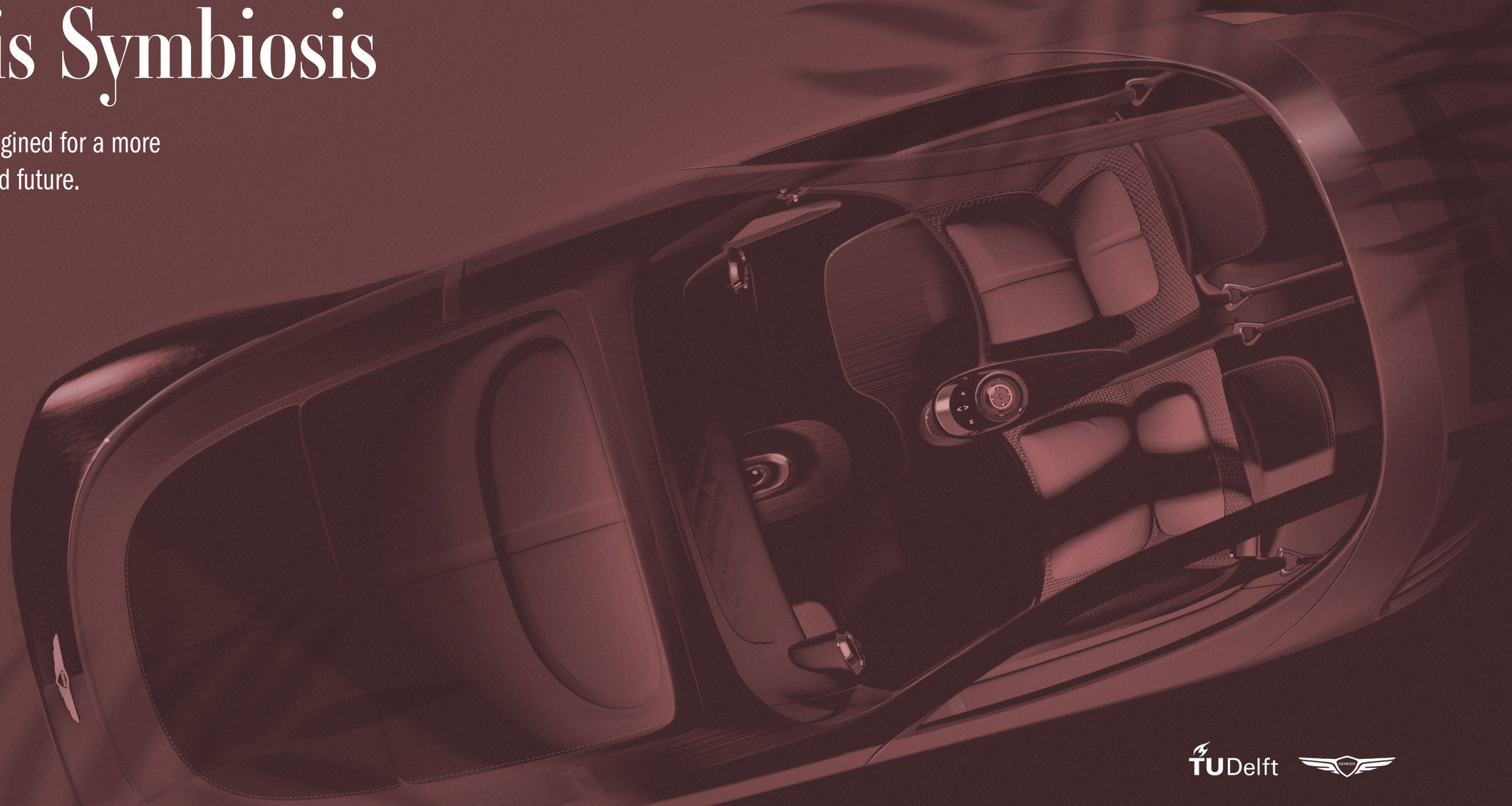
Genesis Symbiosis

Luxury mobility reimagined for a more sustainability-oriented future.



Master thesis
Vitto Bonnemayers

TU Delft

Disclaimer

This master thesis is written for the completion of the MSc Integrated Product Design programme at the faculty of Industrial Design Engineering (IDE) at Delft University of Technology, Delft, The Netherlands.

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Genesis Symbiosis

Luxury mobility reimagined for a more sustainability-oriented future.

'genesis' (noun)
/ˈdʒenəsɪs /
the beginning or origin of something.

'symbiosis' (noun)
/ˌsɪmbaɪˈəʊsɪs /
a relationship between different organisms, entities, concepts, etc. that is to the advantage of both.

(Oxford University Press, 2021)

GENESIS SYMBIOSIS
A vision for a new era of mobility, where luxury and sustainability, people and the environment, benefit each other.

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Preface

The reason for me to study design and come to Delft was actually to pursue my dream of working in the car design field, by graduating at an established brand like Genesis. Since the path towards this career can be long and challenging, having reached this point is special to me.

While chasing this dream of a glamourous car design career from schoolboy to student, the world's attitude towards cars changed rapidly. From being the evocative symbols of progress and identity, I witnessed how they became emblematic of environmental and societal decay - and rightly so. My dream suddenly felt like a loaded topic. Finally, the car industry started to respond and sustainability efforts slowly accelerated.

The days of 'rockstar designers', who turn anything into a sports car, might be over soon; but in return, car designers now have the opportunity to make more meaningful impact on society than ever before. This positive twist is symbolic for what I would like to demonstrate with this thesis. That instead of compromising welfare and comfort, sustainability can actually give more. On a deeper, more profound level. Even when it comes to luxury, I believe.

Ultimately, I see sustainability as a moral issue. We can choose to live in self-interest only, without caring about other people or species that live around us or are yet to come. We can also choose to live a life where we are kind to ourselves and others, to live a life with greater fulfilment. With sustainability it is no different.

I hope this thesis can inspire how sustainability can be a starting point for experiencing luxury in different, yet equally exciting ways. And I hope it will fuel the same enthusiasm that I got when discovering how much hope new developments in both society and technology bring.

The future looks bright indeed. Enjoy reading!

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Acknowledgements

This project would not have been possible without the support of many extraordinary people. First of all, I would like to thank my chair Jan Willem Hoftijzer, and mentors Wouter Kets and Guillermo Mignot for their active involvement. You pushed me to get the most out of this project, whilst giving me the positive, sincere and open-minded guidance I needed! Then, I would like to thank my managers Filippo Perini and Alessandro Serra for this opportunity; as well as my talented colleagues Seyul (Garfield) Choi, Songlin (Vincent) Jiang, Sergei Brühler and Moritz Martin for their tips and support.

Furthermore, special thanks goes out to my unofficial mentors, the heroes in the shadows: Jelle Tjebbes, Joost Bianchi and Victor Andrean. Thank you for being there for me along the way; be it help with designing, project management, or just having fun to rest the mind. You guys made me feel at home in Germany!

Moreover, I would like to thank Nico Munkler and Raphael Bretecher for bringing me into contact with the Genesis team in the first place.

Also thank you to the Hyundai Design coordinators, the people of the VTD workshop and reception for helping me organise the TU Delft visit to HMETC. In addition, thanks to Rolf Verhoeven and Michael Schreiber for their engineering input. And special thanks to Joost Roes, Casper Barendse, Lou Jedeloo and Liong Lie for their enthusiastic involvement and insightful conversations about luxury.

In addition, I would like to thank my parents and sister for their unconditional support and my first car to get around in Germany. Finally, I would like to thank Lisanne for her endless support, refreshing fun and laughter, as well as expert view on sustainability and climate change. Your bright, idealistic yet pragmatic thinking always seems to be one step ahead of the world, thank you for sharing that with me.

Thank you all for supporting me on this journey and making a little boy's dream come true.

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Executive Summary

The main finding of this thesis is that sustainability does not have to be a compromise for luxury (or vice versa). In fact: it can be a starting point for experiencing luxury mobility in new ways that are more beneficial to the environment, the user and the brand - in this case Genesis, the luxury brand of Hyundai. Based on this, a vehicle interior design proposal was developed for a sustainability-oriented future Europe (2035).

Problem

The automotive industry is under increased pressure to become more sustainable and has responded to this with electrification and new mobility services. However, there has been less focus on the interior design, especially in the luxury segment. The underlying problem is that luxury and sustainability do not easily seem compatible, resulting in sustainability efforts that are mostly limited to the trim and decoration of the product. The aim was to go one level deeper (the interaction level) by envisioning a new and more responsible interpretation of luxury mobility.

Analysis

Using the ViP-method, the three pillars of the project - the brand, luxury and sustainability - were deconstructed. This led to the conclusion that traditional luxury is 'ego-focussed'. Conversely, sustainability means looking beyond the ego, namely balancing the needs between users and the environment. This could be achieved with a circular approach to products and reinforcing human-nature connections in interactions. To innovate on this interaction level was considered most interesting, since this was lacking in Genesis' current sustainability strategy. This could be a way to bridge the gap between the brand's ambitious 'New Luxury' slogan and their current interior designs.

Vision

With an overview of the status quo, now the future context could be explored. This was done by studying sustainability-oriented, societal and technological trends that shape future ('new') luxury. With this the Eco-Luxury travel trend was identified, that united luxury benefits (digital detox for mental wellbeing) with environmental benefits (awareness for more responsible behaviour). Based on this an interaction vision was created of exposing users to their environment, inspired by yachts with open-air lounges. This led to a moodboard and scenario that became the foundation for the design.

Design

Next, several ideas were explored for the overall vehicle architecture that impacts the interaction. A GT proportion with off-road capability was selected to fit the interaction vision. Based on this a basic technical package was developed as well as several concepts. The selected concept reinterprets the 'majestic bonnet proportion' of typical luxury cars, with a yachting-inspired lounge deck. Here the user is invited to unwind and connect with his/her surroundings.

The lounge can accessed via an interior that is designed to fully immerse in the travel environment. The space looks airy thanks to the enlarged visibility and a calm and honest design, to prevent any distraction. Autonomous driving makes you focus fully on the road ahead, thanks to the absence of a dashboard with steering wheel. Instead the vehicle can be assisted when nessary with a joystick from the comfortable seating position of a hammock.

Evaluation

The design was optimised after extensive reviewing with professionals, experts and users. This led to a final design that was created in 3D. The design is presented with 2D renderings, as well as an interactive, Augmented Reality model.

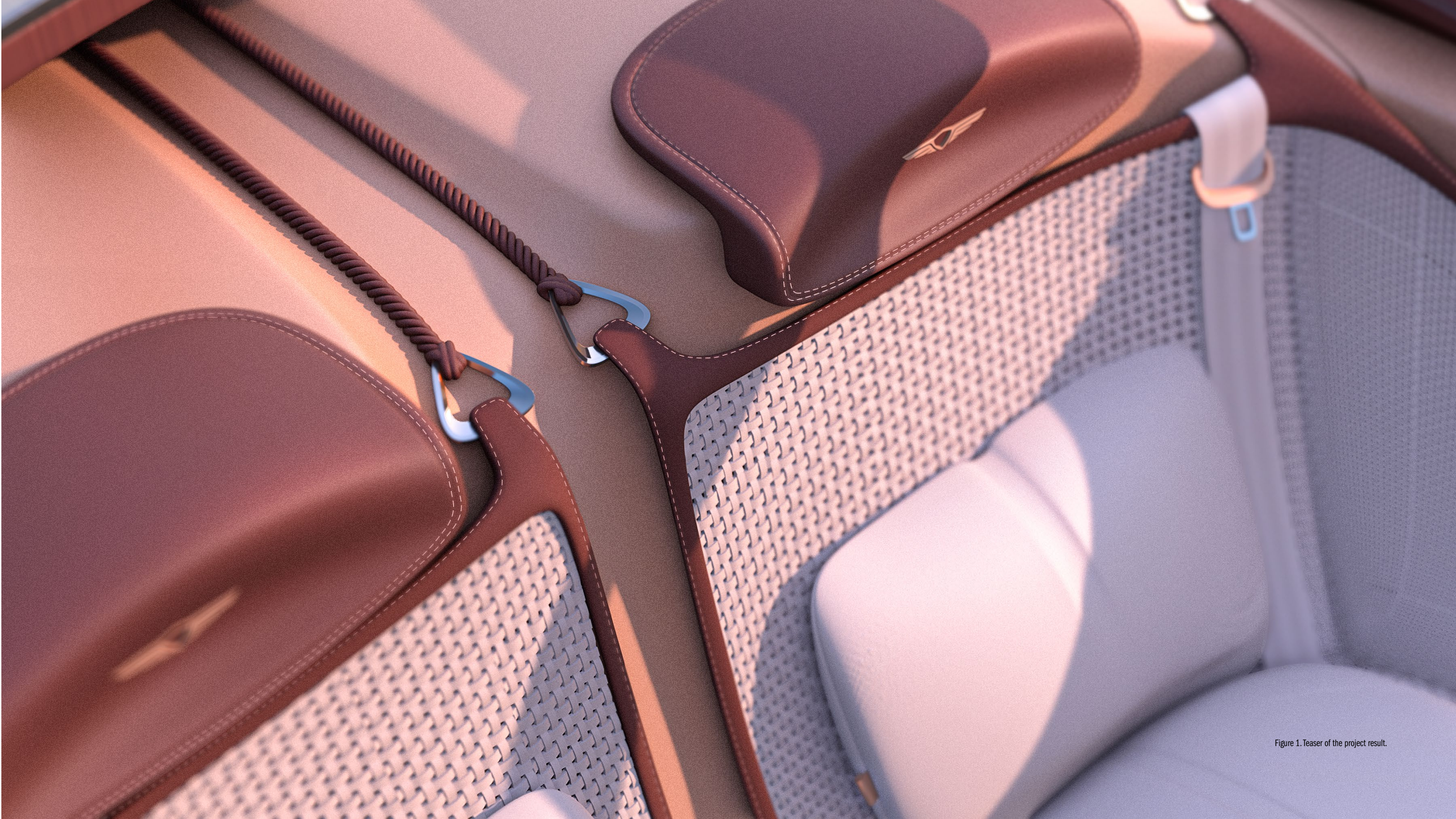

Figure 1. Teaser of the project result.

iv Glossary & Abbreviations

Terms

A-pillar = support post positioned on the side of the windshield, connection the car body to the roof.

Architecture = main composition of all (styling) design elements. Closely related to the layout and/or package.

Cant rail = structural bars running longitudinally on both sides of the roof, starting from the A-pillar.

Gesture = main manifestation of the styling theme;
often a simple, yet recognisable shape.

Instrument panel = dashboard

Interaction = the relationship between the user and a product; related to user experience.

Layout = placement of the main design elements.

Package (design) = the configuration of the main technical components of a car.

Theme = the guiding styling element of the design, also called 'leitmotif' at TU Delft.

Deconstruct = analysing the status quo with the Vision in Design method.

Domain = a set of boundaries for the ViP context

Acronyms

AHP = accelerator heel point
GED = Genesis Europe Design, the design studio that is the client for this thesis.
GHG = greenhouse gas
HMG = Hyundai Motor Group, the parent company of Genesis Motor.
HMETC = Hyundai Motor Europe Technical Center, the European R&D facilities of Hyundai Motor Group where also the Genesis Europe Design studio is located.
IDE = Industrial Design Engineering, the design faculty of Delft University of Technology
IP = instrument panel or dashboard
OEM = Original Equipment Manufacturer; commonly refers to large car manufacturers that are responsible for the design and manufacturing of their own vehicles.
TU Delft = Delft University of Technology
UX = user experience
ViP = Vision in (Product) Design, a design methodology by P. Hekkert & M. van Dijk.
VR = virtual reality

Abbreviations

Gen Z = generational cohort born from 1995-2010.
H-Point = hip-point, the most important ergonomic reference in the technical package.

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III. Design

IV. Evaluation

Key takeaways - Brief

Stakeholders: Genesis Europe Design studio (interior team), as well as TU Delft.

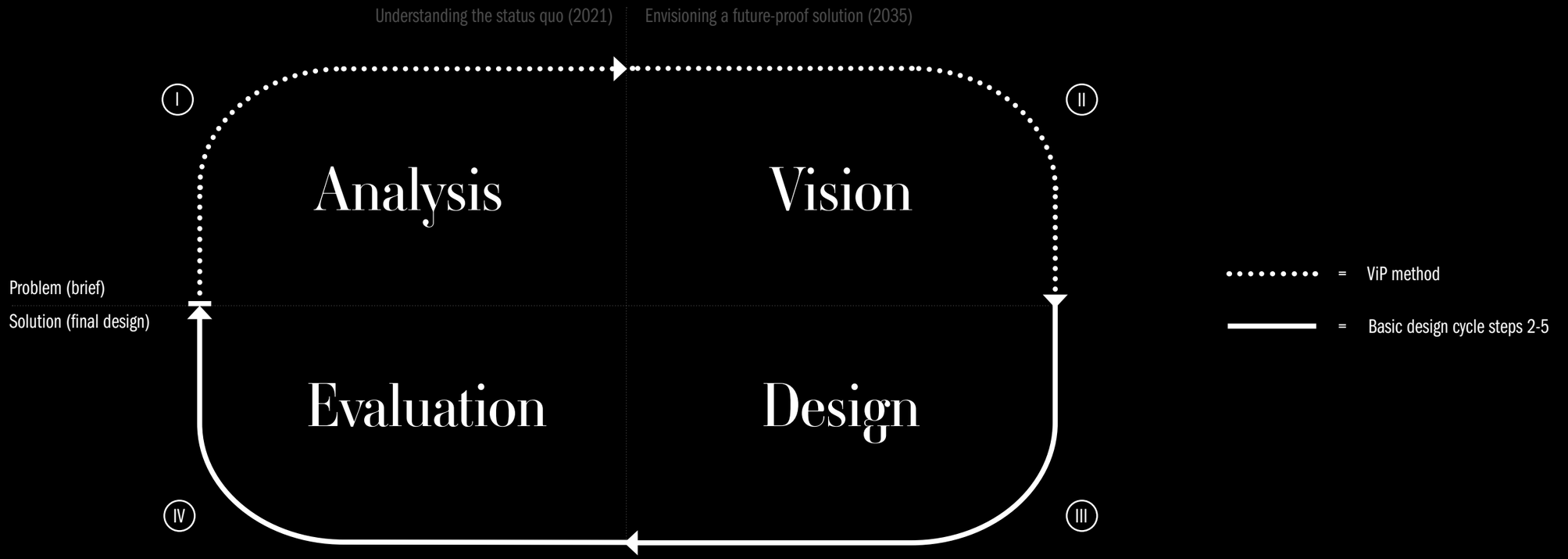
Problem: sustainability and luxury seem incompatible and compromise for each other.

Goal: envision a future Genesis that interprets luxury in a new and more responsible (sustainability-oriented) way.

Criteria & project pillars: fits the brand, luxerious and sustainability-oriented.

Scope: conceptual interior design for the European luxury market in 2035. Eye-catching styling design to spark a debate about sustainability within the design studio.

Methodology: Vision in Design (ViP) method integrated into the Basic Design Cycle, see page on the right.



Process

Figure 2. Process & methodology overview.

00 Design brief

0.1 Introduction and stakeholders

Genesis Motor is the luxury brand of the Hyundai Motor Group (HMG). HMG is a Korean conglomerate which is among the largest vehicle manufacturers in the world (OICA, 2017). HMG's European R&D centre (called HMETC in short) is located in Rüsselsheim am Main, Germany. It features the Genesis Europe Design (GED) studio, which is the main stakeholder (client) behind this project. They are mainly responsible for the styling and concept design of Genesis vehicles.

The thesis is conducted as (remote) internship in the interior team of GED. As the thesis is labeled a 'visionary project' within the studio, their aim is to be inspired by new and creative ideas. GED is represented by Guillermo Mignot (Interior Manager) in the supervisory team. Mignot is responsible for day-to-day guidance whereas Filippo Perini (Chief Designer) is involved in decision making for every major step in the design process. Perini is an authority on luxury car design, as he was previously Head of Design at i.e. Lamborghini.

This thesis is the concluding project to obtain a Master of Science (MSc) degree in Integrated Product Design at the faculty of Industrial Design Engineering (IDE), Delft University of Technology (TU Delft), The Netherlands. The TU Delft is represented by chair Jan Willem Hoftijzer (Head of Design Drawing) and mentor Wouter Kets (teacher and former Senior Interior Designer at Audi).

See Appendix A for an overview of the key stakeholders that are involved.

0.2 Problem

It is needless to say that sustainability has become a priority for the automotive industry to tackle the ongoing climate crisis. The sector plays a critical role in achieving the goals of the Paris Agreement, as transportation currently accounts for over 25% of the energy-related global greenhouse gas (GHG) emissions (Holmblad et al., 2020). These emissions lead to global warming of the planet, which in turn could have severe effects on ecosystems, societies and economies (see Chapter 4, p. 56). From a technical and business perspective, the automotive industry is partly responding to this by introducing i.a. electric powertrains and shared mobility. However, car interior design has been largely neglected (Wellbrock et al., 2020). Especially luxury car makers seem to struggle with sustainability (Garsten, 2021; Tschödrich et al., 2021).

The underlying problem is that luxury and sustainability do not easily seem compatible (Sattler, 2019; Kapferer & Michaut, 2017, p. 2). Often, sustainability is seen as compromise for luxury and vice versa (Heil & Langer, 2017). For example, superyachts typically carry only a few people but require many resources to be operated; whereas ferries are far more efficient in transporting people, but are obviously less luxurious.

As a result, luxury car interiors today exhibit only limited sustainability efforts. They are generally restricted to solutions on the surface - literally - as they mostly concern trim and decoration elements (Berk, 2020). For example, replacing leather and plastics with more eco-friendly variants. Besides this 'sustainable' make-up, the design of luxury interiors seems fundamentally still the same, even when explicited marketed as 'sustainable luxury' (Genesis, 2021; Jaguar Land Rover, 2020; Mercedes-Benz, 2019), see figure 3.

Why is this relevant for Genesis?

The car industry is under increased pressure from regulators and a changing public opinion - including luxury car buyers themselves - to become more sustainable (Wellbrock et al., 2020; Campbell, 2019, Hasmi, 2017). For luxury brands, reputation and brand image is crucial (Kapferer & Bastien, 2012; Fombrun & Shanley, 1990). Genesis is a young brand which has only recently launched itself in Europe (May 2021). Hence, there is an opportunity to set foot in Europe with a positive, more sustainability-oriented brand image.

Why is this relevant for society?

Luxury products generally have a wide influence on the rest of the market due to their aspirational nature (Heil & Langer, 2017). When luxury car buyers are influenced to make more sustainable decisions, that could have a “positive trickle down effect on a wider consumer society” (Harrow et al., 2017).

Why is this relevant for TU Delft?

Mobility and sustainability are considered two key areas of focus for design education and research at the Faculty of IDE (TU Delft, 2017).

Problem:

Luxury and sustainability seem incompatible.

Why important?

Increasing pressure from regulators and public opinion, including luxury car buyers themselves.

(Wellbrock et al., 2020; Campbell, 2019; Hasmi, 2017)

Figure 2. Genesis Electrified G80 (top); Mercedes EQS (bottom left); Jaguar I-Pace (bottom right), all electric luxury cars. All interiors feature more sustainable materials and elements, but overall, the designs seem pretty much the same.

Goal:

Envision a Genesis interior that interprets luxury in a new and more responsible way.

Criteria / Pillars

- Fits the Genesis brand
- Luxurious
- Sustainability-oriented

0.3 Goals and criteria

Addressing the main problem, the goal is to envision a future *Genesis* that interprets *luxury* in a new and more responsible (*sustainability-oriented*) way.

This also reveals the three main criteria: *fit to the Genesis brand*, *luxurious* and *sustainability-oriented*. These form the main pillars of the project.

0.4 Scope

Interior design

The main area of interest is the vehicle interior as the project takes place in the interior design team.

However, the design should be based on a holistic vehicle concept, to look at sustainability on a deeper level (beyond trim materials), using the methods from TU Delft. In addition, the overall vehicle architecture needs to be taken into account to illustrate the usage scenario; as well as to 'sell' the concept to the design management. What type of vehicle this needs to be, is left open by the client.

Focus

The design process focusses on the initial 'fuzzy front end' of product development due to the visionary and explorative nature of the project. Styling, interaction and the overall concept are the most important aspects for the client.

Deliverable

Conceptual design that demonstrates how luxury could be reimagined for a more sustainability-oriented future. The design should look eye-catching and inspiring to spark a debate about sustainability within the design studio.

The format will be a 3D computer model due to the digital workflow of the GED studio and limitations to create a physical scale model (due to home office, time and budget constraints).

Time-frame and market

The assignment focuses on the European luxury segment for 2035, given the role of GED as satellite studio to represent the European perspective on design.
The year was chosen in consultation with Mignot, as 2035 is far enough in the future to distance the project from current (confidential) developments at Genesis.

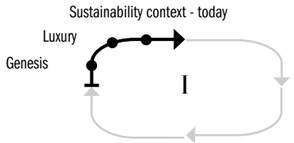
It was also considered well-balanced to allow for creative freedom in the design, yet not too far away to become far-fetched. In addition, the year is in line with the targets by the European Commission for a sustainable European economy by 2035 (Bontoux & Bengtsson, 2015).

0.5 Methodology

In order to fit both the academic and design studio (client) context, a custom design method was used, displayed on the next page. This method is a combination of the Basic Design Cycle (Van Boeijen et al., 2017; Roozenburg & Eekels, 1995) and Vision in Product Design (ViP) method by Hekkert & Van Dijk (2017).

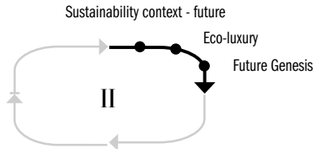
The Basic Design Cycle is one of the most commonly used methods in (industrial) design and therefore forms a solid foundation for structuring the design process (Van Boeijen et al., 2017). The ViP method is integrated into the Basic Design Cycle (forming the first two phases, see figure 2), due to its vision-driven approach that suits the project goal as well as the automotive design field.

This project is structured according to one full cycle. However, multiple smaller loops are often subsconsciously applied when designing anything as big as a architectural theme or as small as a button (Roozenburg & Ekels, 1995).



I. Analysis phase (2021)

The process starts by framing the problem and goal based on the three project pillars: Genesis, luxury and sustainability. This is done by 'deconstructing' the current situation according to the ViP-method; by starting at the Genesis brand and design today (product level), zooming out to luxury today (interaction level) and finally sustainability today (context level).

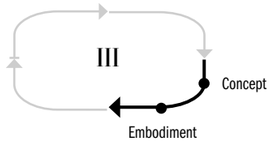


II. Vision phase (2035)

The vision phase zooms in again from context, to interaction, to product level. First a future context is created based on extensive trend research, to discover how sustainability trends and developments could shape luxury in 2035. This leads to a vision for how luxury mobility could be experienced in a new and more responsible way, supported with an analogy for the luxury experience (interaction qualities) and a matching, new take on styling (product qualities). This systematic approach encourages the designer to make sure that the design has a solid, future-proof purpose (Hekkert & Van Dijk, 2017, p. 132). Finally, ideas are explored for how the vision could be realised. These are combined into one final concept, illustrated with a scenario.

III. Design phase

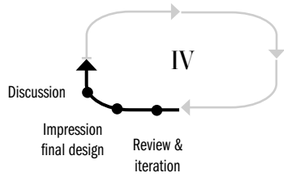
Now the actual designing takes place, based on the envisioned scenario. In order to create a believable technical base for the design, first a package design is explored and created using 3D modeling. This is used as reference for hand sketching to create four different concept proposals. The most promising proposal is then developed in detail in the embodiment phase, using hand sketching and 3D modelling.



IV. Evaluation phase

In order to verify whether the goal and basic criteria have been met, the design is evaluated with professional designers, external experts and luxury consumers. Their input is used to optimise the design. An impression of the final design is presented in renderings, based on the 3D data. Finally, the results and process are discussed in the concluding chapter.

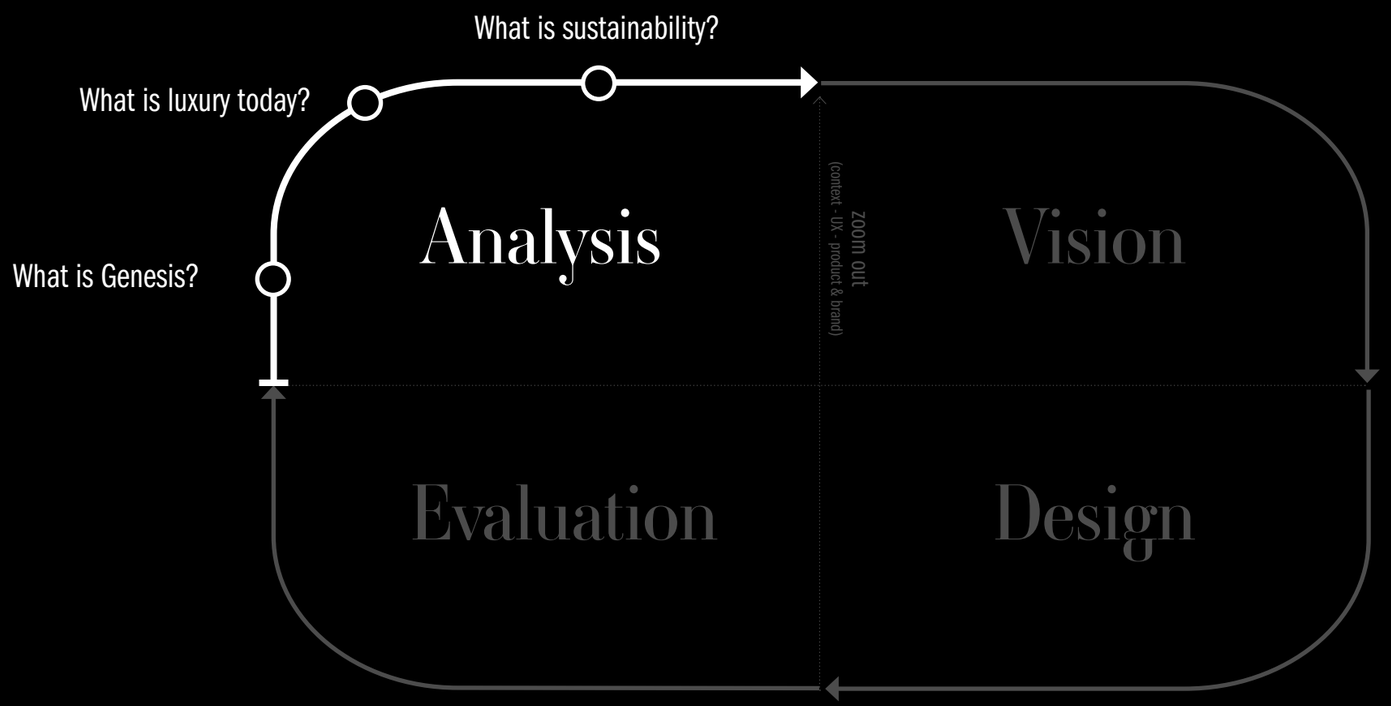
For easy navigation, the header in the following chapters features the same process graphic, to indicate where you are in the process.



Part I

Analysis

Understanding the status quo (2021)


What is sustainability?
What is luxury today?
What is Genesis?
Analysis
Vision
Evaluation
Design
zoom out
(context - UX - product & brand)

Key takeaways - Analysis

Reframed problem

Traditional, 'old' luxury is ego-focussed, namely focussed on providing only luxury for the user - at the expense of the environment (see Chapter 2). This reframed problem is illustrated in a simplified way in figure 3.

Conversely, sustainability means looking beyond the ego with a core definition that highlights the importance of balancing the needs of both humans and the environment. This can be achieved with a circular approach to design with several sustainable and regenerative strategies (see Chapter 3). In addition, driving experiences that reinforce human-nature connections could improve awareness to stimulate more responsible behaviour.

Implications for Genesis

To innovate on this interaction level is considered most interesting, since this is lacking in Genesis' current sustainability strategy (Genesis, 2021). This could be a way to bridge the gap between the brand's ambitious 'New Luxury' slogan and their interior designs, which currently express traditional luxury (see Chapter 2).

However, the overall 'Beauty of White Space' design philosophy is a good foundation for a more sustainability-oriented design (focusing on what is truly important) and will be taken along in the Vision phase (see Chapter 1). This also goes for the 'elegance' part of the Athletic Elegance DNA, since 'elegance' implies calmer, more travel-oriented (rather than driver-oriented) experiences where human-nature relationships are at the core.

Luxury today = ego-focussed

A) User disconnected from nature [interaction level]
B) Design based on linear resource extraction [product level]

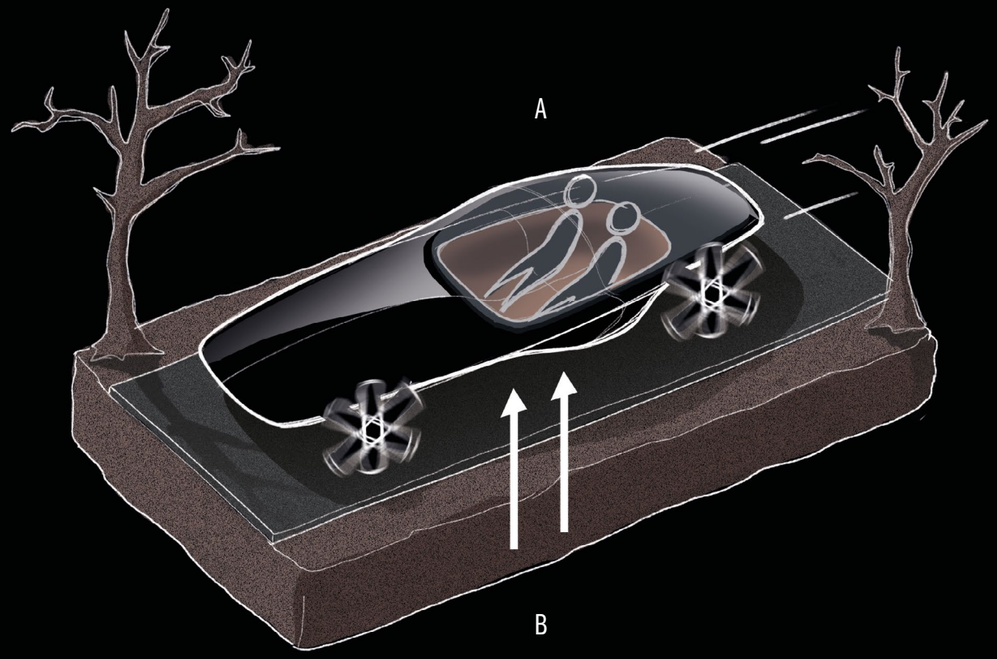


Figure 3. Illustration of the reframed problem.

01 Genesis brand

1.1 What is Genesis?

Genesis Motor is a car brand that was established in 2015 as luxury marque of the Hyundai Motor Group. Before this, Hyundai was creating luxury cars under their own brand, such as the Hyundai Equus (1999-2016), a full-size sedan that competed with e.g. the Mercedes-Benz S Class and BMW 7-series in the luxury markets outside of Europe (Hyundai Motor America, 2010). The name 'Genesis' was first used for an executive sedan under the Equus, namely the Hyundai Genesis (2008-2016).

Following signficant market succes of the Hyundai Genesis, Hyundai Motor Group decided to make Genesis a stand-alone brand to be able to "elevate and differentiate" from the Hyundai brand (Hyundai Motor Group, 2015). A smart move, considering that Hyundai's brand image is connected to lower-budget cars - a move that has been proven succesful before by Toyota with Lexus, Nissan with Infiniti, Honda with Acura, etc. (Siler, 2015).

The Hyundai Equus was rebadged to Genesis G90 and the Hyundai Genesis became the Genesis G80. Genesis now offers three sedans, one sedan-based shooting break and two SUVs. The Genesis G80 sedan (electric and non-electric version) as well as the GV80 SUV were introduced to the European market in May 2021. See figure 7 for an overview of the model range.

1.2 Brand Identity

Method

According to Jean-Noël Kapferer (2008), a leading authority on luxury (Cunningham, 2016) a brand's identity can be explained by six facets and displayed in what is called the 'Brand Identity Prism'. This model is used to analyse the Genesis brand, see Appendix B.

Results

The main statement (also called 'Brand Essence') that was identified to be at the core of the Genesis brand is called 'New Luxury'. This was proclaimed since the launch of the brand by Hyundai Motor Group chairman Euisun Chung (Genesis, 2016) and in the first press release in 2015, which stated that "The Genesis brand seeks to create a new definition of luxury" (Genesis, 2015). This statement is still up-to-date as Genesis used it again to introduce the GV80 for a high-profile commercial during the Super Bowl 2020 in the US, widely regarded as the one of the most-watched events in the world (Iliff, 2020).

So what is 'New Luxury' according to Genesis? "While conventional luxury can be about showing off, new luxury is more about subtly impressing those around you, just as a good fragrance drifts around a room and pleases people" (Hyundai Motor Group 2016, p. 23).

Moreover, Genesis attracts customers that can be described as "progressives who lead the New Luxury and do not identify their status and dignity through the eyes of others" said Hyundai Motor Group chairman Euisun Chung (Genesis, 2016). They are also characterised by being "forward-thinking leaders who are embracing new experiences that drive progress for humanity", explains Mark del Rosso, head of Genesis North-America (Genesis, 2020).

Figure 4. The main statement ('brand essence') of the Genesis brand identity.

1.3 Design DNA

Method

Due to the project's focus on styling and design, the second important brand aspect to examine is the design DNA - also called the 'brand's physique' (Kapferer, 2008, p. 182).

In order to get to know the design of current Genesis cars inside-out, a field study was conducted in which 2 SUVs and 2 sedans were studied in terms of styling (product) qualities. These 4 cars are highlighted (non-faded) in the product portfolio overview on page 28. The field study took place at the vehicle testing facilities of HMETC. Unfortunately, no pictures were allowed to be taken due to confidentiality policies at the facilities. Therefore, similiar, public photos were selected from the NetCarShow database to exemplify the results.

