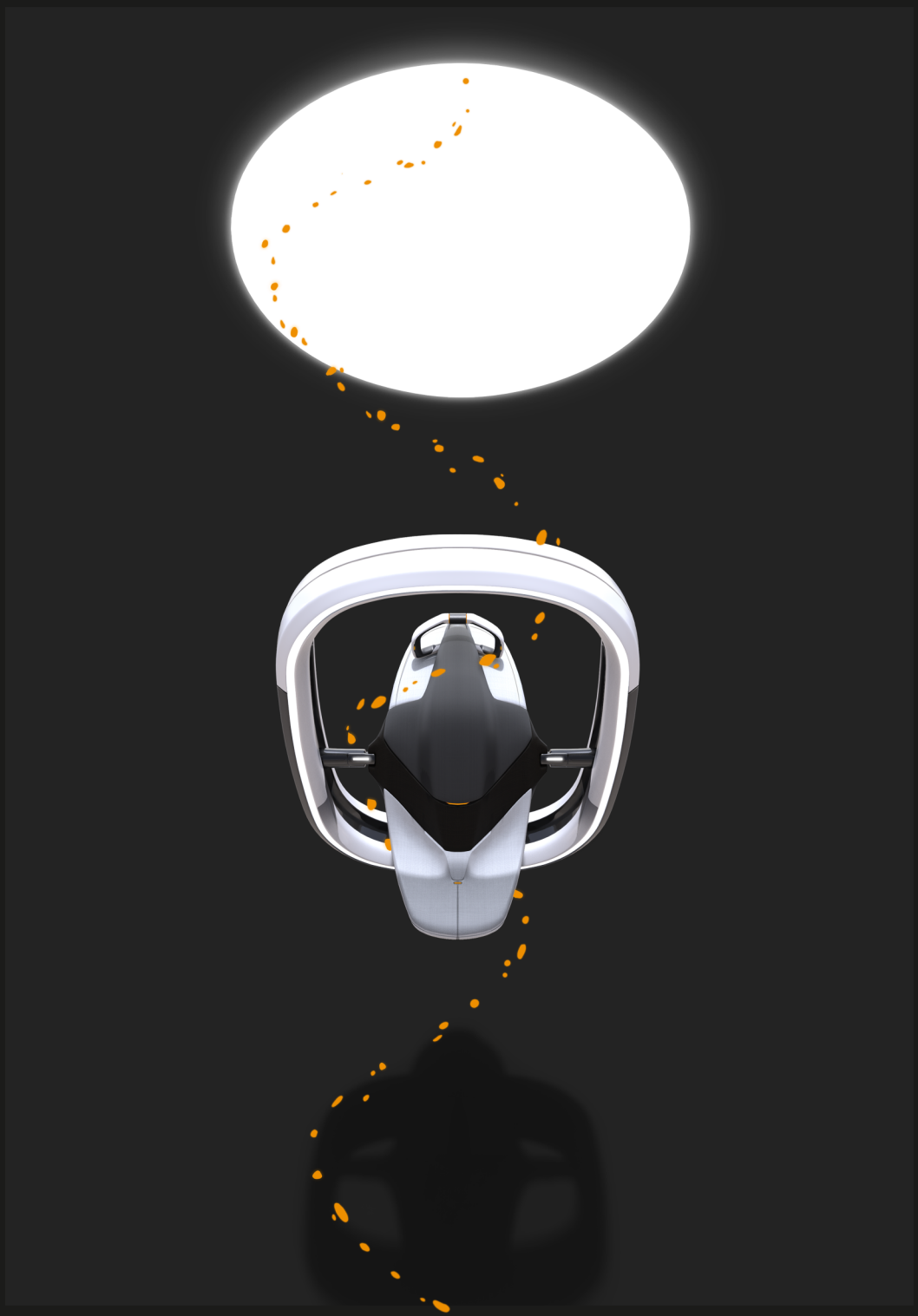
Future Active Mobility

MFA Transportation Design 2019



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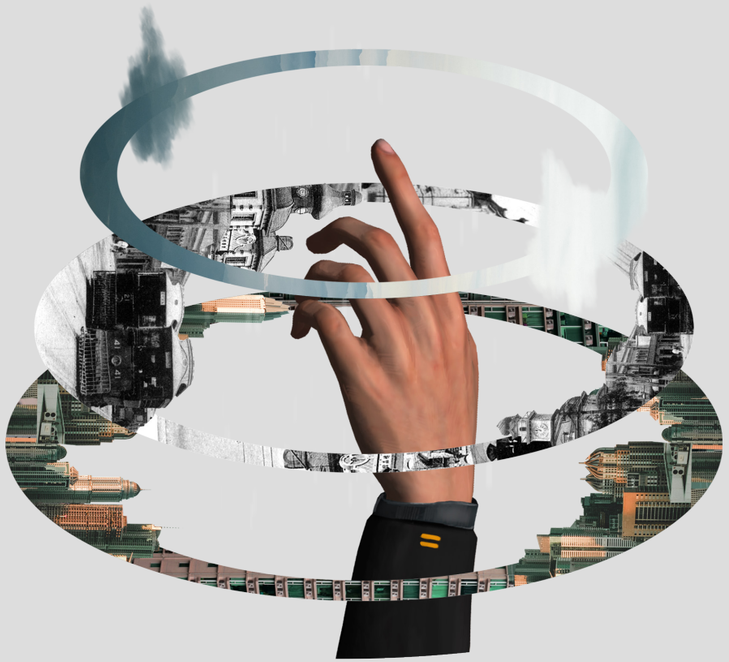

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Abstract

Inspiration

Purpose Specific Mobility

The topic of the project has been about how the time spent during transport could take on a more engaging and active form; physically as well as mentally.
The initial inspiration for this is the changing landscape of mobility, where technologies such as autonomous and shared systems, could allow for purpose specific vehicles rather then personally owned ones. The project investigates how a subscription based business model could help a global mass-market brand, like Volkswagen to stay true to its brand essence. The project is set in 2039's megacities and is describing a scenario, where Volkswagen sets out to emphasise the 'Volk' in its name, by offering a whole new range of purpose specific vehicles, which the user then can pick and book at any given time.

