repair centre, as the car moved through the last stretch with her in it, the car highlighted the parts that were swapped with infographics showing how the new parts were "better" with new stats and the lifespan of each changed component - all displayed in the car centre-console screens.

As Sarah drove away from the automated repair centre, she couldn't help but think about how much easier it was to customise her car compared to a few years ago. Gone were the days of having to take her car to a mechanic and wait for days to get it back. Now, she could easily make changes to her car with just a few taps on an interface and watch as it was done right in front of her. But it wasn't just the convenience that impressed her. The automated repair centre also had a sustainability aspect to it. With the use of modular car designs, parts could be easily replaced and upgraded, reducing the need for entire car replacements. This meant less waste and a more environmentally friendly approach to car ownership.

As Sarah drove home, she felt good about her choices. She had created a car that was unique to her needs and preferences, and had done so in a way that was both convenient and sustainable. She couldn't wait to show off her new upgrades and tell her friends all about the innovative technology and interface that made it possible. And as she thought about the future, Sarah couldn't help but wonder what other advancements in car technology and design were just around the corner. One thing was for sure - she looked forward to being a part of it all and experiencing the exciting changes to come.

Figure B.2: Car interior screens display relevant information for repair[3]

B.1.3 Scenario 3 - Non-customers change to customers

Alan, Sarah's grandfather, owned a Omnitech car that he used sparingly. But unfortunately after his passing, Sarah inherited it through a very seamless process that was arranged by the car company, Omnitech. Alan had only owned the car

for a couple of years and so it was practically brand new after a few visits to the local repair centres. When Alan passed, Sarah merely inherited the key-fob that her grandfather left behind that she kept away with a few other knick-knacks in a box. Though this box was put away when Sarah was grieving the loss of someone she truly cherished, she never truly inherited the car after Alan's death since she never thought of using it. One day, while the car sat in her garage, Sarah decides to go through the box of nostalgic things after a long day of work. She takes the car key-fob into her hands and with a quick chime, the screen on the key slowly fades the text "Hello! It's been a while". Then the text fades to "Shall we take a ride?"

Sarah enters the garage and the lights in the car come on as she approaches it with the key-fob. Instantly, as her hand approaches the driver's door, the door clicks open while she effortlessly pulls the door open wide enough for her to enter the vehicle. It was a cold winter evening but the car had turned on the seat warmers and almost imperceptibly contours to her body while closing the driver door after she sits inside. The screens on the centre console fade in with the text warmly welcoming Sarah accompanied by a voice asking her - "Hello! I see that you are not Alan. May I ask who this is?"

Sarah replies - "Uhhh.. This is Sarah, his grand daughter." [pause] The lights slightly dim in the car to a warmer tone of white. "I am terribly sorry for your loss. He was a great owner of this car and he must have been a caring person." The car takes a moment and replies to her. "Hi Sarah. It is a pleasure to meet you. **I know I wouldn't completely understand your loss but I can try to empathise with you.** I have something I want to share with you. If it is ok with you, I would like to play a video message for you from Alan. It's a recording from when he sat in the car for the first time. Would you like to see it?

Sarah's heart starts racing. She was not ready for this but enough time had passed by now and she felt ready enough after a few deep breathes. Hesitantly, she whispers, "yes".

The car dims the interior lights further. Alan's face is now on the centre console screen. He looks excited and distracted while he looks around at the interior of the car. He is feeling the materials and he plays with the knobs, the buttons, and the screen gestures. All the while, Sarah notices he has a grinning smile on his face the entire time. Without her knowledge, she finds herself smiling too seeing Alan once again. Through watery eyes she reaches for the screen to touch Alan's face. The video memory ends and the car's voice resumes to speak to her. "Alan has been a good owner of this car, Sarah. Omnitech and I wanted to wait until you were ready. So here it is - your grandfather has arranged for you to inherit the car if you please. All transactions on the car have been paused after his passing. Of course, they would resume once you choose to take ownership but that is only if you are ready to take that step forward. You do not have to do that now and only when you feel ready to do so. If you choose not to, I will arrange for a car pick up at your current location tonight. You are welcome to hold on to the key-fob which has the video memory I just played for you saved on it for as long as you keep it. However, if you are ready to keep the car, I can go over a few details with you that take about 2-3mins to truly

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She finally decides to learn more about the car and the company so she once again sits in the car while the car assistant welcomes her back. Sarah tells her she wanted to learn more about what she would be signing up for. The car was happy to help but first wanted to direct her to an Omnitech showroom and books a tour for Sarah later that day.