The results were mapped according to the Brand Identity Prism (see Appendix B) to identify the main characteristics of the design DNA for this chapter. They are also used for chapter 3, to highlight how the current styling relates to a feeling of luxury (see p. 32).

Figure 5. Studying the interior of the GV70.

Athletic

Elegant

Figure 6. Genesis design DNA pillars.

Athletic Elegance

At the core of the Genesis product portfolio is the so-called ‘Athletic Elegance’ philosophy, according to Luc Donckerwolke. He explains how 'athletic' implies sportiness and dynamics, whereas 'elegance' implies purity. Combining both leads to the "perfect orchestration of 'muscles' or design elements" according to Donckerwolke (Genesis, 2017). This can be explained with the aesthetic 'law of contrast', an universal theory which describes how contrasting visual elements lead to a better appreciation of an artpiece or design (Van Dongen & Zijlmans, 2017).

Although all models feature a design that balances both athleticism and elegance, the strategy is that nimble and driver-oriented models lean more towards the athletic side; while the spacious and comfort-oriented models lean more towards elegance. This is shown in the portfolio overview in figure 7 on the next page.

The project will focus more on the 'elegance' quality since the vision focusses more on the overall travel experience, rather than being driver-oriented (see Chapter 6).

Product portfolio

Figure 7. Overview of the current Genesis line-up as of June 2021. The non-faded models were studied real-life at HMETC.

In terms of concept cars, only the most recent (relevant) ones are displayed, since they display the future direction for Genesis design the best.

SUV

GV60 (EV)

GV70

GV80

Saloon

G70

G70 shooting brake version

G80

Electrified G80 (EV)

G90

Concept

Mint concept

Essentia concept

X concept

Athletic ⟷ Elegant

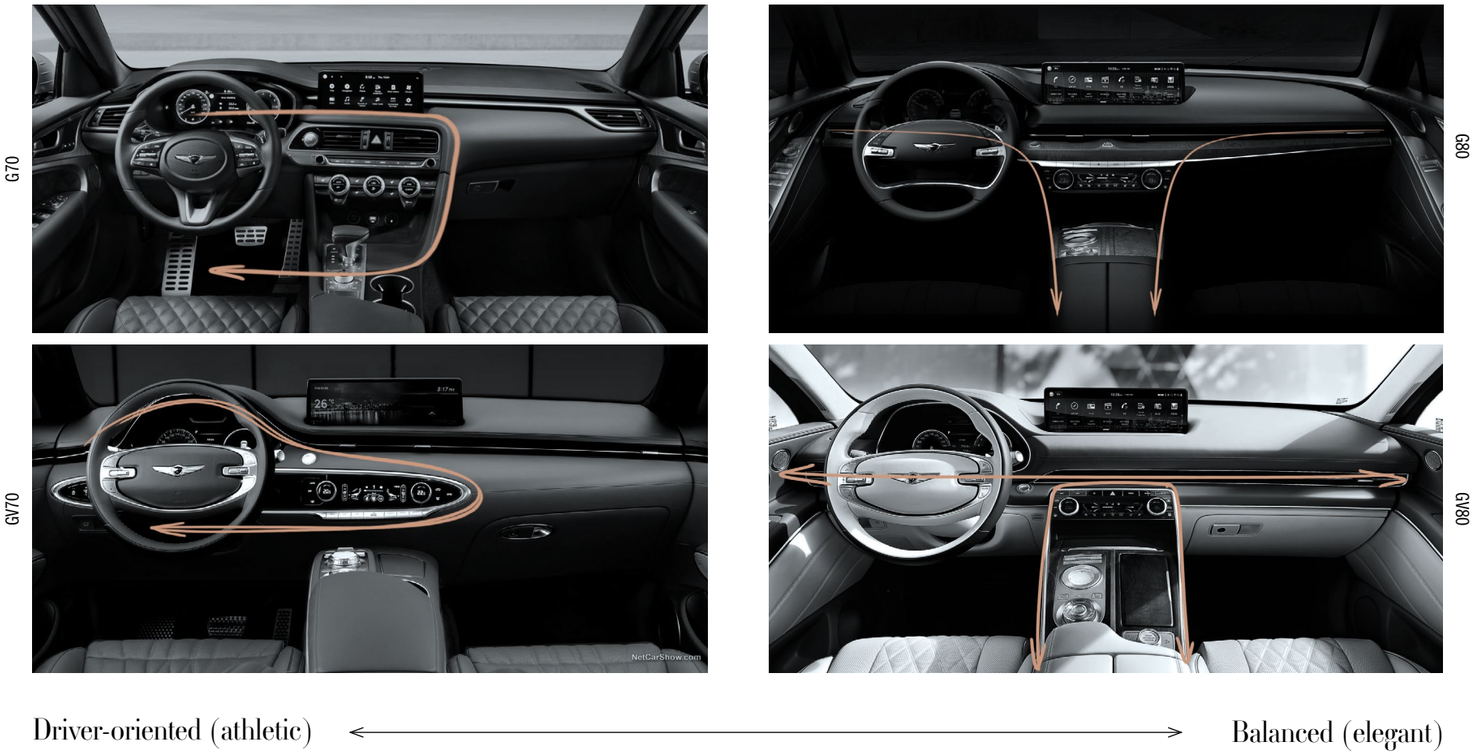
Interior architecture

Figure 8. Example of how the 'Athletic Elegance' strategy is applied to the interior design.

Notice in figure 7 how the exterior designs of the smaller models on the left have a more dynamic look by leaning more forward and more tension in the lines (athletic); whereas the larger models on the right have a more static, upright and clean presence (elegant).

The same 'Athletic Elegance' strategy can be found in the interor architecture designs, as shown in figure 8. This is exemplified with the design of the dashboard or instrument panel (IP), as this component is traditionally the focal point of an interior design.

The smaller models (here: G70 sedan and GV70 SUV) have a more driver-oriented, thus more sporty and athletic design. Conversely, the larger variants (here: G80 and GV80) have a more balanced and elegant design. This is indicated with the beige arrows sketched over the photos.



“The Beauty of White Space”

Figure 9. Left: interior of a traditional Korean ‘Hanok’ showing that every (major) element in the room has been given space around it. Right: same principle applied to the interior design, here in the Genesis Mint concept.

Beauty of White Space - interior philosophy

Within the framework of 'Athletic Elegance', the Genesis interiors follow a specific philosophy called 'Beauty of White Space’. This originates from traditional Korean architecture (Genesis, 2021), as displayed in figure 9.

'Beauty of White Space' does not mean that the design is lacking elements, but that "every design element has been given space to breathe" explains Chief Creative Officer Luc Donckerwolke (Genesis Europe, 2021).

Exterior DNA

Figure 10. Genesis exterior design DNA, showing the Crest Grille and Quad Lights (top) and the Parabolic Line (bottom).

Brand graphics

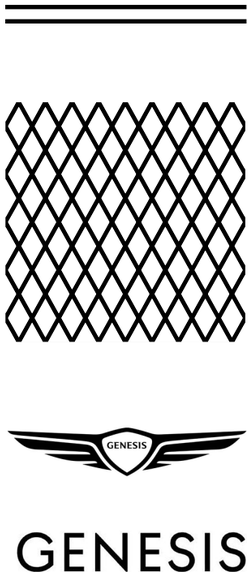


Figure 11. Main graphical elements communicated by Genesis.

Exterior Design DNA

As explained in the design brief, the overall vehicle architecture will be taken into account to visualise a holistic design concept, even though interior design is the focus of this project. Therefore, the two key elements of the exterior DNA were examined as well, see figure 10. The first element is the front of the vehicle which resembles the Genesis logo (the 'crest grille' is the emblem and the 'two line' headlines resemble the wings). These two lines virtually run across the whole car from the headlights to tail lights. Secondly, there is the so-called ‘parabolic line’ (Genesis, 2021), a “long sweeping line” across the side of the car, “gently flowing downwards to evoke the elegance of classic cars of the past” (Genesis, 2020).

Brand graphics

Besides 3D elements, a brand is also represented by 2D graphics. These are important to take into account for design detailing as well as visual (graphic) presentation of the design. Firstly, there is the 'two-line signature' which is not just visible on the exterior designs, but a key element in general brand communication. Secondly, there is the so-called 'G-matrix' diamond pattern, used for textures and patterns throughout the interior (e.g. the quilting on the seats, see figure 8) as well as exterior details and 2D media. Finally, there is of course the Genesis logo and wordmark.

02 Luxury

2.1 What is luxury?

Luxury is an elusive concept that is hard to grasp and much debated (Heil & Langer, 2017; Kapferer 2015). However, Heil & Langer (2013, p.90) managed to create a concise definition:

> "Luxury is something that provides a unique experience in combination with enhancement of the social position."

This is definition is acknowledged and expanded by Kapferer (2015, p. 722), an academic authority on luxury branding. He describes how luxury has two sources of value: "luxury for the self (self-pampering, self-healing, self-elevation, escape from day-to-day life and chores, etc.) and luxury for others, signalling one's positioning in a social group and structure".

Luxury vs. Premium

Luxury is often confused with 'premium', as both concepts appear similar, although they are very different. According to Harrow et al. (2017, p. 175) "premium is something that is just better than normal, whereas luxury is more open".
When luxury is experienced frequency and becomes 'normal', it can be 'become premium' (Harrow et al., 2017, p. 175). This thesis focusses on luxury, since Genesis claims to be a luxury brand since the moment it was established (Hyundai Motor Group, 2015).

2.2 Interviews

Method

Besides the theoretical definition of luxury, there was a need to get a deeper understanding of luxury in practice as well. Therefore, in-depth interviews where conducted with luxury experts and luxury consumers. Open-ended questions where used to allow for a free flowing conversation, in order to gather qualitative insights for the design process (McLeod, 2014). The interviews were prepared according to interview guidelines by IDEO (2015, p. 97-104) and Van Boeijen et al. (2017, p. 47).

Participants

Interviewees were selected that work or consume on the rather extreme end of the luxury spectrum (multimillionaire and billionaire range), since this generates more creative insights for the so-called 'inspiration phase', according to IDEO, a renowned design consultancy firm (Phillimore, 2019; Cooper-Wright, 2015). Two design experts in luxury mobility and luxury living (figure 12) were interviewed; as well as three luxury car owners and consumers (figure 13). These consumers are in the age category of 40-60 years old and therefore representative for the average European buyer of luxury cars today (Campbell, 2019; Francis & Hoefel, 2018). Their personal details are disclosed in this report for privacy reasons.

Luxury experts

Figure 12. Overview of the experts that were interviewed and some of the projects they worked on.

Joost Roes
Senior Designer & Manager
Superyachts and private aviation

Liong Lie
Architect and Director
Luxury villas, penthouses & interiors

Luxury consumers

Luxury consumer 1

"Access to exclusive things that not everybody can afford."

Luxury consumer 2

"Unique experiences that overwhelm and surprise you."

Luxury consumer 3

"Feeling treated like a king: everything taken care of for you."

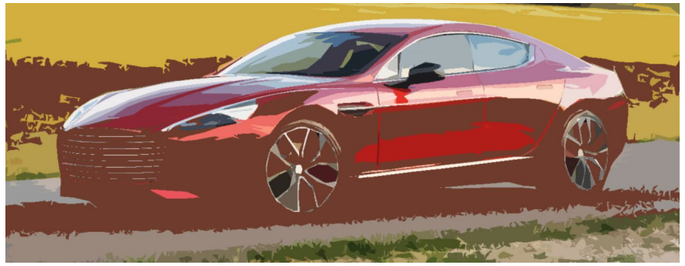


Figure 13. Overview of the luxury consumers that were interviewed, with one of their quotes highlighted. Their picture is blurred for privacy reasons. On the right some examples of the luxury cars they own(ed). From top to bottom: Ferrari 599 GTB Fiorano, Aston Martin Rapide, Wiesmann GT MF4.

Results

The interviews were transcribed and analysed with a deductive approach (Canary, 2019), to connect the data found in the interviews with the theoretical definition of luxury found in paragraph 2.1. See appendix D for an overview of the interview transcripts on which they were based.

2.3 Luxury framework

Luxury in general

The findings were conceptualised in a framework for luxury in general (figure 14). The starting point for this framework was the definition by Heil & Langer (2013) who explained that luxury consists of two elements: social differentiation and a unique experience. This definition was comfirmed by the interview results.

According to experts Roes and Lie, social differentiation comes down to showing status. This is often expressed on a product & styling level via visual cues, a concept known as 'status signalling' (Han, Nunes & Drèze, 2010). The property of 'unique experience' is something more abstract and is connected to the interaction and UX. These two aspects always need to be fulfilled to consider something to be luxury.

However, the ratio between the two aspects may differ per luxury consumer.

For example, Roes explained that throughout his experience working with different clients, he found that millionaires are often interested in showing off their status through luxury products, whereas billionaires are usually more interested in being provided with a unique experience.

This shift in importance, from status signalling to experiencing something unique, is also taking place when the user is frequently exposed to luxury (habituation). In addition, younger luxury consumers (e.g. millenials, born from 1981-1999) also value unique experiences more than showing off status with 'glitz and glamour' (Beauloye, 2019; Oakes, 2019). This is an important insight considering that the design has to be future-oriented, thus targetting younger users.

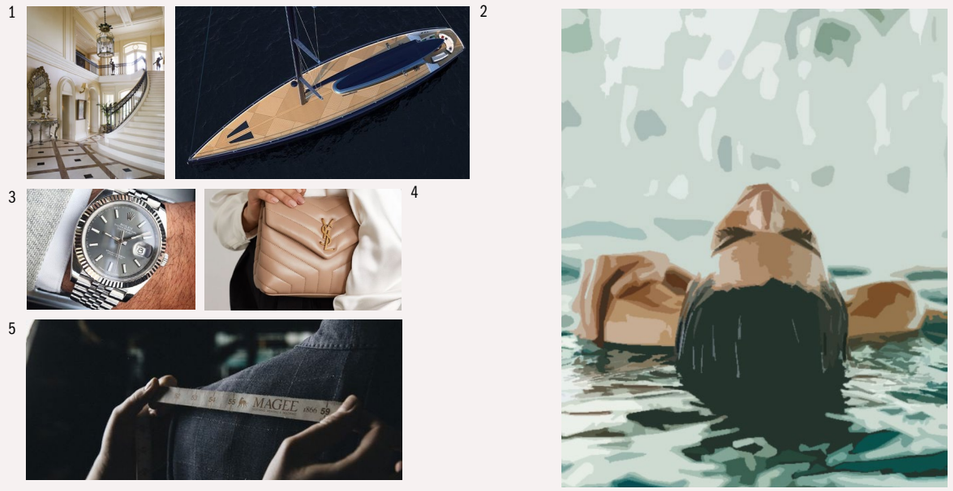
Nevertheless, it should be emphasised again that both aspects - status and unique experience - always need to be considered for something to be luxerious, even though the balance might differ per situation.

Figure 14. Luxury framework; luxury broken down into two aspects. Based on literature and interviews.

Ego - luxury today

Social differentiator
(product & styling)

Unique human-product experience
(interaction)



Traditional luxury cues

Pampering

Figure 15. Luxury framework filled in for luxury today.

Luxury products today

The theoretical framework on the previous page is now used to show how luxury is expressed and experienced today. Traditional visual cues that signal status on a styling level were also discussed with luxury experts Roes and Lie. The ones applicable to car (interior) design are: 1) generous (negative) volumes, 2) grand gestures, 3) intricate details indicating craftmanship, 4) exclusive materials and on top of that 5) personalisation. This is exemplified with images of typical luxury products in figure 15.

On a UX (interaction level), luxury products should offer a unique human-product experience - or human-machine experience in terms of a car. The unique aspect what sets luxury experiences apart from 'normal' experiences today, is the feeling of being 'pampered'. This was mentioned frequently during the interviews and expressed in various ways, such as "being treated like a king", "treating yourself with new and exclusive experiences" and "indulging in pleasure and comfort". This is displayed with the analogy of a spa in figure 15.

Ultimately, luxury today revolves around the ego of the luxury consumer, as it provides status and pampering for the self - called 'ego benefits' by Kapferer (2017, p. 32). That is why the word 'ego' is chosen as summarising term.

Figure 16. Luxury framework filled in for how Genesis manifests luxury today.

Genesis luxury today

With a benchmark of how luxury is expressed and experienced today, the framework is now applied to the current Genesis interior. By comparing the images, it is assumed that the same, traditional luxury cues can be found in the Genesis interiors today. This is interesting considering that a European perspective towards luxury was at the foundation of the framework, whereas Genesis is a Korean brand. However, Genesis' global design strategy, with many cultural influences outside of Korea (such as the GED studio) to target global markets, might well explain this. Only 5) personalisation is not really possible. Genesis offers different colour and trim packages to choose from, but does not focus (yet) on truly bespoke design, e.g. in co-creation with the customers, which high-luxury brands such as Rolls-Royce do. Therefore, this aspect is left out of scope.

With regard to the UX, Genesis considers the user to be their guest, which comes from the Korean principle of 'Son-Nim' (Genesis, 2021). Chief Creative Officer Luc Donckerwolke also explains that the interior feels like a "curated butler service, delivering exactly what you need when you need it" (Genesis Europe, 2021). Hence the analogy is made with a luxury hotel lounge. This is in line with the interview results, where it was mentioned that in particular luxury hotels and resorts provide an experience of feeling pampered. The hotel that is shown as example is the exclusive JW Marriot hotel in Seoul, South-Korea.

03 Sustainability context - today

3.1 What is sustainability?

Sustainability can be an abstract term involving multiple aspects. One of the most widely used frameworks in sustainability called the 'Triple Bottom Line' or '3Ps', describes how sustainability involves rethinking how we treat the planet, people as well as (business) profits (Elkington, 1994). This project focusses mainly on the 'planet' dimension, since environmental sustainability (i.e. reducing CO_2 emissions) is the priority for the car industry. The 'people' dimension usually refers to social sustainability, e.g. fair labour conditions, for example what the fashion industry is most concerned with. 'Profit' refers to the economic aspects of sustainability.

Circular economy is a commonly used framework for the 'profit' dimension to describe the economic opportunities of sustainability. However, it is also applicable on a much more holistic level. It proposes a systematic change from our linear, 'take-make-dispose' economy that we know today, to a circular economy where waste is not disposed, but seen as 'food', a valuabe resource (Ellen McArthur Foundation, 2013, pp. 22-24). This is explained in figure 18.

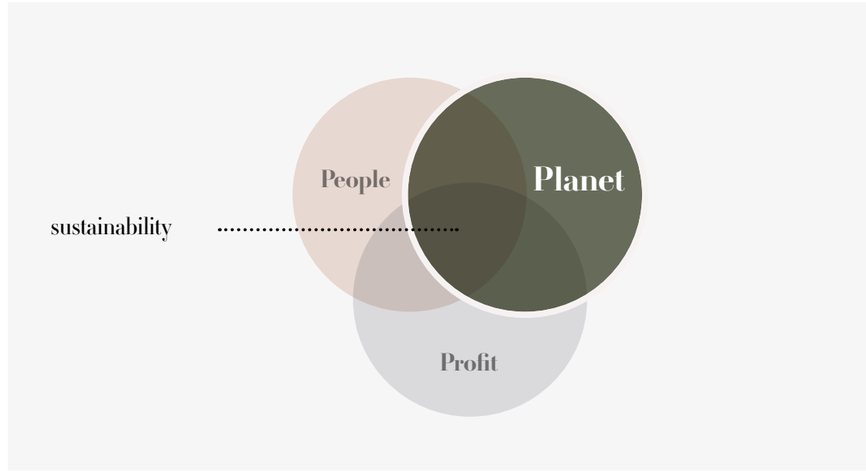


Figure 17. The 3Ps and focus on the 'planet' aspect when it comes to sustainabilty.

Linear economy

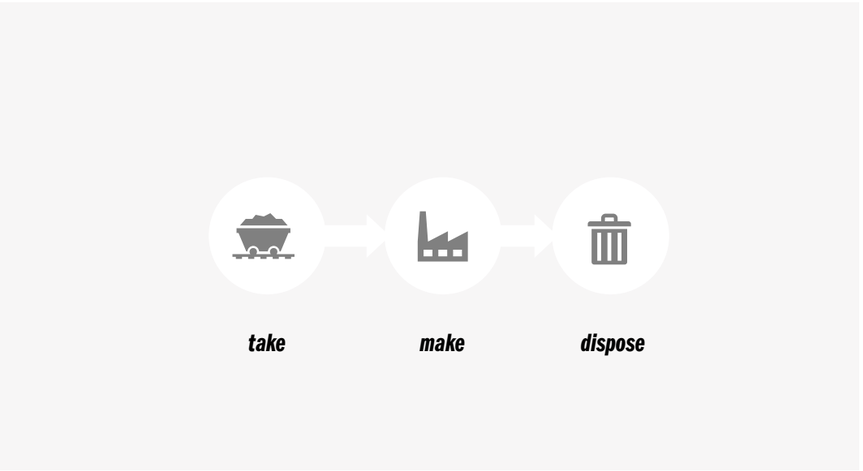


Figure 18. The basic principle behind our current, linear approach to design explained.

Circular economy

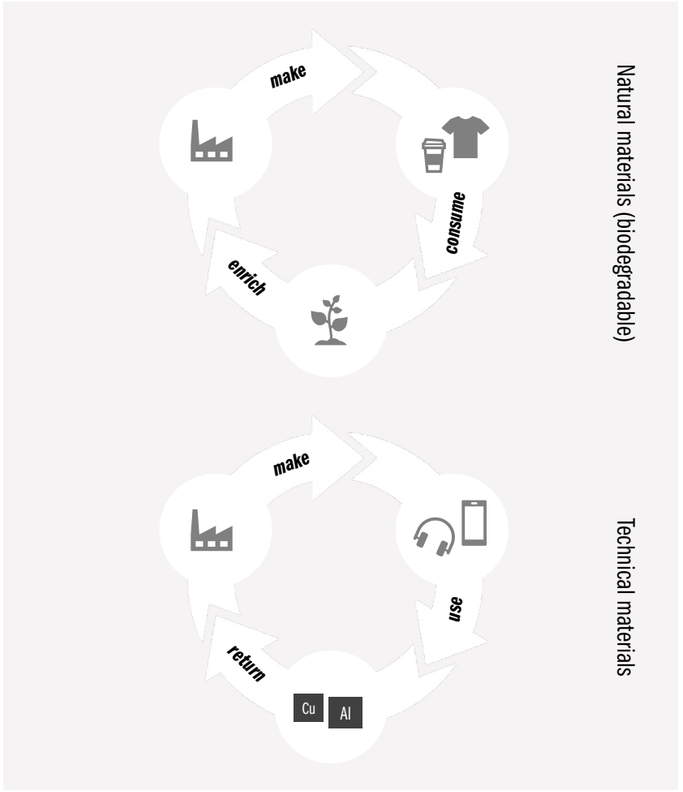


Figure 19. Basic principle of the circular economy explained.

This approach is applicable to product development as well and will be kept in mind when developing the holistic concept behind the design, as well as the interior design itself. Adopting a circular approach has not yet been done for the design of Genesis vehicles, but is an important future target for parent company Hyundai (Hyundai Motor Company, 2021).

Defining sustainability

In order to fully define sustainability for this project, a definition needed to be found that includes the environmental focus, the European perspective, and is also applicable to design. For this, the following definition used by the World Design Organisation (2021) and European Health Futures Forum (2021 is adopted: "sustainability refers generally to the capacity for the biosphere and human civilization to coexist".

> "Sustainability = Symbiosis, meaning coexistence between the biosphere and human civilization."

The word ‘coexist’ is key here, as Brown et al. (2018, p. 8) explain how sustainability is also not an end-goal, but merely a “state of equilibrium” where the human impact and consumption of resources would equal the ability of the planet and ecosystems to replenish (Barbier, 2010). In other words, when we are sustainable, we are simply not adding any new damage.

This is explained in figure 20. The left side of the graph shows how sustainable design practices enable a shift from 'business as usual' towards this equilibrium of a 'sustainable' world, by reducing negative environmental impact.

It is often marketed wrongly that sustainable products are 'good' for the environment, but in reality, they are 'less bad'. When products are designed to have actual positive impact on the planet, this is called 'regenerative design'. This is shown on the right side of the graph, where doors are opened to restore environments and communities for a healthy planet and population (Brown et al., 2018, p.8).

However, given the growing magnitude of environmental challenges, just changing the products around us is not going to help much when people's behaviour stays the same (Klaniecki, Wuropulos & Hager, 2018). Hence, it is important to look into behaviour change on a deeper, interaction level. This has the potential to work on both the sustainable and regenerative level, as pro-environmental behaviour can lead to decreasing impact (e.g. reducing household waste) as well as positive impact (e.g. volunteering in a beach clean-up).

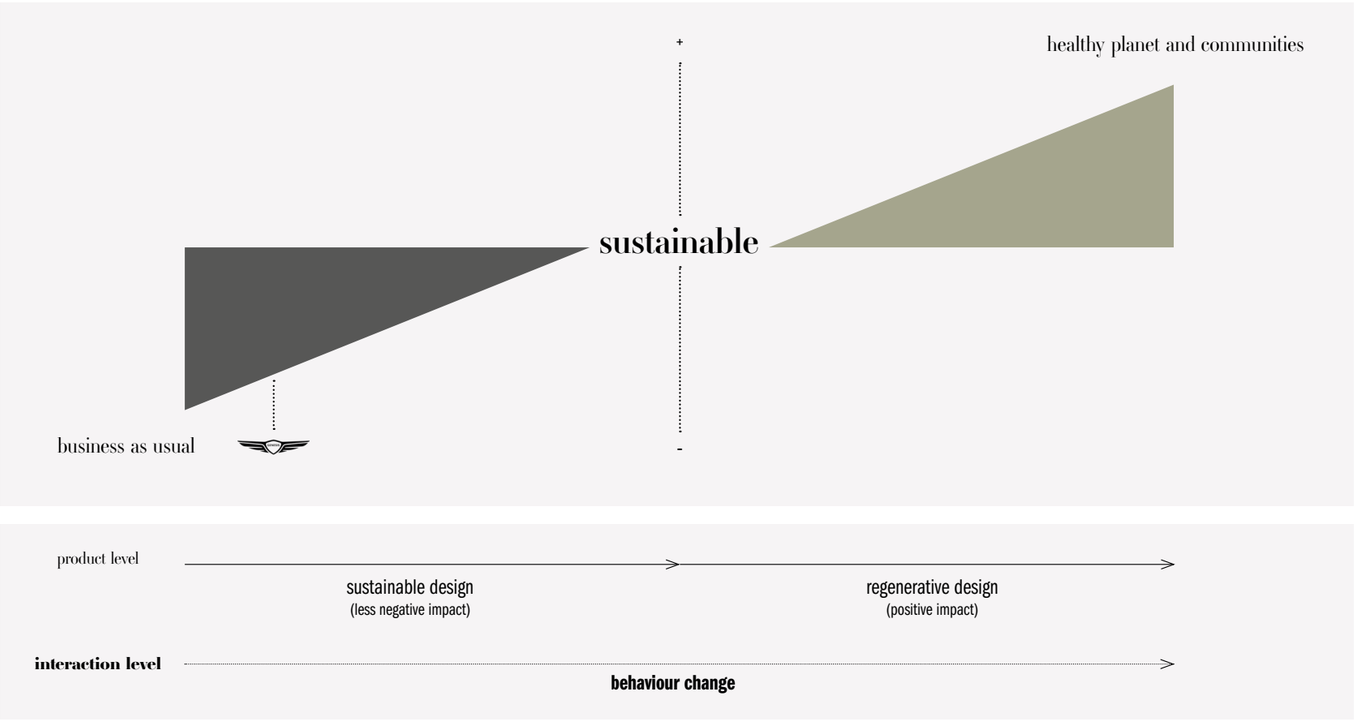


Figure 20. Explanation of what sustainability means, and what can be done to strive towards it; both on a product and interaction level. This latter level is highlighed, since sustainability-oriented interaction became the main driver behind the concept.

3.2 Genesis' current sustainability strategy

Genesis recently revealed their first electric cars - the Electrified G80 (April 2021) and GV60 (August 2021), both not for sale yet. It is a good start, but as the rest of the line-up is still not sustainability-oriented (yet), this puts the brand on the ‘business as usual’ (left) side of the graph.

However, on 2 September 2021, Genesis released a sustainability strategy for the first time. This focuses mostly on electrification of the line-up, with 8 new models planned for the future (Genesis, 2021). Clearly, Genesis aims at becoming more sustainable on a product level. Concrete sustainability-oriented ambitions on the interaction/user experience level, are currently still lacking.

Therefore, sustainability-oriented interaction (behaviour) strategies were explored to build on their current strategy. However, first strategies on the product level were explored, to get a better overall understanding of sustainable design.

3.3 Sustainable design strategies

The state of the art in sustainable design for the automotive industry was explored on four levels, zooming in from system to detail level (see figure 21) to ensure a holistic approach as mentioned in the brief.

To benefit from the technical expertise developed at HMETC, R. Verhoeven (Manager Interior Engineering) and J. Schell (Sustainable Materials Engineer) where interviewed to gain input on the structural and material level (see Appendix E)

Sharing & ownership

Shared mobility has been recognised by the EU as an essential element in the shift to a more sustainable future (European Commission, 2016). The main benefit behind shifting from ownership to access on demand, is more efficient use of resources, as most privately owned cars are only used 5% of their life cycle (Shaheen, Cohen & Farrar, 2019).

Positive sustainability-oriented effects include fewer emissions from less cars on the road and in production, as well as reclaimed parking space for urban green areas (Holmblad et al., 2020). Negative sustainability-oriented effects could be less emotional bonding with the product and a lower feeling of responsibility - also called 'sharing without caring' (Mai, 2020; Vezzoli et al., 2018).

Three types of sharing models currently rising in the European luxury mobility domain were explored. The first model is luxury ride-hailing and -sharing. Ride-hailing refers to a user 'hailing' a chauffeur - usually via an app - to bring him or her from A to B. Uber Premier (previously known as Black or Lux) is a well-known example. It differentiaties itself from standard Uber rides by offering luxury segment cars, more

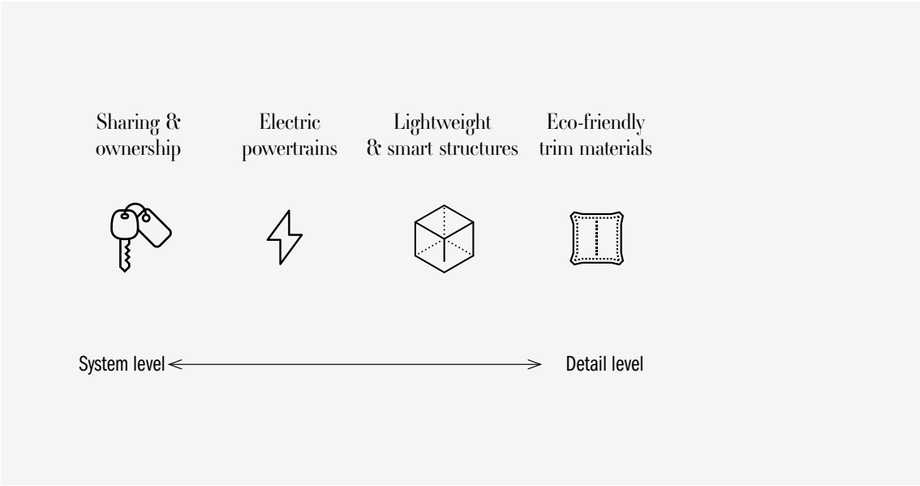


Figure 21. The different levels of sustainable design that were explored.

personalisation (e.g. requesting a quieter ride) and additional services that make it feel more like a limousine service rather than a taxi. (Uber, 2019). The start-up Wheely (figure 22, top image) goes even further by offering 'proper chauffeur étiquette', 'concierge style support' and a flower collect service for a loved one (Wheely, 2021; Browne, 2020). On the other hand, ride-sharing (also known as ride-pooling) means that you share the ride with a few other passengers on the same route. This means that the level of privacy and personalisation is less than ride-hailing, but increased compared to public transport. For example, MOIA operates specially designed vehicles with an interior that feels like a business class aircraft, featuring standalone seats and generous legroom. (see figure 22). Ride hailing/sharing services can either be a dedicated service provider such as Uber; or owned by an automotive OEM itself, such as MOIA which is part of the Volkswagen Group.

The second sharing model that was explored is upscale car-sharing such as Share Now (previously known as Car2Go and Drive Now), a joint-venture between Daimler and BMW. Contrary to ride-hailing/sharing where only the service is accessed, here the user has actual access to and control over the car. Compared to budget car-sharing services, ShareNow offers luxury cars such as the Mercedes CLA and BMW 2 Series convertible. Users can access these cars on-demand with their smartphone, drive them and leave them somewhere else, using their so-called 'free-floating' system (Share Now, 2019)

The third model takes the concept of sharing to a more systemic level and is currently still in a conceptual stage. For example, the Mercedes-Benz Vision Urbanetic displays the benefit of sharing one autonomous 'skateboard' platform with different parties that can each fit their module on top, to serve various use cases. Here the technical components and expertise are provided and possibly also managed by Mercedes-Benz in the form of the platform, whereas the bodies could be provided and owned by another party, such as a public transport or logistics company (Mercedes-Benz, 2018).

This last option of mixed ownership, in particular this split between technical and user-related components, was regarded as the most promising insight for the design process. This could open doors to create a product with the luxury of ownership (i.e. privacy and autonomy), and the emotional attachment of ownership to prolong the lifespan (Vezzoli et al., 2018; Aftab & Rusli, 2017); while at the same time keeping Genesis responsible for the technical modules, to stimulate good care of precious technical components at the end of life (Hernandez, 2019). This could be an incentive for increased resuse, repair, recycling etc. of precious and high-impact components (e.g. valuable metals in the battery).

ride-sharing & ride-hailing

car-sharing

technology-sharing

Figure 22. Different sharing levels that were explored.

Electric powertrains

Electric vehicles (EVs) have the potential to significantly reduce GHG emissions compared to vehicles powered by internal combustion engines. In fact, when powered by renewable energy, Lifecycle Analyses (LCA) show that, on average, electric cars could emit 75% less CO_2 during operation (usage, power/fuel generation and maintenance) and 37% less over its entire lifetime, compared to ICE vehicles (Capgemini, 2020).

Another benefit of EVs is that they could be integrated into the power grid, e.g to store energy in times of energy surplus (e.g. on a windy day) or give (back) energy to the grid (Smith, Sanborn, & Slaughter, 2017).

Generally speaking, there are two categories of EVs: battery electric vehicles (BEV) and hydrogen fuel cell vehicles (FCEV). Contrary to many other OEMs, HMG actually invests in both technologies because both are regarded as integral parts of the energy transition (Hyundai Motor Company, 2020). However the focus of Genesis as a sub-brand is currently more on BEVs, as demonstrated with the recently released Genesis Electrified G80, as well as all recent concept cars (X, Essentia and Mint, see figure 7). An exception was the GV80 Concept from 2017, which explored the FCEV package.

BEVs use batteries that need to be charged in order to power the electric motors. FCEVs, at the other hand, need to be fueled by hydrogen (H_2) gas, which is stored in a pressurised tank. The gas undergoes a chemical reaction in the fuel cell, where it reacts with oxygen (supplied from an air inlet) to produce electricity to power the electric motors, as well as pure water (H_2O) as by-product.

The biggest advantage of BEV over FCEV from a sustainability-oriented perspective is the overall 'well-to-wheel' efficiency of 70% compared to only 15%. This means that for a FCEV, only 15% of all the energy generated at the source (e.g. a windmill) can be used to drive the wheels of the vehicle. The remaining 85% gets lost in the energy conversation process (Hajek, 2019).

However, BEVs are often criticised for their unsustainable lithium-ion batteries, as they require the extraction of lithium, which causes damage to local ecosystems, such as land degradation and water scarcity (Tattersall & Rohr, 2020). Finally, rare earth metals are required for both the production of batteries as well as hydrogen fuel cells (Tattersal & Rohr, 2020)

From a usability perspective, FCEVs have several benefits over BEVs. The first is longer range, since BEVs are usually heavier due to the weight of the battery pack (Graham, 2020). The second benefit is faster refueling: ca. 5 minutes versus ca. 12 hours for charging a BEV on average today, although advances in fast-charging technology show potential of decreasing this significantly (Carrington, 2021; Hajek, 2019). However, refueling points are still limited in Europe, although they are expected to increase by 2035 (Graham 2020; European Commission & FCHJU, 2019). Furthermore, the Hindenburg disaster has led to safety concerns among the general public about the highly flammable nature of hydrogen, even though hydrogen tanks are now heavily protected to prevent explosions (Morris, 2020).

It shows that both BEVs and FCEVs each have their strenghts and weakenesses. However, the choice was made for BEV since this fitted the scenario better, see Chapter 6. The biggest advantage of BEV over FCEV was the abilility to easily work together with the vehicle's environment as energy storage device (the battery), which became an integral part of the scenario.

Figure 23. Top image: Genesis' first electric car, the Electrified G80. Bottom left: hydrogen-powered Genesis GV80 Concept from 2017. Bottom right: the Hyundai Nexo, HMG's only dedicated FCEV at the moment.

Figure 24.Top: lightweight and tensile seats. Middle: lightweight and simple structures. Bottom: BMW 'Shy Technlogy', making use of smart surfaces.

Lightweight and smart structures

On a structural level, weight reduction is a key aspect to reduce the energy required to power the vehicle. Seats are the heaviest part of a contemporary interior and account for 6% of car's total weight on average (Interior Motives, 2016). Hence, several lightweight seat concepts were explored, notably the Lightweight Bionic Seat by Toyota and Materialise, and the Kinetic Seat Concept by Lexus.

The Bionic seat (figure 24, top left) makes use of topology optimisation and additive manufacturing (laser sintering) to apply geometry only there were needed, resulting in a prototype of only 7 kg (Koslow, 2015). The Kinetic Seat (figure 24, top middle) features a slim lightweight structure, with web-pattern nets spanned in between that serve as cushion and backrest. The nets are made out of synthetic spider silk material, which is not only biodegredable, but also stronger than steel and tougher than Kevlar to provide sufficient safety (Matchar, 2017; Lexus, 2016). The concept then evolved and was applied in the Lexus UX Concept car (see figure 24, top right).