Process

Analogue and Digital Ideation

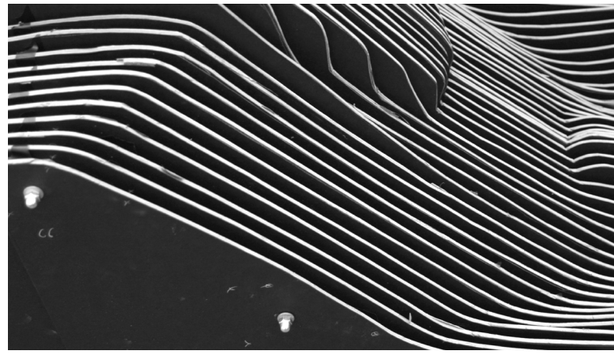
During the creative process both analogue and digital tools were used to explore form, function and the overall experience. Full-scale physical mocks-ups and 3D software models where additionally used to validate proportions, scale and concept principles. Working from the Volkswagen design studio gave valuable insights into the brand heritage and design inputs from the design team.

Result

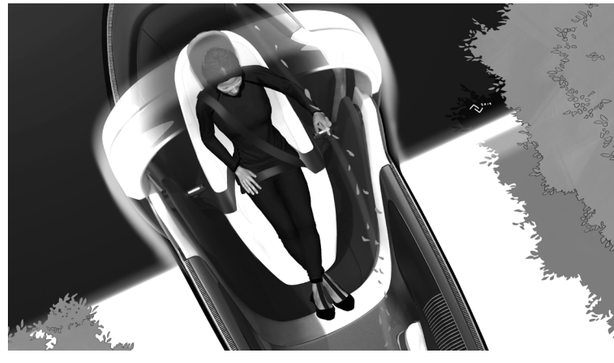
Future Active Mobility

The result is an active mobility vehicle concept called, *((((O))))*, which allows its users to spent their transport time in an more engaging way. Through two modes the user can decide to exercise body or mind while being transported. This is done by the usage of mixed realities which connects and relates with the passing surrounds. The project hereby links the digital world with the real one, in order to create new notions of what a travel experience could be in the future.

Inspiration



Process



Result

“I live on Earth at present, and I don’t know what I am. I know that I am not a category. I am not a thing - a noun. I seem to be a verb, an evolutionary process - an integral function of the universe”

- R. Buckminster Fuller (1970)

Introduction

Initial Thoughts

With the all-compassing challenge of the global climate change, it has been made obvious that we are living in times of transformation. The planet can no longer rely exclusively on yesterday’s solutions or ways of thinking, in order to solve the challenges of tomorrow, since these solutions has made us face the problems in the first place. One way or another we need to rethink our way of consuming, producing and how we generally live.

Throughout the author’s education and internships in industrial design and more recently transportation design industry, it has become clear how design potentially can play a major role in this transformation, since everything around us is designed. The author has realized the power of storytelling as a tool to invite people into alternative scenarios for the future, making it obvious that things could be different and better.

With the foundation for this project being a collaboration with Volkswagen, where the author previously had an internship, the thesis will naturally circle around transport and what role and shape it will take in envisioned future scenarios. But in the acknowledgement of that nothing exist in a vacuum this thesis will take its starting point by extrapolating certain key topics in our world today, as a way to get a better understanding of how tomorrow might look like.

This is crucial in order to figure out what might actually be meaningful to design around in such future scenarios - and a way to avoid repeating past failures where some solutions weren’t thought through, resulting in unexpected backfire over time.

Lastly, it is the author’s believe, that the most interesting and exciting projects come from experimenting freely, within a carefully designed framework. Only then can a project starts to have a life and a direction on its own, as energy and enthusiasm arise from the creative journey of not knowing exactly what the outcome is going to be. It is with this mind-set, that the present thesis will take its start.

Relevance

Since the dawn of the modern world, one could argue, that two factors have characterised it more than any other. One being the growing urbanisation resulting in densely populated cities. A trend which is predicted to only increase in the future, as the world population keeps growing (Lakskow, 2018). Another factor being the demand of mobility, speed and connectivity. These demands has lead to cities as being ‘a world of convenience’ where most of the day is spent sitting behind a screen and where everything is always within reach. (Fisher, 2014) This has to a certain extent established a very physically passive way of life. In other words, humanity has never been moved around so much as in the modern age, and never have it physically moved itself so little.

One could say that these two dynamics, dense urbanisation and fast mobility, to some extent has been working against each other, rather than embracing one another. This is especially noticeable in the urban infrastructure today, where big roads and highways, in an infinite race for connectivity, in some cases, have been cutting through the existing, essential city veins, like neighbourhoods and town squares, in order to connect with the growing suburbs surrounding it. London for example allocates 24% of its land to road, while this number in some US cities is 40%. (Sumantran, Fine, Gonzalvez, 2017) Eventually, the infrastructure has been splitting cities into two and created alienating landscapes, which to a larger extend are designed around the roads and vehicles passing through it, rather than the humans it was supposed to connect. (Stromberg, 2016)

As a future transportation designer, it is therefore essential to explore how this demand of new ways of organizing and moving around would feed into our means of transportation. As new technology continue to emerge, it is necessary to carefully investigate which elements potentially could be used to address these challenges and to create positive vision for a sustainable future.

One such technology is the promise of the autonomous car where the interior space is allowing for new activities and shared setups. (Walker, 2018) This transformation would potentially lead to a change of focus in how cars are designed. From being a car designed for a specific customer who owns it, to becoming a car designed for a specific purpose, which the users then rent whenever they need it. (Livingstone, 2018)

Additionally, we are now witnessing a vast and fast development in technologies that allow the merge between the digital, virtual worlds and the real physical world. These so-called, *Mixed Realities* are environments and visualisations, where physical and digital objects co-exist and interact. (Forbes, 2018) These technologies are raising a whole new set of moral and ethical questions, which, at their core, expose a need for us to ask ourselves, what we will do with these new tools.