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Sarah was intrigued by this and asked how the new biodegradability affected the car's performance. Roger explained that the highly modular design allowed for easy upgrades and customisation, ensuring that the car would always be up-to-date with the latest technology i.e. if she chooses to keep it that way. He insists that she does not have to but the options are available for owning pre-owned or refurbished certified parts left behind by other customers for a heavily discounted price if she chooses to be thrifty and environmentally conscious. He briefly shows her the wall of compostable components the robots are actively shelving and organising based on the needs of the other customers and is proud to present the zero-waste options that are compatible with Alan's car.

The car's user-friendly design also impressed Sarah. She had always struggled with

the complicated controls and systems in her old car, but the Omnitech car had a simple, intuitive interface that made driving a breeze. Especially with the voice initiated assistant she is now familiar with that all Omnitech cars are equipped with as a complementary feature. Sarah also appreciated the advanced safety features of the Omnitech cars. The cars were equipped with sensors that could detect obstacles and prevent accidents, and most of the interior was designed to keep her safe and uninjured. She briefly thought about how Alan felt when he first learned about his car and its features. The accident prevention system would keep the car on the road and in her possession for as many years as she chooses. Sarah also witnessed the efficiency of the repair and maintenance process. Unlike her old car, which had required frequent repairs and maintenance, the Omnitech car was designed to be low-maintenance, with most repairs and upgrades handled through automated repair processes and upgrade specialists like Roger. Thanks to the real-time predictive maintenance data that was analysed for every drive.

Overall, Sarah was thrilled with what she saw at the Omnitech showroom. She excited to be part of the Omnitech ecosystem, just like her grandfather. Rogers escorts her back to where they first met and Alan's car approaches them both with a faint door latch clicking open. "Please don't hesitate to ask me any questions if any. For now, your car assistant will help you with whatever you need. Have a good one, Sarah. It was a pleasure to show you around and once again, sorry for your loss. Hope to see you again." Sarah sits in the car and the car assistant waits for her to initiate the conversation. "I'm ready," Sarah says after a deep breathe to take some of the weight off of her chest. She wanted to keep her grandfather's old car and she needed one too. She had many reasons for why this was a good decision. The car proceeds to walk her through some questions and with just a few steps, the car transfers and confirms ownership of Alan's car into her name. Sarah sees the key fob's screen flash to get her attention. She sees "Hello, Alan!" change to "Hi, Sarah" on the key fob. This made her emotional yet lightened a lot of the burden Sarah was feeling. Sarah asks what she can do with her old car since it isn't even running.

"I can send a specialist over to check it out and Omnitech can arrange for a buy back option if you are certain you would like to no longer drive it. Would you like for me to arrange that for. . . " (after a pause) "early next week? You will talk to Mathilda who can answer all other questions about the process."

"That would be great! Thank you so much," Sarah says.
"Here to help. Would you like to go home now?"
"Yes please."
(pause) "Please follow the directions on the screen. You will be home in 17mins."f

Sarah feels like she has owned this car for years and so connected to the car. She feels like she will be a loyal customer of Omnitech, just like her grandfather.

Figure B.3: Car keyfob with welcoming text as part of the interaction[4]

Figure B.4: Illustraion of the Car keyfob inside a car[5]

B.1.4 Scenario 4 - Returning a car element that is biodegradable to be reused

Dana woke up one morning to find that her car key fob had begun to sprout. She hasn't been using that car for a while and has left the key fob next to the window. Delicate green vines had emerged from the biodegradable casing, reaching toward the sunlight streaming through her window. Intrigued and curious, she decided to visit her local Mobility Hub to see what she could do with this unexpected development.