The BMW GINA Concept (2008) and Mini Next 100 Concept (2016), show this principle more or less applied to other parts in the interior as well. Considered a revolutionary concept at the time, the BMW GINA features lightweight tubular structures with fabrics spanned over them. This provided both a lightweight design as well as lightweight aesthetic (Car Body Design, 2008). The Mini Next 100 instrument panel (IP) shows a minimalistic design and uses a lightweight construction with mesh in between. This principle of using open structures with (elastic) material spanned in between, served as inspiration for the seat design later on (see. Chapter 6: Future Genesis and Chapter 7: Concept Design).

Suitable materials for these lightweight seat structures could be aluminium alloys, magnesium alloys or carbon fibre reinforced polymers. The weight reduction potential of these materials is respectively 45%, 50% and 50-70% compared to conventional steel, while meeting the automotive safety and performance criteria (He, Soo, Kim & Doolan, 2021). Despite these benefits, these materials cost significantly more energy to produce and cause GHG emissions (He et al., 2021) .

Using recycled or 'secondary' alloys or carbon fibres show potential to tackle this. Advances in research show that all three materials can be recycled with relatively low energy required and a relatively low loss of mechanical performance (He et al., 2021; Kuchariková, Tillová & Bokuvka, 2016; Mendis & Singh, 2013).

Finally, interviews with HMETC interior engineers R. Verhoeven and J. Schell (Appendix E) taught that replacing buttons with interactive 'smart surfaces' (see figure 24, bottom) also has a potential to reduce weight, as well as material usage. According to Verhoeven, "one thin touch foil could easily replace 50 buttons" (R. Verhoeven, personal communication, 21 May 2021). This idea was further developed for the UI design, see Chapter 10.

Eco-friendly trim materials

The choice of material for the trim parts (i.e. the ones visible on the outside) is very important for interior design, as the user is in direct contact with the material through various senses. In particular leather is traditionally seen as an important luxury material for automotive interiors due to its quality, good craftmanship and aesthetic appeal (De Klerk, Kearns & Redwood, 2018). However, leather has several negative effects on the environment and human health, due to i.a. heavily poluting chemicals used for the tanning and finishing process (Kim, Kim, Wha Oh & Jung Jung, 2016).

Car interiors also feature high-quality plastics and synthetic fabrics. Virgin plastics are widely critised for their uncircularity, harmful environmental disposal impact, as well as contribution to GHG emissions, as 90% of plastics are currently produced from fossil fuels (Tonini, Schrijvers, Nessi, Garcia-Gutierrez & Giuntoli, 2021).

Two type of replacement materials with potential for circularity are currently being developed at HMETC: recycled fabrics to replace synthetic fibres and plant-based, 'bio-leathers' to replace traditional leather. These bio-leathers have minimal harmful impacts on the environment and enhanced functionality, while costing less than natural leather (Kim et al., 2016).

Figure 25. Pictures of the material study. 1) Regular leather; 2) Vegatex Apple Leather; 3) Banatex banana-based leather; 4. Pinatex pineapple-based leather; 5) Cork; 6) Flax.

The risk with recycled materials for luxury products is that consumers do not easily associate status and exclusivity with recycled materials (Achabou & Dekhili, 2013). A problem with eco-materials that mimic leather is that they can look so authentic, that the added sustainable value is not directly visible (R. Verhoeven, personal communication, 21 May 2021). However, this risk was considered less problematic compared to the lower value perception of recycled materials.

Therefore, a brief study was conducted on innovative, luxury-grade eco-material samples from the engineering department at HMETC. These included Piñatex (pineapple-based vegan leather), Vegatex (apple-based vegan leather), Bananatex (banana plant-based fabric), cork fabric and flax fabric. The samples were all examined on visual, tactile and olfactory qualities and benchmarked against three genuine leather samples from Mercedes Benz, BMW and Audi.

Out of the two vegan leathers, Vegatex (Upperapple & Lorkapple types) was considered superior and therefore usable for designing (see Chapter 8: Embodiment Design). Especially on look and feel, it scored significantly better than Piñatex, which texture felt and looked too unrefined for a luxury material. On the subject of smell, both vegan leathers failed to give off any significant smell at all. Also the flax fabric was considered interesting due to its soft, textured feel and naturally sustainable look. Both cork and flax also did not give off any particular smell.

3.4 Regenerative design strategies

In parallel to reducing environmental damage with sustainable design interventions, regenerative design practices are an extra tool to combat climate change. Regenerative design looks at how products could support the restoration and regeneration of ecosystems, to 'undo' environmental damage that has already been done (Wahl, 2018). This could support the prevention of continued global warming even when human emissions are reduced, because the earth's complex dynamics can create a snowball effect when certain temperature thresholds are reached, called 'tipping points'. For example, when temperatures are high enough to melt permafrost (permanently frozen grounds in cold regions), even more carbon is released automatically, which was previously stored in the form of plants and animal material trapped by the ice (Brouillette, 2021). In turn, temperatures increase even more dramatically, with possibly devastating effects to ecosystems, societies and economies (Steffen et al., 2018).

Regenerative design is a relatively young topic and still rarely applied in product and automotive design. It is mainly becoming more important in the archicture field, which makes sense since buildings are generally more connected to their surrounding environment. However, it has a lot of potential for car design too, since cars stand still for ca. 95% of the time, which essentially makes them interact more with their environment as static object (Holmblad et al., 2020).

After exploring several regenerative architecture concepts and principles (Holl 2020), the four most interesting, yet applicable principles (for automotive design) were selected. The connection with cars, especially interiors, might still seem distant; but the goal here is to find new inspiration and come up with innovative ideas for the concept behind the design (see Chapter 6: Future Genesis).

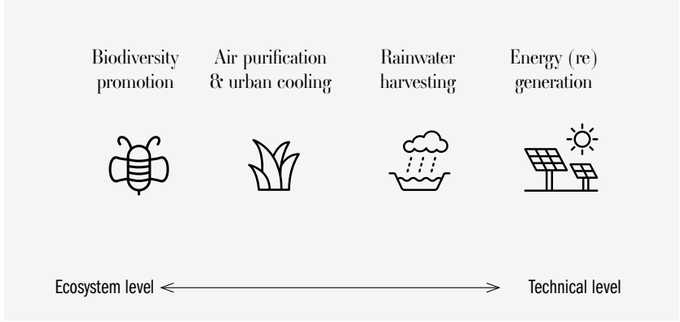


Figure 26. The different levels of regenerative design that were explored.

Biodiversity promotion

Biodiversity generally refers to a wide range of living organisms in an environment. It is key to the health of ecosystems, societies and economies, as it provides i.a. food and materials (Brown et al., 2018). This is especially interesting for cities where biodiversity is most in decline (McDonald et al., 2019). One example that promotes biodiversity through design is the Elevator B project in Buffalo, the United States. The project combats the decline of bees, which play an essential role in ecosystems as pollinators. This is done by converting abandoned grain silos into new urban habitats for bee colonies to provide them with protection and warmth (Donovan, 2012). Another example are 'living walls', facades or rooftops covered with e.g. living plants, mosses and algae, have the potential to attract life and thus promote biodiversity in urban environments (Brown et al., 2018). These living surfaces also capture CO_2 to produce oxygen, through the natural process of photosynthesis. For this, e.g. bioreceptive panels are being developed with geometric patterns to make the green areas look controled and intentional. Experts point out that this is essential for user acceptance, to prevent a neglected, 'wilderness' look (Cruz et al., 2017; Eveleth, 2015).

Air purification & urban cooling

When covered with specific mosses, living surfaces can also improve local air quality by absorbing fine dust particles (due to the large surface area of moss). In addition, moss facades could combat the 'urban heat island' effect (heat accumulation in cities) because mosses can store and evoporate a lot of water. An example is the CityTree street furniture used in Beijing, London and Rotterdam; which yields the same air purifying results as 275 trees and cools down the local ambient temperature by up to 2,5 °C (Green City Solutions, 2021; Hitti, 2018). Moss has been shown in concept vehicles such as the BMW i Inside Future concept, but only for decorative purposes, as it was not living anymore (Murphy, 2017).

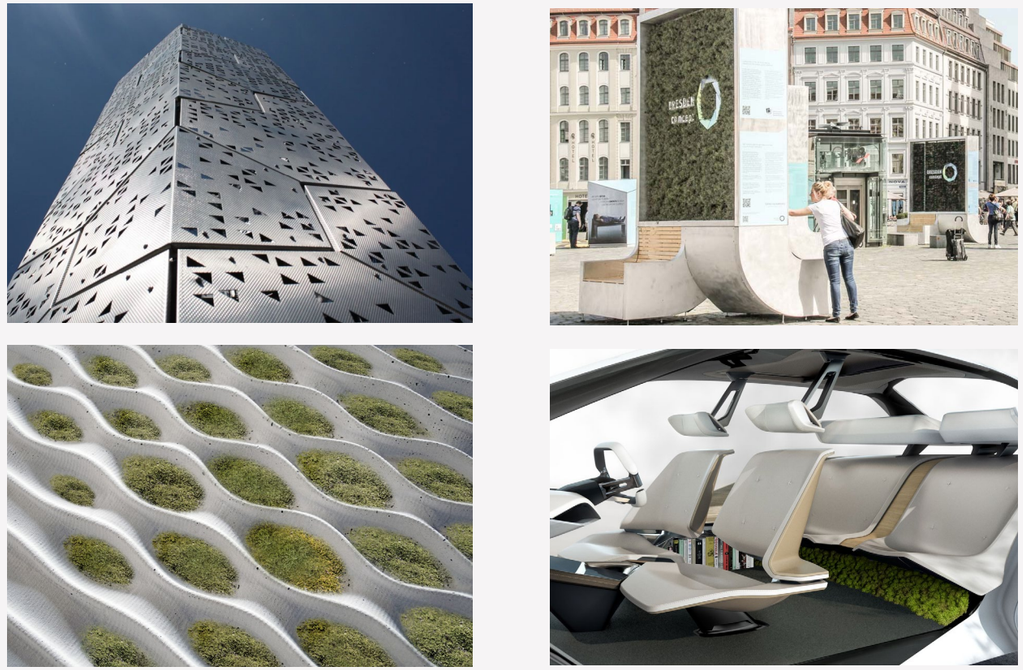


Figure 27. Exploring renerative design features. Top left: Elvator B urban beehive. Top right: CityTree steet furniture with moss integrated. Bottom left: living walls, here with moss. Bottom right: (dead) moss applied in the BMW i Inside Future Concept (2017)

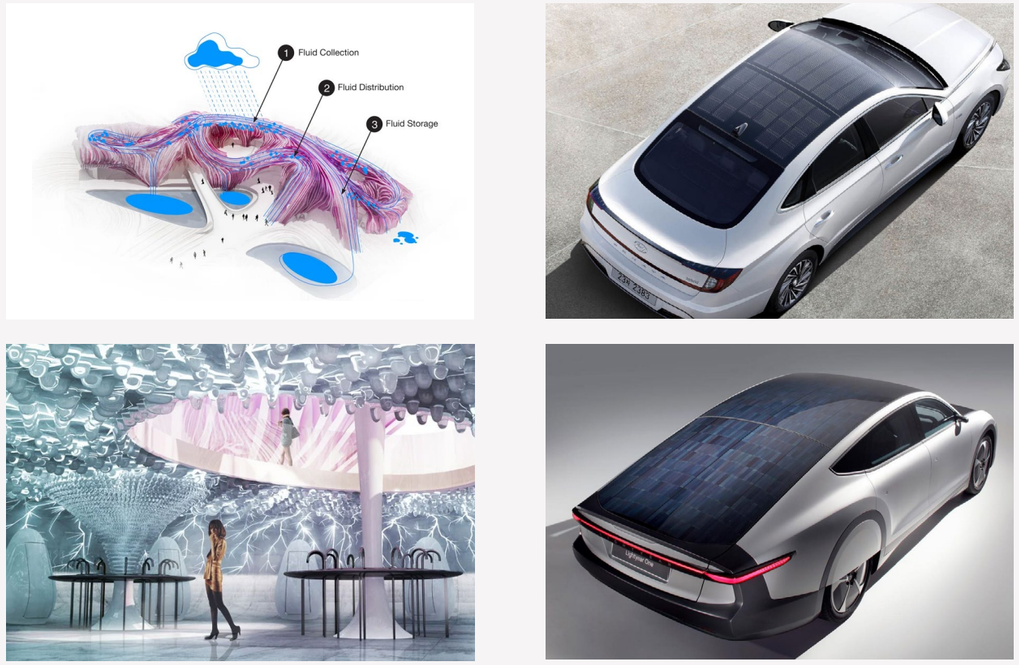


Figure 28. Left: Life Aquatech project by thinkTANK and the Architectural Association of the School of Architecture in London. Right: vehicles today starting to adopt solar cells slowly; top: Hyundai Sonata with solar roof; Bottom: Lightyear One.

Rainwater harvesting

Another environmental problem which architects attempt to tackle with regenerative design, is the management of water shortages or surplus. Rooftops can be equiped by rainwater harvesting systems. This could either provide water in dryer seasons; or mitigate water surplus in case of extreme rainfall to prevent overburdened sewer networks (Brown et al., 2018). The sustainable collection of water could make buildings net positive - meaning that they create more water than they actually use. The water can be either purified to create e.g. drinking water or used directly for lower grade purposes, such as flushing the toilet. An example is the Life Aquatech project by the thinkTANK and the Architectural Association of the School of Architecture in London. The shape of the building is actually derived from the water network itself, which creates a unique aesthetic that expresses sustainability as well as luxury (Testado, 2013).

Energy (re)generation

Just like the rooftops of buildings, car roofs can be equiped with solar cells, also called photo-voltaic (PV) modules. This is already available today as an option in e.g. the latest Hyundai Sonata Hybrid. This car has a small solar roof (204 Wp) that can deliver 0,6 km extra per hour charge in the sun with South-Korean solar irradiance (Hyundai Motor Group, 2020). There is also the Lighyear One (release date 2022) by the Dutch start-up Lightyear. Being a long range solar EV, the car achieves 710 km on a singele charge with support of its 1075 Wp solar cells (Lightyear, 2021), which deliver 12 km extra per hour charge in the sun (Dutch irradiance). Higher efficiencies of up to 47,1% by advances in PV technology are expected to increase the performance of PVs even more in the future, which could prove interesting for the design (Fraunhofer, 2021). Vehicle-to-Grid (V2G) technology could increase the potential of PVs as it enables cars to deliver generated energy back to the grid, as discussed on p. 43.

3.5 Behavioural change

Human behaviour change is regarded an important sustainability-oriented tool on a deeper, interaction level (Newell et al., 2021). Kesebir & Kesebir (2017) write that “human connection with nature is widely believed to be in decline - a cause for concern with regard to evoking curiosity, respect and concern for the natural world”.

Furthermore, Ives et al. (2018) describe how “actions to reconnect people with nature can help transform society towards sustainability”. Reconnecting with nature is nothing new. In fact, the 'biophilia' theory describes how humans have an innate "tendency to prefer being close to nature through an emotional connection", because humans largely relied on natural resources for survival throughout evolution (Chang et al., 2020). Brown et al. (2018, p. 22) describe how evoking this feeling of biophilia might be considered the "secret sauce to sustainable behaviour.”

In addition, bringing people closer to nature could improve their mental health, wellbeing and vitality, as well as overall happiness (Brown et al, 2018; Kesebir & Kesebir, 2017).

Hence, there is an opportunity for facilitating human-nature with the design on an interaction level, to create more awareness and stimulate more sustainable behaviour.

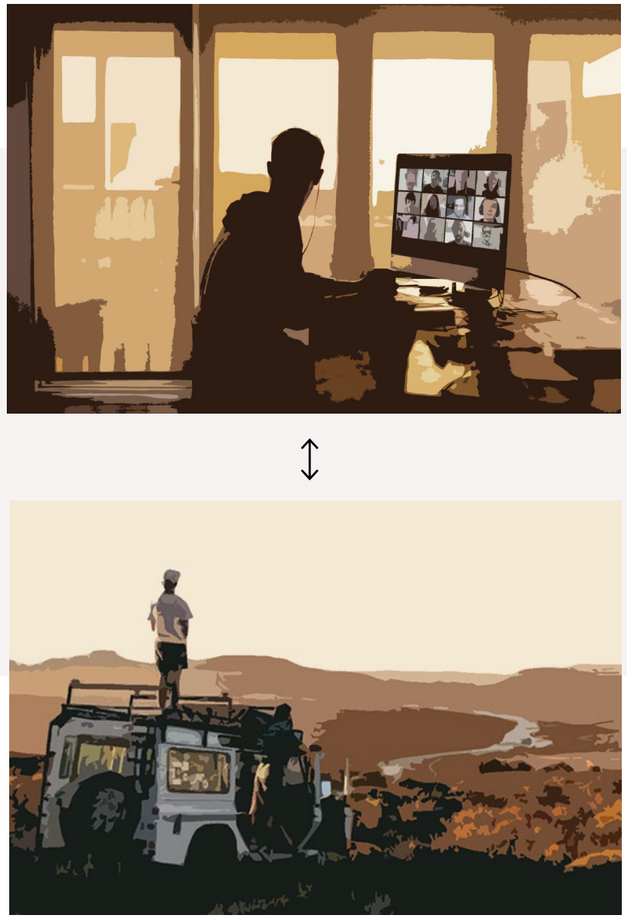
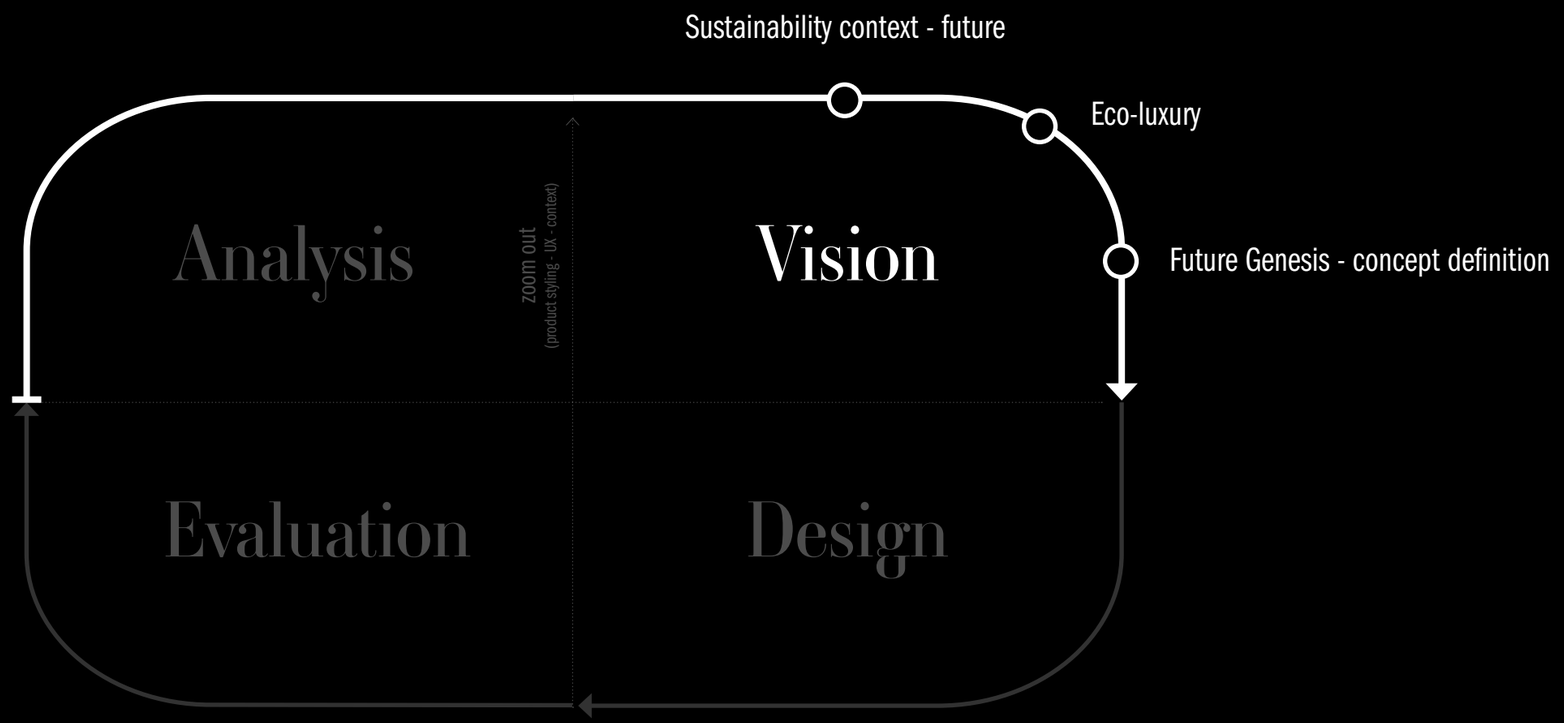


Figure 29. Disconnected vs connected with nature.

Part II

Vision

Envisioning a future-proof solution (2035)


Sustainability context - future
Eco-luxury
Future Genesis - concept definition
Analysis
zoom out
(product styling - UX - context)
Vision
Evaluation
Design

Key takeaways - Vision

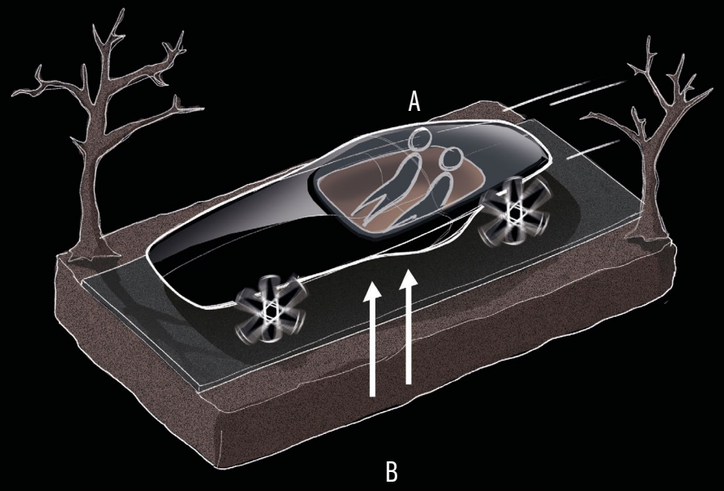
Solution to (redefined) problem

The main takeaway is: shifting the luxury mindset from 'ego to eco', by tapping into the Eco-Luxury travel trend (see Chapter 4 and 5). As explained in Chapter 2, 'Ego-Luxury' was defined as 'luxury for the user, but at the expense of the environment'. Conversely, 'Eco-Luxury' means that the vehicle is more in balance with the environment by connecting the user to its environment and adopting a circular design approach.

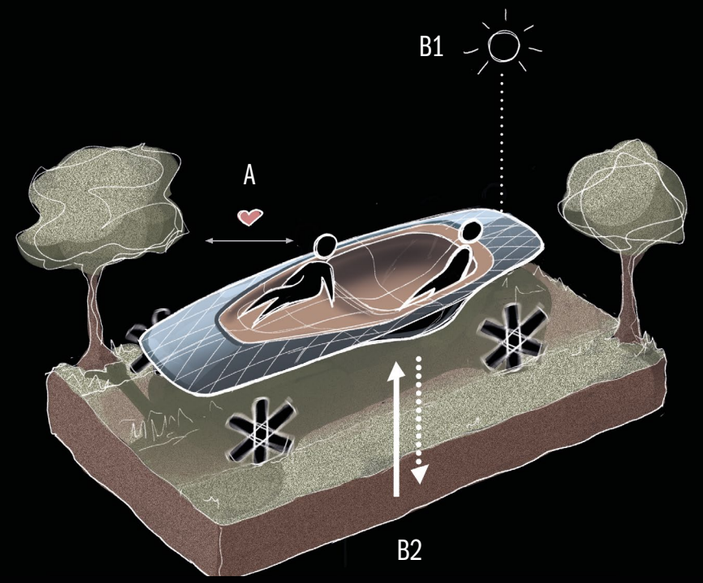
The Eco-Luxury vision unites luxury benefits (digital detox for mental wellbeing) with environmental benefits (awareness for more responsible behaviour). Based on this an interaction vision was created of exposing users to their environment, inspired by yachts with open-air lounges. This led to a moodboard and scenario that became the foundation for the design (see Chapter 5 & 6)

Implications for Genesis

By tapping into the 'digital detox' and 'eco exclusivity' macrotrends with the use of the interaction analogy, moodboard and scenario, there is potential to create a more progressive design that could deliver the 'New Luxury' statement better. This is shown in figure 30 and 31 on the following pages.



Envisioned solution
"From Ego to Eco"



Ego-luxury

A) User disconnected from nature [interaction level]
B) Design based on linear resource extraction [product level]

Eco-luxury

A) User-nature relationship reinforced [interaction level]
B1) Energy regeneration [product level]
B2) Circular design [product level]

Traditional luxury - design

'New Luxury' - brand statement

Genesis today

Inconsistency between design and brand statement

Current design
(Ego-luxury)

Current interaction
(Enclosed pampering)

!

Genesis brand

Figure 30. Explaining why the envisioned solution is relevant for the brand, by showing the current inconsistency between design and brand statement.

Reimagined luxury - vision

'New Luxury' - brand statement

Genesis 2035

How the envisioned solution could also increase brand-design consistency

Envisioned design
(Eco-luxury)

Envisioned interaction
(Exposed pampering)

Genesis brand

Figure 31. Explaining why the envisioned solution is relevant for the brand, by showing how the envisioned solution could also increase the consistency between the brand and design.

04 Sustainability context - future

4.1 Trends

This chapter looks at which sustainability-oriented trends could shape the evolution of luxury. In addition, general trends in society and technology need to be considered as well, to get a complete overview of the hypothetical future context around the car. This is useful for creating a solid rationale (vision) behind the design.

In order to identify the right trends that are relevant for describing the future context, first the (search) domain needs to be clearly specificied (Hekkert & Van Dijk, 2017). The domain was described as: "luxury lifestyles and mobility in a sustainability-oriented future society (2035)".

Within the scope of this description, relevant trends (also called ‘context factors’) were gathered in the fields of culture, psychology, demographics, sociology, economics, biology, evolution and technology (Hekkert & Van Dijk, 2017). The main requirement was that they were related to sustainable developments (UN, 2015). The see the 'bigger picture' as a designer, the context factors were clustered into large macro-trends to simplify and summarise the findings, using the ViP guidelines by Hekkert & Van Dijk (2017, p. 148), see appendix F.

The macro-trends that emerged were then mapped to identify patterns (Hekkert & Van Dijk, 2017, p. 152). The results are displayed in figure 32. These macro-trends are explained in the following section.

Ecological criticality

Environmental challenges due to anthropogenic (man-induced) climate change for future Europe include: loss of biodiversity in water and on land (bees), flooding in coastal and lower areas such as the Netherlands while also risks of water scarcity for Southern-Europe; increase in climate refugees, forest fires, etc. to name a few (European Commission, 2013). This stresses the criticality of sustainability.

Ecological exclusivity

Even though sustainability is becoming mainstream, eco-friendly lifestyles remain rather exlusive. For example, vegan diets and superfoods are not only expensive, but also trendy and status-signalling among the rich, to show that you can afford to be responsible. Although electric cars are expected to become more affordable in the future, charging might still be an issue for working class families living in small appartments without private parking. Moreover, affluent people are investing in self-sufficient villas to be both responsible and independent in case of power blackouts during natural disasters. Cities in developed countries have the means to mitigate extreme weather conditions and create healthy green environments for their citizens, becoming green islands, as opposed to less developed, overcrowded cities. And in general, rapid urbanisation and carbon taxation on cheap air travel, are expected to make encounters with (wild) nature even more exclusive (Nastri, 2020; Roland Berger, 2018; Harrow et al., 2017)

Digital ubiquity

Hyper connectivity, blockchain technology, advances in virtual and augmented reality and artificial intelligence are expected to make lifestyles even more digital then they are now. E-commerce as well as remote working are on the rise as well, making analog interactions ever more rare (Borelli, 2021; Maqui & Morris, 2020; Brown et al, 2019; Harrow et al., 2017).

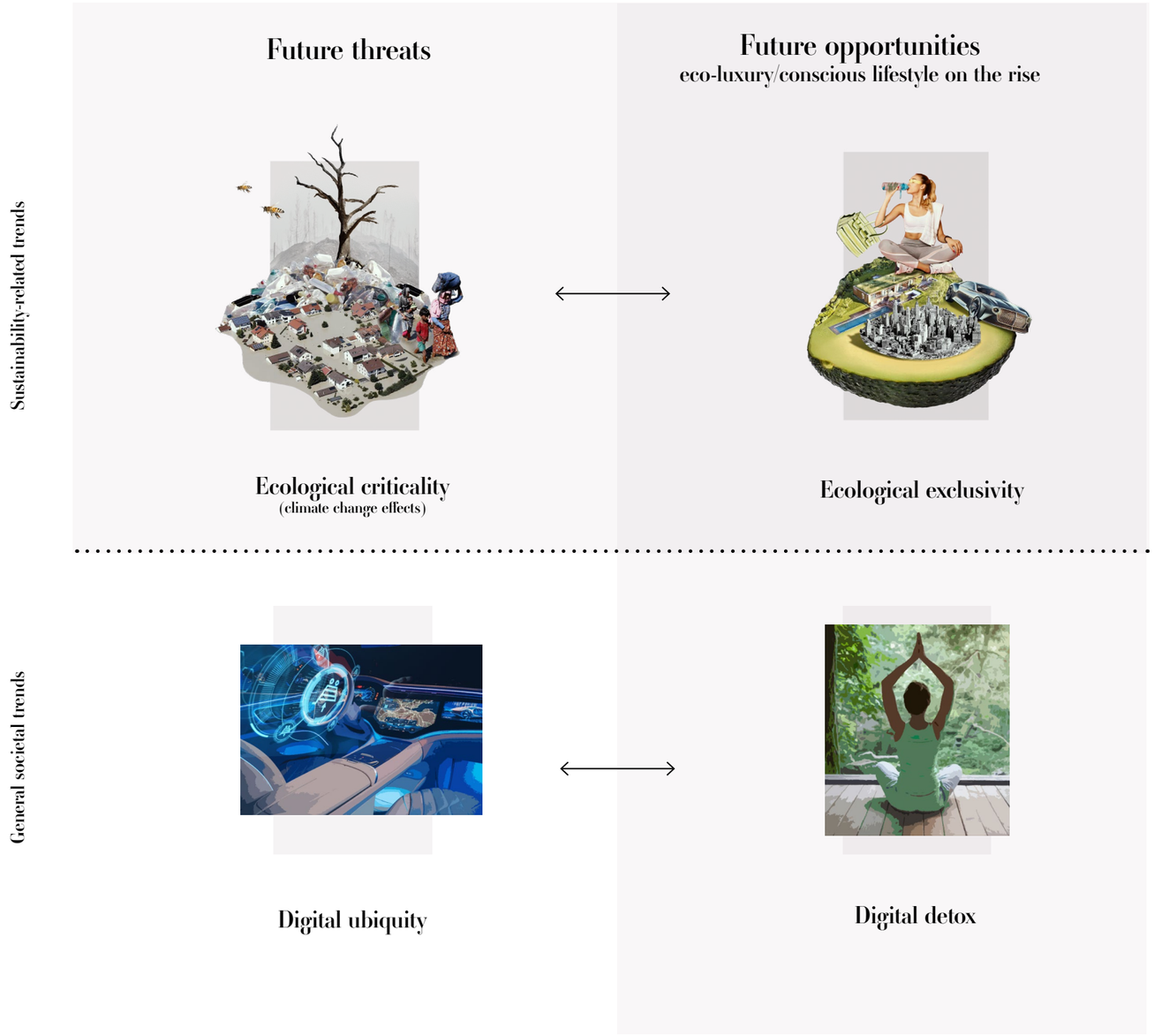


Figure 32. Overview and relations between the identified trend clusters.

Digital detox

Being more and more sucked into our screens is not without a price. Digital fatigue due to excessive screen time, constant notifications and information overload is increasingly causing stress and other mental health issues. At the same time, rising cybersecurity threats and privacy concerns as well as fake news combined with the advent of hyper-realistic deep fakes, are expected to cause more anxiety. In parallel, the mindfulness and meditation industry is expected to continue growing as people are increasingly looking for a 'digital detox' to escape from connectivity and technology in general (Müller, 2020; Meehan, 2019; Harrow et al., 2017; Weinswig, 2017).

4.2 Focus & mission statement

The relationship between these different clusters was analysed in depth to find opportunities in future behaviour to design for. Figure 32 on the previous page shows how these macro-trends reveal contrasting developments in society (namely: eco-criticality vs eco-exclusivity and digital ubiquity vs digital detox). Digital ubuiqity is general future threat; while eco-criticality is obviously a major, sustainability-related threat. At the other hand, eco-exclusivity and digital detox could be provide design opportunities as they both fit into a broader 'eco-luxury' lifestyle (described in more detail in Chapter 5).

Nature could be a way to provide digital detox as it provides several mental health and wellbeing effects (see. p. 45). Hence, a traveling experience that facilitates digital detox in an exclusive ecological environment, could be used as stepping stone for bringing luxury consumers closer to nature. In turn, this could elicit more awareness and admiration for the environment. This indirect, unforced way of eliciting certain behaviour is called 'nudiging' and is regarded a succesful tool for sustainability-oriented behaviour change (Klaniecki et al., 2018).

From a user perspective, this taps into a larger luxury trend called 'transformational travel' (see Chapter 5), which is about going on journeys that have a profound, long-lasting effect on one's world view, following "self-reflection and interaction with new cultures and nature" (Potter, 2017).

This led to the following mission statement for the design:

"Expose the user to nature to provide 1) wellbeing effects, and 2) the reinforce user-nature relationship."

This way, there could be a more balanced interaction between the user and the environment, as the user is pampered by the beauty and healing effects of the natural environment; and the environment is indirectly 'pampered' by the elicited responsible behaviour (as well as by the lower impact of the vehicle itself).

The philosophy behind this is to create a luxury experience in which ultimately the user and the environment are more in balance - or *symbiosis* - refering back to the definition of sustainability (see p. 35). This vision also led to the name of the concept: *Genesis Symbiosis*. This way, luxury and sustainability actually positively influence each other, rather than being a compromise.
This is illustrated with the mutual arrows in figure 33, which summarises the mission.

This philosophy also has a link with traditional Korean culture, in particular the 'Taegeuk' philosophy, which symbol is represented on for example the national flag. Similarly to the Chinese concept of Yin and Yang, this concept stands for harmony between different elements in the world and describes how seemingly contrary elements (the user and nature, or luxury and sustainability) can actually be complementary to each other (Prescott, 2015; Bellaimey, 2013).

Mission:

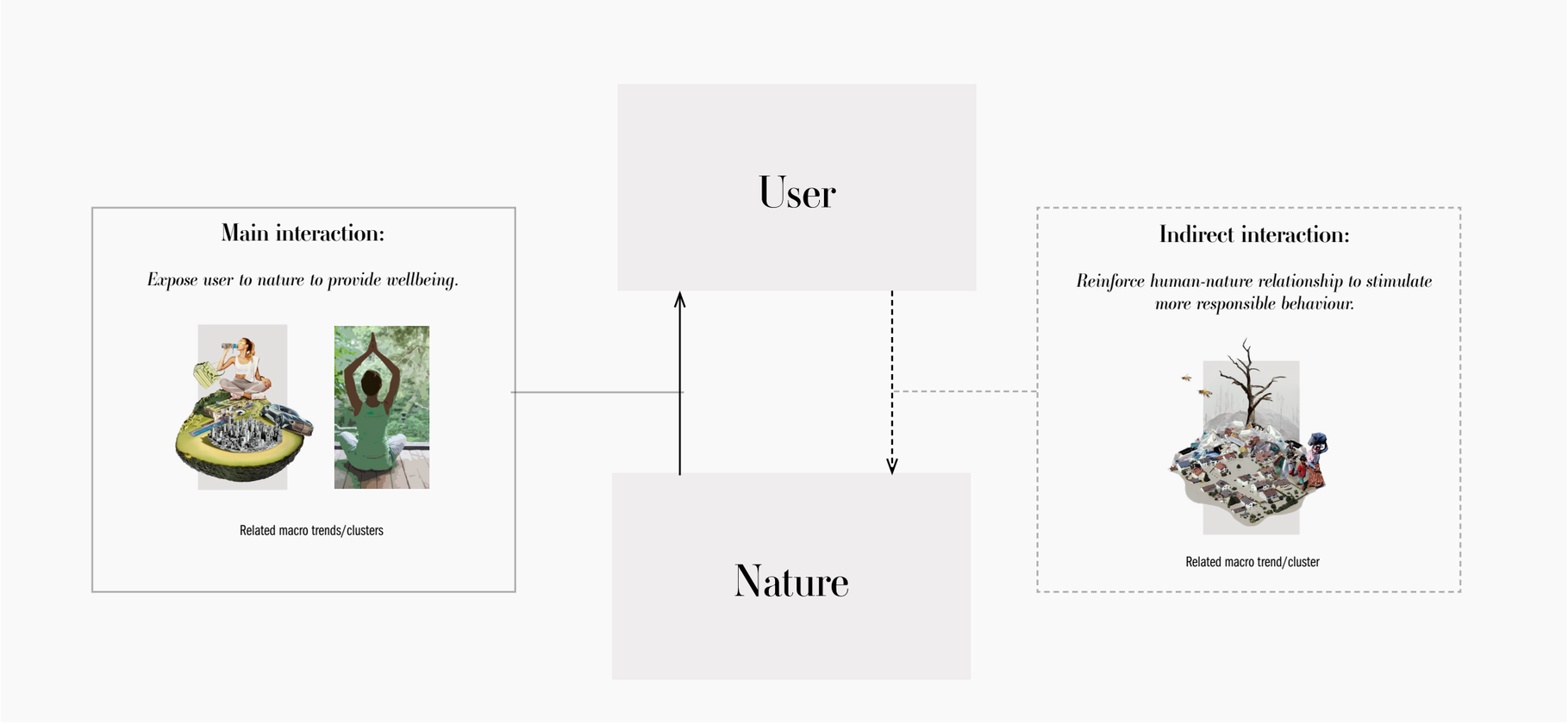


Figure 33. Visual explanation of the 'Symbiosis' Mission.