Since ‘the medium is the message’ as famously coined by Marshall McLuhan (McLuhan, 1967), it remains to be seen how mixed reality influence its content and hereby the experience using it. As with any other mediums before it, it can be both used and misused. It is therefore important to explore these potential future scenarios and their consequences in order to become better equipped to evaluate and decide on which future we would like to have and design towards. (Dunne, Raby, 2013)

In other words, transportation time used to mean more passive time. But what if that is about to change? What if these new technologies could help move means of transportation in new and more sustainable directions? Thus, this thesis’ goal will be to explore how the tension between the digital and physical world, could create a more active way of being transported - physically as well as mentally - as a way to examine how mixed realities can enhance and enrich the real, physical world, rather than becoming a substitute for it.

02

03

Process

Research & Process

To achieve this goal, this thesis will first have a look at the global climate change the planet is facing in a broad sense, and how new sustainable approaches could help turn the development around. Furthermore, it will have a look at the growing cities and the people living there, in order to get a better understanding of the future context and what characterises it. By researching and questioning the emerging new technologies and their potential usages, the thesis aims to open up new areas of opportunities. Opportunities, which lastly, are cross-referenced with Volkswagen's current philosophy and brand in order to clarify, how such a brand could propose meaningful services and products in such a context.

It is here worth acknowledging, that the format of this thesis doesn't allow for an exhaustive and in-depth examination of the researched topics at hand. Rather its aim will be to give a quick overview of the core messages of the investigated areas.

During the creative process, traditional tools like, sketching, Photoshop and CAD modelling will be used, as well as form experiments within new VR software like Gravity Sketch. This is done in order to achieve the best of each medium as a way to hopefully find new and unexpected solutions.

To conclude this introduction, it is the author's humble hope that this thesis can add to the ongoing discussion about, how we create a future which uses technologies as a way to enhance human qualities such as curiosity and imagination.

Sustainability - A Turning Point

Sustainability is a broad term used in a wide-range of contexts. In the Oxford dictionary, it is defined as an “avoidance of the depletion of natural resources in order to maintain an ecological balance.” The word, *balance* is key here, as it is exactly the unbalanced extraction of natural resources, which is now causing, what scientists have tagged ‘the challenge of our generation’ (Sentance, 2015)

The challenge affects all the crucial factors of humanity’s current way of life. From the way in which things are produced and consumed, to essential economic notions like, growth as being a matter of utilizing and maximizing the outcome of the resource at hand. In other words, “[...] humanity has to go a whole lot easier on the living system that sustains us, acting regeneratively rather than extracively.” (Klein, 2014)

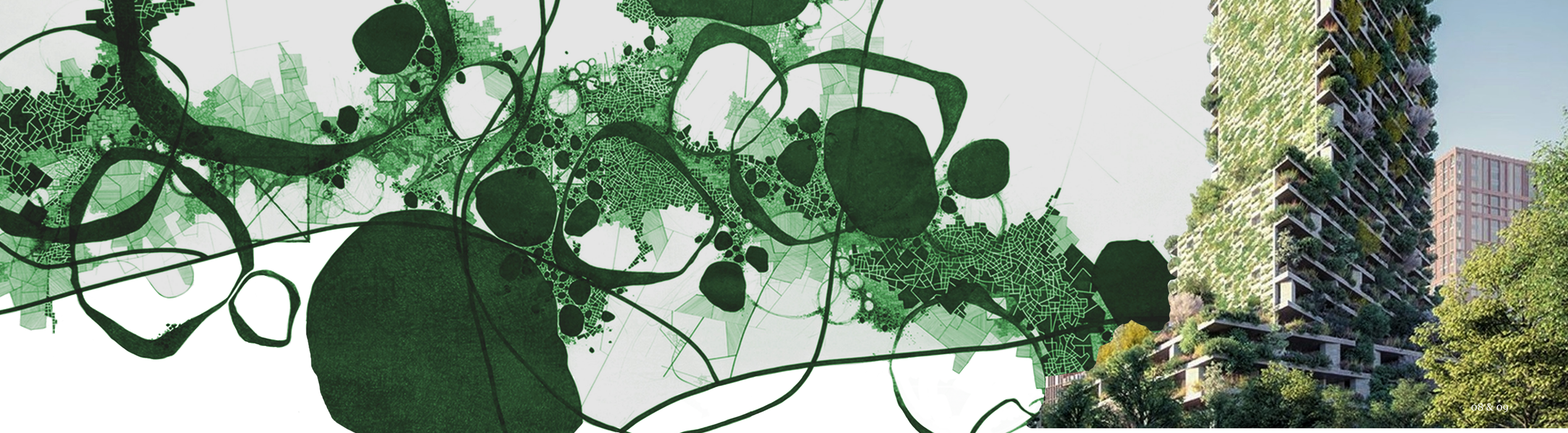
Critical voices point toward the need to “liberate the science from the economics, finance and astrology, stand by the conclusions however uncomfortable [...] we need to have the audacity to think differently and conceive of alternative futures.” (Anderson & Bows, 2012) This appoints the need for questioning humans’ connection to nature and their place within it. At its core, it all comes down to the realization of the fact, that humanity itself isn’t standing outside nature, controlling it like a machine, but rather that we ourselves are a part of the complex organism, that is the ecosystem on earth.

While such an all-compassing climate change can seem to be an enormous, almost invincible challenge, it marks a great chance to rethink and question the world surrounding us. How could we make changes to accede to a more sustainable world that at the same time would improve our quality of life?
It is from such backdrop, that this thesis will take its starting point, by looking at how a call for change, would allow for radically new approaches to how we are being transported in the future.