Upon arriving at the Mobility Hub, she was greeted by the Care-AI, which instantly recognised her and her sprouted key fob. The Care-AI presented her with two environmentally friendly options: she could either plant the key fob, which would grow into a small plant, or trade it back to the Mobility Hub in exchange for a cup of local coffee, grown right on the premises. Dana considered her options carefully. The idea of planting her key fob and watching it grow into a flourishing plant appealed to her, especially since it would contribute to the greenery in her home. She was also intrigued by the prospect of trading in her key fob for some locally grown coffee, a testament to the sustainable practices of the Mobility Hub.

After much thought, Dana decided to plant her key fob, eager to nurture this small life that had sprouted from her everyday object. The Care-AI provided her with a biodegradable pot and nutrient-rich soil, and she carefully nestled the sprouted key

fob into its new home. As she watered the tiny sprout, she could already imagine it blossoming into a beautiful, leafy plant, adding a touch of natural beauty to her home.

Care-AI offered her a complimentary cup of their locally grown coffee as a token of appreciation for her choice to contribute to a greener world. With a smile, Dana accepted the steaming cup, savouring the rich aroma that wafted from it.

As she walked away from the Mobility Hub, her freshly planted key fob cradled in her arms, Dana marvelled at the innovative solutions that the Mobility Hub provided. Not only did they make it easy for her to care for her biodegradable car components, but they also encouraged sustainable choices in everyday life. Sipping her coffee, Dana felt a renewed sense of connection to her community and the environment, knowing that every small action truly made a difference in creating a greener, more vibrant world.

Figure B.5: Car keyfob sprouting rendered image<insert midjourney entry here>

B.1.5 Scenario 5 - A.I. based personal car care assistant

Melissa and her family were preparing for their annual beach vacation. As they packed their bags and loaded the car, Melissa's AI-based personal car care assistant, Care.AI, diligently monitored their preparations. Care.AI was a groundbreaking innovation in automotive technology, ensuring that Melissa's vehicle was always prepared for any journey or challenge. With its sleek interface integrated seamlessly into the car's dashboard, Care.AI resembled a friendly digital companion rather than a complex AI system. Its voice, warm and engaging, was like that of a close friend who knew just what you needed before you even realised it yourself. As Melissa finished packing the car, Care.AI analysed their destination, current weather conditions, and upcoming forecast. "Melissa, I've noticed you're heading to the beach for a week," it said. "Based on the weather and your planned activities, I recommend switching to our all-terrain tires and installing the sand-resistant undercarriage cover

for optimal performance." Melissa appreciated the suggestion and headed to the GreenPort Mobility Hub to make the recommended adjustments. Upon arrival, the AutoMinder scanned her car, and Terra, the AI assistant at the Hub, greeted her. Terra was already aware of Care.AI's suggestions and swiftly guided Melissa to the appropriate service station.

As the all-terrain tires and sand-resistant cover were being installed, Care.AI continued to monitor the vehicle and provide recommendations. "Melissa, I've noticed that you've packed your surfboards but haven't attached the roof rack. Would you like me to guide you through the installation process?" Care.AI asked. Melissa agreed, and Care.AI provided step-by-step instructions through holographic visualisations, ensuring that the roof rack was securely attached and ready for their trip. Throughout their vacation, Care.AI continued to provide valuable insights and suggestions. When Melissa and her family planned a beach bonfire, Care.AI recommended inflating the portable seating stored in the trunk. On a particularly sunny day, Care.AI reminded Melissa to reapply sunscreen and stay hydrated.

As the family returned from their beach vacation, Care.AI analysed the wear and tear on the car and prepared a maintenance report. "Melissa, based on your recent journey, I suggest that you schedule a tire rotation and an undercarriage cleaning at the GreenPort Mobility Hub," Care.AI advised. With Care.AI's help, Melissa and her family enjoyed a memorable and worry-free vacation. Care.AI's seamless integration with the GreenPort Mobility Hub ensured that her car was always well-maintained and ready for the next adventure, adapting to every situation with the care and attention of a personal car concierge.

C

Appendix 3

C.1 Questionnaire

Interaction Design and Technologies Thesis Project Exhibition Questionnaire

* Indicates required question

1. Email *

Inform consent

This short questionnaire is to collect short feedback for the exhibition for the Master thesis work for Interaction Design and Technologies program.

I understand that my responses will be kept in the strictest of confidence and will be available only to the researcher. No one will be able to identify me when the results are reported, and my name will not appear anywhere in the written report. I also understand that I may skip any questions or tasks that I do not wish to answer or complete. I may choose not to participate or withdraw at any time during the study without penalty.