05 Eco-Luxury

5.1 Eco-luxury lifestyle & target group

The average customer age for luxury cars is dropping and will continue to fall, e.g. from 57 a decade ago to 43 today for Rolls-Royce (Campbell, 2019). If this trend continues, the average European luxury car buyer could be younger than 40 years old by 2035. Therefore, Generation Z - born from 1995-2010 (Francis & Hoefel, 2018) and their characteristics are used as reference for the envisioned target group.

Eco-status

These younger luxury consumers are more eco-friendly (Campbell, 2019). A survey with over 12,000 respondents by Altagamma and Boston Consulting Group (2019) confirms this by stating how the environment is becoming a key factor for luxury purchases. The mindset of affluent Gen Z customers is also more casual towards showing off material wealth (Campbell, 2019).

In a luxury product category with negative consumption effects such as luxury cars, a product that reduces, eleminates or even counters negative consumption effects, can "signficantly increase the luxury value perception", a phenomenon that is called 'additional sustainability value jump' by Heil & Langer (2017, p. 141).

Luxury mobility expert Joost Roes highlighted during the interviews that affluent people like to use luxury assets to actually benefit social or climate-related causes (see Appendix D). He explained how some billionaires use their yachts to support rescue operations at sea. According to Roes, this enhances their status positively in terms of positive publicitiy but also makes them feel powerful since they have the means to create positive impact.

Off-the-grid luxury experiences

Oakes (2019) and Powell (2019) describe how younger generations are also more keen on discovery and adventure, as "remote working and family duties arrive later in life and nomadic lifestyles are paving the way".

Rather than 5-star luxury hotels, they are likely to want to experience 'off-the-beaten path' destinations with a "stronger sense of place" (Oakes, 2019; Powell, 2019).

This is highlighted by trends in the luxury hospitality industry such as the creation of eco-resorts, glamping and wilderness cabins (see figure 34). This is caused by a rising demand for authentic and off-the-grid luxury experiences, as part of a larger 'transformational luxury travel' trend (Villa-Clarke, 2020; Andjelic, 2018; Potter, 2017).

Although these travel experiences might seem more spartan, they are actually commonly positioned in the extreme end of the luxury spectrum. This is because they require a serene, prestine, small-scale and individualised environment, which allows guests to immerse in nature. At the same time, these resorts are usually are sustainability-oriented with a focus on lowering environmental impact and improving the wellness of the local surroundings. An example is the highly anticipated T-Nest Eco-resort in Croatia, which incorporates wooden villas in a scenic forest landscape. Sustainability-oriented efforts include "natural pools with self-cleaning systems, organic gardens and greenhouses supplying the on-site restaurants" (Powell, 2020).

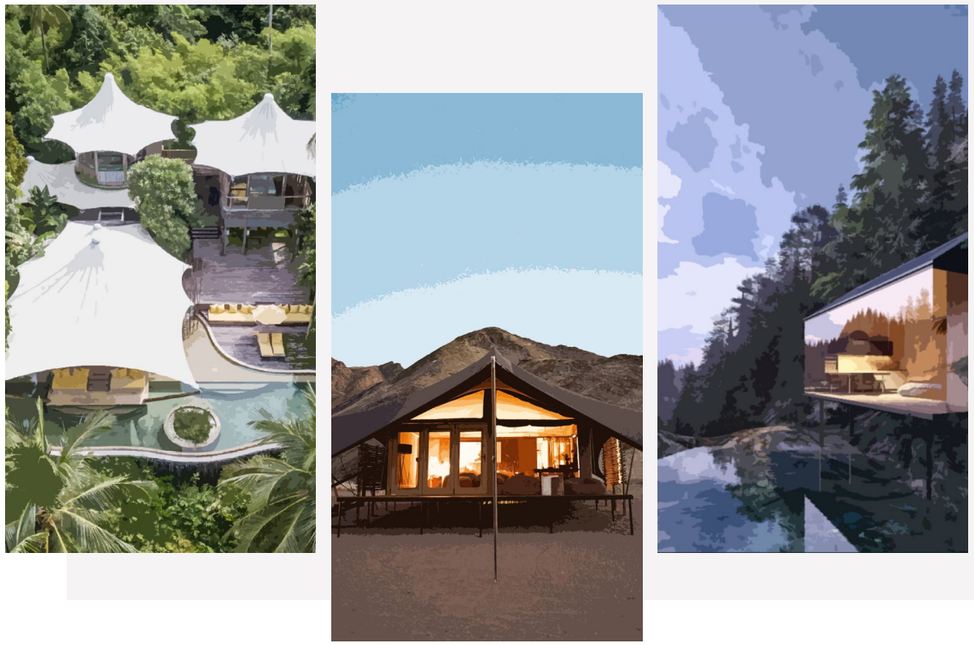


Figure 34. Three examples from the 'eco-luxury' travel trend, from left to right: eco-resorts, glamping, wilderness cabins.

5.2 Interaction analogy

The goal of this eco-luxury travel experience is to expose the users to their natural environment (see 'main interaction', figure 33). The product (vehicle) will in this case be the means in order to elicit this intended interaction. Before jumping straight into the design, it often helps to define the envisioned interaction more. One way to do this, is by exploring analogous situations, to imagine the intended interaction vividly (Hekkert & Van Dijk, 2017, pp. 159-163).

Different analogies were explored where people feel connected to their environment through interaction with a product - in a luxerious way ('unique experience, see Chapter 2). They were exemplified with emotional images to trigger reactions by the designers, as well as to provide with inspiration for the concept ideation (see Chapter 6).

As a starting point, a luxury cabin in the mountains was used as analogy, inspired by the previously identified eco-luxury travel trend. Feedback by the design team taught that the cabin was too static for a moving product such as a car. However, it did provide valuable input for envisioning the holistic scenario around the concept (see p. 70). Therefore two other analogies were explored that create a similiar interaction, but in a more dynamic way: arctic dog sledding and sailing.

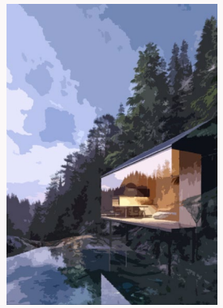


Figure 35. Exploration of analogical situations were people feel connected to their surroundings through a product. Top left: luxury cabin in the woods; bottom left: husky dog sledding experiences;

airy, calm, honest

Figure 36. Final analogy image, that became the main inspiration behind the interaction and architecture.

The sailing analogy was considered as most interesting, but felt a little too dynamic, as the Genesis brand is more connected to the interaction of being 'pampered', i.e. a more passive way of experiencing luxury.

Hence, yachting in general became the interaction analogy; to be precise, the image in figure 36, which communicated this the best towards the design team. Just like the boat, the vehicle architecture should allow for outdoor lounging to expose the users to their surroundings in a luxerious way.

Other inspiration from figure 36 is the optimal use of the vehicle footprint (sustainability), as the interior spans the whole length of the boat.

5.3 Product qualities & moodboard

To create an experience where people feel connected to their environment, the product needs to have certain 'product qualities' (keywords) that elicit this interaction, according to Hekkert & Van Dijk (2017, p. 163). These can be found by examining the design of the boat from figure 36, to reveal which underlying qualities could help to create a similiar experience for a car.

This led to the following keywords: *airy*, *calm* and *honest*. First of all, the boat is very open and spacious for its relative size. Together with the experience of graceful floating, this creates an airy impression that helps the users to gently observe the environment. This creates a bridge to the second keyword: calm. The soft and uncluttered interior invites the users to relax and slowly cruise the waters, to fully soak up the scenery, rather than speed through it. Finally, the boat has an honest character thanks to the straightforward design without unnecessary bells and whistles. This helps the users to fully immerse in the environment rather than being distracted by fancy features of the product itself.

Next, a moodboard was created to visually communicate these keywords in an emotional way to the client. For this, more abstract images from outside the transportation field were found, in order to come up with more original ideas for designing (Poetz, Franke & Schreier, 2014).

The final moodboard was discussed with and validated by the Genesis team. It served as a guideline for the styling design later on (see Chapter 7, 8 and 11).

Figure 37. Moodboard expressing the product qualities for the envisioned styling.

06 Future Genesis - concept definition

6.1 Ideation

With the mission statement, interaction analogy and styling moodboard clear, as well as with the criteria of the brand, luxury and sustainability in mind, the design process can almost kick off. However, first an innovative concept and story need to be created that can unify all the previous findings in a convincing way (Hekkert & Van Dijk, 2017).

Finding this all-ecompassing concept out of nowhere is rather difficult, which is why first ideas for smaller elements were explored in a 'divide-and-conquer' manner. Ideas for the type of vehicle (typology), occupant layout, user interaction, sustainable solutions, and regenerative solutions were generated using quick sketching (doodles). This was supported by the 'How-Tos' method and an online brainstorm organised with fellow master students, which was joined by W. Kets too. The most promising and complementing ideas were later synthesised into one final direction using a morphological approach (Van Boeijen et al., 2017; Tassoul, 2006; Roozenburg & Eekels, 1995).

Keep in mind that a part of the ideation already took place when the mission and interaction where not fully defined yet. This is sometimes unavoidable as the ideation process can be lengthy, and design tends to be an iterative process (IDEO, 2015, p. 25). Hence some of the ideas came from the cabin and dogsledding analogies as well.

See the following pages for a selection of the ideation sketches. Sketch pages of other directions can be found in Appendix G.

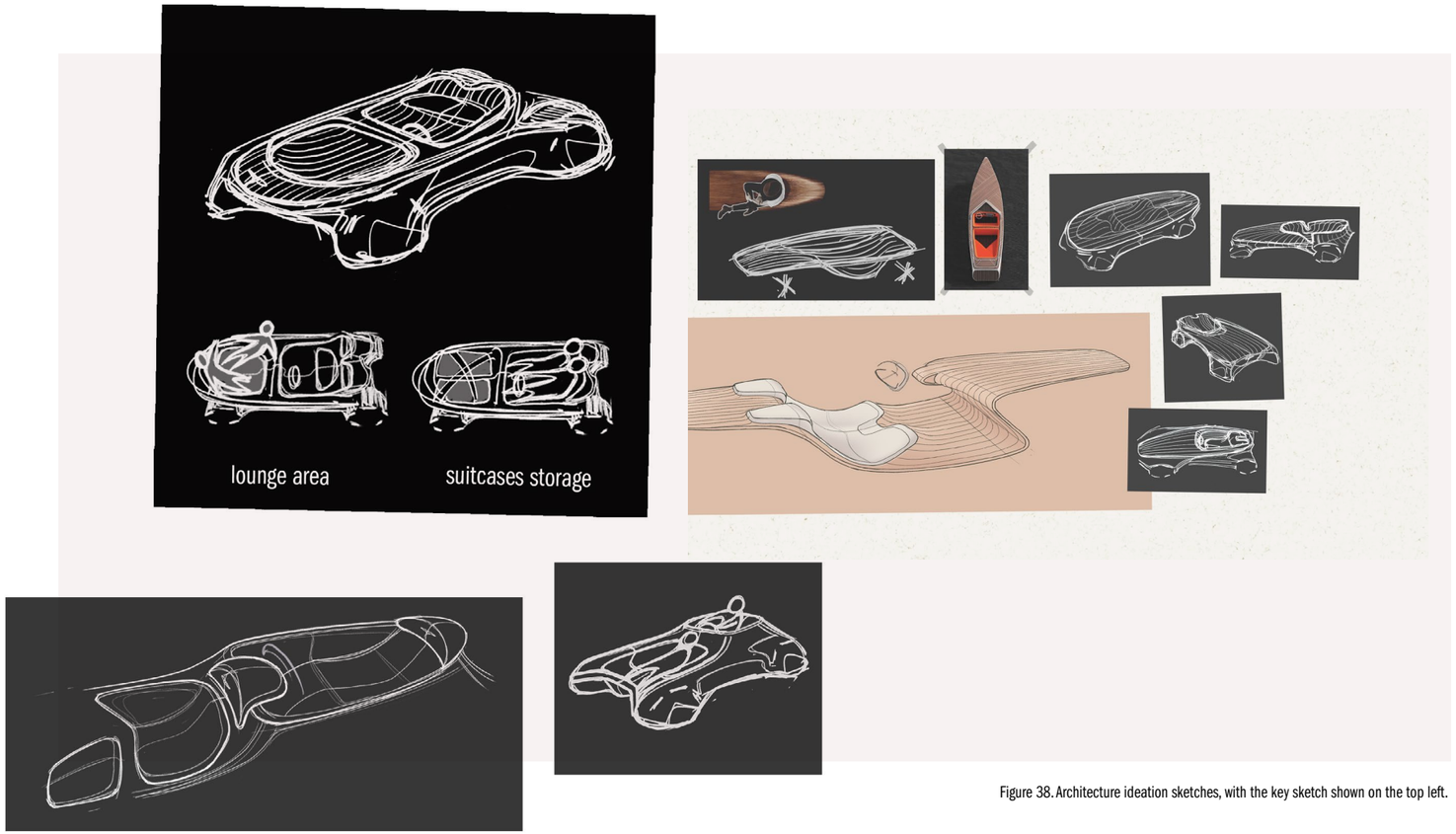


Figure 38. Architecture ideation sketches, with the key sketch shown on the top left.

Architecture

For this an exploration was done how the architecture of the car could faciltate human-nature interactions inside and outside the car. For inside the car, this mostly concerns visibility, creating open structures to enjoy more of the surroundings visually. Open structures could also support weight reduction.

The key sketch that was selected was a two-seater (side-by-side), with a additonal space in the front to creat an outdoor lounge or space for suitcases. It also resembled the boat interaction analogy the most and caught the eye of the GED team.

As alternative direction, the tandem layout inspired by dog sledding was chosen, because of the more unique shape of the architecture and panorama lounge seat in the front.

Vehicle type

Three vehicle typologies were explored, ranging from very athletic and driver-oriented (e.g. a speedster) to very elegant and comfort-oriented (e.g. an autonomous shuttle). The Grand Tourer (GT) fitted best to the mission and story of travelling away to (re)connect with nature. This is because the Grand Tourer has a historical connection to luxerious traveling for young aristocrats. Basically the 18th-century version of 'transformational travel', this had the aim of increasing their awareness of other cultures and environments (Swarbrooke, 2018, pp. 10-12). The GED team also considered this typology an interesting case study, since GT's are normally sharpy evocative of the 'petrolhead' realm (Perini, personal communication, 14 May, 2021). However, instead of a regular GT package, a more off-road capable GT was chosen. This is to allow to user to get closer to nature.

Visibility

The raised ground clearance that comes with an off-road package, thus higher seating position, increases the visibility, making it easier to connect to the surroundings. A higher driving position also creates a calm driving experience, since the sensation of speed decrease as you sit higher up from the ground.

To further boost the interaction of being exposed to the environment, different ideas were explored for cut outs in the door area, to create as much window area as possible.

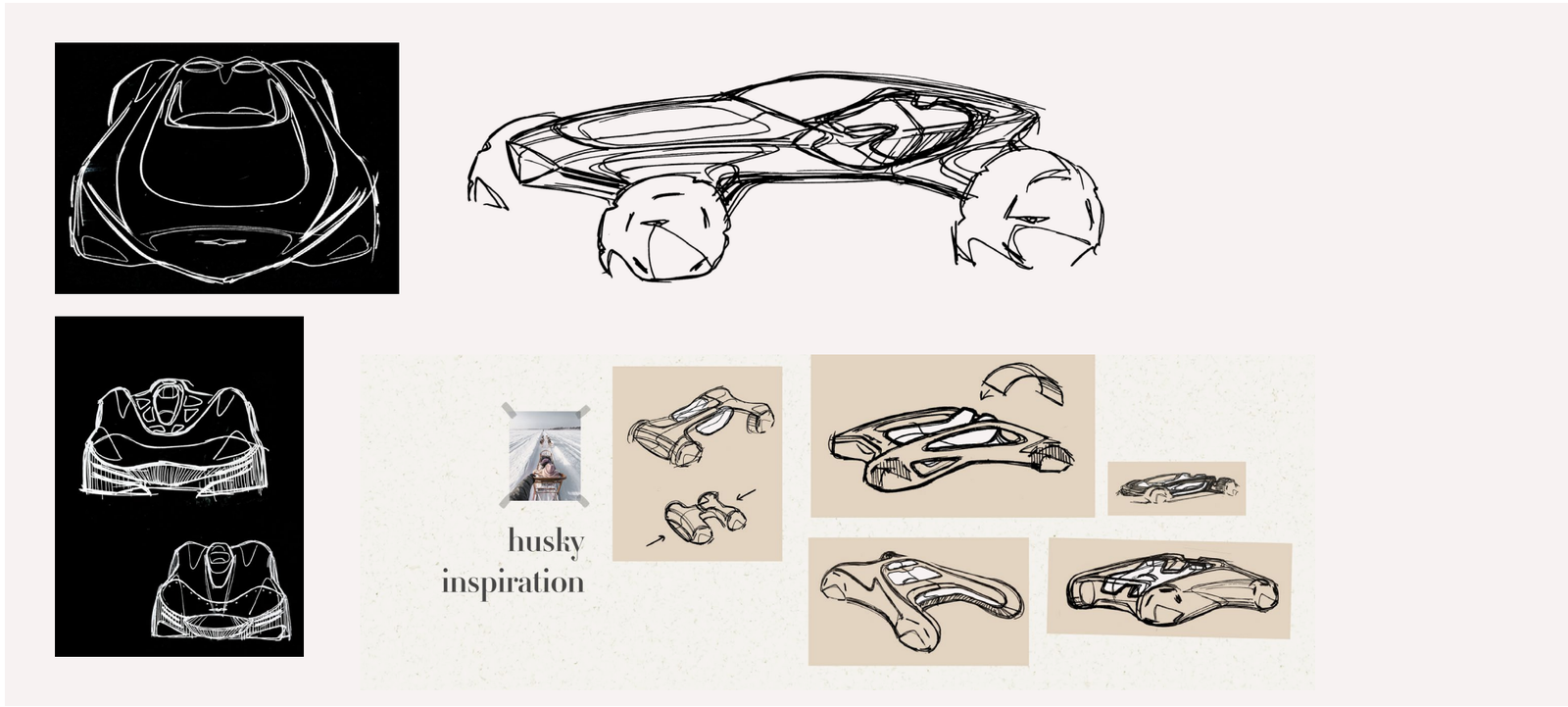


Figure 39. Ideation sketches for exploring the vehicle type and outside visibility.

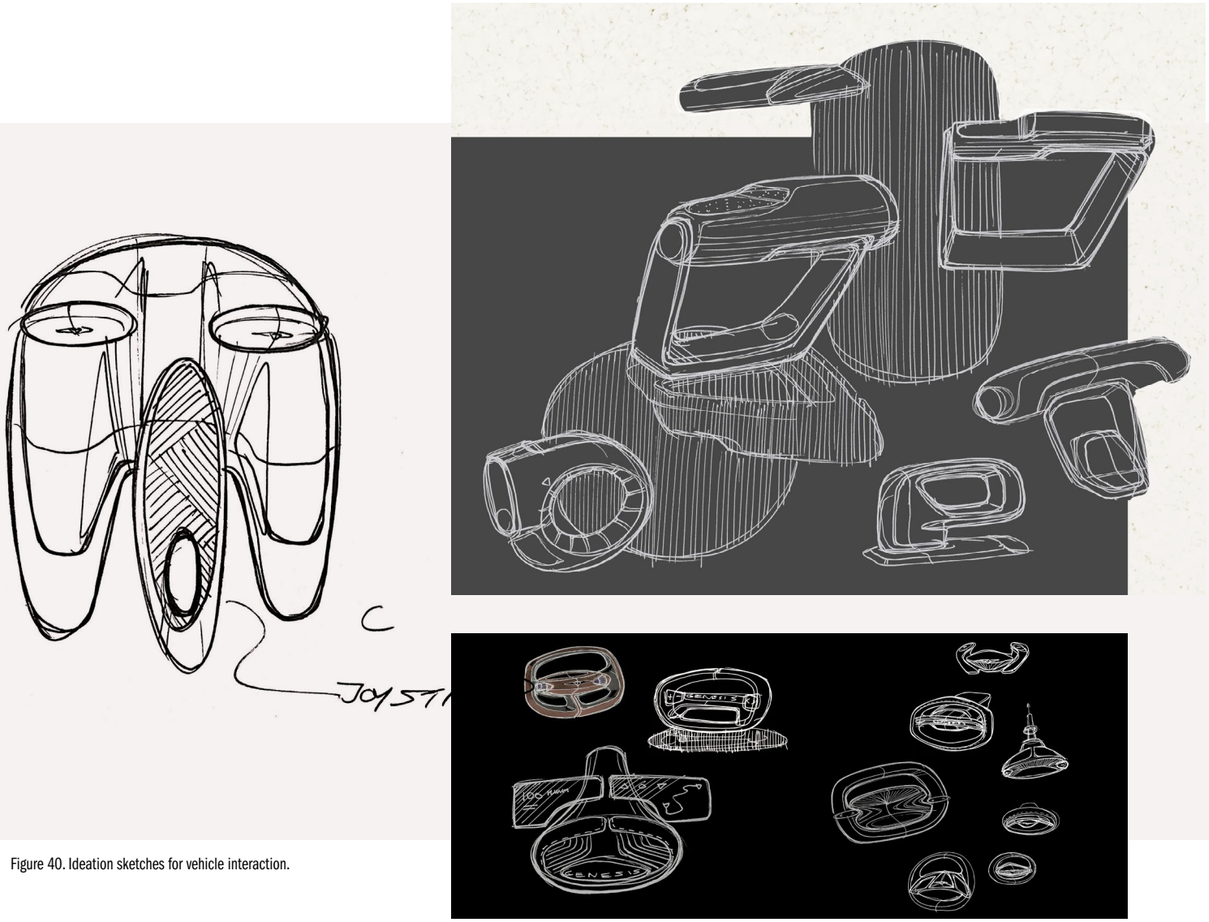


Figure 40. Ideation sketches for vehicle interaction.

Vehicle Interaction

Replacing the IP and steering wheel with autonomous drive, complemented with joysticks for emergency situations, could clear up the view to enhance visibility and connection with the surroundings.

It also has the potential to reduce components, as complex mechanical steering systems, as well as the IP, are replaced with a simple, drive-by-wire interface.

Sustainable strategies

Various lightweight architecture ideas were explored, for example inspired by sail boats. The main idea that originated from that was the hammock seat idea, which creates an airy impression and calm ambiance for observing the outdoor scenery. It also has the potential to provide weight reduction compared to regular heavy seats, when the design follows the same principles as found in Chapter 3 (p. 44)In addition, the yachting aesthetic was explored with several ideas for stretchy and wood surfaces.

Regenerative strategies

To find creative ideas, first an online brainstorm was held with peers and W. Kets. The main task was to come up with quick ideas (rounds of 5 minutes) to explore how cars could contribute to regenerating the environment around the vehicle. See Appendix G for overview of the ideas generated. The ideas ranged from a moss deck for lounging and regenerative benefits; rainwater capture; biolumiscent algae; and an interior made from recycled ocean plastic, which the user collects him/herself to creat a deeper bond nature and the design. of the oceans, and is involved in plastic cleaning himself. *However, most ideas were* as too far-fetched by the design team to apply in a car design. However, they have been incorporated in the usage scenario (for the envisioned self-sufficient villa for the target group).

The only regenerative idea that was found suitable for the client, was the idea of giving back energy to the grid when standing still, to compensate for the manufacturing footprint. This can be done with solar cells. See scenario, p.70.

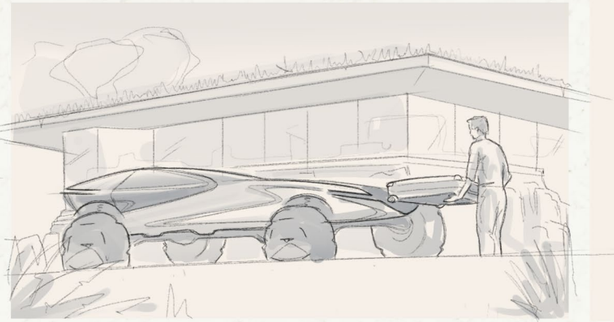
Figure 41. Ideation sketches for exploring lightweight constructions and sustainability-oriented aesthetics.

Envisioned scenario

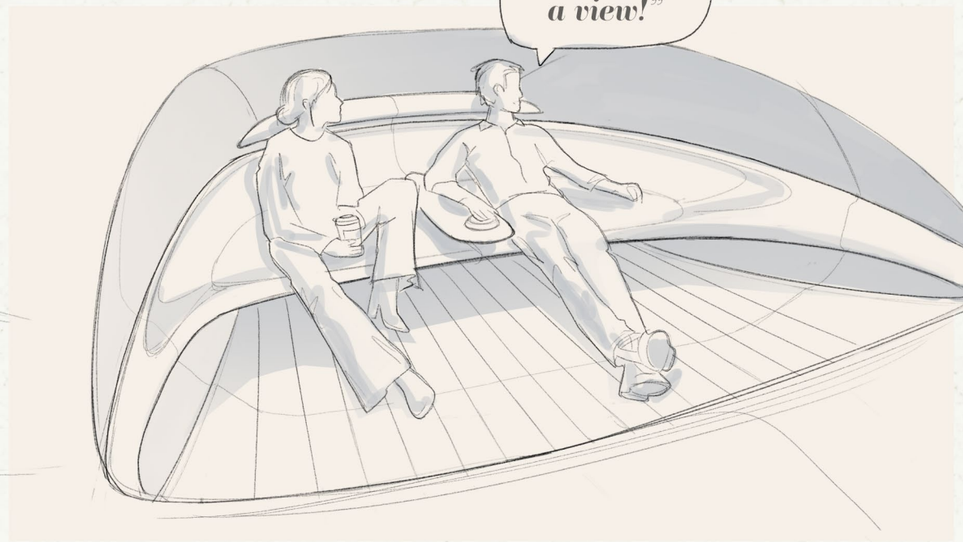
Figure 42

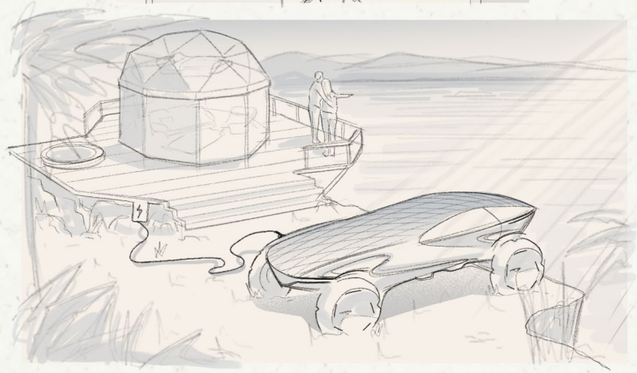
1. Build-up of digital fatigue and stress

2. Departure: need for a break

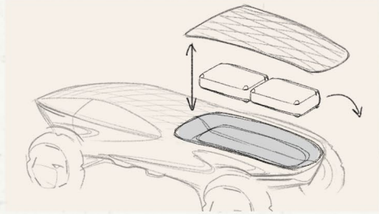


3. Undisturbed and mindful travel experience



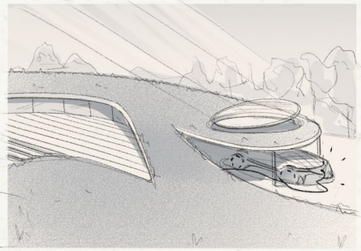


4. Off-the-grid retreat: vehicle delivers energy



5. Open up bonnet area

6. Outdoor lounge to unwind and enjoy the surroundings.



7. Back home: vehicle connects to self-sufficient villa.

6.3 Envisioned scenario

In order to illustrate the final concept, the scenario on the previous page was created. It includes the following scenes:

1. Build-up of digital fatigue by increasingly digital and virtual ways of working and lifestyles.

2. This causes a need for a break for the users, to disconnect from the digital technology that is surrounding them in daily life. Thanks to the electric platform and elegant GT proportions, there is plenty of space under the bonnet (in the 'frunk') for the luggage.

3. The users set off to their eco-luxury retreat on a grand touring journey. The autonomous interior that follows the 'Beauty of White Space' mantra, creates an undisturbing, serene traveling cocoon. This puts the focus on enjoying and connecting with what's outside the car - the vast sceneries and road ahead - facillitated by the openness of the structure that enhances the visibility. The car drives autonomously wherever it can to not distract the users, but can be assisted in difficult (off-road) situations with the compact UI (here depicted on the console).

4. Arrival at the off-the-grid retreat, deeply situated in a prestine landscape with awe-inspiring views. Here a geodesic dome is shown as example, for its futuristic look (scenario is set in 2035 after all) and to match the G-matrix pattern of the envisioned solar bonnet. However, it could also be other types of accommodation as shown on p. 56. The car is part of the retreat's ecosystem as it provides it with electricity. All power-related components are already there in the vehicle (e.g. solar cells, inverter, battery as buffer), so they are not needed in the accommodation, to reduce material impact.

To offer a full 360 brand experience for enhanced engagement and customer relationships, Genesis could actually facilitate these 'all-inclusive' trips and thus manage these domes to optimise the integration between car and dome. Luxury car brands are already offering exclusive, all-inclusive trips, such as Porsche Travel Experiences, which combine 'exploring hand-picked destinations with driving thrills' (Porsche, 2021). This concept could take that to the next level.

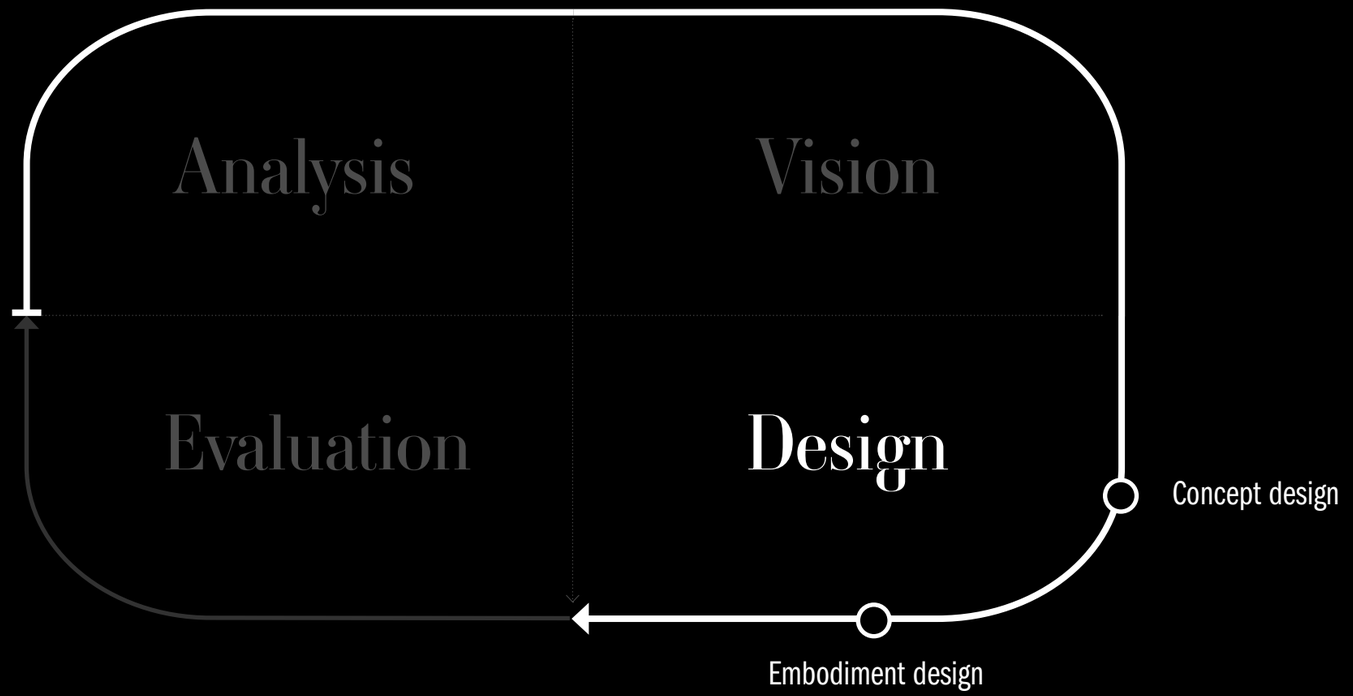
5. The long, elegant bonnet could house several aspects such as the suitcases, as well as an outdoor panorama lounge to immerse oneself in the environment. Here it opens up by removal of the solar bonnet.

6. The reinterpreted GT proportions provide a spacious and elegant outdoor lounge. The higher seating position on the bonnet combined with the increased ground clearance, allows for spectacular views. This way, the users can connect with the natural environment and each other in comfortable, 'pampered' manner. A wide range of seating interactions could be facilitated, for example meditation. This could facilitate resting (digital detox) as well as self-reflection, to allow for transformational experiences and elicit more appreciation for nature. The lounge is mainly used when the car stands still, but could also be used a lower speeds (see Chapter 8: Embodiment).

7. Back home, the car can also connect to the self-sufficient villa when standing still, to generate energy for the house by means of V2G technology (see p. 44). The idea behind this is to become energy positive in the long term, meaning that car could compensate the energy needed for its production, by giving back energy to the grid over a longer period.

The car's limited surface area could be compensated with Fresnel lenses in the carport that can concentrate the sunlight to boost the energy harvest, similarly to a magnifying glass. The lens could move along with the sun direction for optimal performance. This principle has been proven to work for automotive use by Ford with their C-MAX Solar Energi Concept (Ford, 2014). These concentrating photovoltaic (CPV) systems can achieve the highest efficiencies of all currently available PV technology (Wiesenfarth et al., 2017, p. 5).

Part III Design


Analysis
Vision
Evaluation
Design
Concept design
Embodiment design

Key takeaways - Design

Concept phase

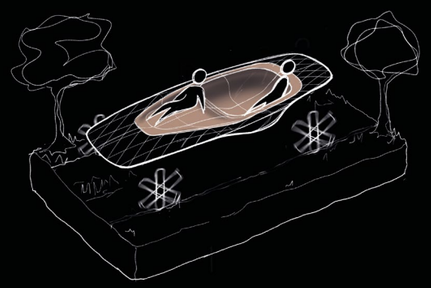
Inspired by the yachting analogy, the overall vehicle architecture features a lounge deck in the front that reimagines the architetypical ('majestic') luxury proportion.

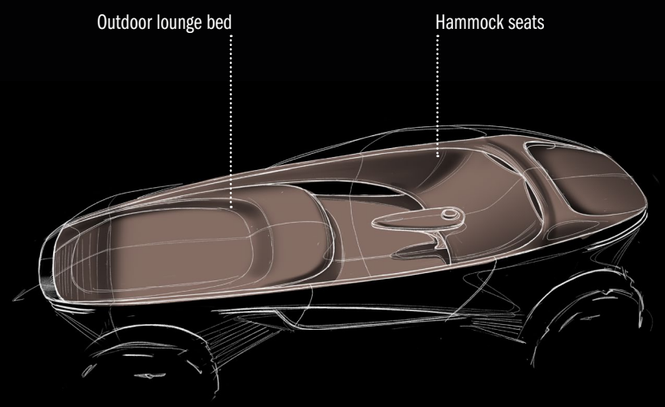
Based on this layout and a basic conceptual package, four concepts were created for the interior architecture. Concept 'Lounge Deck' was selected because it comes closed to the envisioned interaction (connecting to nature in a pampering way). It also featured a calm and airy hammock design and elegant proportions.

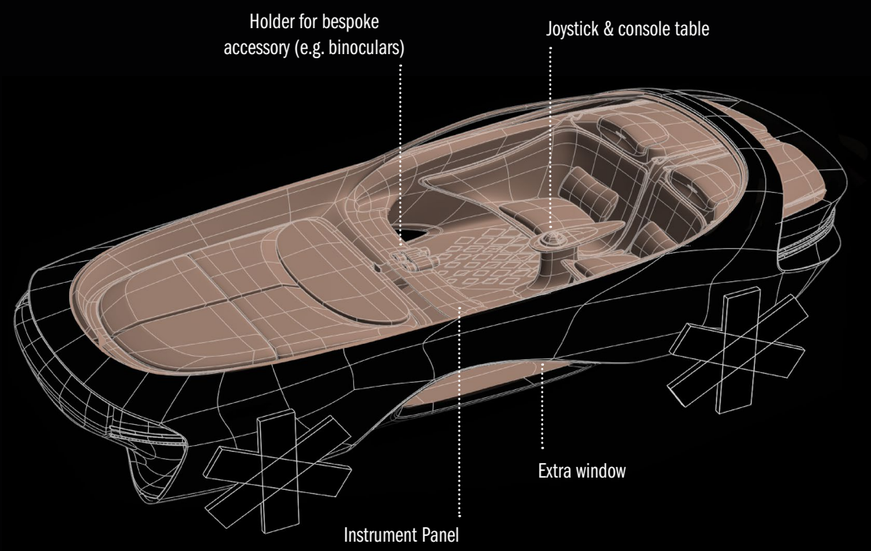
Embodiment phase

Here the selected concept was developed in more detail. Attention was given to the overal styling gesture ('wrap-around' theme from seats to the IP), development of the lounge deck, hammock seats, user interaction and CMF design. The design was developed in 3D using Blender software.

This process from vision to 3D model is shown on the right.







Concept design
(sketch)

Embodiment design
(3D model)

07 Concept design

7.1 Overall vehicle architecture

Archetypical luxury proportion

Our collective memory of ‘luxury cars’ includes their ‘majestic proportions’ (Mignot, personal communication, 8 April, 2020). The most notable factor that determines this proportion is the lenght of the bonnet, which communicates power and grace, commonly associated with luxury cars (Gallina, 2016; Popely, 2007). This is because in the past (1920s and 30s), the more exclusive the vehicle was, the larger the engine it sported and thus the longer the bonnet became (see figure 43).