UN has compiled a list of 17 goals towards a sustainable future. This master thesis will centre around two of these, in order to create a sustainable foundation for the project. (UN, 2015)

04 & 05

opposite:
06 & 07



08 & 09

Urbanisation

The first one being UN goal number 11, “Sustainable cities, in balance.” With the rise of more and more megacities (cities with more than 10 million people, are projected to rise to 41 in 2030 (UN, 2016)) and a rising global urbanisation (60% of the world population is expected to be living in a city with a least half a million inhabitants (UN, 2016)) the cities will be where the most people would live in the future and they are therefore crucial in the transition into more sustainable ways of living. This is due to the ongoing population movement from rural to city residencies, as more and more jobs and opportunities have been available in urban areas over the last couple of centuries.

In such hyper-connected areas as the cities are, residents are experiencing what has been tagged “a world of convenience.” (Fisher, 2014) A convenience that covers all of our basic needs, but which additionally have brought new challenges with it.

Besides the obvious challenges, such as dense traffic and air pollution, living in big cities has also turned out to have an effect on the mental aspects. For instance, people who are living in less densely populated cities are statistically more satisfied with their lives, than the ones living in the most densely populated cities. (Ingraham, 2018) And even though, it is worth having in mind, that the mentioned survey’s data is accumulated in a limited demographic area (Toronto) and is dealing with a subjective term as ‘happiness’, something could suggest that experiencing wide open spaces, from time to time, does have a positive effect on one’s mood. A factor which urban planners and architects are starting to point towards as well, as new neurological in-situ research reveals how experiencing different buildings and city areas directly influences the test person’s mood. Here the key message is that green areas such as parks and woodland are some of the best ways to get a break from the stress of city living. (Bond, 2017)

Pioneering Cities

Some big cities around the globe have in recent years shown initiative towards re-engineering their energy infrastructure from fossil fuels to renewable energy sources, such as wind, solar and water. And this has, in some cases, happened despite of what their current national climate policy has been. (Milman, 2018) A lot of cities have hereby acknowledged their responsibility by taking action towards a more sustainable way of producing and distributing the energy.

Furthermore, initiatives have been taken to reintroduce the plants into the urban landscape. Vertical farming and forest projects like the Nanjing Green Towers in China, integrates the green ‘lungs’ into its design. The trees help to absorb CO_2 and generate oxygen through photosynthesis, making the city air cleaner. (Hojnicki, 2017)

Similarly, cities with sustainable aspirations have started to gather and compete through initiatives like ‘Reinventing Cities’ where projects that aim to improving neglected parts of the city are rewarded. (Stathaki, 2018) The competition is global and established by C40, which is a network of the world’s megacities with agendas towards developing more sustainable cities.

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An abandoned train station in Paris is turned into a green cultural tower. Proposal made by DGT Architects.

Passive Mobility

Another challenge, which is predicted to increase with the growing urbanisation, is the inactive lifestyle, as more and more people globally are spending their day working desk jobs - leading to what scientist have named the ‘global obesity epidemic.’ (WHO, 2013) This leads to the second UN goal, which this thesis will be based upon. UN goal number 3, “Good Health & Well-being”

The city as being a “world of convenience” has led to a physically passive way of life, where food and transportation is always within reach.
As cities continuous to grow, more and more time is used on daily commute. People living in megacities like New York and Tokyo spent respectively, 36 min. (Kolomatsky, 2018) and 51 min. (Real Estate Japan Inc., 2017) on average during daily one-way commute.

To accommodate for this, there has, over the last couple of decades, been a rising interest in acquiring a healthy lifestyle and in training your body. Most of this has taken place within the gym and fitness sector, which according to International Health Racquet & Sports-club Association (IHRSA) have seen arise of 3-4% annually over the last decade in the U.S. Around 20% of the adults in the U.S. have a fitness club membership today and the number is expected to keep rising. (Midgley, 2018) Additionally, a study finds that 77% prefer to do their weekly exercise alone. And that only 27% find time to get in a workout during a regular work day. (Internicola, 2013)

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Future Users

Volkswagen is a global car manufacturer with a wide range of cars in their portfolio, which have the reputation of appealing to people of all ages. Looking at the future, new generations, their values and world views will become increasingly important to understand in order to design for and around them.

Gen Z & Gen Alpha

There doesn’t seem to be a conclusive definition of the exact years that sets the generations apart. The following definition is taken from the Australian Research Firm, McCrindle. Gen Z are born between 1995 to 2009, and became the first generation that grew up with the internet, also called the ‘dot com kids’. The generation following them, Gen Alpha is born in 2010 or later. While both the Gen Z and Gen Alpha have grown up with technology, Gen Alpha is characterized by their relationship with technology not as being a tool to be used, but rather as extensions of themselves. Hence the alias “Digital Natives”. This relationship is especially seen today, through the extensive use of social media, online avatars and smartphones, which some have named the first step towards us becoming cyborgs –which are characterized by the merge between the organic human and the inorganic machine. (Martin, 2014)

Homo Deus

Predictions regarding where humanity will be in the near and far future are many and diverse. Historian Yuval Noah Harari describes, in his book ‘Homo Deus: A Brief History of Tomorrow’, how the humans, Homo Sapiens, have developed through time. From being a social group of hunter-gatherers, whose ability to make up fictional stories allowed them to collaborate in much higher numbers than their distant relatives, the Neanderthals. To the revolution of the domestication of animals and land, and later the scientific breakthroughs, on which the current world is based today.
Harari defines four future predictions of how advancement in technology will influence our lives in the near and far future.
It will be to turn death into a concept of the past, control the aging process, provide happiness on demand and ultimately give humans the divine ability of creating life. The sum of these humanity upgrades would lead us to the next step in the human evolution, Homo Deus.