2. Do you consent? *

Mark only one oval.

- Yes *Skip to question 3*
- No

Questionnairs

This questionnaire is aimed to understand the general feeling you have for the exhibition, it should take less than 10 mins to answer.

3. How well did this exhibition engage you?

Mark only one oval.

Not at all

1

2

3

4

5

Very much

4. Is the exhibition easy to understand in general?

Mark only one oval.

I still don't understand.

1

2

3

4

5

It's very easy to understand.

5. Is the exhibition thought-provoking?

Mark only one oval.

	Not at all
1	
2	
3	
4	
5	
	Very

6. Did you understand the concept of this exhibition? (The concept is that after the announcement of the new regulation, 4 potential timelines has emerged, the exhibition shows how each world's life is going to look like from the perspective of automotive).

Optional

Mark only one oval.

- Yes
- No
- Other: _____

7. Did you understand the meaning of the exhibition ?

   Mark only one oval.

   - ◯ Yes
   - ◯ No

8. Which timeline resonates (you connected with) with you the most?

   Optional

   Mark only one oval.

   - ◯ Cottageville
   - ◯ Cyberworld
   - ◯ Solarian
   - ◯ Dystopia
   - ◯ None of them

9. Can you tell us a bit about why you did or did not resonates with this timeline (or none of them)?

   Optional

10. Which one of the artefacts (items or digital media) left you with the most memorable impression?

    Optional

11. Can you tell us a bit why it left you with the most memorable impression?
Optional

Appreciation!
Thank you so much for answering the questions and for participating in our exhibition!

12. Do you want to spending some time for a short focus group interview? (Voluntary) *
We would really appreciate your contribution!

Mark only one oval.

- Yes *Skip to question 13*
- No

Thank you so much for agreeing to take part in the focus group!

13. Please leave your email address or any other form of communication so we will contact you and let you know about the time and date for the focus group interview. Thank you! *

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D

Appendix 4

D.1 Focus Group Questions

1. What do you think about the exhibition?
2. Have you experienced speculative design concepts like the exhibition before?
3. What do you think this exhibition is about? Why do you think we had this exhibition?
4. How does each timeline make you feel? Tell us about each one, which one you connected the most, which one you like the most etc.
5. What do you think could be added to the timeline? What new artefact could be added to make the viewer resonate more and have a more emerged feeling?
6. Which timeline do you see us potentially moving towards? And why?
7. After seeing the exhibition, would you want to live in a more sustainable lifestyle?
8. After the exhibition, do you see themes of consumerism? How about sustainability?