This is relevant for the interior as it dictates the inner room and architecture. It also creates this experience of seeing this gracious, long hood in front of you while driving. One could argue to get rid of this long bonnet and create a car as small as possible, as this would seem more obvious from the perspective of sustainability (e.g. to save weight and material resources).

However, this 'compact luxury' direction was already explored recently by the GED studio with the Genesis Mint Concept, see figure 7 (Genesis Canada, 2020). Therefore, the long bonnet will instead be reinterpreted in a sustainability-oriented way, by giving it the following features:

- Outdoor (panorama) lounge to connect with the environment and reinforce the user-nature relationship [product level].
- Covered with solar cells. The longer the bonnet, the larger the area covered with cells and thus the more energy can be generated [interaction level].

The Rolls-Royce Boat Tail and Vision Mercedes-Maybach 6 Cabriolet also show examples of a reintepreted majestic proportion for new use (figure 44). The Rolls-Royce is especially interesting as it stimulates user-environment interaction as well. The upper panels of the rear can open up to reveal a luxury picnic set, which is complemented with a parasol and folding seats to create an outdoor seating area Rolls-Royce, 2021).

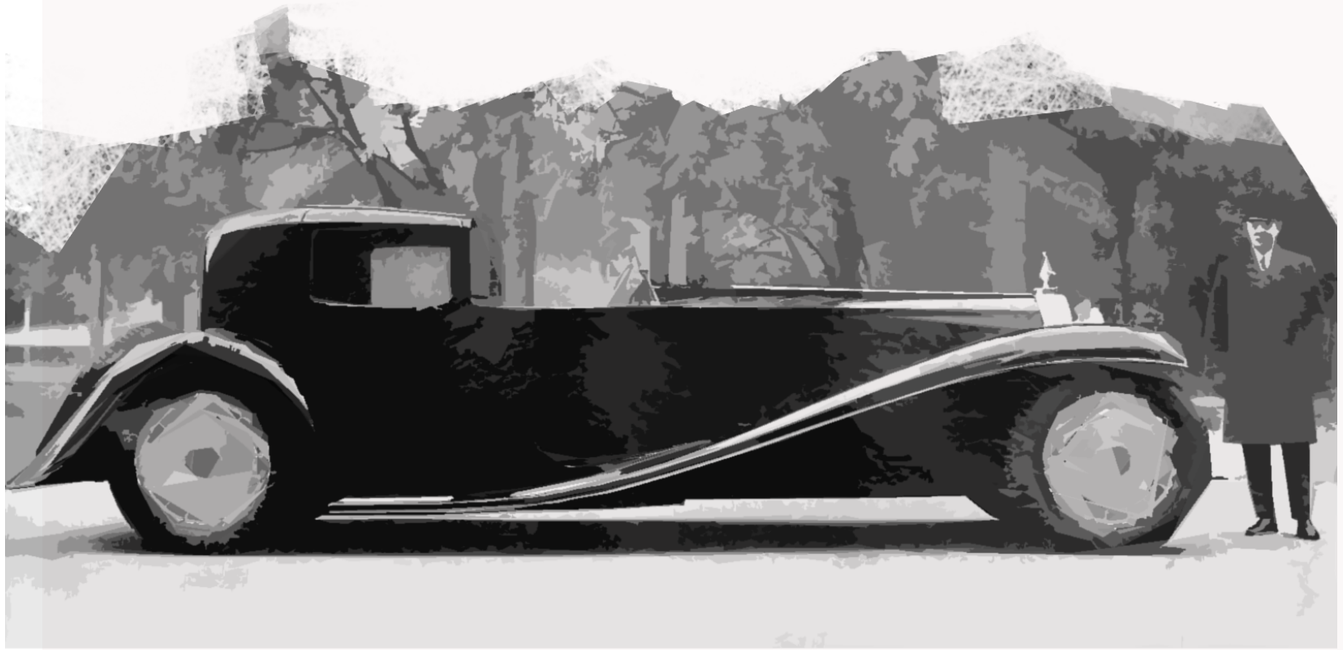


Figure 43. The Bugatti Type 41 Royale (1927-1933), the epitome of this majestic bonnet proportion for luxury vehicles.

Figure 44. Top: Mercedes-Maybach 6 Concept showing how the long bonnet, in combination with an electric package, can be used as sophisticated 'etalage' of items to take with you on a grand tour. Bottom: the Rolls-Royce Boat Tail concept that facilitates more user-user and user-environment interaction, thanks to the integration of a luxury picknick set.

7.2 Conceptual technical package

Approach

In the fuzzy-front-end of the development process, designers should strive for being as creative and innovative as possible, while preserving a certain degree of realism (Hekkert et al., 2003). This principle, coined first by notable industrial and automotive designer Raymond Loewy (1951), is called 'MAYA', an acronym for 'Most Advanced, Yet Acceptable'. Therefore, conceptual projects such as this one, should aim for a design that is 'believable' from a technical and ergonomic point of view, rather than 'feasible', explains the Head of Transportation Design at Umeå Institute of Design (J. Sandström, personal communication, 5 October, 2020). This gives more design freedom to achieve an aesthetically convincing end result, in order to 'sell the dream' to the design management first and spark a discussion about sustainability (see Design Brief). Only after they buy into the concept, a more feasible iteration can follow with further investments. Therefore, a conceptual package design is developed to provide this 'believable' technical base.

Reference dimensions

As stated in paragraph 7.1, for this project it was considered more interesting to explore a larger interpretation of luxury with a typical GT proportion. As a starting point, the dimensions of the Genesis Essentia Concept are taken as reference - the only GT that Genesis has created before. See Appendix E for the reference dimensions.

Occupants

GT cars are usually 2-seaters or '2+2' seaters (Goldasz, 2017). The latter refers to a seating arrangement focused on the front passengers, but with additional room for two occasional (rear) passengers. Space as well as comfort for the '+2 passengers' is usually compromised to allow for an elegant roof profile which is typical for GT cars (Macey & Wardle, 2014, p. 130). Both configurations were explored. However, the 2+2 layout (see right page) was not selected as the additional seats are only rarily used, but always compromise the overall interior experience, proportions and roof silhouette.

Next, anthropometric data from the 'Central Europe' dataset from the DINED database were used, to provide a believable reference of our average European user. The initial package should be build around tall users, to ensure that the vast majority of the users will fit into the interior (Macey & Wardle, 2014, p. 122). Hence, the 95th percentile data for the Central European male (height: 1805 mm) and female (height: 1760 mm) were used (TU Delft, 2017; Jürgens et al., 1989). This is translated to the 3D reference manikins.

For the seating position (H-point, AHP, etc.) the GT seating position of the Genesis Essentia is taken as reference with support by S. Brühler, Studio Engineer of GED.

Luggage

For the luggage compartment in the boot, two large, typical suitcases were taken as reference (Macey & Wardle, 2014, p. 156).

Autonomous drive

As the project is set in 2035, the assumption can be made that self-driving technology is more mature and adopted in terms of regulations. Self-driving has the following benefits:

- Luxury: effortless traveling, almost like being driven by a chauffeur.

- Sustainability: opportunity to eliminate components and mechanisms needed for full manual driving. This creates more focus on the traveling experience and connection with the environment you are driving through.

- Brand: Genesis did not design any (publically released) self-driving concept so far, so this topic is interesting to explore. In addition, elinating user interface elements such as the IP, can create a clean and minimal interior ('Beauty of White Space' interior philosophy, see Chapter 1).

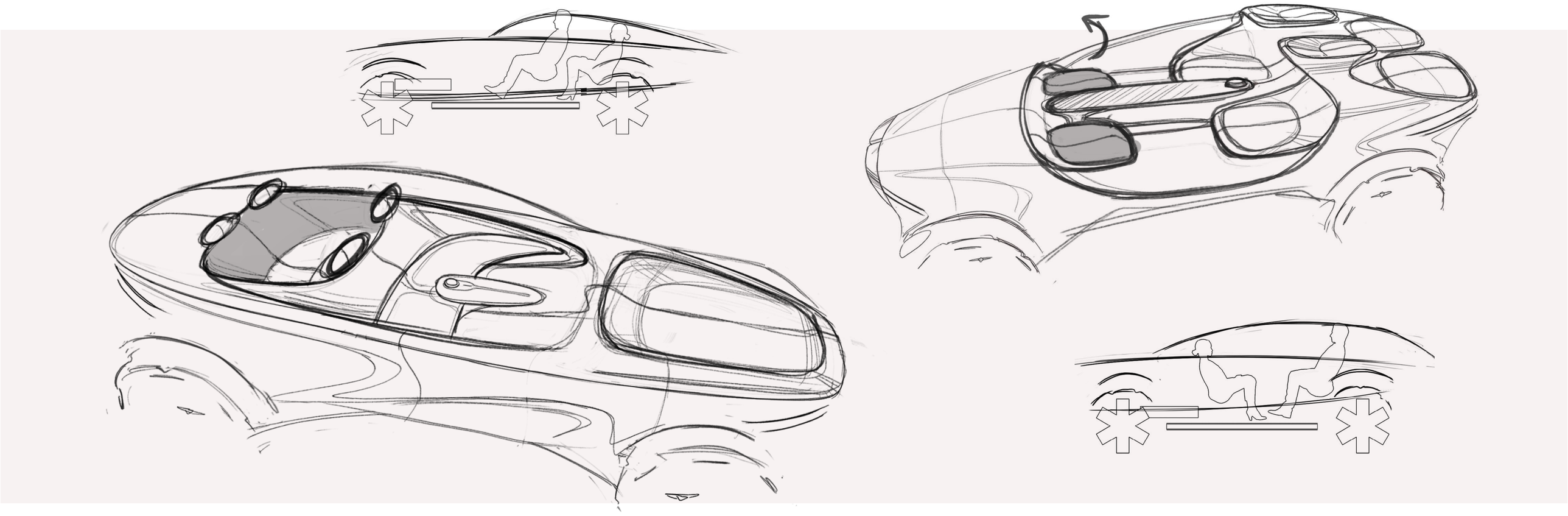


Figure 45. 2+2 layout exploration based on similar design themes developed for the architecture proposals on pp. 82-85).
It shows that with this package and proportion, the (head) room for extra occupants is limited.

For self-driving, additional sensors are needed, plus more energy is required for additional computing power. However, most of these sensors and cameras are expected and already present in today's luxury vehicles. For example, the GV80 has already dozens of sensors, cameras and AI technology for their advanced driver-assistance systems that enable e.g. adaptive cruise control, lane keeping assist, emergency braking, etc. (Genesis, 2020).

To enable self-driving, the following additional components are added with input by Hyundai engineers: lidars, short and long range radars, 360 cameras and V2V antennae (for 'vehicle to vehicle communication'). Only the position and a rough bounding box to indicate basic dimensions were implemented, because any more details are considered confidential.

Powertrain and battery pack

To provide electric energy for the motors, a solid-state battery pack was used in the package design. This battery was estimated to have ca. 700 km range, equaling ca. 75 L of volume (see Appendix I). Solid-state technology has the potential to deliver 2.5x higher energy densities than conventional Li-ion batteries (Samsung, 2020; Dudney et al., 2015). This is creates more space and freedom in the interior, as battery packs are usually the largest component inside an EV. Albert Biermann, Head of R&D Hyundai Motor Group, confirmed that by 2030, the group will take solid-state battery technology into production (Jin-Woo & Ha-Yeon, 2021).

Solar cells

Three different solar cells or photovoltaics (PVs) were considered for the design: (semi) transparent PVs; flexible PVs and regular PVs (see Appendix J). Transparent PVs have the lowest efficiency but provide the benefit of application on more (window) areas, leading to a larger solar surface (Lunt, 2017). Flexible PVs have a medium efficiency, but could provide a way to easily remove the solar surfaces, to e.g. open up the outdoor lounge area (Heinrich et al., 2020). Obviously, the most efficient and market-ready cells are regular (double-curved) photovoltaic, but they provide less design freedom. These 3 options are also indicated on the architecture design proposals (pp. 83-86) with a corresponding number of sun icons (ranging from 1-3 to indicate the efficiency).

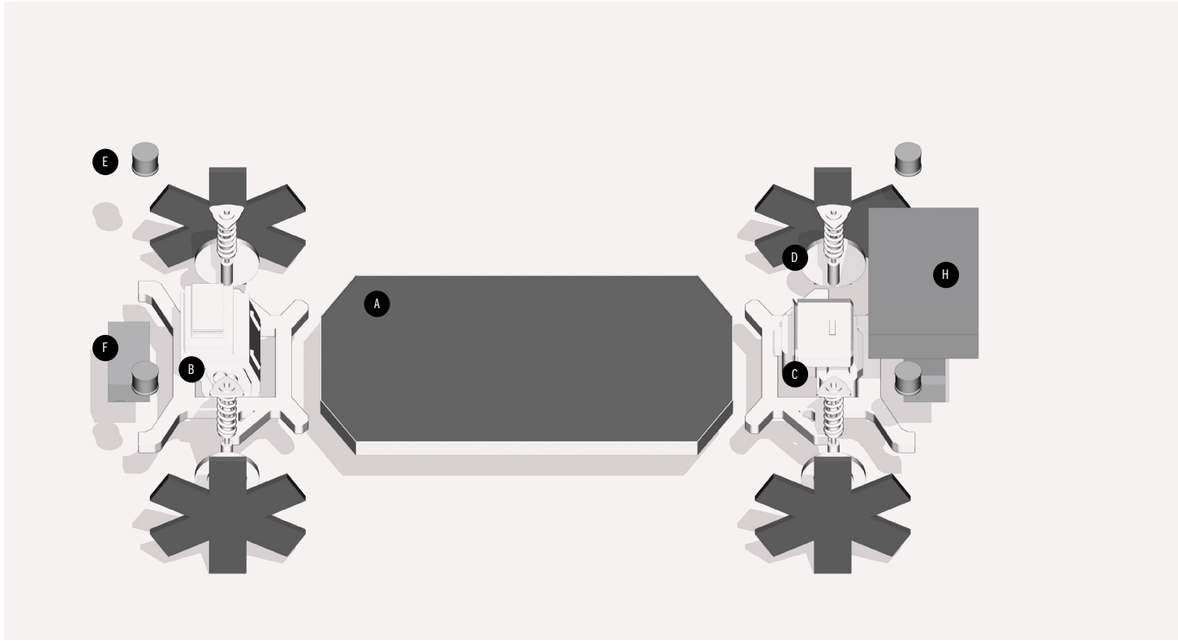


Figure 46. The E-GMP package, remodelled and with autonomous components added:

A) Solid-state battery pack (700 km range)
B) Front electric motor
C) Rear electric motor
D) Suspension and brakes
E) Lidar, 360 camera & V2V antennae
F) Short and long range radars
H) Suitcases (2x)

package drawings

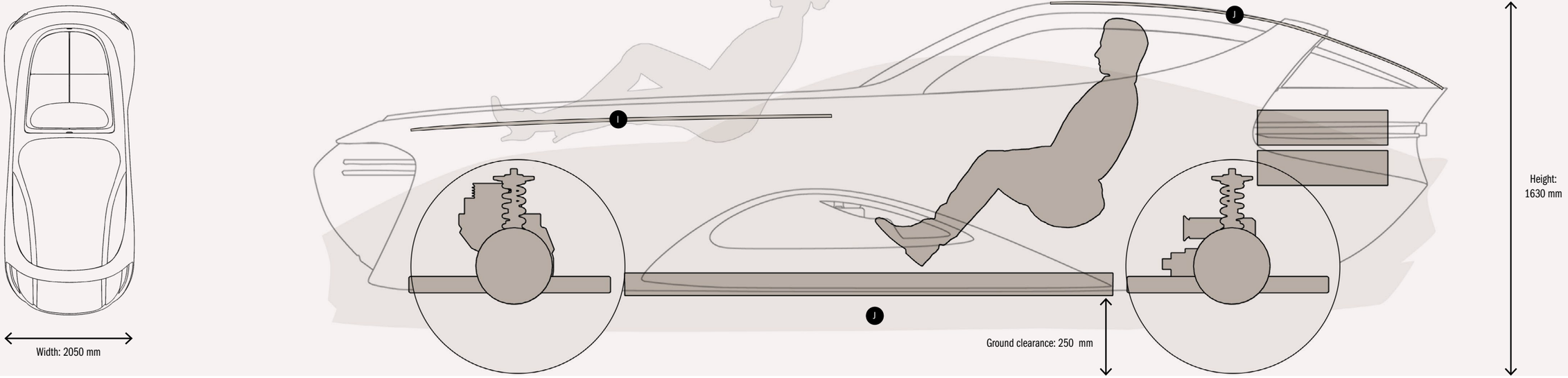


Figure 47. Package drawings on which the final design was based (see chapter 10), including:

I) Main solar area (Maxeon SunPower PVs)
H) Secondary solar area (semi-transparent, Perovskite PVs)
J) Genesis Essentia Concept, benchmark dimensions (in grey)

7.3 Concept proposals

Proposals

The technical package, including mannekins, was created in 3D using Blender modeling software. This was used to create underlays to sketch over, to create a feasible and ergonomical base for the designs. Based on the selected direction in Chapter 6, the process diverged again to create four different architecture proposals, each based on different configurations of the package (see following pages).

The final proposal is shown on the right page. The other proposals are displayed on the following pages.

Selection of the final design

Concept 'Lounge Deck', on the right page, was selected in consultation with the GED team and Chief Designer Perini, because of the ability to lie down. This enables the user to connect to nature in a 'pampering' way, like on a boat. Also in terms of overall shape, it comes closest to the interaction analogy (Chapter 5).
Finally, the integration of the hammock idea (Chapter 6) for the seats and overall elegant proportions made it an obvious winner.

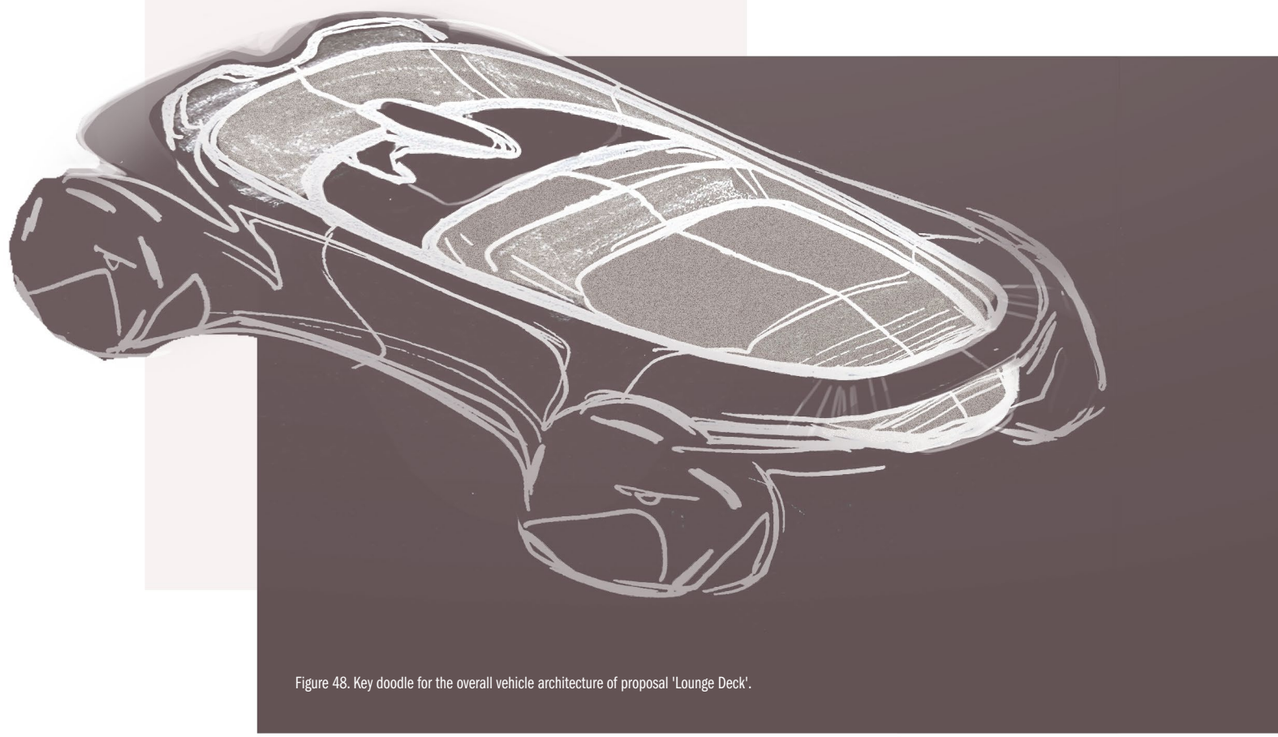
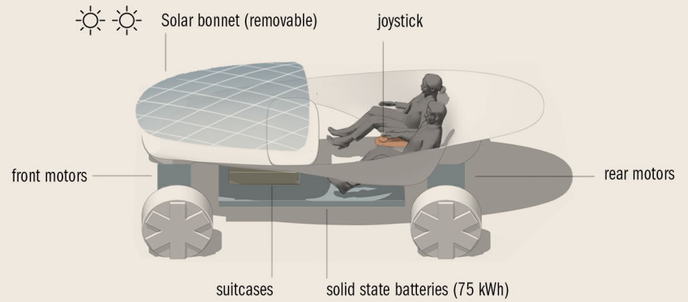


Figure 48. Key doodle for the overall vehicle architecture of proposal 'Lounge Deck'.

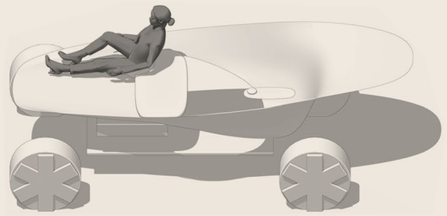
Selected proposal

Concept Lounge Deck

driving mode



outdoor lounge mode



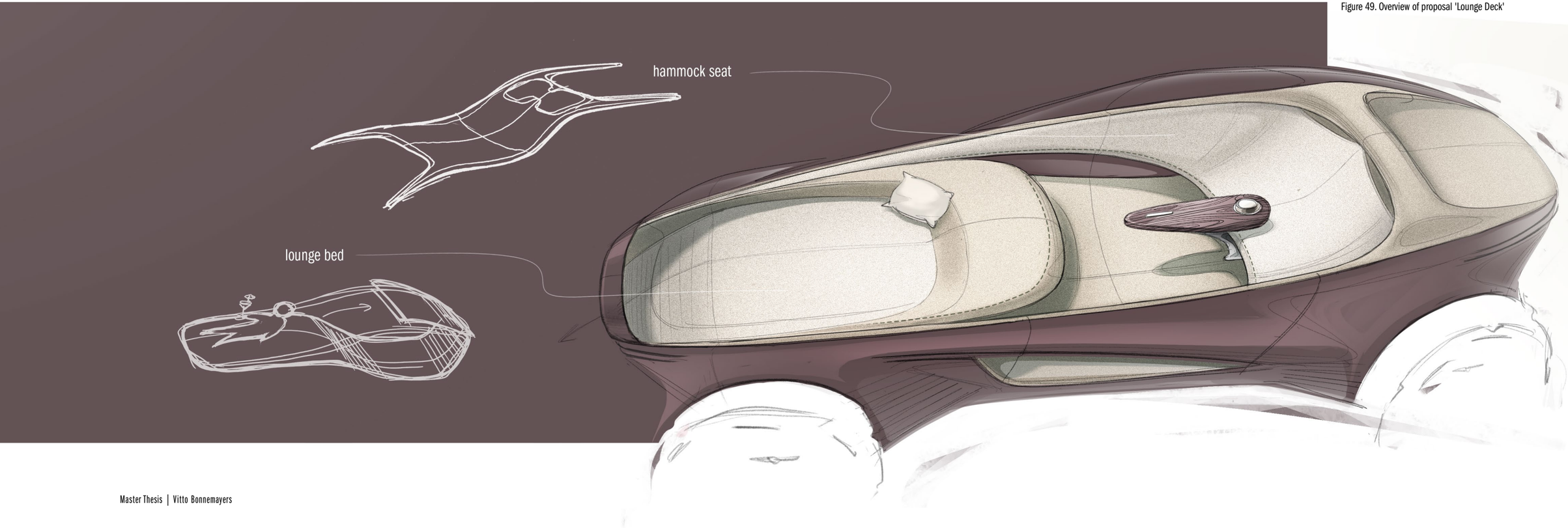
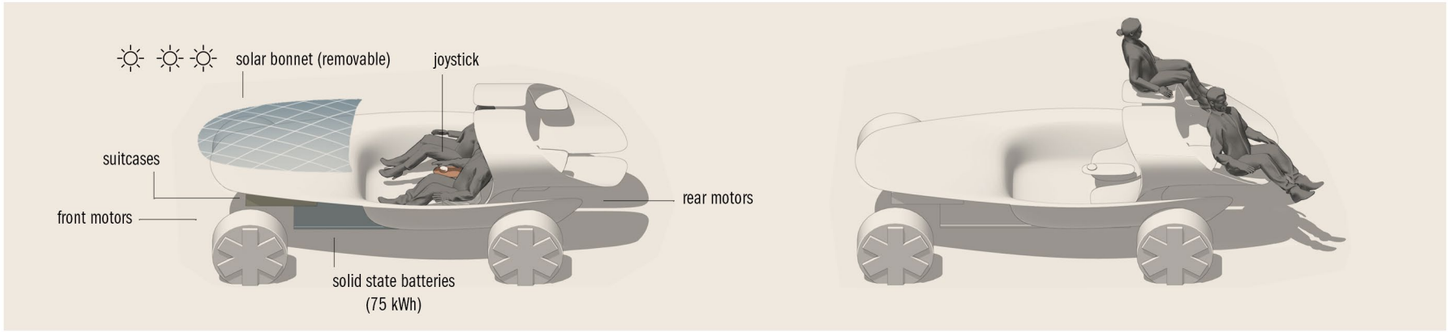


Figure 49. Overview of proposal 'Lounge Deck'

driving mode

outdoor lounge mode

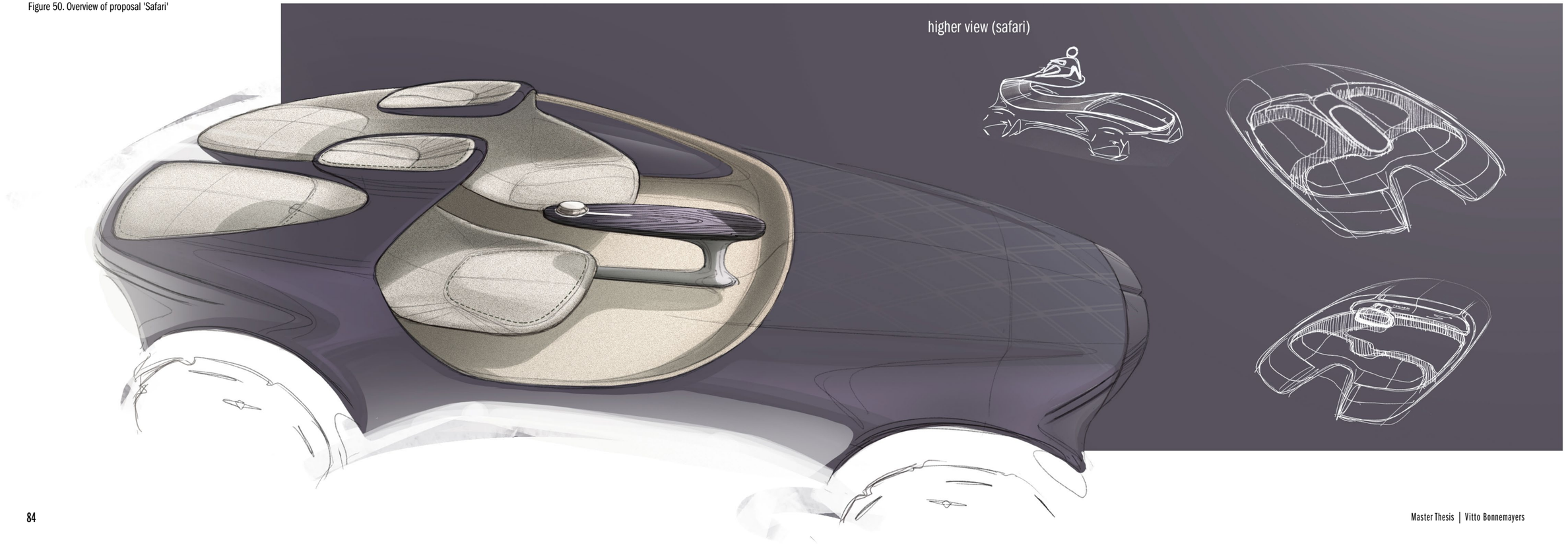


Concept Safari

This concept features an interior that flows over into the seat ing area in the rear. Here there are two levels, one lower one and one higher 'panorama seat', hence the name 'Safari'.

However, this concept was considered not elegant enough due to its bulkier proportions; as well as less feasible due to the complex lounge construction.

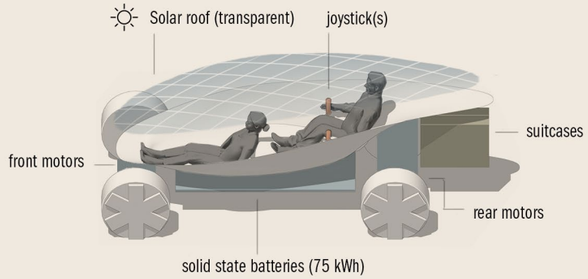
Figure 50. Overview of proposal 'Safari'



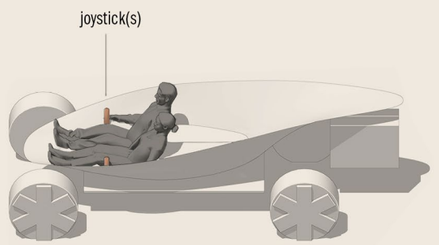
Concept Tandem

Concept 'Tandem' was inspired by the second layout that was selected during the ideation phase (see p. 65). With the tandem layout, the vehicle is nimble for off-road situations and reduced in terms of footprint (sustainability). This architecture also creates a novel proportion of the overall vehicle. In this layout, the 'driver' sits behind the passenger, like in a husky sleigh. This gives the passenger more visibility to look ahead. The concept was regarded too advanced (for user acceptance), not elegant and not comfortable enough.

assisted driving mode



autonomous / lounge mode



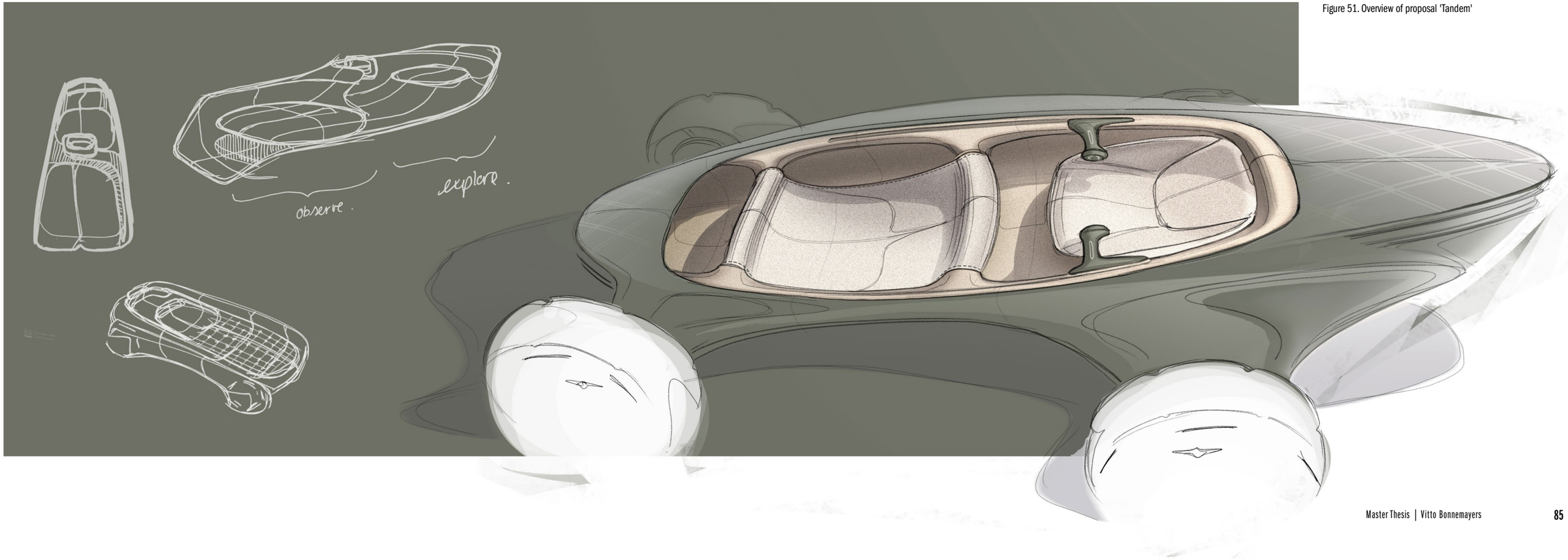
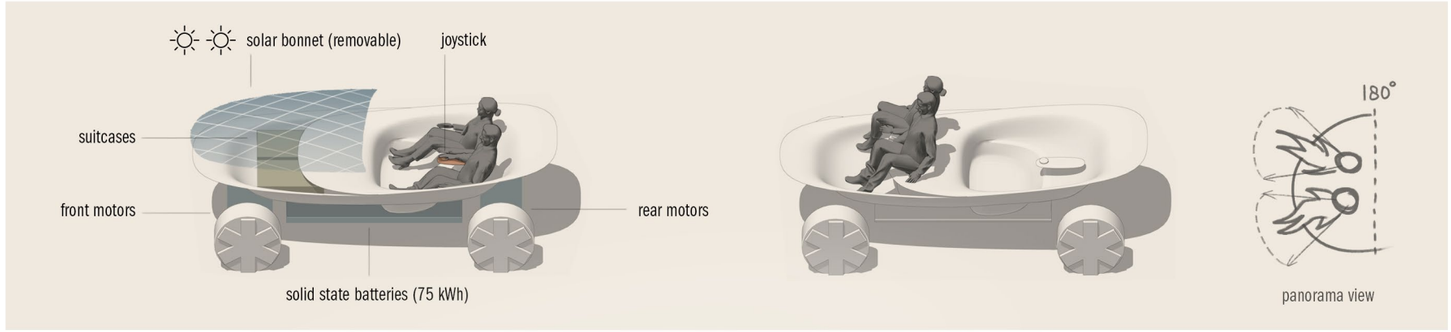


Figure 51. Overview of proposal 'Tandem'

driving mode

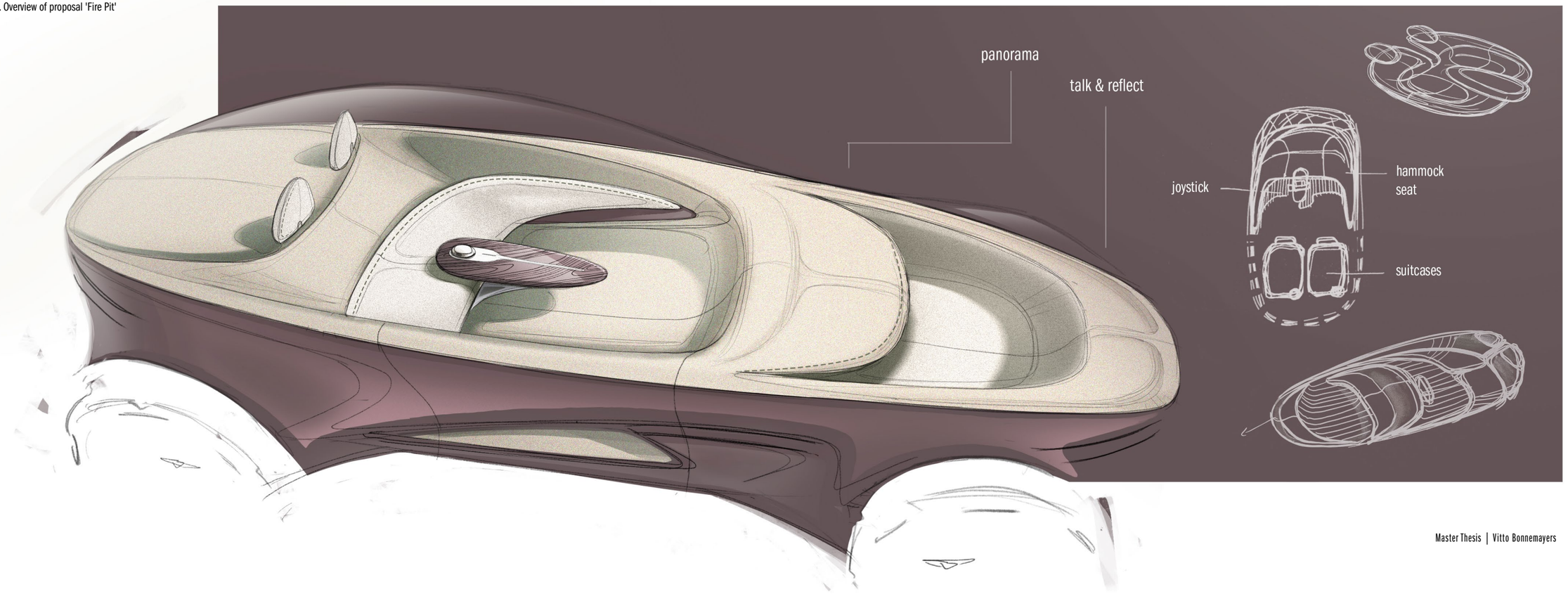
outdoor lounge mode



Concept Fire Pit

This proposal was a variation on the selected concept. Instead of a lounge deck where you can lie down, this concept features a seating area in the front. The curved and recessed shape of the seating area was inspired by a fire pit lounge. When facing forward, you are nudged to look around by the convex, moon-shaped sofa. When sitting backwards (to the interior), the users are facing inwards to stimulate conversation and reflection about their travel experience. This concept was considered a 'weaker' version of proposal 'Lounge Deck' in terms of interaction and styling.