From here on Harari predicts that society in the future will go towards a data-centric one, in contrast to today’s human-centric. Since recent research can be used to argue for, that our brains work like very complex algorithms, with an input coursing and output, Harari argues that, inorganic computer intelligence, named Artificial Intelligence, eventually could match and outdo the organic human brain. In this case, we will enter a new era, which Harari names *Dataism*.

As much as this can seem like a far-fetched sci-fi fantasy, it is this author’s believe, that it is worth having in mind as a reference for today’s developing technologies, taken to the extreme, as a way to question in which direction we want the future to take.


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New Realities

In recent years, the interest and development in so-called Virtual, Augmented & Mixed Reality have seen a big increase, as technology has become cheaper and more accessible, making some researchers call it ‘the next change of interface.’ (Huber, 2018) These three terms all deal with added digitally-generated visuals that to different extents connects to the physical space around the user. This thesis will now have a look into what characterizes the three terms and how new wearable technology allows the body to physically feel these digital worlds.

Virtual Reality

Virtual Reality (VR) immerses the user in a fully digital environment, normally through a closed-off set of googles. The goggles are tracked by cameras, so that the user’s head movement is linked to what one sees in the goggles. Due to its all-embracing artificial worlds, it has so far mostly been developed for the gaming industry. But it has also been used in artistic psychological experiments, like ‘Being Barbie’ by artist, David Byrne and technologist, Mala Gaonkar. The experiment explored the emotional impact VR can potentially have, by giving the subjects the point of view of another person, in this case a baby doll. (National Geographic, 2017)


14


15


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Opposite:
Frame from the dystotopian TV-series, Black Mirror

Above:
Audi Holoride Concept
Microsoft HoloLens &
TeslaSuit VR Haptic Feedback Suit

Argumented Reality

Another technology is Augmented Reality (AR) that allows for virtual objects to be overlaid onto the real-world environment. Today it is mostly seen in the shape of smartphone camera filters on social media like Snapchat and games like Pokémon Go. But as technology becomes better and cheaper, AR is expected to become more natural via headsets like today’s Magic Leap and Microsoft’s HoloLens, which are transparent glasses that via cameras can be controlled with hand gestures. And even though VR might be more widespread today, researcher believe that is about to change, as “AR seems to be better equipped to handle the social needs of humans, largely because it’s augmenting our current world, not trying to replace it.” (Interaction Design Foundation, 2018) AR has also been pointed out to have a huge potential, as an information and educational tool in a wide set of areas like on-site construction and in training of future doctors.

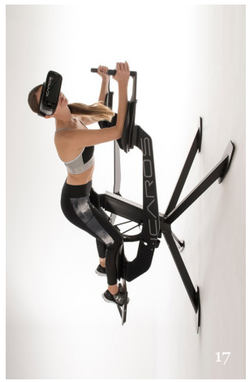
Mixed Reality

Mixed Reality (MR) or Extended Reality as it is also called, encompasses both VR & AR as it combines the virtual world with the physical, anchoring virtual objects into the real world or real objects into the virtual. Mixed Reality is by some predicted to be where the technology is headed in the future, as it would allow for different levels of virtual immersion, depending on the context; it being used for entertainment (fully immersive game worlds) or professional contexts (info layers shown on top of the real world.) (Huber, 2018)

Haptic Feedback

Haptic feedback has to do with the recreation or simulation of the sense of touch by applying forces and vibrations to the user's body, as a way to enhance the interaction.
With the introduction of the previously mentioned virtual elements, primarily to the visual sense, new wearables are developed to include the whole body and sense of touch, through haptic feedback. Some of these are attached directly on the body, like the full body Tesla VR Haptic Suit, which lets its user feel real-time stimulation through 46 vibrators placed around the body. Another example being the Kickstarter-project, VRgluv, which supposedly gives the feeling of holding a real object in one's hand.
Other examples, like the Icaros VR-training, use the gravitational forces to make the virtual experiences more immersive or in this case turning them into a work-out session.

Additionally new approaches are made by printing with biological material on fabric. New bio-hybrid wearables use natto cells, which responds to humidity, in order to make sportswear which automatically adjust to one's body temperature. As the cells retracts and extends, the suit opens and closes and acts like a second breathing skin. (Hill, 2015)