D.2 Thematic Analysis Data

Thematic Analysis on Focus Group transcript

Theme: Genre/Topic of the Exhibition			
Automotive			
	Comments on the topic		"Maybe environmental thing that makes something bad like that makes them very bad. So I think that's really good to pick the car."
	Connection between Automotive & the Exhibition		
Overall Reactions			
	Reaction to Exhibition		"It was cool."
			"It made you think, really… in a way."
			I feel like I was. It was like 4 different books and. You were like. In like the first few chapters where you like trying to understand the world.
			"it made me think."
			"You have like one way in mind of how it will affect things like...Yeah, okay maybe a bad example, but when EU requires like all electronic products to be of use USB-C instead of USB-B or lightning or whatever like you, you have one way in mind of how that will develop. And the same thing with like environmental things. So so like. Yeah. But I think this brings up like. an Important question of things that. Seem like they like because the the first thing you see when you see that kind of statement that everything has to be recycled of 80%. Uh. You think Yeah, that would be great. But like, it's not the only scenario. It can go very many different ways depending on like different other factors like how people will react to them and how would the whole society that would."
			"I think it's a really neat way of creating different scenarios, but maybe also it's like would be cool to see even it would be maybe a bit more boring, but like the way of how it progressed there"
			"Make you think of other way, not just in one way of like this scenario is the most probable, but have multiples, isn't it also very valuable to not say it so it can make us discuss on how like? Things could go in that direction to get our perspectives on it rather than feed us with one linear thought."
	On theme		"I think so. I think it was pretty clear, especially also the like the poster that you had with the car and the horse head, kind of like the four different worlds kind okay. So this is the course or the vehicle is very like central to this."
			"Thingy so and also the car keys, parking tickets and so on. To me it was pretty pretty clear."
			"Yeah, I I think so. Yeah. I actually I think like it kind of gave us a like few a few points to start the conversation where you had like different worlds, right. So it kind of gave us. Yeah, a different parts to start the conversation and maybe to start thinking in our own heads. So yeah."
			"I think so too. And and maybe you brought brought up some potential futures that has like features or quirks."
			"Maybe environmental thing that makes something bad like that makes them very bad. So I think that's really good to pick the car."
Theme: Artefact Engagement			
Artefact Disconnection			
	Biodegradable Car		"I think like the the cars that start to break down."
		Reasoning	"I imagine like having a car like this to get the OR some I missed to pay my bill or whatever and I get the ticket and when I returned to it like. The wheels are no longer reduce and like I would be so mad if I will be able to buy a new wheel for you just because I forgot to buy a ticket. It feels so like the the the, the the penalty of like a minor like stuff would be so hard."
	Breathable Air		"But the one I didn't really interact with it as much, but the like air canister, whatever, from the dystopian one, I felt like maybe wasn't as interactive like you can kindly just read it, but didn't really engage me as much."
		Reasoning	"I felt like maybe wasn't as interactive like you can kindly just read it, but didn't really engage me as much. But I also didn't really take as much time to read it, so could also have been my fault for not actually looking at it."
	Parking Ticket		"I do have a a like a unfair hatred towards the little note that you had like a ticket that you had. Which me and Researcher had this conversation before. Like it. It does not make sense for the parking thing and that the airport."
		Reasoning	"Because do we still have to use the key QR code all the time like?"
Artefact preference			
	Reddit Post		"I also really liked that you made the like Reddit post on the screen. I thought that was really a nice."
		Reasoning	"...because then you really you know, I thought that was more immersive."
			"There were also super well done, so I think those two. In particular, were like made it more immersive?"
	Breathable Air		"I think that the air in a tube painted like the most immersive picture for me who where I like could imagine living there with a very. Small amount of yeah, context...the tube of air with and it felt so frightening or surreal to have to. The idea of reading through or like buying air or clean air.
			"the tube of air with and it felt so frightening or surreal to have to. The idea of reading through or like buying air or clean air."
			" I like the air tube as well because it feels like since while we are biassed, because we worked automotive company with our work, but like there is actually air purifiers in some cars in some markets. But then it's just like."

		Connection to the reality	"...basically in the Chinese market it's pretty big to have air purifiers in your cars. And so it feels like just another step, an extra step from how it all like we're already getting in there. And this is like if we take this and drag it, take it like it, take it once the further this you can't even purify the error that you have like you actually have to buy. So I like that it feels like connected in a way to reality basically."
			"And it's also feels really close to reality sometimes because there are like we know of major cities around the world where the air is like at some points really, really, really, really polluted and like, really bad for health. So like, it's not that far fetched kind of like, even if you in your scenario, it's at least a future and it it's all around, I guess or everywhere. But you can still like still see like ohh this is."
	Black market invite		"I feel like the the with the the the chip thingy with Omnitech. I feel like that was for me. Because it feels like something that. Humans in that that kind of society would do. And like being able to. Good and cheat the system in a way and cause we're resourceful and I feel like in whatever society, there's gonna be some ways that people will try to take and a shortcut, if you know what I mean. Like."
			"I also like the. They're called the things that would give you the. Code the hidden. Yeah, I don't remember what they called those."
		Reasoning	"There were also super well done, so I think those two. In particular, were like made it more immersive?"
	Keyfob		"Key fob. because it gives me hope."
			"I like the the key that can grow and just yeah, falls apart."
			"I also like the key. Yep, the keyfob..."
			"Yeah, I also like the key"
		Reasoning	"It kind of makes me feel excited that I want things to act like that. Yeah, I like the idea. And that it one element has more functions like this question in general."
	Customisation Summary Report		"Your phone with the customization of the cars cause I really like to interact. If it was and like specially with the car one and was really neat to go through and like seal the different options."
	Artefact Blueprints		"I also really liked the the book. The booklet from Cottage core..."