Figure 52. Overview of proposal 'Fire Pit'



08 Embodiment design

8.1 Main architecture & theme

The selected concept design (p. 83), was translated into 3D data using Blender. First the overall architecture was explored and modelled (figure 53, left) named 'Forward-looking Lounge'. Throughout this process, discussions with the project mentors led to the exploration of another architecture direction, proposal 'Face-to-face Lounge' (figure 53, right image).

Advantages proposal 'Face-to-face Lounge'

1) More coherent and harmonious styling theme (counter-balancing shapes of the seats and lounge).
2) Feels more like one connected space, which creats a sense of spaciousness (luxury) and openness (connecting with environment).

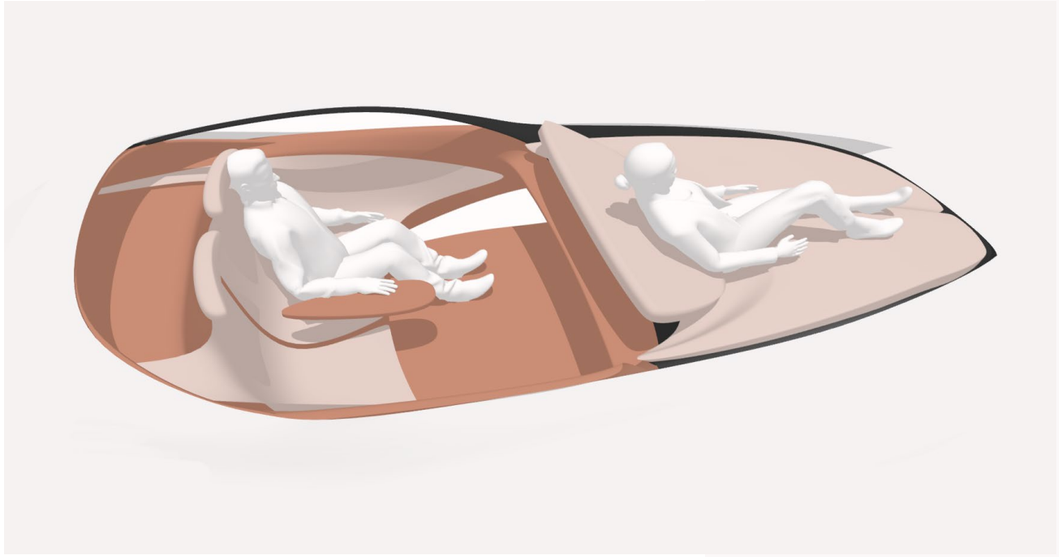
Advantages proposal 'Forward-looking lounge'

1) Creates an experience that is closer to envisioned interaction and interaction analogy of the boat: connection to environment, by looking out the car (to the road and around) on higher 'panorama' position, rather than connection to each other by sitting face-to-face.
2) More space (around the side of the lounge) for a believable bonnet opening mechanism.
3) More unique concept (similar architecture to 'Face-to-Face' lounge was done before in 2020 by an Art Center student).

The 'Forward-looking Lounge' was clearly favoured by the Interior Team and author, mainly because of the strong weighting of point 1 and 3. In addition, the advantages of the other proposal can be implimented in the selected proposal as well when developed further.

Architecture proposal 1

Forward-looking Lounge



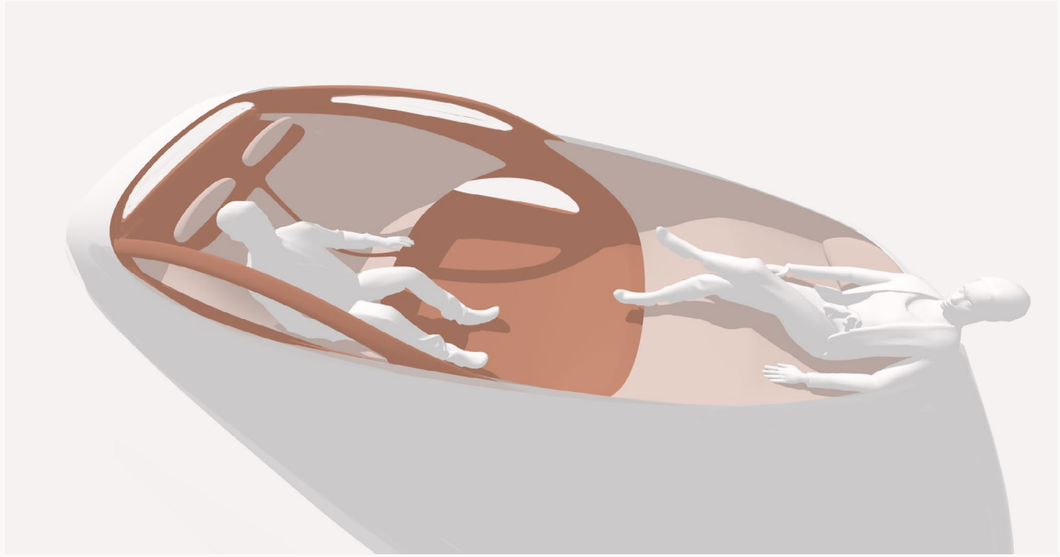


Figure 53. Left: selected architecture design; right: alternative direction.

Architecture proposal 2

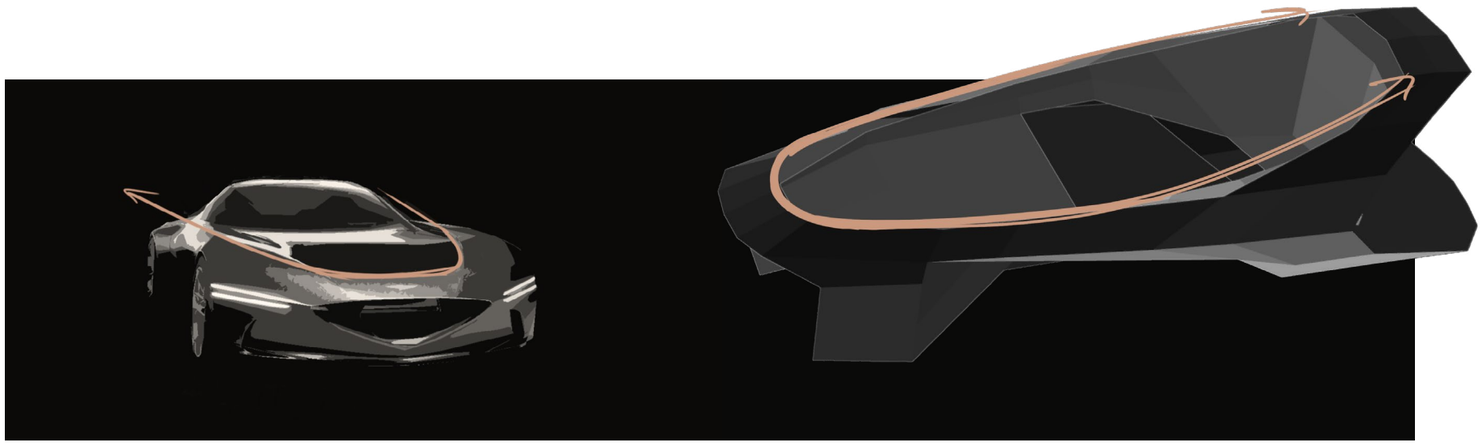
Face-to-face Lounge

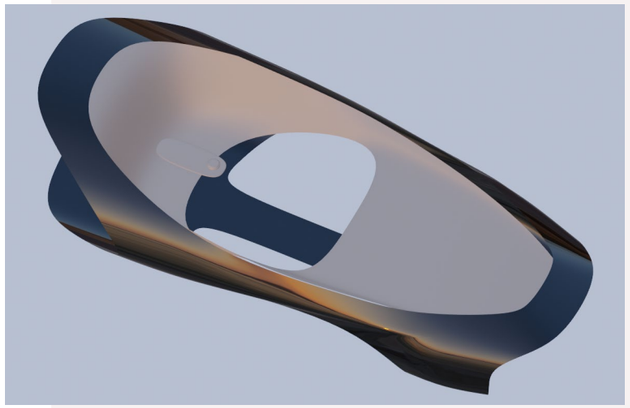
8.2 Exterior shell

In order to present the interior design, there needs to be a surrounding structure that holds the different interior elements together. Normally that would be the vehicle's exterior design, but fully developing this is, would be beyond the scope of this project. Therefore, the decision was made to create a rather abstract exterior 'sculpture', which forms a skin around the interior. This also addresses the need to communicate the overall vehicle concept (see Chapter 0: Design brief).

Even though it is not the focus, the exterior styling is crucial due to its large visual presence by surrounding the whole interior. It also needs to look aesthetically convincing towards the GED managers, who have an exterior design background.

The overall structure was inspired by the hull of a boat as well as the architecture of the Genesis Essentia concept (green house graphically extending to the front, wrapped by the fenders), see figure 54. To create the design efficiently, the exterior shell was mainly developed in 3D, directly around the interior.





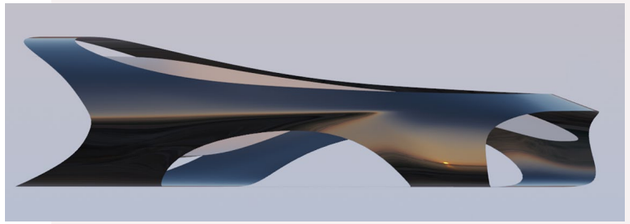


Figure 54. Exterior sculpture development, inspired by the hull of a boat and the architecture of the Essentia Concept.

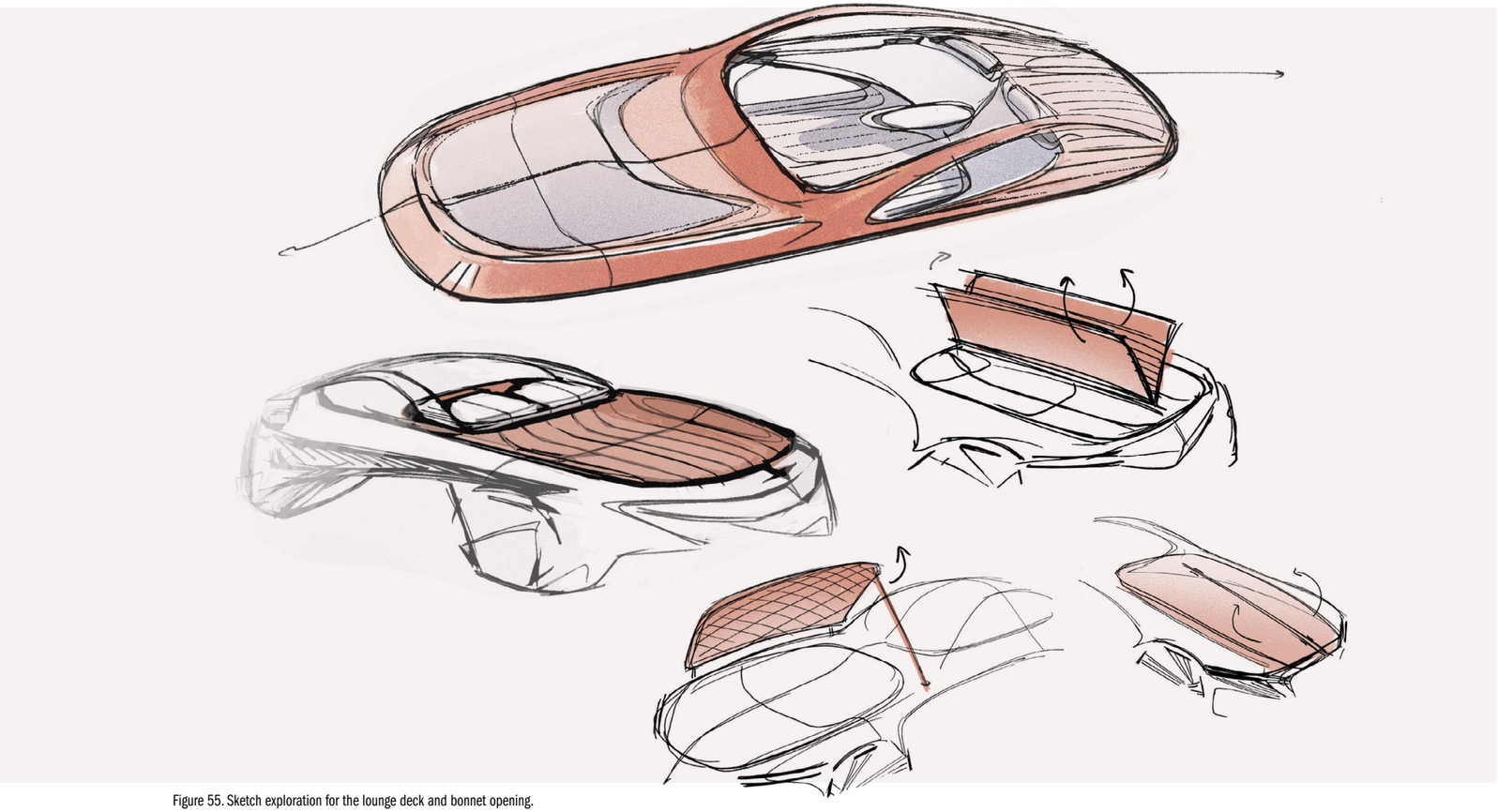


Figure 55. Sketch exploration for the lounge deck and bonnet opening.

8.3 Bonnet lounge area

Having selected the 'Forward-looking Lounge' architecture, a lounge area was developed in the long bonnet where traditionally, a large engine would be located for a GT. The area can be accessed from the interior, with the help of two steps that slide out to bridge the small height difference (see figure 56, step 4). The lounge is recessed relatively low into the bonnet to support accesibility. In addition, this provides sheltered feeling for the user. This follows the same design principles as applied in yacht design, where users would like be exposed to the environment, but not feel 'all in the open', unprotected from the elements and the eyes of other people, explained luxury mobility expert J. Roes.

The outdoor lounge is mainly intended for usage when the car is parked, e.g. on a location with a spectacular view); but with the safety benefits of automated driving, one could imagine to enjoy the lounge when cruising at very low speeds (e.g. max. 10 km/h) through remote areas. This could emulate an experience and exposure to the environment similar to the the boat analogy.

Since the lounge is located on a part of the exterior with this architecture, this means a solution had to be found to cover the lounge when not in use. This cover has the purpose to feature solar cells (sustainability criterium, see scenario, p. 70) as well as protect the cushions from the elements when driving. The switch from covered to uncovered should happen with a low level of effort for the user (luxury

criterium) and with elegant movement (Genesis brand criterium). Several options were explored, first using hand sketches and later in 3D to assess the functionality and required space.

The mechanism in figure 56 was selected in consultation with the design team and mentors. The main reasons were the relatively simple and elegant movement and space-efficiency (no need to hide-away large, double-curved bonnet panels in the front area, where there is also the powertrain and suspension). An additional benefit of this mechanism is the ability to be hide either the lounge or solar bonnet. This makes the design more clean when not in use (Beauty of White Space) and could make the 'slow cruising' mode possible, since there are no open body panels that could generate (major) drag.

A disadvantage with regards to sustainability and mechanical complexity is the need for additional (small) electric motors and structures (weight) that enable the up-and-down and rotational movements. However, this could be compensated with lightweight materials and the absence of sturdy (hydraulic) hinge mechanisms that are needed for traditional bonnet opening mechanisms.

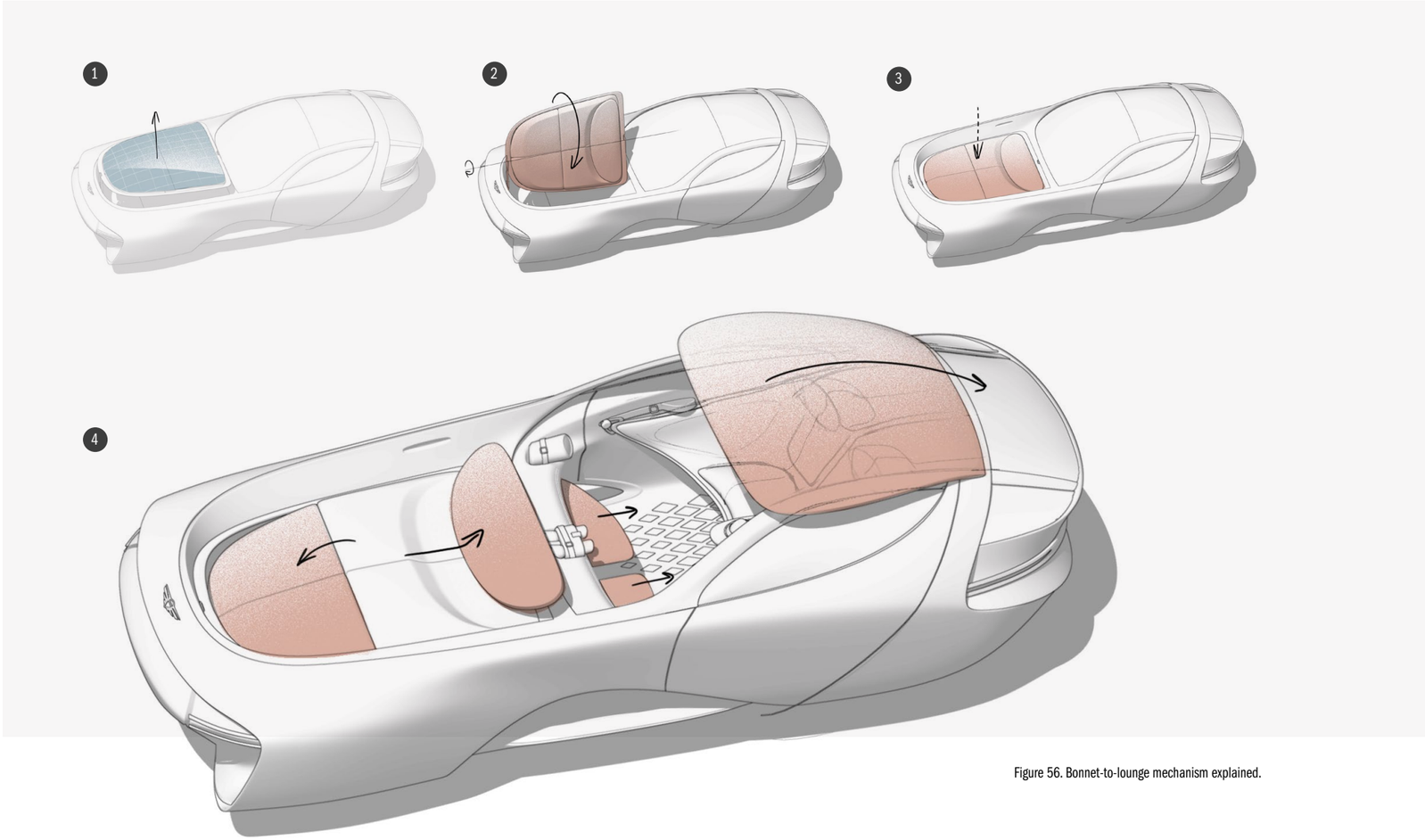


Figure 56. Bonnet-to-lounge mechanism explained.

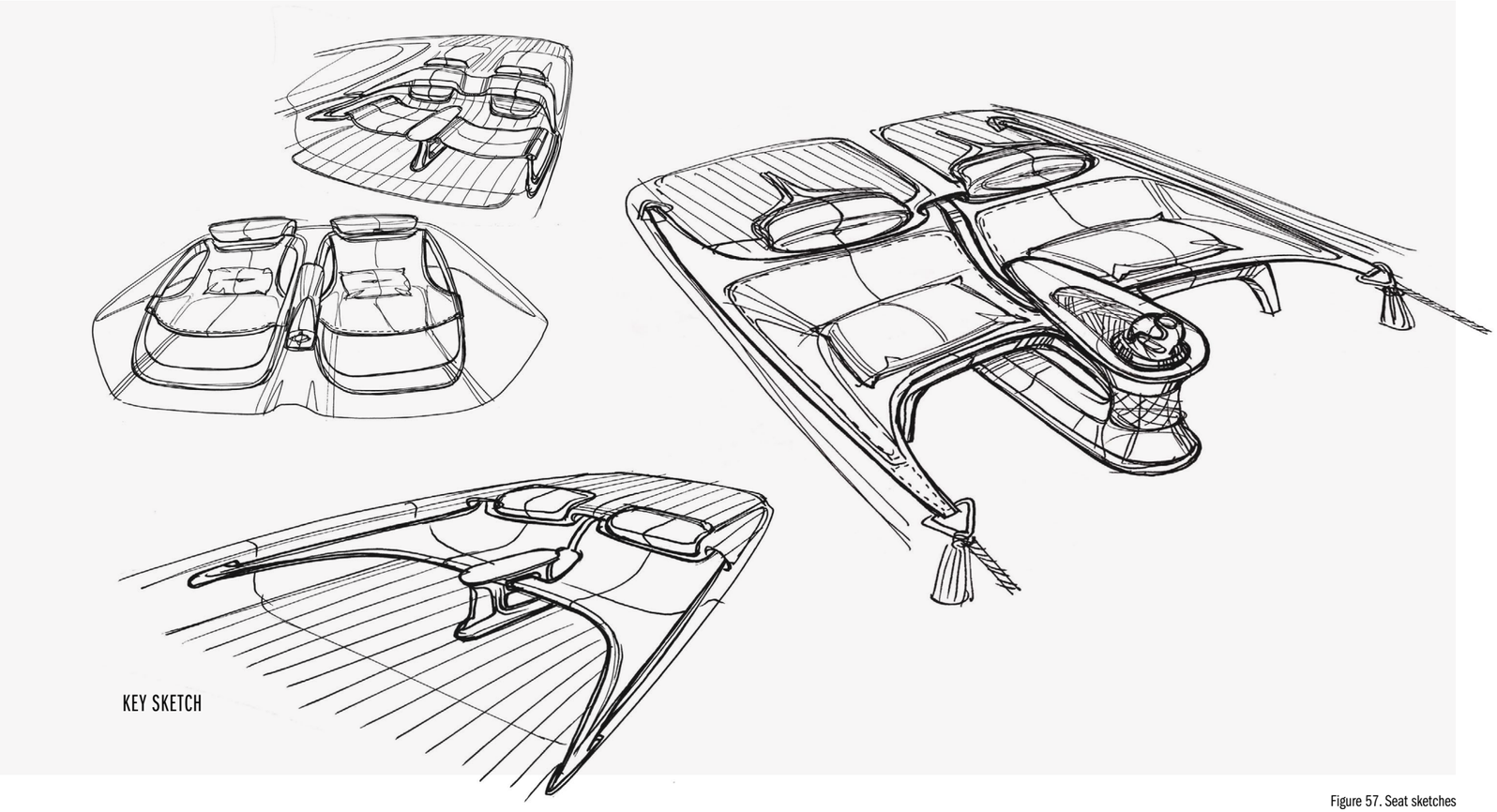


Figure 57. Seat sketches

8.4 Hammock seats

The hammock seat design theme (see p. 83) was developed further in order to create a lightweight, suspended structure (see Chapter 3) and aesthetic that looks airy, calm and honest. The principle of using a suspended seating area was first explored further in several variations. However, the key sketch that was selected (figure 57, bottom right) was again close to the original seat theme. This design was selected for its elegant wrap-around aesthetic and purity in the way it is suspended and overall airy impression.

The hammock is suspended with two points at the back, elegantly running over what normall would be the parcel area. There is another suspension point in the centre console area and one on the door panel.

In order to provide stability during driving as well as safety, the seat features a strong yet lightweight frame (recycled aluminum) under the seat. When the user sits down on the cushion, the buttocks are thus enclosed and supported by the frame.

Ingress & egress

The hammock features more elastic material (material split) on the side 'wing that is connected to the door. This part is not connected to the part on which the user sits (in the frame). Therefore the seat can be connected to the door, which preserves the elegant wrap-around theme. This is possible by using so-called suicide-doors which open in reverse fashion.

An additional benefit is that these doors rotate away from your view compared to regular doors, which creates an impression that the car opens up completely to the outside environment, thus exposing the user instantly to the environment when exiting the vehicle. The suicide doors are also reminiscent of iconic luxury GTs, such as the Rolls-Royce Wraith.

Naturally, choosing this unorthodox door design comes with additional challenges, such as the shape of the door split line, and the elasticity of the hammock part connected to the door.

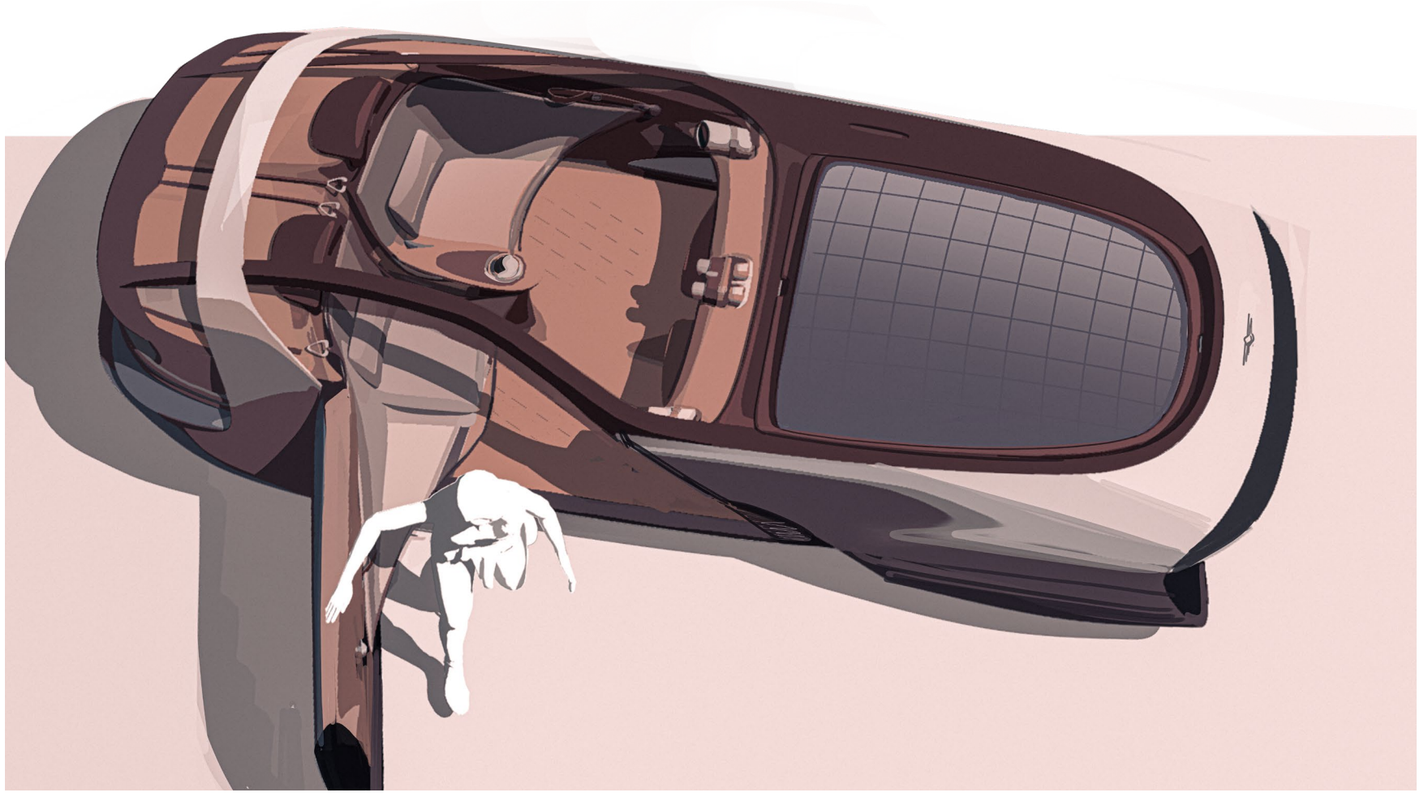


Figure 58. Sketch exploring the opening of the doors and ingress/egress.

8.5 Vehicle interaction

Instrument panel (IP)

Usually, the dashboard or 'instrument panel' (IP) is the focal point of the interior, as it is right in front of the user's eyes. However, given the vision and mission statement, the intention to was actually keep it as minimal as possible, to prevent (digital) distraction and instead let the user enjoy the scenery and road ahead. In addition, hardly any interface is needed since the car is envisioned to drive autonomously for most of the time.

Therfore, a design could be created with a honest and time-less (sustainability criterium) aesthetic, featuring only two gauges in the corners. These gauges look like analog dials, but are in fact digital displays that show only the most relevant information (e.g. speed or battery level) depending on the situation. These two dials can switch to camera images from the virtual side mirrors when the user needs to manually assist the car. Virtual side mirrors have the benefit of creating an overall vehicle design that looks more elegant.

The large sketch on the right shows an early exploration of what later became the main gesture: an elegant wrap-around theme that follows the shape of the seat for visual coherence.

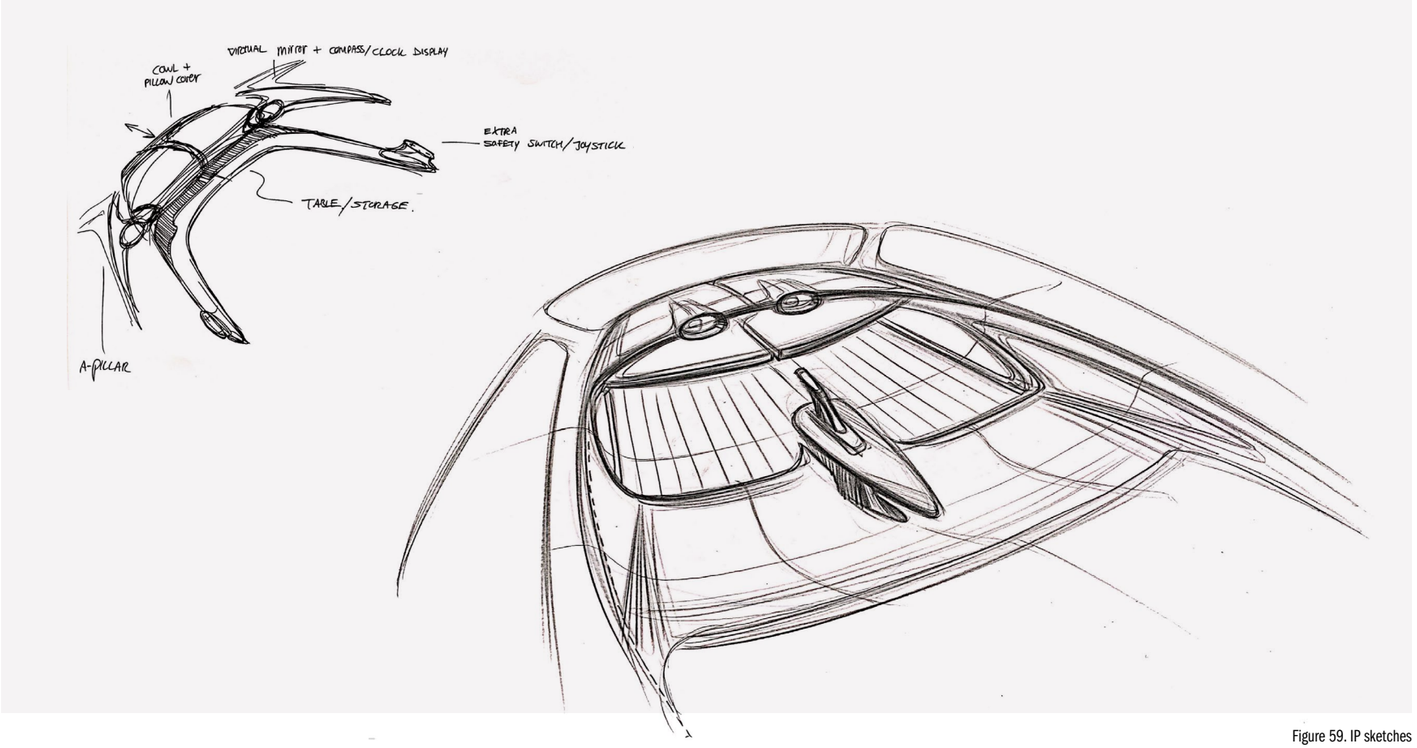


Figure 59. IP sketches

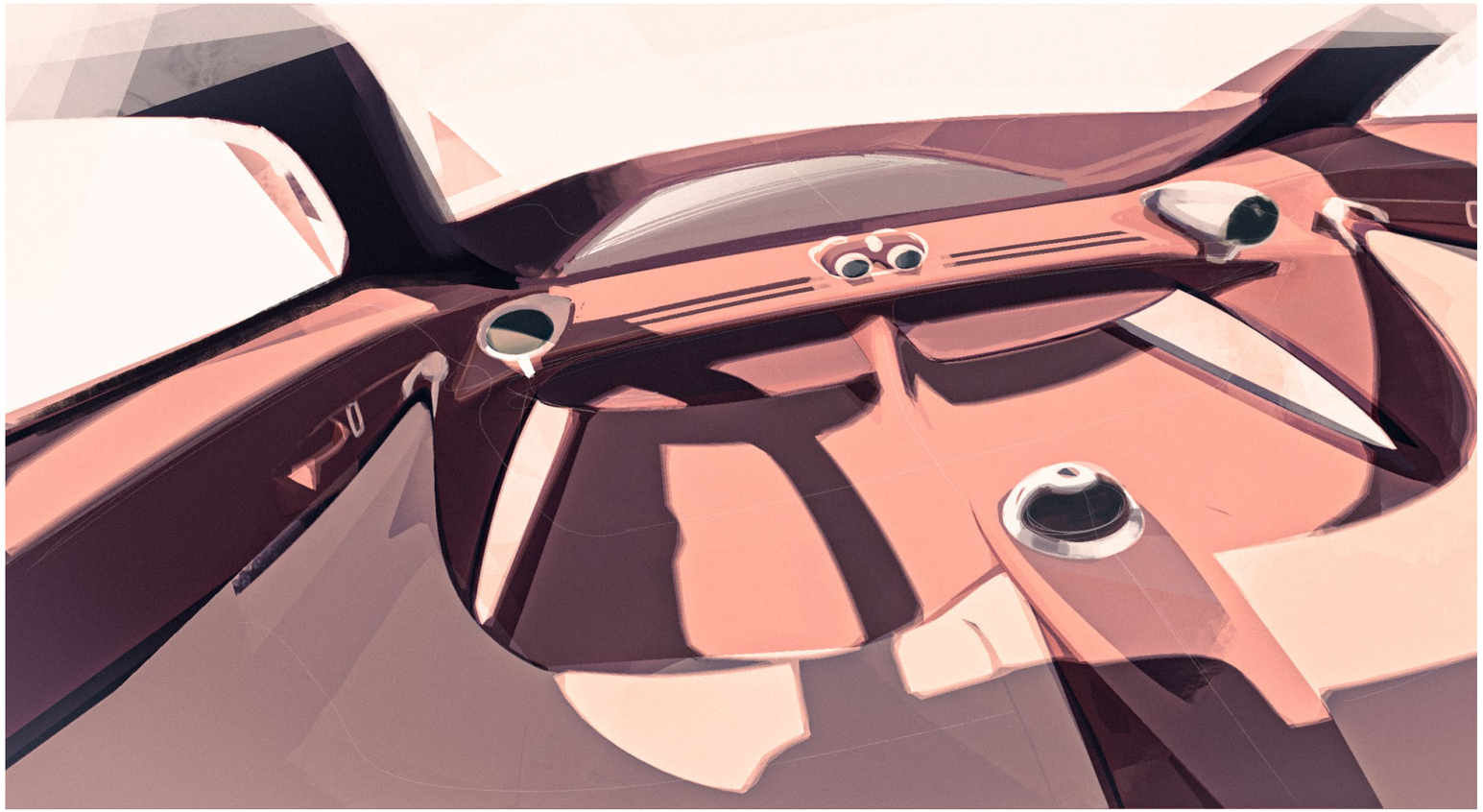


Figure 60. IP development sketch

The sketch on the left shows how this theme was developed in further detail. The most amount of complexity in terms of shapes ('sculpture') was created around the two gauges, to highlight these elements. The rest of the IP is left relatively clean to keep it calm and honest, as well as durable to step over. Together with its low position, this also creates an airy impression. Figure 60 shows how low the IP is compared to regular cars. This helps to enhance both the visibility ahead and ability to enter the deck from the inside. Underneath the IP there is a T-structure which is necessary to house the mechanical structure for the lounge mechanism, and creates an additional structural pillar (when stepping on the IP). It also visually connects the IP to the centre console.

Finally the IP features a holder for a set of binnoculars, which nudges the user to explore and connect to the natural surroundings. These are positioned in the centre and highlighted with a aluminium frame to stimulate this interaction.

Navigation Sphere & center console

As explained in the scenario (p. 70), the car features a (drive-by-wire) joystick as main interface for vehicle control, when the car needs to assisted (e.g. difficult terrain off-road). The main benefit is the location and compact size, which is not blocking the view ahead, contrary to regular steering wheels. One could argue why not use a retractable steering wheel as shown in many concept cars over the

years, but this usually uses considerable space (in the IP area) for (heavy and complex) folding mechanisms. Moreover, this vehicle is envisioned to drive primarily autonomously, rather than switching between different driving modes (as most of these concepts do). This makes the joystick a suitable choice, acting merely as back-up or last-mile-steering device. Several joysticks were explored, as shown on the right. The final design features a spherical shape which is inspired by nautical compasses. Just like in (sailing) yachts, this element is the focal point in a calm and reduced interface. Following this analogy, the joystick displays a compass when not in use, hence the name 'Navigation Sphere'. This also strenghtens the notion of focussing on the travel experience. Finally, the spherical shape follows the same design DNA as the 'Crystal Sphere' shifter that is becoming a trademark element of Genesis (as seen in the Mint and X concept, as well as latest GV60).