17 Icaros VR-training

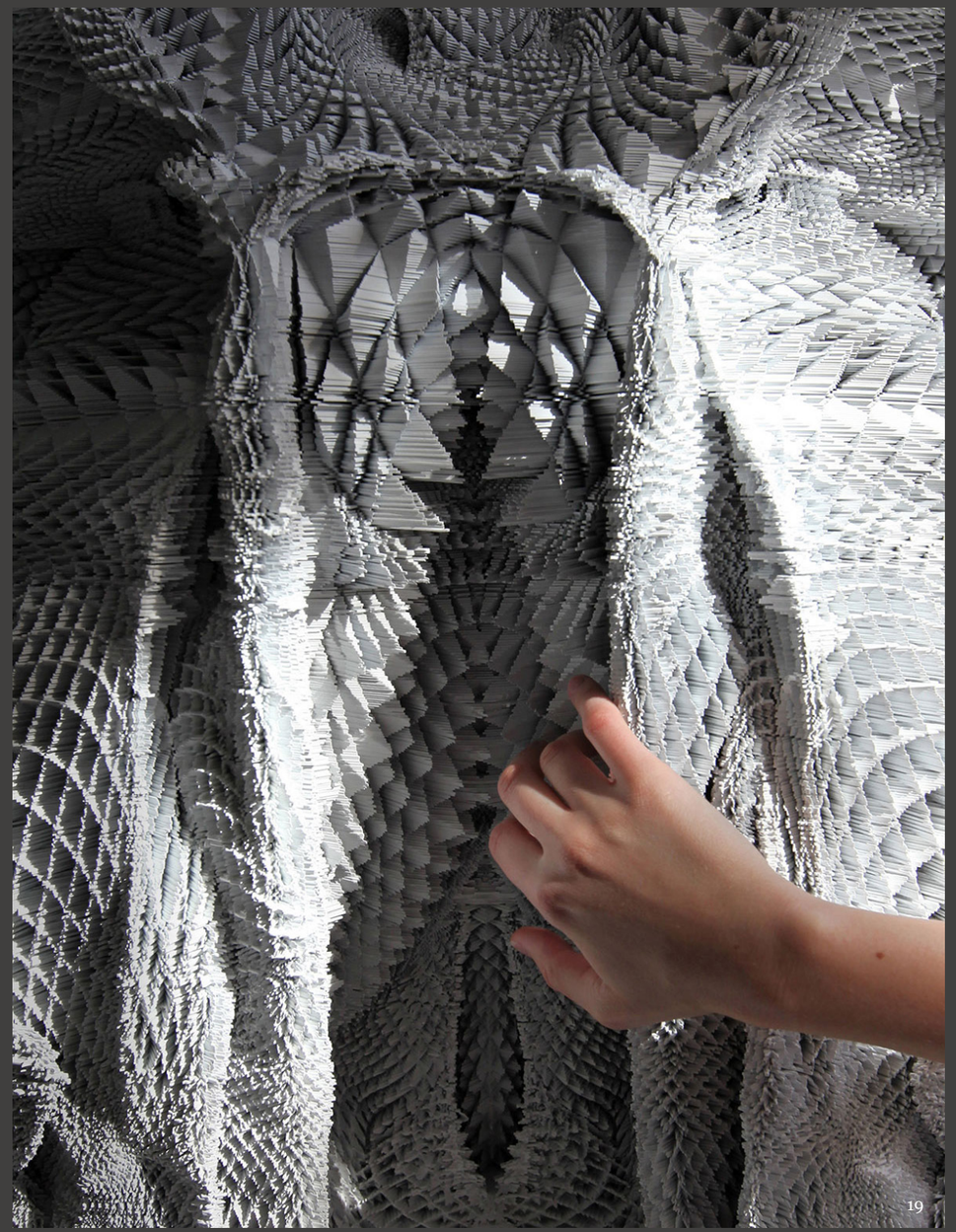
18 Biologic Breathable Suit

Rapid Manufacturing

Over the course of the past half century, machining and injection moulding has become the go-to manufacturing processes, due to their low cost and good quality. Additive manufacturing (also known as 3D printing) has mainly been used for rapid prototyping and testing, but that is expected to change, as some researchers predict that 3D printing in mass-produced scale, so-called rapid manufacturing, will grow significantly over the next decade. (Zistl, 2014) This is due to the technology becoming faster and cheaper, and more and more printing materials becoming available, to include everything from metal to coffee. (Rael, Fratello, 2018)

Looking at the transportation industry, researchers make it clear that a complete vehicle will probably not be manufactured by a 3D printer any time soon. (Metal AM, 2018) But the number and size of parts from the 3D printer will increase significantly, as additive manufacturing can create complex structures, that allows for a lower number of total components and a lighter end product.

In combination with machine learning, (which is an algorithmic based system that uses models to adjust and 'learn' from its predictions) additive manufacturing also allows for a higher level of optimization and customization of parts, even in low quantities, with the same end price. (Carroll, 2018)



19 Computer-generated and ornamented columns by computational architect, Michael Hansmeyer

Autonomous Driving

If one takes a look through the automotive brands and start-up companies' announcements, regarding where the industry is headed next, the notion of *autonomous drive* is very likely to show up more than a dozen of times. As technology is developing fast, a lot of companies have claimed that the setup for cars to move on their own, without the need for the driver to interfere, will be here soon. (Mohn, 2018) While this might not go as fast, as the car brands would like us to think, there is undoubtedly a movement towards an autonomously driven future.

Levels of Autonomous Drive

Autonomous drive is normally divided into 5 levels in order to describe to which extent they are a self-operating entity. In Forbes, the five levels are described as such:

Level 1 - Driver Assistance: Driver is controlling all the main function. The car can only control one main function for a finite time, like an emergency break or Adaptive Cruise Control.

Level 2 - Partial Automation: The car can take control of steering, breaking and acceleration under certain conditions. The driver has to monitor the road all the time.

Level 3 - Conditional Automation: The car can drive itself, but will need the driver to be prepared to take over at any time.

Level 4 - High Automation: The car can drive itself full-time and if it encounters problems, which it can't handle, it will stop by the side of the road, if the driver doesn't react at first.

Level 5 - **Full Automation:** No driver is needed at any time, as the car controls itself under all circumstances. This requires cameras and a comprehensive 3D scanning of the surroundings.

At the time of this thesis being written, level 3 cars are making it onto the streets. Even though technology might very soon be good enough to give us fully automated vehicles at level 5, they are still expected to be at least a decade away, in order to deal with testing, validation and legislative challenges. (Murray, 2018)

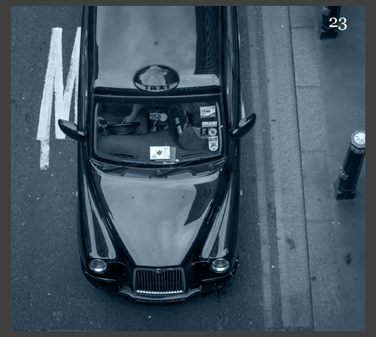
EVs & Energy Grid

Over the last decade, we have seen an increased interest and development of electric vehicles (EVs) with companies like Tesla leading the way with cars fully powered on batteries, as a cleaner alternative to the combustion engine.
But as several researchers have pointed out, more cars fuelled on green energy, wouldn't solve the cities' dense traffic and pollution problems alone. Electric vehicles today are produced by and partly powered by energy coming from fossil fuels, charged on batteries which are depending on limited resources like lithium carbonite. The batteries have a limited lifetime and we currently don't have a sustainable way to recycle them. (Sumantran, Fine, Gonzalvez, 2017) New initiatives are being developed to accommodate for this, by focusing on improving the capacity and lifetime of the batteries and making them recyclable. (Engerati, 2018)