Theme: Feedback on World(s) created

World Preference			
	Solarian		"I would want it to be Solarian"
			"But personally, coming from like an environmental engineering like. Green design kind of background. I really liked both the Solar Topia and the cottage core. I know I'm not getting his name's right, but I really like those because I really liked the fusion of like design and clean living with like nature, I guess cause that's personally what I think, especially in my field of industrial ecology. It really feels like that's what we're going to or like, that's like kind of the vibe of everyone in my class anyway, so."
	Cottagecore		"I see the cottage core as the best life. Like I agree with that. It's unlikely, but I want it to go that way."
	Other alternative worlds		"I thought about that for the first question as well that these four scenarios that you came up with, I don't think that's how I visualise how the future will go. In my head it's more like everything is underwater, we're flooded..."
Futures			
	Future Envision		"The likelihood of it being one of the four is quite small, I mean. And even a combination of all like I mean we have so it. It's too complex to say that this is gonna be the the future. I mean it it, as mother said, it can be the one she envisioned. It can be like a completely different."
			"I just think that we will probably have some kind of technology at least in the future."
			"Maybe people gonna have to go back to a bit more like a nomad life where we in the summers live somewhere in the winters, we live somewhere where they."
			"...it's not. Necessary to well, like one of the four scenarios will probably not be completely true."
		Dystopia	"I guess it's also the dystopian world and like the everything is kind of dead and the world is like all smoked up or fogged up or whatever. And it's also pretty likely I would say."

			"The future will like how it could be a disturbia or like utopia. It it all depends on like. The method of transportation, or what's left of the method of transportation in case of like a dystopian future. In that case, I think. Yeah, it's more for a like a dying wish of the automotive industry to be what? What they'll leave. When they go out, kind of. And so that was my thought. Like if. It could be anything, right? It could be. A way to kind of rejuvenate the world somehow with their the technologies that they have. Ohh the products that they have. And so I was thinking of something like that in terms of dystopian future, but if if it's almost like a side one thing, I don't know it it's it's interesting. To think of. And how how much that would affect like going from point A to B, how much that would that affect our lives as people in that sort of future? Would it affect at all? Do you think could be just like just quick transportation and it wouldn't mean anything at all? Right now he does, but maybe in the future it might not."
		Solarian	"Personally, that really felt like that was more of what we. We think of when we envision the future, especially the solar utopia one."
			"i think Solarian, that one is like the least social changes, it's still a car that you own but just with different questions. but i think the car might just melt instead of sprout, like the car just becoming a mush"
Commenting on 4 worlds			
	Cottagecore		"I have a hard time thinking that it will be like full cottage core that will just drop everything with everything we know right now."
	How it is IRL		"I'd like waht you said about mixing, since that's probably how the world is right now"
			"Where the posters that you had and and also I I think they it's the key as well where you have. Vehicle. So objects that relates to vehicles that kind of decays and also brings up like trees and life from it. Yeah, this I've seen many times like before that we are you see like left out vehicles that are parked inside of the road or something which also have like life growing out of it. But I never actually connected that to the future of. Automotive industry or like how it could be? A point that we could actually make."
World reality			
	Cyberworld		"but I'm the one that is the greatest possibilities, probably like Omnitech because it's quite like capitalistic and people want to profit in the name of an environmental."
			"I felt like the Cyber Topia cyber, whichever, whatever that one was kind of felt most relevant to the present cause. It really reminded me of like. Apple andTikTok and all these like big corporations kind of becoming monopolies over our lives. And that was very interesting."
			"Like 1 presentation we had. Some of our classmates at the presentation about having like subscriptions for vehicles and. And so on. South, that part, I don't know if the cyber punk world where one corporation owns it and you have to kind of earn points and the repair and be a good customer and have subscription and so on seems kind of likely already."
World Reality			
	Mixture of all worlds		"So I think there's always going to be different levels of, yeah, worlds in the world."
Future			
	Future Envisions		"The likelihood of it being one of the four is quite small, I mean. And even a combination of all like I mean we have so it. It's too complex to say that this is gonna be the the future. I mean it it, as mother said, it can be the one she envisioned. It can be like a completely different."
			"I just think that we will probably have some kind of technology at least in the future."
			"Maybe people gonna have to go back to a bit more like a nomad life where we in the summers live somewhere in the winters, we live somewhere where they."
			"...it's not. Necessary to well, like one of the four scenarios will probably not be completely true."
	Influence of future		
		Climate	"I feel like the climate has a big part of it"
			"it's so many factors that play into. Scenarios that are not only man made, but also environments made of Mother Nature is can I ever say."
		Technology	"I think that someone will always struggle and like fight to keep technology. And because it feels like giving up and away to just drop everything. And since we have so much right now like you, our whole society basically is built on technology in one way or another. So I have a really hard time thinking that we will just drop it and go for."
Theme: Feedback on the Exhibition Design			
Suggestions			
	Exhibition setup		"And I know that this is like maybe outside, like too big for the time that you have. But maybe to put it like in a bigger context like just not an exhibition of all four like more focus on one at a time and that like add more to put."