When needed, the Navigation Sphere moves up to become a joystick. The hand posture and envisioned interaction is similar to Mercedes-Benz AVTR Concept (2020), because of the same central location, and clean shape that is easily hidden when not in use (no obvious handle). The technical and ergonomical principles of such a joystick concept have been proven by Daimler, which has been working on research vehicles controled by joystick-only since 1996 (Luchian, 2020). Finally, around the joystick additional buttons are integrated in the smart surface of the table (see p. 44). These are used to control the content on the two round displays (e.g. climate control). Being the centerpiece in the interior, this element was developed to a highly detailed level, see Chapter 10.

Figure 61. Top: testing the joystick in the Mercedes AVTR concept myself. Bottom: Crystal Sphere shifter in the Genesis X Concept.

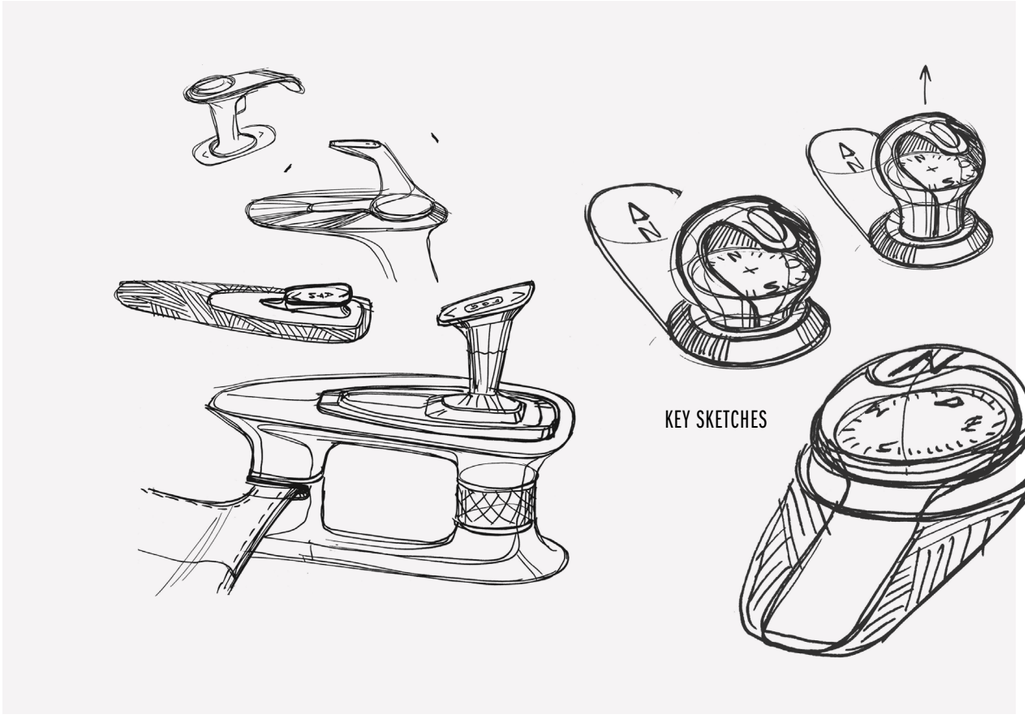


Figure 62. Doodles for exploring the joystick design.

8.6 Colour, materials & finish

Colours

The final colours follows the moodboard and are also inspired by world of sailing and yachting (e.g. Riva boats). This palette features earth-tones to blend the design into the environment, when the lounge is activated and doors are open. Lighter tones are used in higher areas to make the design look calm and airy; darker tones are used in shadow areas (e.g. on the floor), to create visual contrast.

Materials

The main soft materials are made out of Vegatex apple-based leather (carpets and side trim), flax (hammock seats) and cork (other parts), see Chapter 3, p. 45.
The so-called 'brightware' and structural metal parts (e.g. seat frame and exterior panels) are made of recycled aluminium alloy, since the material offers significant weight-reduction compared to steel, while being able to be recycled without major energy and quality loss (see p. 44).

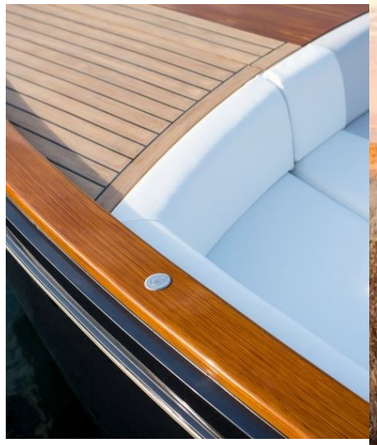
Furthermore, wood is used to create a reference to the boat analogy, e.g. for the deck structure. For this densified wood composites are used with a red, mahogany-like finish. This material is highly fit for structural and automotive purposes and can be molded in any shape. Furthermore, it reduces weight and fuel consumption while being recyclable (Ashori, 2008; Perkins, 2018)

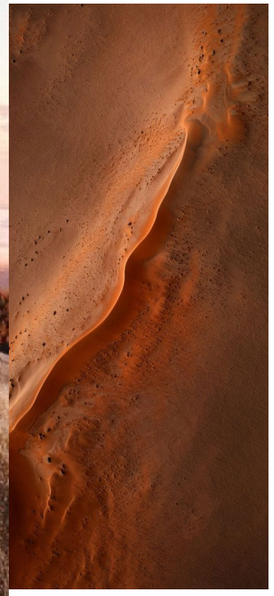
Finish

The soft trim materials are left untouched to show their authentic visual and tactile qualities (see pp. 45-46).

The aluminium parts are highly polished but raw and unpainted (also on the exterior), to allows for a a natural build-up of scratches and patina over time, which could contribute to positive visual ageing of the product. Walker (2006) and Aftab & Rusli (2017, pp. 1059-1060) describe how relying too much on "shiny new surfaces" for the aesthetics of a product "defies the natural aging effects of time", which could lead to a shorter lifespan through what is called "unsustainable empathy". In addition, visual patina and wear are actually increasingly valued by collectors of exclusive goods such as classic cars, watches and paintings; as they signal authenticity and tell a story (Hartov, 2020).

The floor matte and IP feature the Genesis G-matrix pattern. For an impression of how the CMF design came to life, see Chapter 10.

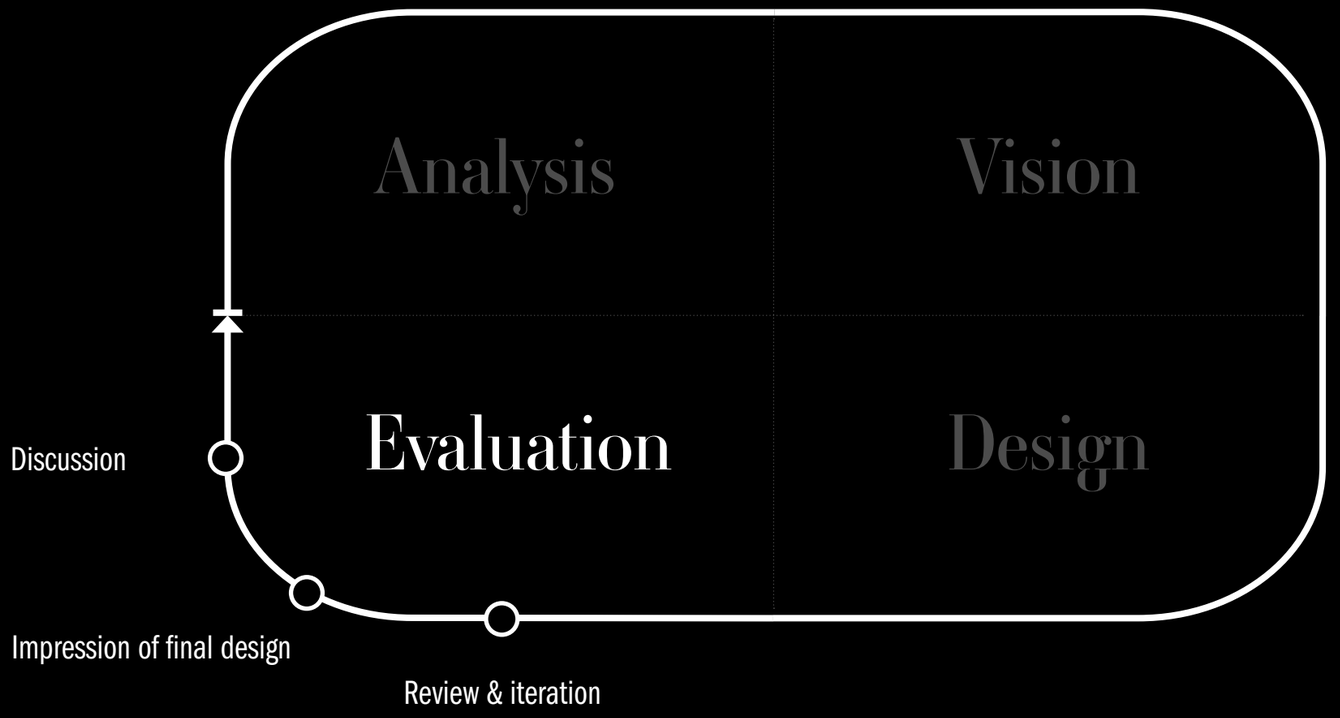




Densified wood composite (red finish)	Alu unfinished, brushed
Apple leather beige	Alu unfinished, high gloss
Flax	Recycled Nylon (Econyl)

Figure 63. Basic CMF design (right) and the moodboard were it was derived from (left).

Part IV Evaluation


Analysis
Vision
Evaluation
Design
Discussion
Impression of final design
Review & iteration

Key takeaways - Evaluation & result

Evaluation

The design was reviewed with professionals, experts and users with Virtual Reality and online interviews. This led to the following key improvements:

1) Overall better aesthetic integration of the seperate elements;
2) Refinement of the shapes, to make them look more elegant;
3) Redesign of the steps (for accessing the lounge deck);
4) Redesign of the center console
5) Integration of the rotary 'Crystal Sphere' mechanism, which is becoming a signature feature of the brand;
6) Enhanced CMF design by detailing on the seats and different finishes.

Impression of final design

An overview of the final result is given on the following pages, with the key features highlighted that make it a Genesis, luxurious and sutainability-oriented.

Discussion

A) Vision and Concept: it might be too naive to think that the envisioned interaction (exposing users to nature on a fancy lounge) can make an impactful contribution towards more responsible behaviour. Further steps would need to take into account how to turn passive awareness into active behaviour change, to bridge any potential (transformational) insights from the journey with behaviour in daily life.

B) Styling approach: intricate shapes with sculptural surfaces are important for communicating emotion in the luxury domain. During the process this was mainly lacking in the design, but towards the end, this important realisation came.

C) Styling refinement: more attention should be given to the door panels (currently look to plain), as well as optimising the line flow (to prevent wavy lines and mismatching curvature). In addition though-through split lines (i.e. regarding them as design element) and a more defined CMF design, can boost the overall quality of the design.

D) Believability of the concept: the complexity, architecture and available space regarding the lounge deck (and respective mechanism) should be studied in further detail. In addition, the proportions, comfort and overall idea of (suspended) hammock seats need more attention, to make this idea seem to work.

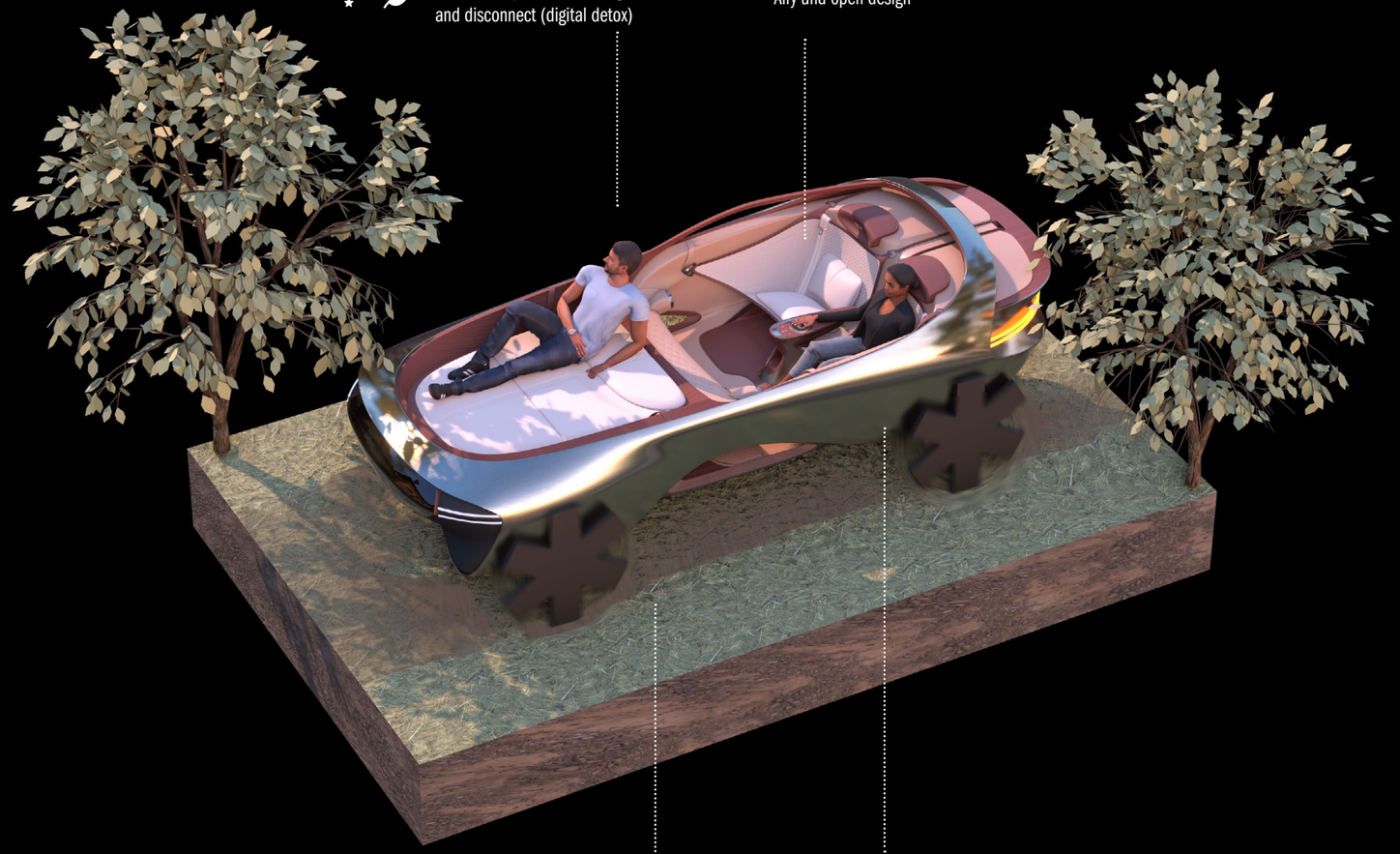
What makes it a Genesis?

What makes it luxerious?

What makes it sustainability-oriented?

Connect to your surroundings and disconnect (digital detox)

Airy and open design



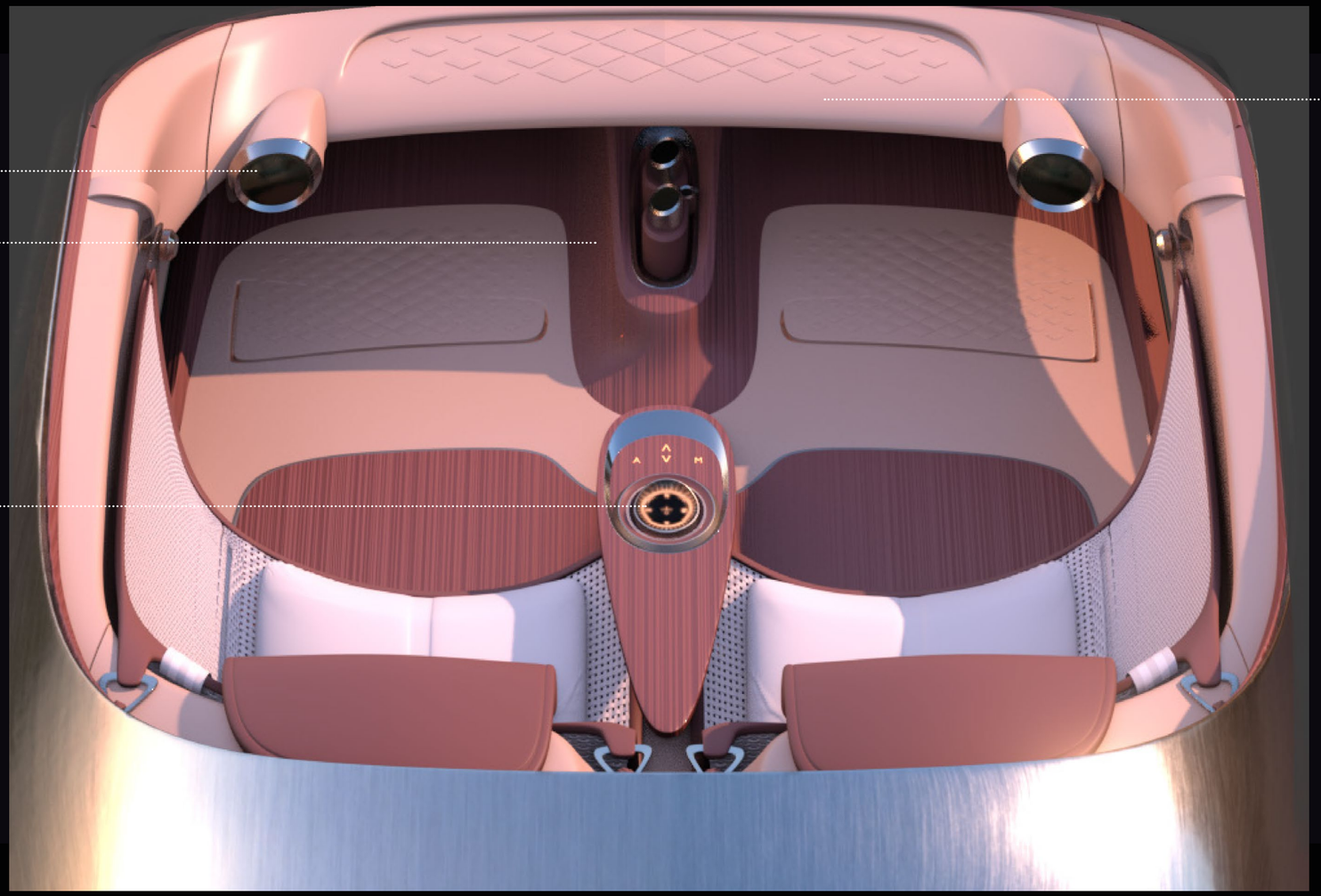
Elegant design

Higher ground clearance for more visibility, calmness (slow cruising impression) and airyness (floating)

Minimal and undistracting interface

Storage area for bespoke accessoires, here a pair of binoculars to immerse in the surrounding landscape.

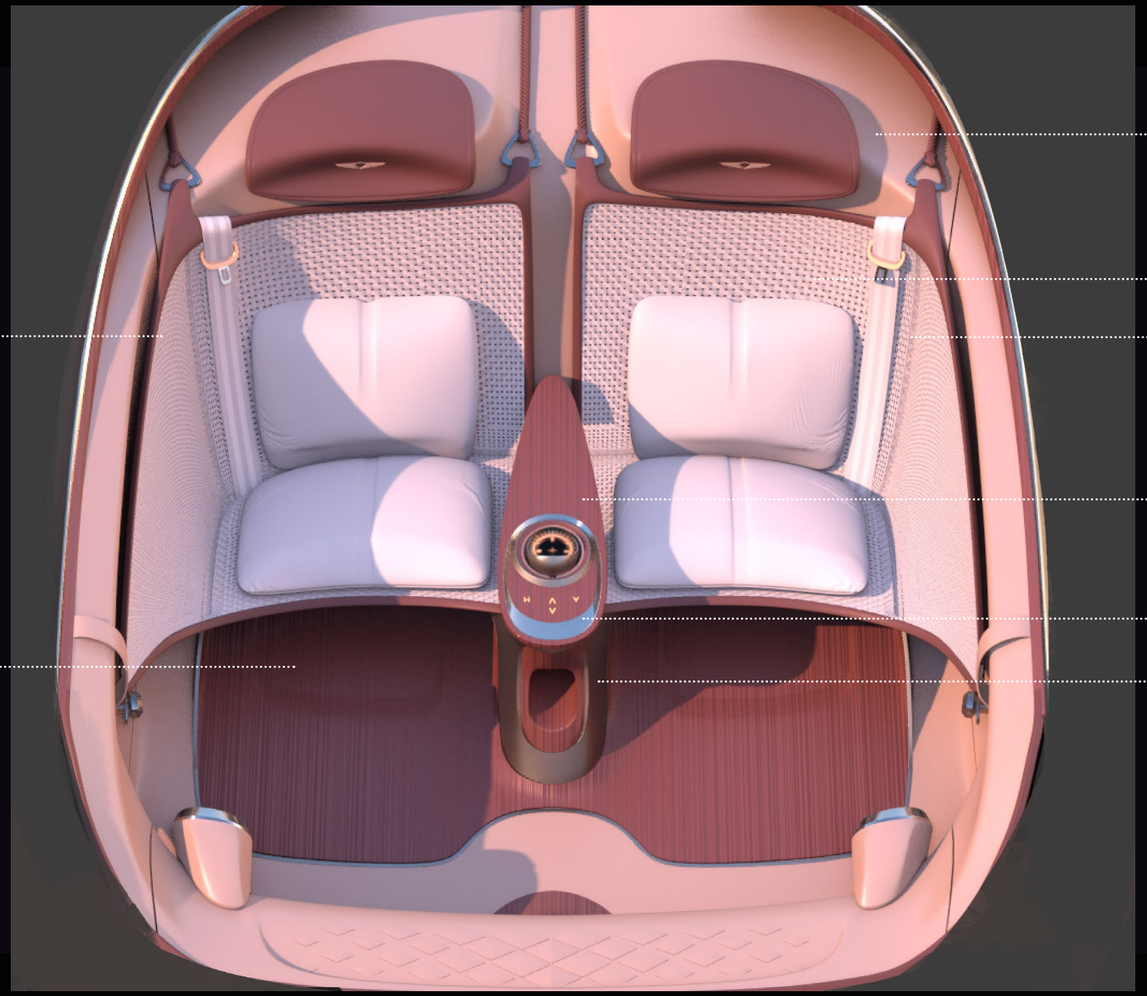
The Navigation Sphere: a focal point that highlights the journey by displaying a compass in autonomous mode; and switches to joystick in assisted (manual) mode



Beauty of White Space

Calm & airy
hammock seats

Shoe storage



Apple-based leather (Vegatex)

Recycled Nylon (Econyl)

Recycled stretchy Nylon
(Econyl)

Densified wood composite
(biodegradable)

Recycled aluminium (polished)

Recycled aluminium (brushed)

9 Review & iteration

The design was reviewed with a wide range of experts and users to check whether 1) the deliverable fulfills the project goal (convincing looking Genesis interior that reimagines luxury); and 2) meets the criteria (fits the brand, luxurious and sustainability-oriented). Also see Chapter 0: Design Brief.

The gathered input is used to optimise the design before rendering and presentation. For this a final iteration was made in 3D. In addition, the evaluation points provided a foundation for design recommendations discussed in Chapter 11.

In this chapter, only the reviews related to the overall design, usability and brand are described, since they impacted the final design the most. The user and expert reviews (luxury expert and sustainability expert) can be found in Appendices L-O.

9.1 General design review

Goal

The goal of the general design review was to evaluate the quality of the design itself, on the aspects of:

A) Styling (execution-wise, to be eye-catching on professional level).
B) Usability, to evaluate if the design is 'believable' enough with regards to basic packging and ergonomics, see p. 78).

Method

The design was show in in Virtual Reality (VR), to get a realistic, full-scale impression of the design. The 3D model was loaded into VRED software which creates a real-time

rendered visualisation. The model was also matched with a physical seating buck in the studio, such that the seating position was similar as envisioned. The VR reviews took place at 26 August, and 27 August when the mentor and chair visited the design studio. A total of 12 participants (11 professional Automotive Designers and 1 Studio Engineer) tested and reviewed the design. Unfortunately no pictures could be taken, since the reviews took place inside the Hyundai European Design Center.

For the evaluating the interior styling, afterwards participants could give their (open-ended) feedback via an online survey (Google Forms, see Appendix K). The interior usability feedback was discussed in a one-to-one interview setting with Studio Engineer S. Brühler, since he is the only expert in the team on interior packaging. This led to deeper insights about possible package improvements (figure 67).

The same happened for the exterior design feedback, which was discussed one-to-one with Senior Exterior Designer M. Martin. Since this is not the focus area, these results can be found in Appendix L.

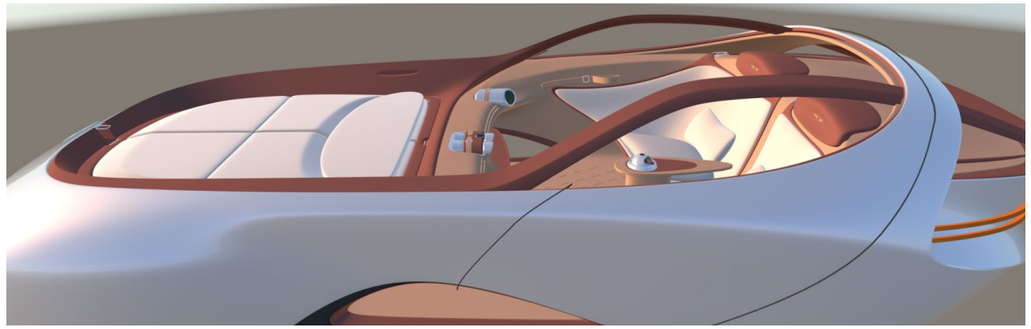


Figure 64. VRED screenshot, roughly taken from the perspective of the participants when walking towards and around the vehicle in VR.

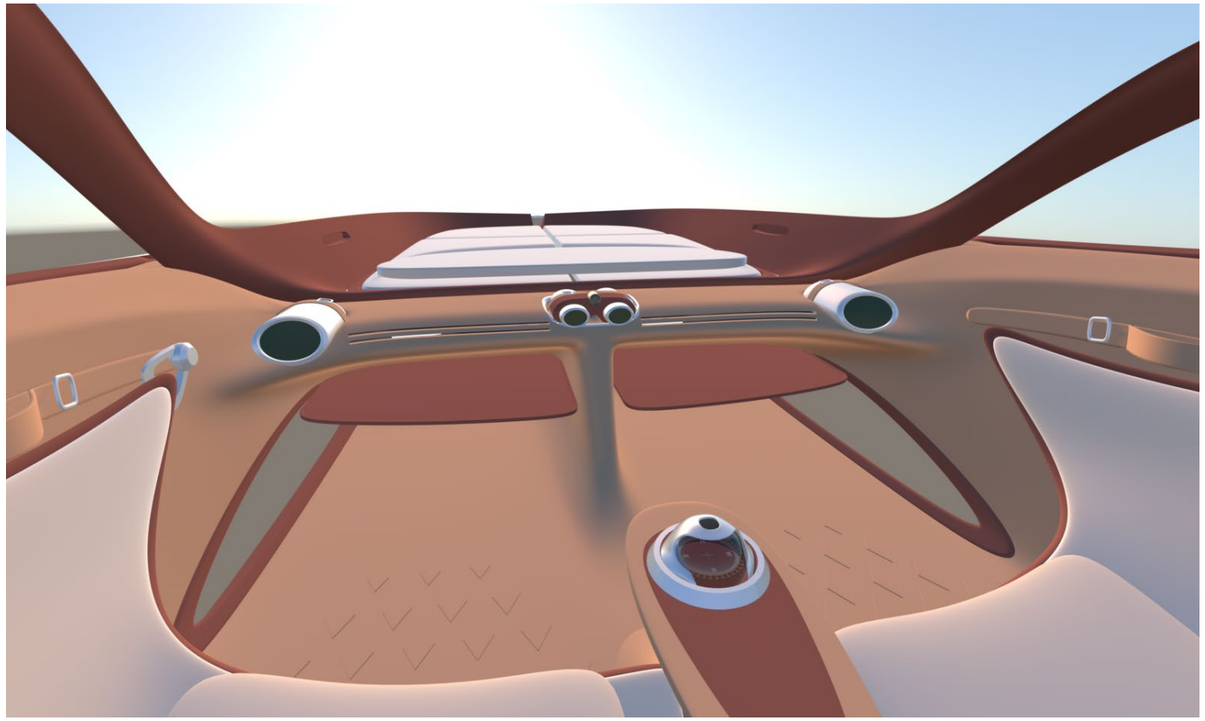


Figure 65. VRED screenshot. Roughly taken from the perspective of the participants, when sitting inside the VR model.

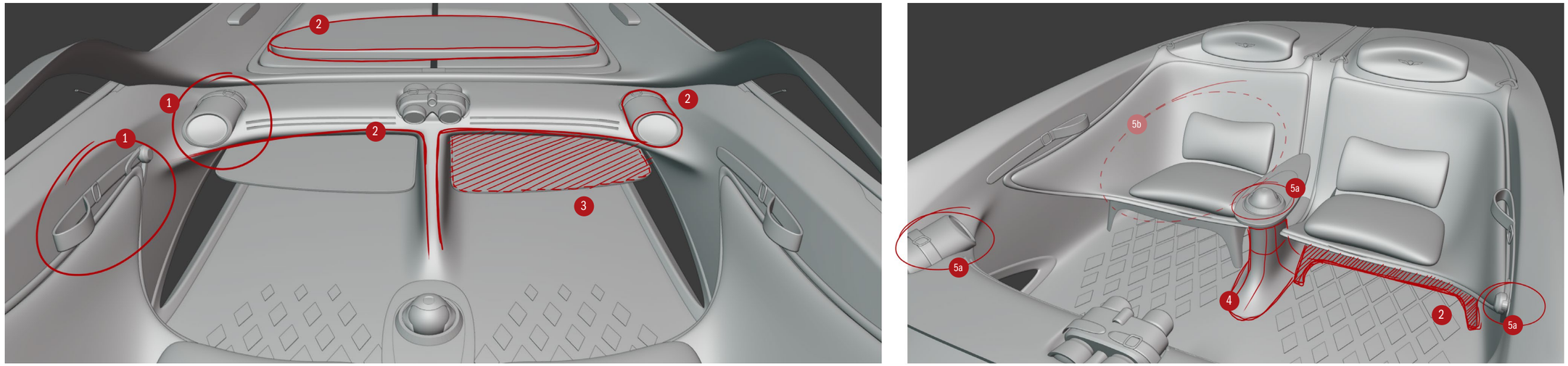


Figure 66. Left: feedback points 1-3 of the styling review, indicated on the model at that stage. Right: styling feedback points 2-5.

Results - styling review

The main feedback points concerning the execution of the styling:

1) Gauges and door strap should look more visually integrated into the rest of the design, to make the design look more coherent;
2) Refinement of the shapes, for a more elegant, less 'crude' impression;
3) Redesign of the front steps, such that they look less obtrusive and more integrated into the rest of the design;
4) Shape of the center console should be defined more to be more aesthetically convincing (still too flat and primitive);
5) Emphasise the luxury aspect with the final CMF design, by means of:
    - 5a Different brightware finishes (e.g. matte and shiny);
    - 5b Quilt finishing in G-matrix (diamond-shape) pattern.

All points except 5b were processed into the final design iteration. Adding the diamond-pattern in the form of quilt-finishing to the seats as well, would make the design look less calm. Instead, a more subtle, yet sophisticated finish that follows the Genesis 2-line signature was designed for the seats (see Chapter 10).

Results - usability review

The main feedback points with regard to basic packaging and ergonomics are summarised below and in figure 67. It should be noted that S. Brühler based these improvements on a comparison study with a fully feasible production car, namely the Genesis G70 (see figure 7, p. 28).

1) Door section line should more more forward, to ensure easier ingress/egress;
2) (Center) console should move up ca. 80 mm for a more comfortable resting position of the arm;
3) Headrests should move up ca. 20 mm for a more comfortable resting position of the head;
4) Roof should be raised ca. 100 mm to provide realistic head space.

Only point 4 was not processed fully for the final design iteration, and used as a recommendation instead (see Chapter 11). This is because the design should be considered a concept car (see Chapter 7, paragraph 7.2). In that regard, the design is assumed to be at least as believable as the Genesis Essentia concept, in which "you could barely sit" (S. Brühler, personal communication, 30 August, 2021). With this in mind, the roofline was raised up until a point that it looked believable enough, yet still aesthetically convincing (ca. 50 mm).

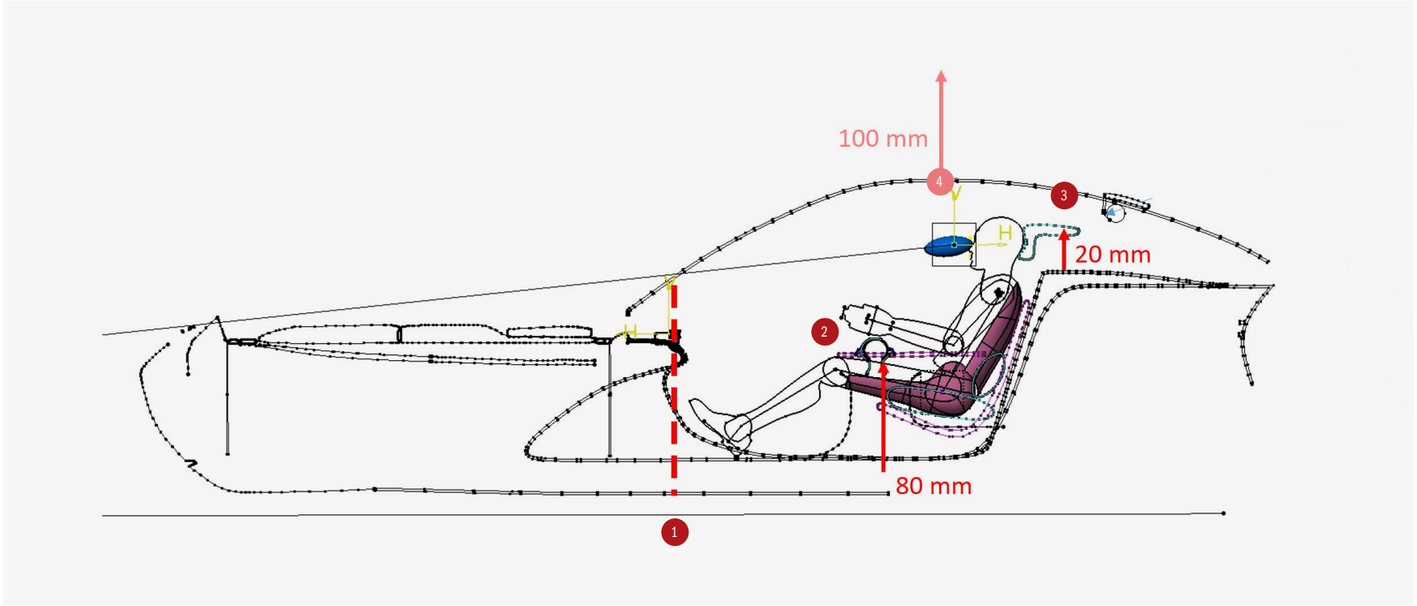


Figure 67. Usability feedback points based on a realistic production package (G70), given by Studio Engineer S. Brühler. Screenshot from CATIA (CAD engineering software).

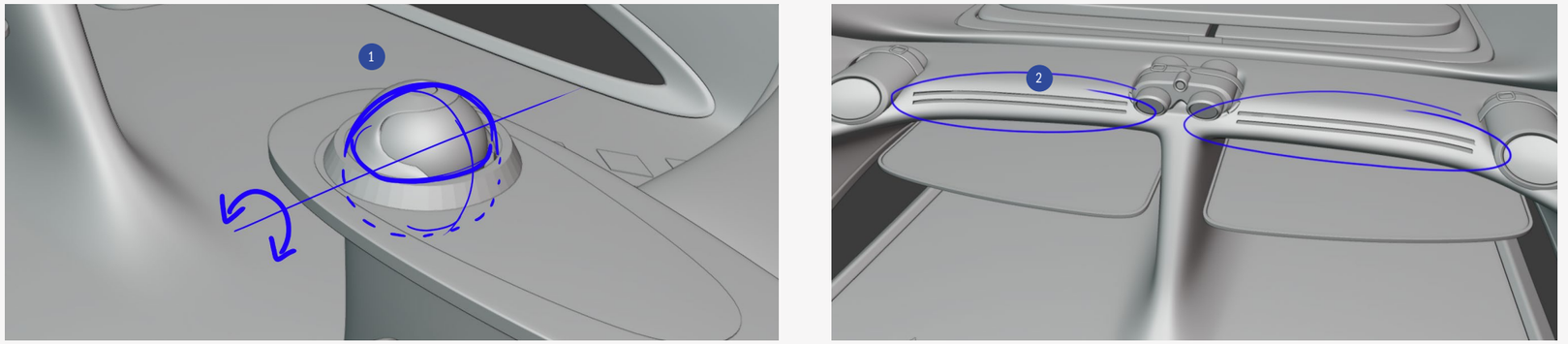


Figure 68. Feedback points of the brand-fit review. Left: incorporating the signature rotation of the Genesis Crystal Sphere. Right: removing the 2-line airvents, since they are too obtrusive.

9.2 Brand-fit review

Goal

Evaluate whether the design fits the Genesis brand, based on the key design DNA aspects:

A) 'Elegance' (not 'athletic', as the car is not driver-oriented, see p. 27).
B) 'Beauty of White Space'
C) Implementation of brand graphics (two-line signature and G-matrix pattern)

Method

To evaluate whether the design fits the Genesis brand, an online evaluation session took place with Chief Designer F. Perini and Group Manger A. Serra, since they are experts on the brand. The session was structured according to evaluation guidelines by IDEO (2015) and renowned design research experts Nielsen & Norman (2018). The design (i.e. stimulus) was shown through live through a digital prototype; namely a 360 overview in Blender, rendered in real-time, and shown via WebEx meeting software. Perini and Serra were asked to respond on the model in open-ended and in-depth manner.