Hydrogen cars have by some been appointed as an alternative to EVs, but its advantages, such as a longer range, are currently only a benefit on long remote travels. A big disadvantage is that they currently also depends on extraction of non-renewable natural gas. (Cooper, 2018)

According to the non-profit organisation, World Economic Forum's report from 2017, "The Future of Electricity New Technologies Transforming the Grid Edge" a change to sustainable energy source would mean a decentralisation of the energy production and storage, since windmills and hydroelectric energy distributes the areas of energy generation. This would lead to a new energy infrastructure, where each

22 Tech-Company, Qualcomm testing wireless lane- charging implemented into the road.



23 Site specific vehicles might be more common in the future, if cars are shared in autonomous mobility systems.

citizen could contribute to the energy grid, through for example solar panels integrated into the architecture of one's home. The energy grid for this to happen is already to large extend there, in the shape of our current electric infrastructure. What is missing is it being constantly accessible for EVs as well.

Today, charging stations are getting more and more common in public spaces, but with a current charging time around 30 min. it is still not as fast as putting gas on a combustion engine. Recently development of wireless charging implemented into the road have gained momentum, as a way to completely eliminate the need to wait for the EVs to charge. (Bazzi, 2018) The implementation of roads with charging magnetics in them is a costly transformation, but it could simultaneously benefit from a decentralized energy net; potential making the distance between the energy production and the consumption very short.

Subscription Services

Most cars today are transporting only one person, despite there being room from for 4-5 persons; de facto moving 15-20 times the weight of the one person it carries, which makes for a very inefficient and space requiring mean of transportation. (Sumantran, Fine, Gonzalvez, 2017) The researchers point toward, that the solutions to these challenges can't solely be found in optimizing each individual vehicle, but rather to radically reduce the number of vehicles.

With the prospect of more and more automation in the transport sector, level 5 autonomous vehicles would eventually allow for a new shared mobility infrastructure to emerge. Today, start-up brands like Lynk & Co. have made the shared mobility a cornerstone in their brand philosophy and apps like ZipCar and Car2go have turned car sharing into a regular alternative to longer journeys with public transportation.

Similarly, monthly based subscription services like Volvo Care and Audi On Demand, just to name a few, are emerging and hinting a paradigm shift from personally owned cars towards a subscription based business model. (Singh, 2018) Certain predictions, like the one from think tank ThinkX, are forecasting a 70% drop in private car ownership in the US by 2030, mainly due to an expected lower price on shared, autonomous vehicles.

This change from the personally owned car to a subscription based, shared mobility system could potentially change how means of transportation is perceive and used in the future. In Livingstone's article on the subject (2018) he is arguing, that there will be a weakened focus on the individual customer and an emphasis on the purpose of the vehicle and the location in which it will function. This, he argues, would give an opportunity to reintroduce the site-specific vehicle in an otherwise globalized one-size fits all, as more or less seen today.

Volkswagen

Brand Heritage

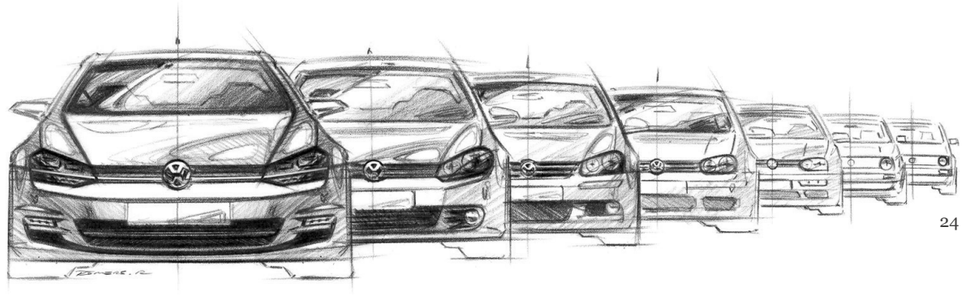
Established in Wolfsburg (then called Fallensleben), in 1937, by the Nazi-National Socialist Government with Adolf Hitler as its leader, Volkswagen were a part of the vision of a new Germany; connected by highways and cars, which the average German worker could afford. Automotive engineer and designer, Ferdinand Porsche were appointed to deliver the proposals for the 'car-for-the-people', the KdF-Wagen, which eventually was presented at the Berlin Motor Show in 1939. With Germany's invasion of Polen the same year, World War II became a reality, and the production only reached 630 cars, before the factory was change to make military vehicles and where eventually bombed by the Allies.

After the war, the KdF-Wagen was updated and put into production again by the Allies. The advertising agency Doyle Dane Bernbach gave the car its now famous nickname 'the Beetle' which by 1955 was produced in 1 million entities - making it a milestone in West Germany's economical rise after the war. Following the success of the Beetle (Typ 1) the Transporter (Typ 2) was introduced in 1950 and the two cars shaped Volkswagen into a global brand and one of the best-selling car manufacturers in the world. Since then, Volkswagen have continued to produce top selling models like the Polo, the Passat and the Golf, which in 2002 out-numbered the Beetle as the most sold Volkswagen of all time, with 27,5 million sold entities to date – making it to the top 3 of all time most sold car models. Today Volkswagen Group consists of twelve brands and is the second biggest car manufacturer in the world.

"We are a globally leading provider of sustainable mobility."

- Official Volkswagen Group Vision and Strategy for 2025

The above-mentioned Volkswagen models' popularity has given the brand a wide spread appeal, exposure and trust in solid German engineering. This trust did in 2015 take a hit, as it was unveiled, that Volkswagen had intentionally been cheating with their cars' emission levels during testing. This scandal, tagged the 'Dieselgate', have made Volkswagen announce that they will start to "gradually fade out combustion engines to the absolute minimum." (Wehrman & Amelang, 2018)



24 Volkswagen's heritage and design evolution is often emphasised, when a new generation is launched. Here its the Golf VII from 2012.