			"Uh, I might have focused on creating a bit more even worlds because now one one of the concepts and I I know that was the goal of course like but it can kind of become an unfair comparison between the worlds when one have way more artefacts than another one."
			"What you can do and kind of set up, but I think that if this was like a larger exhibition, you could kind of play with having like maybe four different paths or maybe first encounter one world and then they come to this regulation sheet again okay and it's like OK, now we rewind back time or something and you walk through this next World kind of or something. It's like ohh yeah, you know, so you you go down one path, you see this regulations and then you can kind of go into the different worlds."
			"One thing I kind of about how to present these different worlds and so on and kind of how to compare them. One thing that could be fun is to kind of set up scenarios and then kind of how would this world answer this question?"
			"In this case, it felt like the EU regulations was kind of in the middle and then you took us to the back and then you started to walk us towards the kind of start again. And I would have wanted to be kind of a straight line or a like EU regulations, this world, this world, this world. So I yeah and very like significant. This is this world, this is this world and maybe."
			"I think that would be cool. I should like to have the work through like you said, like a like, [other participant] said the work through would be nice because. It was kind of, I know that the the situation is that you had to do it in a very quick. Place and quick manner but. That would be nice so that you can actually go through a more of a storytelling kind of. It would be easier for you to tell the story as well."
			"I also agreed that the walk through was a bit confusing, but was good to have you there."
			"One thing that you could do if to kind of get people up to speed, this maybe have a a timeline or something."
		Examples	"I don't know if you kind of really want to do that N be so specific. Ohh when that's this happened we kind of won kind of summer image that okay here we are now now the timelines are splitting here and the sort of the worlds that kind of it generates or something so okay I see. There, here. Here's the dinosaurs. Here we are now. And here are the different worlds and."
Suggestions			
	Regarding IxD aspect in immersion		"But one in the context in another way, like maybe music or like if you understand like more build feeling around maybe want to reflect by like you yeah, something like more going into one. One future in at a time. She like they focus on that one. And really immersed the yeah."
			"Then you might like, affect the person is visiting the exhibition. More like by choosing the music… then there's more factor that can affect. So there's both the pros and cons with everything but the. That's maybe one thing that I would have wished for, I think."
			"My idea was to add. This is obviously something you couldn't do either, but smell."
			"Cause that would affect like where do I want to live? And you know that in one of the worlds you would have to have this breathing tube. But I mean that would probably be a reall ughmm don't wanna go around there and smell that s**t probably. But in the Cottage Vale might be smelling like flowers and the spraying you know."
			"yeah, we talked about immersive making, but actually making the first point of view of the user like like I am feeling like I'm in this world in some sense."
			"Like if you if you do it like how do you immerse the people in the world and so on."
			"I also think like sounds could play a massive role, just like having some background sounds and what really helps you immerse better to worlds. But yeah."
			"...would be cool to really walk into the world as Mr X mentioned."
			"One thing I kind of about how to present these different worlds and so on and kind of how to compare them. One thing that could be fun is to kind of set up scenarios and then kind of how would this world answer this question?"
		Examples	"if you do it so OK, this distinct section for example, these five metres, you can walk here in a straight line is just assigned to the Super futuristic neon TikTok Corporation world. You can like have strobes or lights or the young lights or something to have in shine in that corridor. And then you go. Out into cottage will or whatever, and you have like weeds or some stuff like oatmeal or in the bowl or something to just arrest them. And then okay this is the new world and then this. You see what I mean."
			"For example, what happens if you just leave your car here for two years? In one case it might be a dead horse laying there, or it's the car is locked, so you can't get into it or the car is just starting to like grow a tree. Or it's a metal shrunk? Or how does for example, travelling with your family look in this car? Or how does it work with parking in this world? Can you just leave this horse cart anywhere or do you need to like kind of to okay? To kind of realise multiple aspects of these different worlds and."
		Perspective suggestion	"like making making something a bit more first person perspective like put you there instead of like a give you a show of some other people's life."
Suggestions			
	Regarding the theme/topic of the exhibition		"Give some kind of perspective of how it would develop."
			"I mean, one thing that you have really thought about is that, well, maybe. Not thought about is the ownership..."
			"And I think the kind of narrative in having a for like this speculative design and four different worlds could be expanded upon, maybe the layout of the. Like Ohh how the like audience is supposed to kind of walk through these worlds could be explored a little bit"