Results

Perini and Serra were pleased with the way the design fits the brand, expressing that "it clearly looks like a Genesis" (personal communication, 19 August, 2021). The concept was considered a fresh interpretation of the Genesis design DNA, yet familiar on the aspects of A) elegance and B) Beauty of White Space. This is in accordance with the MAYA ('Most Advanced, Yet Acceptable') principle by Loewy (1951), a guideline for succesful design. The design was regarded elegant because of the "flowing lines and large gestures"; and "clean and calm" to create 'Beauty of White Space' (Perini & Serra, personal communication, 19 August, 2021). However, on the aspect of C) brand graphics, the following points could be improved:

1) Integration of the signature, 'Crystal Sphere' rotary mechanism for the Navigation Sphere (see p. 97).

2) Brand graphics: the two-line air vents should either be refined or hidden, as they currently look to crude and 'funny' (resemble the 'whiskers of a car').

3) G-matrix (diamond) pattern: application on the floor matte looks good, could even continue on the IP (to indicate that you can walk over to the lounge).

"It's clearly a Genesis to us"

F. Perini, Chief Designer & A. Serra, Group Manager

(personal communication, 19 August, 2021)

10 Impression of final design

10.1 Presentation renderings

The following pages will show an artistic impression of the design in use. In all renderings the emphasis is put on a calm, airy and honest ambiance (see p. 63).

The page on the right shows the perspective from the user. Here the 'wrap-around' gesture, inspired by the shapes in the moodboard (p. 63), is clearly visible. This theme starts at the hammock and continues into the IP. On this transition, the most sculptural shaping was done (the 'zigzag' shape), in order to higlight the main clusters of information, the two gauges. This area on the corner (A-pillar) is the 'epicentre' where all sculpture concentrates, to keep the rest of the IP very calm and clean (Beauty of White Space). This is to prevent distraction when looking out the windscreen. From this 'epicentre' in the corners, all main lines diverge again, which creates a visual frame around the windscreen, nudging the user to look ahead.

Conversely, the calm and simple shape of the dashboard makes it suitable for stepping on it when accessing the lounge deck (i.e. easier to clean and harder to damage). The only styling feature added is the little cutout, where the airvents are hidden. This U-shaped cutout also highlights the gauges.

This view also shows see the enhanced visibility compared to regular cars, thanks to the extra side windows, low IP and overall spacious impression.


80

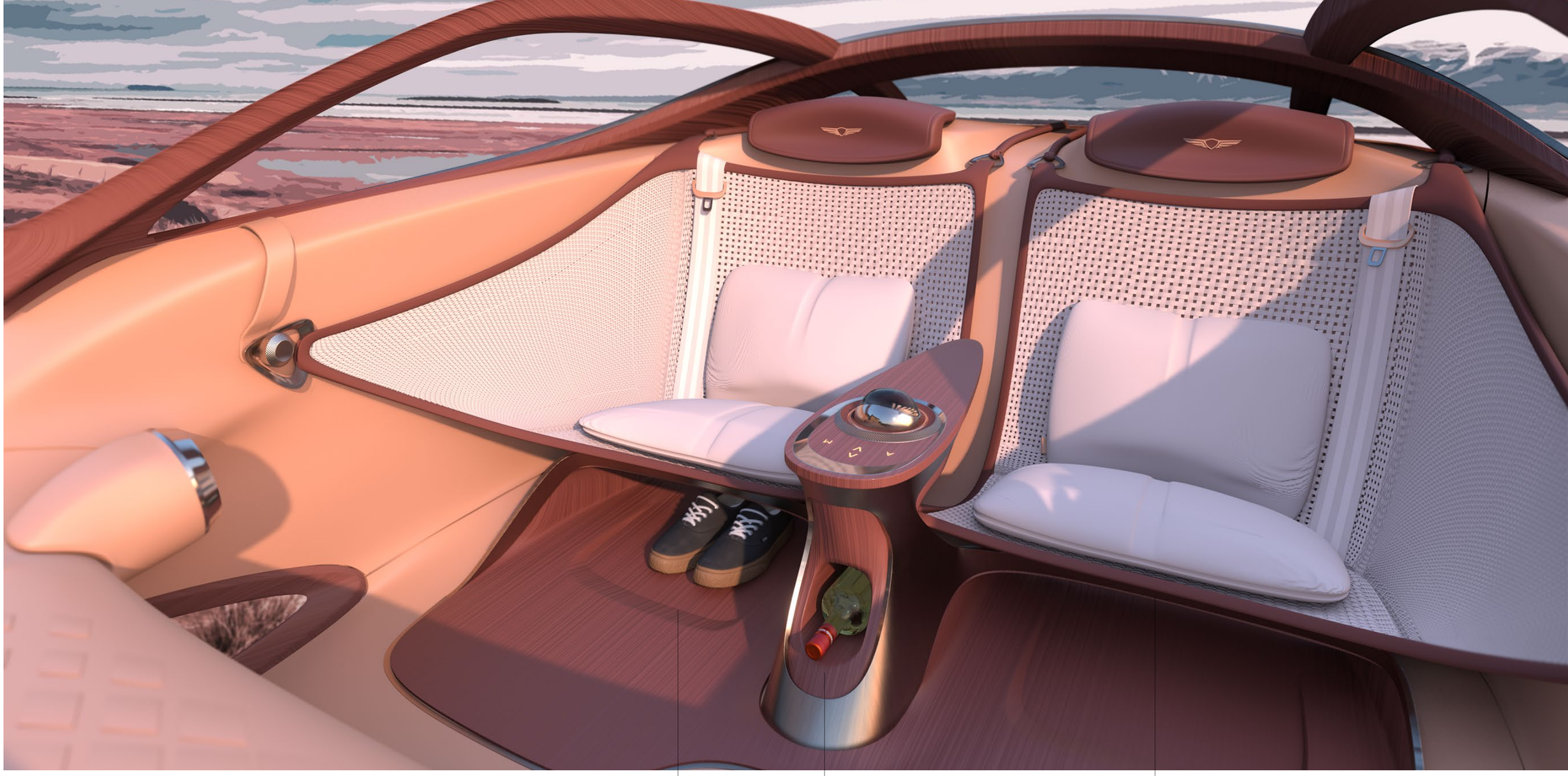
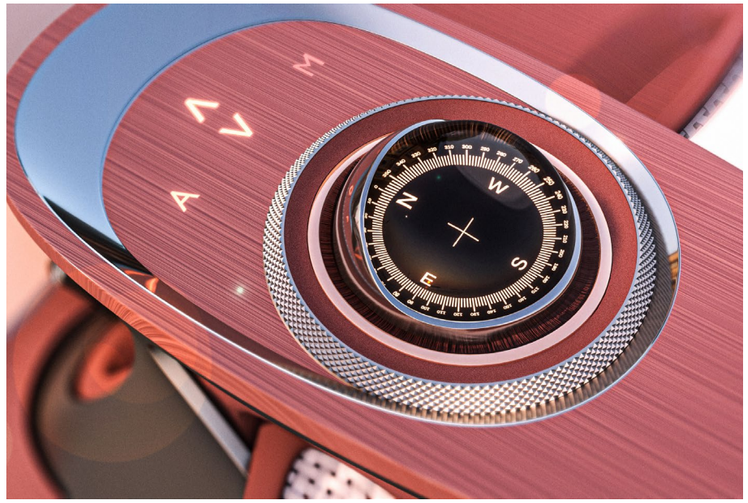


Figure 69. Interior overview, showing the seats and console.

Autonomous mode

Figure 70. The Navigation Sphere displays in compass mode during autonomous mode, to fully focus on the experience of traveling.



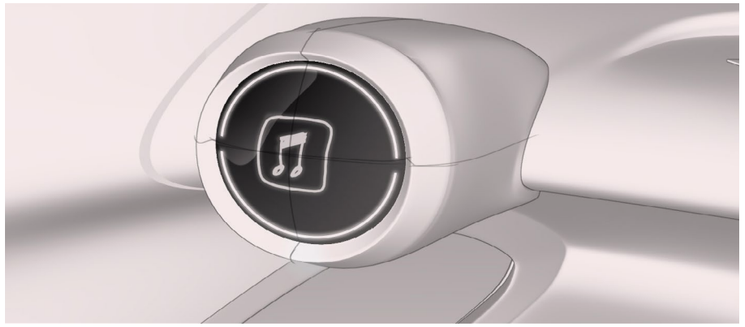


Figure 71. The gauges will only show selective information (depending on each situation), to prevent distraction and digital overload.

Figure 72. In autonomous driving mode, the users have all the freedom to fully immerse in the scenery and travel experience.

Manual assistance mode

Figure 73. Manual driving mode to assist the vehicle's AI in difficult (off-road) or last-mile situations.

Figure 74. The Navigation Sphere flipped 180 degrees to enable the joystick mode

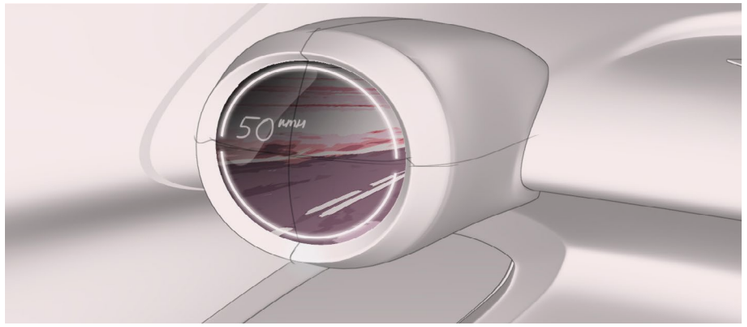


Figure 75. The digital gauges will turn into virtual mirrors with additional info overlays in manual mode.

10.2 Navigation Sphere

The detail design of the Navigation Sphere is displayed on the left image. The final joystick design was inspired by computer mice, to create a comfortable hand position.

The Sphere can rotate along two axes, as displayed on the right. It turns around the lateral axis in the inner ring (also called 'gimbal') to flip the modes (autonomous to manual mode and vice versa); as well as to accelerate/decelerate the vehicle. The Sphere together with the inner ring can also rotate along the longitudinal axis to steer left/right. This mechanism had to be designed since 'regular' joystick mechanisms were not possible with the wish to incorporate the mode flip of the Sphere (see paragraph 9.2). The rotation of the two individual rings was inspired by gyroscopes.

The assembly consist of the following parts:

A) Navigation Sphere (joystick side)
B) Navigation Sphere (compass side)
C) Lateral rotation axis (also for flipping modes)
D) Longitudinal rotation axis
E) Inner rotation ring ('gimbal')
F) Brush strip (for dust prevention)
G) Stretchy cover cloth (in between the two rings, also for dust-prevention/gap covering)
H) Outer ring
I) smart surface (thin cover film)
J) smart surface (sensors & actuators)

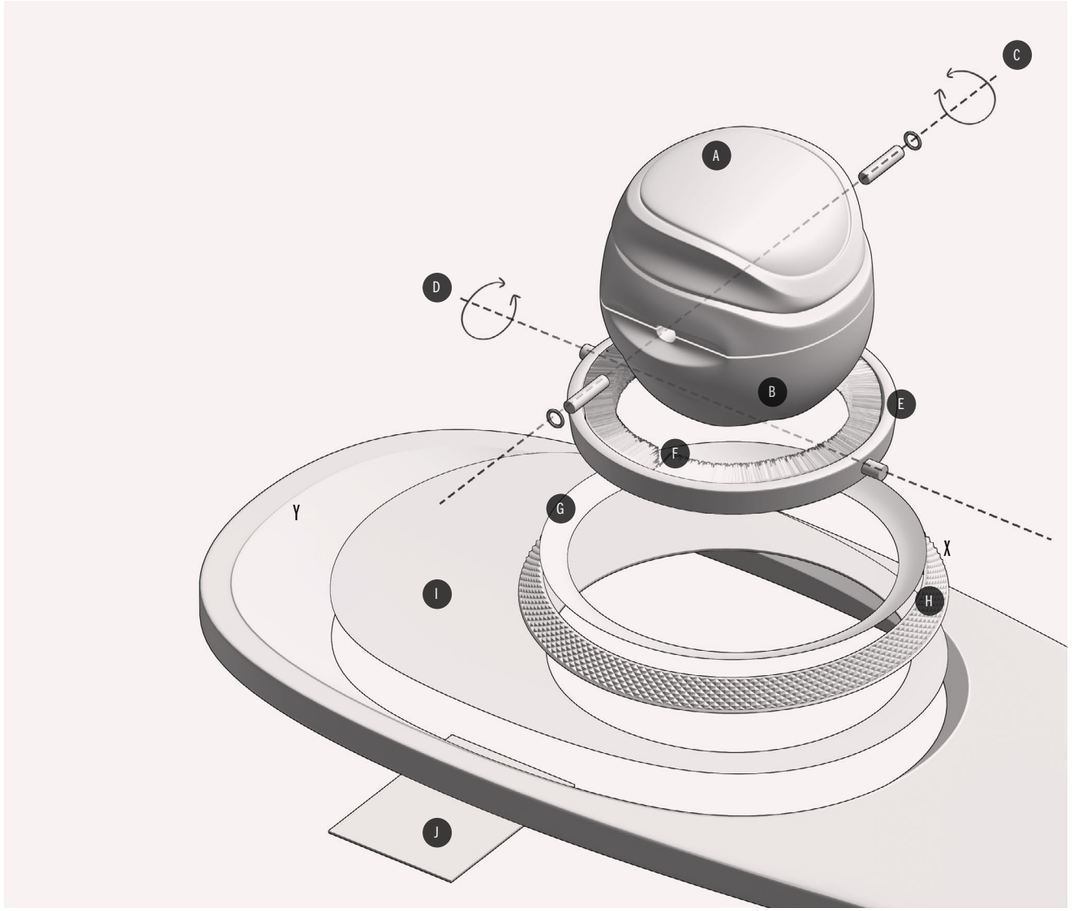


Figure 76. Exploded view of the complete Navigation Sphere assembly.

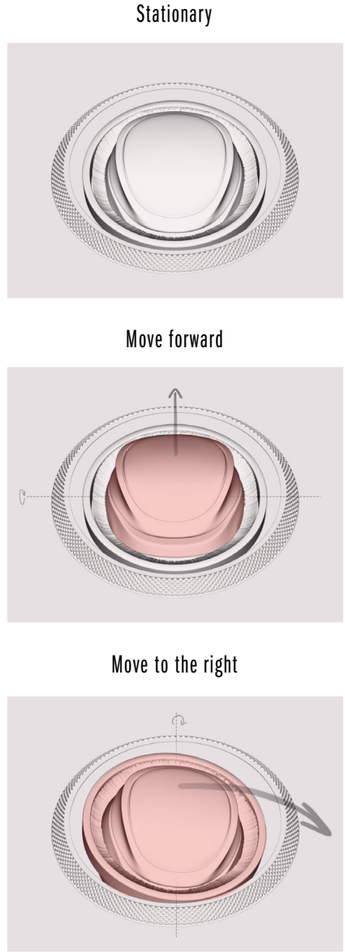


Figure 77. Degrees of freedom of the joystick explained.

10.3 Outdoor Lounge

To access the lounge, the two steps were redesigned. This was done by making them look visually less obtrusive, by hiding them in the floor. Instead of sliding, the final mechanism moves up by means of a simple four-bar linkage. The windscreen slides up over the cant rails.

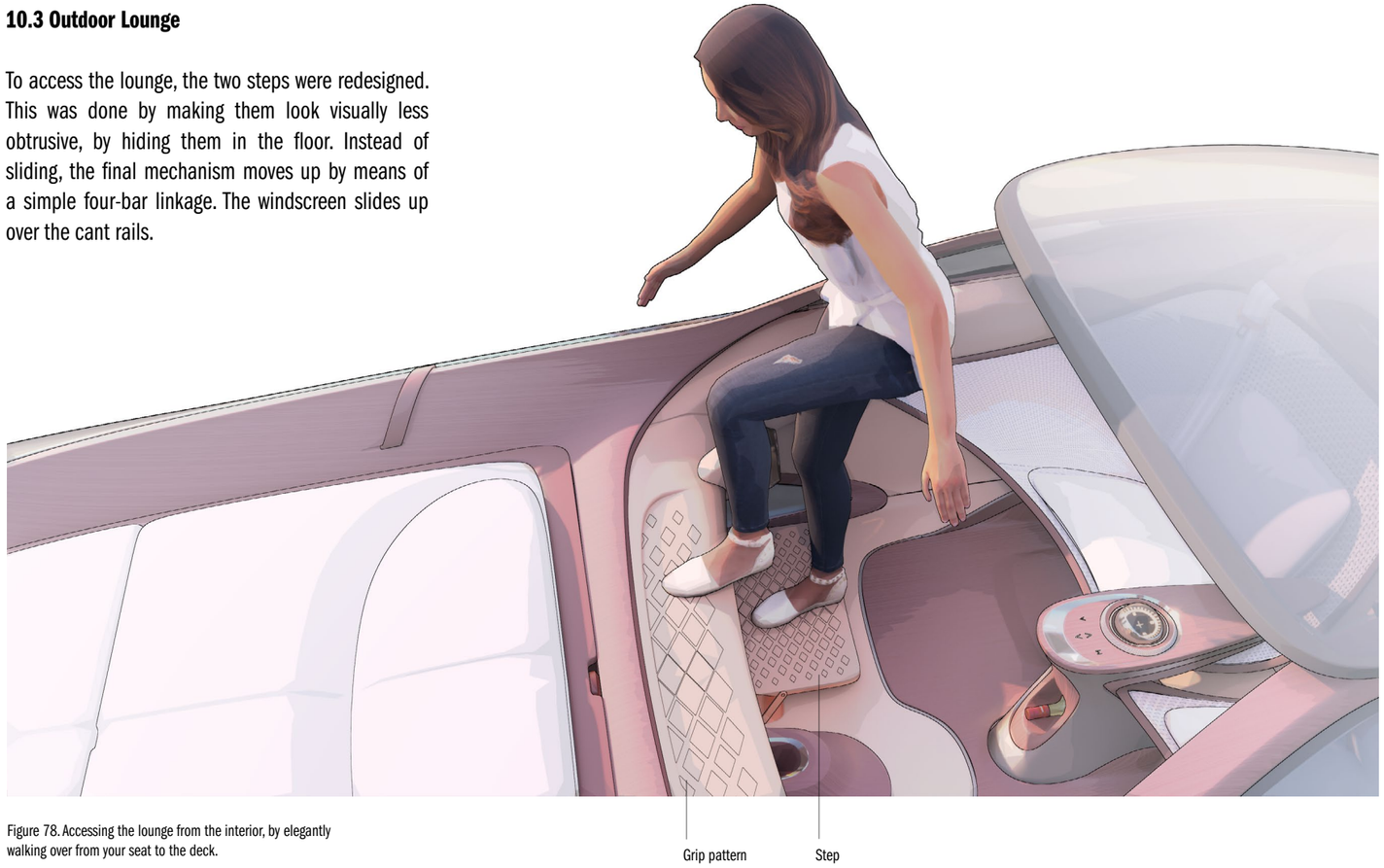


Figure 78. Accessing the lounge from the interior, by elegantly walking over from your seat to the deck.

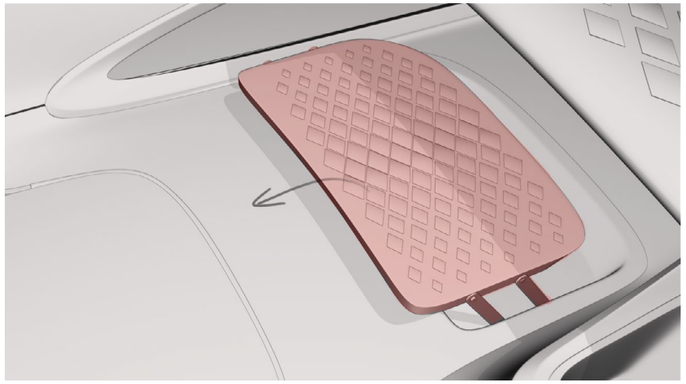


Figure 79. Explanation of how the steps move up.

11 Discussion

11.1 Recommendations - project result

Vision and concept

Throughout the design process, there has been a struggle between the notion whether the concept should be part of a future where sustainability is already a given; or whether it should contribute towards this. All in all, the project leaned slightly towards the latter approach, since this gave the opportunity to add to Genesis' current sustainability strategy on a new dimension: user interaction and experience. In addition, morally this also felt like the right choice - we are in the midst of a climate crisis after all.

However, to think that the envisioned interaction could really make a contribution - even a tiny one - might be too naive. As discussed in paragraph 9.4, how do you ensure that exposing users to nature leads to more conscious behaviour? For this, you probably need more than a fancy lounge and extra set of windows to look around.

Further steps would need to take into account how to turn passive awareness into active behaviour change. For example, designing certain rituals that stimulate the user to reflect about his/her relationship with the environment, facilitated by elements in the interior. This could form a bridge between any potential (transformational) insights and experiences from the journey with mundane, yet impactful behaviour in daily life.

Styling - sculptural vs 'producty'

The main lesson with regard to automotive styling is the importance of sculpture. Coming straight out of a design studio with a more 'producty' (simple and geometric) design language (Hyundai), for most of the project I was inclined to design more primitive shapes that lacked sculpture. Being mainly trained as an Industrial Designer did not help either.

New players such as Polestar are slowly challenging the notion that premium/luxury cars should look sculptural, with a more producty approach to styling (like Apple).

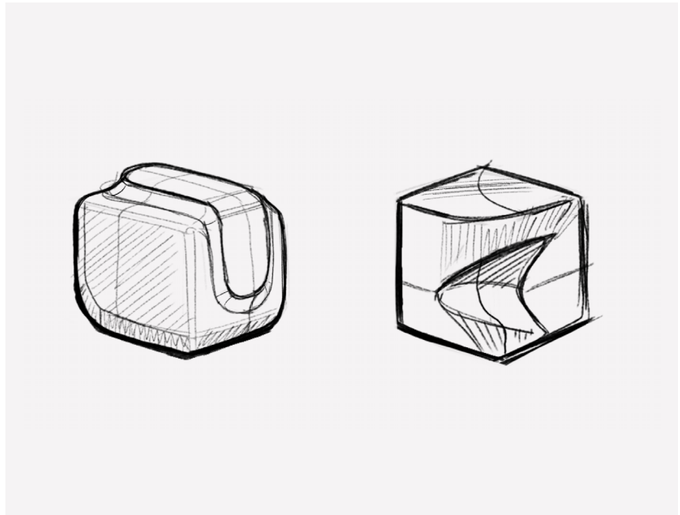


Figure 80. Explanation of how the steps move up.

However, for the moment intricate shapes with sculptural surfaces remain an important tool to luxury brands for communicating emotion - especially to Asian brands (look at Lexus or Infiniti).

Unfortunately, this realisation came late during the project, when receiving feedback by experienced designers such as Mignot. Nevertheless, I am glad it came and made my skill set more well-rounded, after having experienced both approaches to design.

Styling - refinement

A design is never finished, because every project is limited in time and design is a partially subjective field. The following elements need more refinement, to make the end-result look convincing:

1) Door panels need more detailing, as they still look too plain. Attention to detail there could make the design look more luxerious and visually complete. This could be acchieved with e.g. bespoke panels, as discussed in paragraph 9.3.
2) Optimising line flow, by solving unfluent and wavy lines ('s-ing'), to make the design look good from every angle.
3) Optimising the line flow, by paying attention to curvature ('acceleration') and direction (convergence and divergence) of neighbouring lines and surfaces.
4) Split lines/ panel gaps as visually integrated design element, instead of (partly) an afterthought.
5) More defined and though-through CMF design, which is more closely connected to the product qualities (airy, calm, honest).

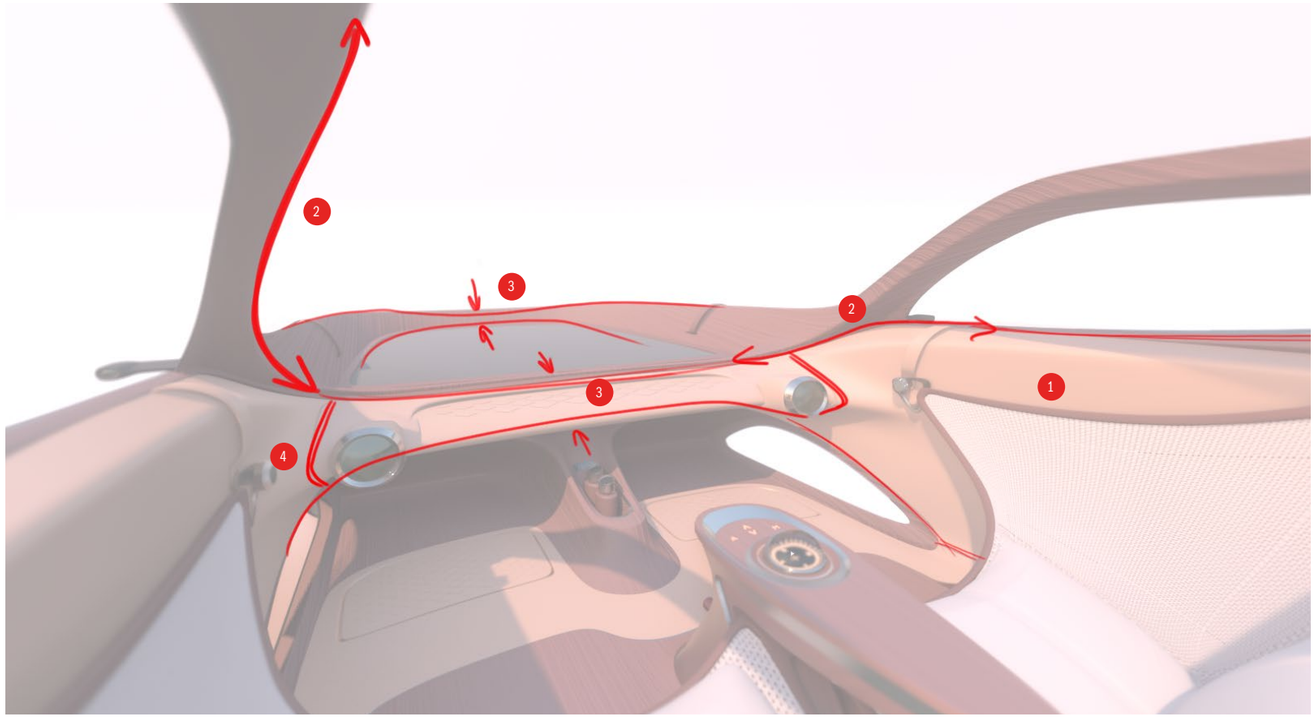


Figure 81. Summary of the key styling improvements.

Believability of the concept

The following elements need attention when it comes to the overall believability of the concept:

1) Lounge deck in front

Although the mechanism to switch from bonnet to lounge follows a similar logic and level of complexity as convertible roof mechanisms (hard tops), there are still a number of critical questions that pop up. For example: is there enough space for the mechanism with this package? The basic package that was developed did not take into account hardpoints such as the wheel envelope (for turning and jouncing), which might reduce the available space. Making this element believable is critical, since it is at the heart of the concept.

Moreover, the available space on the lounge deck for the user is sufficient, but not generous. To make the most of this feature, perhaps a slightly larger package should be chosen, since the bonnet was already extended maximally to the back in the current design. Other options including choosing another mechanism (that does not have to rotate, in order to be more space-efficient) or putting the lounge bed on top of the bonnet, instead of the recessing it. This would create a trade-off between offering a feeling of safety/privacy vs spaciousness.

2) Instrument panel (IP): is it possible and comfortable to step over the IP to access the lounge in elegant manner? Would you not bump your head? These are points of attention to study for further steps.

3) Hammock seats: the main improvement here is the proportion of the seat elements (headrest, backrest, etc.) in relation to each other and the user's body. This could improve boths the aesthetics and ergonomics. At the moment, only the rough dimensions of the seat were determined with the help of basic P95 manikins but. Furthermore, more research and refinement should be done to find out whether the seat frame would actually prevent you from swaying around during driving; and whether it would be comfortable to 'hang' inside the frame. In addition more attention should be given to whether such a seat design would meet basic (crash) safety requirements, by evaluating the regulations and structural strenght.

4) Suicide door concept: the split lines should be defined more in the door area, to make sure that the design does not break up both the interior and exterior design on this crucial intersection. This should take into account the space required for comfortable ingress and egress; room for the door to rotate; and relatively large space required for the hinges. In addition, more thought should go into the stretchy part that stays connected to the hammock, to ensure that this idea and the overall 'wrap-around' styling theme works.

5) Navigation Sphere: although the manual drive mode is intended for occasional use (assistance of the vehicle in difficul or last-mile situations), extra research needs to be done to find out about the comfort, regulations and safety of this particular joystick design. It is also recommended to check how the integration of the rotary mechanism (from compass to joystick) over the lateral (Y) axis would impact the degrees of freedom of the joystick, since the envisioned (gyroscope-inspired) mechanism is different from conventional joysticks.

6) Visibility and roof line: even though the concept is intended to mainly drive autonomously, the visibility is rather poor with such a large bonnet in front, commented Studio Engineer S. Brühler. This could be addressed by e.g. lowering the bonnet.

In addition, Brühler commented that the roof should be raised another 50 mm to provide a realistic amount of head space. With this conceptual student project, I had the luxury to focus more one creating an attractive-looking concept and story, rather than strictly following the package and guidelines by the Studio Engineer. However, I should realise that in the future (when dealing with e.g. professional production projects), I might not have this freedom for loose interpretation.

7) Life-cycle Assement (LCA) could provide more insight if and how the sustainability-oriented aspects of the concept would work. For example, what the environmental impact of the Apple leather in the interior would be versus regular leather from

suppliers that Genesis uses. Or what the potential weight reduction, thus energy-saving would be if you replace regular seats with a lightweight hammock design. Moreover, basic calculations need to be done to determine the yield of the solar cells, and subsequently estimate whether the vehicle could supply energy to an off-the-grid cabin. This would also need to be done for the idea of compensating the vehicle's manufacturing footprint by delivering energy back to the grid when standing still. It would be interesting to find out how long this would take.

11.2 Recommendations - process & project management

ViP method

The ViP method is useful for creating a starting point for design, not necessarily for designing itself. At least, in the context of a car design studio. Before this thesis, I experienced working with ViP during several student projects, where, after weeks of factor-hunting and cluster puzzling, a quick visualisation of the envisioned product (i.e. 'the design') was usually enough to get the job done. I believe that this is due to a tendency in Delft to judge students mostly on theoretical aspects, e.g. process and argumentation.

In my experience, the opposite is true for a (large) car design studio. For example, at Hyundai, using methods like ViP to design the *right thing,* would the job of a Design Strategist. He would compress the insights in a design brief and give this to the interior designer, who focuses on designing the *thing right*.
This may sound petty, but during my internships in this industry, I noticed how the execution makes or breaks an idea. The tricky aspect about ViP in this context, is that it eats away a considerable amount of precious time needed for execution. This is because ViP feels like method without shortcuts: it feels only useful when you fully immerse in your future context, by following several complex steps. As a result, I spent the first 2 months walking on this misty, theoretical road, while my fellow colleagues were often asking me: "So what is your vision?" "What is your design?" Or even: "*Where* is your design?" As most car designers come from an artistic background - some of them might have never heard about design methodology before - you can imagine that it can be difficult to explain that it is useful to go through such a lengthy, abstract process. Especially since they are used to seeing other student interns (from art schools) 'pumping out', visual ideas all day, every day.

One might argue that you still need to sketch on the side, but in my experience, these sketches were not really going somewhere, as the vision only materialised in the end - the 'aha moment'. You could also argue that all scribbles on the side subconsciously contribute to your final concept. However, for a context where most attention goes into styling the concept, it feels that the best thing you can do, is to arrive with your vision on day 1. Basically, on day 2 it already felt like I was behind, resulting in a constant feeling that I had to rush. Looking back, this was also the main reason why my midterm did not go as planned. At that stage, I was trying to manage the expectations of the studio as well as the ViP process.
This resulted in loosing the overview, and a story without 'red thread'.

So is there also something positive about ViP? Well, the unique aspect about this method, is that it truly leads to a well-founded vision, when it is finally there. The importance of having a strong vision based on solid arguments should not be underestimated, especially when it comes to strategic or leadership roles. However, as a soon-to-be junior car designer (i.e. 'sketch monkey'), for me this does not outweigh the lengthiness and complexity of the method. For now, I will leave ViP aside for a while, to focus on design doing. Paradoxically, by focussing on 'just' making beautiful designs in this industry, you could theoretically end up in a situation (e.g. being promoted to manager) where it might be useful to pick up the book again...

Scope and focus

The complexity and sensitivity of the two main drivers (luxury and sustainability) were vastly underestimated. In particular for sustainability, it felt almost like a moral duty to have an exhaustive understanding of the topic, to prevent unintended 'greenwashing'. At times, this resulted in losing focus and missing the point for my client. This could have been prevented by a more strictly defined scope.

Furthermore, the exterior design was too distractive, even though I tried to approach it abstractly (as a shell/sculpture). At the visit by J.W. Hoftijzer and W. Kets to HMETC this was very visible in my presentation. Not only did it eat away time needed for refining the interior, it also grabbed Perini's and Serra's attention far too often. The diffulty here was that the interior and overall concept was strongly linked to the overall vehicle architecture. During the ideation stage, perhaps another direction should have been selected, that was less connected to exterior design. One could also argue that a more distinct 'design from the inside out' approach would have been better. However, the tricky thing was that a car mainly interacts with its environment through the exterior.

Finally, I tried to approach this project too scholarly, as I often found myself torn between different ambitions - an eye-catching design result, and a high grade to graduate Cum Laude. This latter aim was a dangerous mistake, often resulting in a loss of focus and too much time spent on a report, that was missing the point for this styling project. Partly, this was also due to anxiety developed for the report, after the midterm did not go as planned. I also realised later that during my bachelor in Twente, I was hit over the head with treating reports as papers. Anyhow, this resulted in my report feeling like a monster out of control: too heavy and confusing for the main audience one the one hand; and too 'pseudo' academic on the other.

Overall impact of the project

Regarding the MAYA (Most Advanced, Yet Acceptable) principle by Loewy (1951), the conceptual architecture of the vehicle, autonomous driving and hammock seats, made this design perhaps too *advanced* for my client. Therefore, it is highly unlikely that the project will enter another loop of development. However, as the goal was to inspire my client, it can still be considered succesful that it sparked a discussion about sustainability at the Hyundai European Design Center - perhaps for the first time beyond the product level (trim materials). For example, I was asked by the Hyundai Interior Design Manager R. Bretecher to give a presentation about sustainability and circular design later.

11.3 Recommendations for Genesis and TU Delft

Further steps for Genesis

Genesis is still a young brand and has a lot of potential when it comes to sustainability-oriented luxury. Especially the 'Beauty of White Space' design philosophy goes well together with sustainability, as both are in favour of reducing the unncessary, to focus on what is important. Sadly, with their latest model (GV60), it feels that Genesis has taken a different path, with lots of fancy features that seem to distract from the driving experience. My advice for any upcoming models would be to focus on their design philosophy again. As Genesis is still unfamiliar in Europe, this creates the opportunity to set foot on this market with a fresh, responsible brand image - backed with a range of progressive vehicles and services. This could give them a competative advantage over brands stuck with an 'old luxury' image, such as Bentley. At the moment, there is only Polestar that focuses on 'sustainable premium'; Genesis could perhaps become the first 'sustainable luxury' brand.

General recommendation for TU Delft

As discussed on the previous page, there seems to be a gap in design approaches between IDE (analytic and system focus) and the automotive design field (artistic and product focus). With the People in Transit master specialisation becoming a reality soon (replacing what was 'Advanced Automotive Design' in the past), it seems like a good time to decide whether to fully let go of car design, and focus on mobility systems/services instead; or embrace it more again by giving more room for creative expression. Now both worlds seem to drift increasingly further appart.

11.4 Personal reflection

Designing far outside my comfort zone.

Luxury was a totally new domain for me, being a student and coming from a modest family. This enabled me to learn unexpected things from people I would have otherwise never met; the awesome 'luxury consumers' that actively engaged in my

project. A peek inside their world of sophisticitation and indulgence gave me a much deeper understanding of what it means to design something emotional. In addition, I learned how to persuade busy people to get involved in a project; how to talk to them; and how to get the most out of these condensed conversations.

Working on my own remote island

Working almost 100% home alone (abroad) made it easy to get lost. For example, I had no clue (or clues too late) when I was going into a wrong direction. In addition, I was not forced enough to explain my ideas in a digestable way to others. As a result, findings often stayed too complex to grasp for the client, my mentors and myself. This truly made me learn the healthiness of informal 'coffee-machine' conversations with colleagues; and importance of actively reaching out to others when you find yourself in a situation working alone.

Biting off more than I can chew

In this project, my weaknesses of over-analysing and perfectionism often had too much influence. Together with my tendency to lose overview due to over-curiosity (or call it easily distracted), this formed a dangerous combination. For future projects, I should focus on more digestable tasks; to develop a more convincing result within limited time - with greater joy and less stress.

Setting priorities

Only in the end, I learned that setting priorities is not about choosing what to do - what first and what later - but about what *not* to do ('kill your darlings').

Reflecting on this made me think of a maintaining a Bonsai, since this project also felt like an intricate growing organism. If you do not prune a Bonsai, it will distribute its energy across all branches, making the tree less aesthetically pleasing as a whole. Unfortunately, I am too negligent when it comes to pruning my own Bonsai, so there you have it...

The road ahead

My main ambition with this project, was to create a project that would boost my portfolio in order to get a job as a professional car designer (see Project Brief). People who know me well, know that the latter was not just a project goal, but a life goal. However, I was never sure whether I would get there, since the field is niche and competitive. To my surprise, this happened much earlier than expected, being offered a job at GED's sister team (Hyundai Design) with still 3 months of graduation to go. This project played an essential role, because my Genesis project sparked interest by the Hyundai team, and I was still in the loop at the company when the opportunity presented itself. I look ahead with great excitement and am forever grateful for having had this opportunity.

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