		Examples	"...maybe the first thing they see is this regulations, the new laws, and then they go into another world where they can choose between one of these 4 words. So it's like 4 different paths or something. I know that it's quite limited. Yeah, in in the Kuggen. What you can do and kind of set up, but I think that if this was like a larger exhibition, you could kind of play with having like maybe four different paths or maybe first encounter one world and then they come to this regulation sheet again okay and it's like OK, now we rewind back time or something and you walk through this next World kind of or something. It's like ohh yeah, you know, so you you go down one path, you see this regulations and then you can kind of go into the different worlds."
Overall Reactions			
	Complaint		
		Exhibition setup	"For me it was. Like the context for me, like how it related to me like these were just scenarios for me, so I didn't quite catch. What I had to do with it cause it obviously was supposed to evoke some sort of feeling, so I guess for me, but I didn't understand what it had to do with me to get what I mean."
			"One comment I have is that you kind of guided us around and that was very nice and you kind of introduced us to this. But you also said that, OK, if you want to read a little bit more about this world, we have a paper here with some texts, and I kind of wonder how this like exhibition would play out if you weren't there. If if if it was like an open thing, could could I understand without spending too much time and reading all of the stuff, could I understand what was going on and so on."
			"Maybe you should discard my thoughts because I wasn't guided through the exhibition."
			"we were assuming there are, they might be people who don't get the kind of attention that other people might have gotten, cause there's only two of us. So there's no discarding, if anything maybe."
			"Make sure we do them in batches like almost like. Like you know, walking tours almost, you know, like maybe we should be doing that instead. But that comes down to like exhibition design."
			"I also agreed that the walk through was a bit confusing, but was good to have you there."
			"But I think I would have went from one place to the other in the wrong order. If you wouldn't have been there guarding it and maybe a moment to arrive like to have more time in the beginning to really set the scene and get into the topic would have been good for me. And I don't. I think I was just thrown into it a bit too fast and that."
			"I think. I was also a little bit confused about how like where each section goes."
			"...as like narrative aid or like a pedagogic, pedagogic, ohh, you know what I mean, wait to kind of showcase just because some people don't know what speculative design is or splitting timelines or something."
Theme: General Praise			
Overall Reactions			
	Praise		"It was cool."
			"I think it was pretty good that you had a lot of like artefacts and prototypes, that tangible stuff that we can could kind of."
			"Yeah, percent it it presented the settings in a good way. When you have something to actually touch and feel or see kind of, not just read."
			"I thought it was really well polished, seemed to have a lot of work into it, like each and every. Ohh, what do you call them? The artefacts? I don't remember. Yeah, like those are really cool. Really well made. You could see you have put a lot of effort into each and every."
			"super well polished and like you could see a lot of work just put into it. So I really enjoyed it."
			"I was really impressed with the level of detail. Um artefacts. I don't know if I told you when I was there, but I was expecting, just like a few posters. I was not expecting to see all. Actual artefacts. So for me that was really cool. And I think it was really well done."
			"As I said before, I think that the tangible objects help you kind of connect with the worlds."
			"I really have to agree with the artefacts as well that they already helped a lot to understand better the world that they're kind of props of, yeah."