Design Language

Since the very first Volkswagen model, a core part of the brand's design DNA has been based upon modernism's mantra, 'form follows function' coined by functionalism architect Louis Sallivan in his article, "The Tall Office Building Artistically Considered" from 1896.
The Beetle's simple construction is primarily designed around a quick and efficient assembly at the lowest possible cost. One could argue, that Porsche's curly lines gave it a lot of character. Something that turns out to be another trademark of a lot of Volkswagen cars following the Beetle. Simplicity with a grain of character.

The first Golf MK1, for instance, marks a turn away from the 40s and 50s streamlined and rounded shapes. Designed by legendary car designer, Giorgetto Giurgiaro and his Italdesign studio, the MK1 introduced the new minimalistic and flat 'folded paper' style. A style which previously was mostly used in supercars, but with its introduction into an everyday car like the Golf, started a new trend which can be seen throughout the rest of the 70s' car design. (Roij, 2017) Giurgiaro gave the Golf its now classic trademarks like the wide C-pillar, and the easily recognisable geometric shapes like the round headlights and the rectangular grill. Once again just enough to give it a unique character.

Volkswagen has always taken their design heritage into account when designing the next model in line. In other words, they have become known for designing around the idea of small evolutions rather than a new revolution with the launch of every new car. With the introduction and expansion of the car portfolio, to include a microcar like the Up! and SUVs like the Tiguan and Touareg, certain design elements have been kept to make the Volkswagen family of cars coherent and recognisable as such. These elements are for instance, the horizontal front grill and emphasis on clean geometric shapes in the interior as well as on the exterior. These design cues are even visible in the concept cars, like the fuel efficient 1XL, and more recently, the family of electric vehicles concepts, I.D Buzz, I.D Crozz and I.D. Vizzion and the fully-autonomous, Sedric.

"Clarity, reduction and continuity."

- Stated description of Volkswagens Design Philosophy by Klaus Bischoff, Executive Director of Volkswagen Design since 2007

Emphasis on the 'Volk'

Considering future business models from a Volkswagen point of view, there seems to be a deep link to the essence of the Volkswagen philosophy and brand. This is especially clear when looking at subscription based, autonomous services like the ones mentioned previously, which potentially could make Volkswagen available to an even broader audience than today.
Today, Volkswagen has a wide selection of cars in their portfolio, aimed at a wide range of user groups. Such selection could be further broadened in the context of the fully autonomous car, to include young and old, and people without a driver's license as well; potentially making it a truly democratic means of transportation.

25

26

27

approx. 40 years in between. From the top: 1946 Volkswagen Type 11, 1983 Volkswagen Golf GTI MK1, 2017 Volkswagen Sedric Concept

Research Sum-Up

Cities will be at the forefront of sustainable change but also where the most people on the planet will live in the future. In these megacities, the infrastructure will be autonomous and shared. Such a revolution would allow for completely new mobility lay-outs, where vehicles are something you subscribe to instead of own. This change of focus allows for site-specific vehicles with a much higher degree of specialized purpose, as a wide range of different vehicles could be offered to the subscribing user. Such a business model would potentially allow Volkswagen to extend on its philosophy of quality vehicles for everyone - and truly turn it into a democratic brand.

The future user, a part of generation Z and Alpha, would see future technologies, like mixed reality and wearables, as natural extensions of themselves. In order to develop a future in link with UN's sustainable goals, it would therefore be crucial to investigate how these technologies could be used to promote more active ways of being transported.

Goals

The goal of this thesis will be to create a vehicle which will endorse physical and mental exercising, among everyone with a wish to become more active in their daily lives. To achieve this the project will propose a vehicle concept set twenty years from now, in 2039, which will be designed around the usage of mixed realities as a way to promote these new means of active mobility. This will be done to investigate and visualise the potential positive impacts of the synergy between the digital and physical worlds within a limited, controllable scenario.

This thesis would furthermore set out to investigate how level 5 autonomous drive can allow for radically new architecture and physical exercise to take place inside the vehicle. And lastly, to create a visual hypothesis to how Volkswagen as a brand could adapt to this changing landscape of mobility and to accommodate for the future values of the coming generations of users. The focus will be on the interior side of the vehicle, but the overall architecture will be taken into account as the aim will be to visualise a holistic concept.

Wishes

The following is the author's personal wishes for this thesis' creative process and outcome:

To use virtual reality as an idea-generating tool during the creative process.

To make an animation that would describe the vehicle's usage and its future context in an emotional way.

To create a physical model, either a scale model or a rougher full-size model which combined with virtual reality could simulate parts of the concept.

To have fun! If something doesn't work, don't hesitate to change it in order to keep things interesting and moving.

To add to the ongoing discussion about, how we create a future which uses its technologies as a way to enhance human qualities such as curiosity and imagination.

Creative Process

Research Visualised

Following the research phase, insights were used to start visualising a future context and concept, which would address the topic at hand. One of the ways this was done, was through a user journey mapping.

Through a workshop with several colleagues, the user's potential experience were mapped out. This helped realising challenges and opportunities within the framework and hereby what demands the design should full fill. Afterwards one of the potential user journeys were illustrated as a storyboard, which helped turn key insights from the research into tangible scenarios and ideas.

Additionally, several personas where developed in order to clarify and understand who the target group for the design would be. Here the obvious and narrow aim on 'the athletic' and 'the tech-interested' were turned down, in favour of a more including aim on everyone with a wish to become more active in their daily lives. This decision were based upon the future vision of Volkswagen, as being a transport provider for everyone.

A
Daily one-way travel time: 30 - 60 mins
Transport time
B

Emphasis on the 'Volk' in Volkswagen

Subscription service.
Portfolio of purpose-specific vehicles

Exercise time | **77%** prefer to exercise alone

A wish for a more convenient, private and integrated way of exercising one's body & mind during daily life.

Desk worker

Amateur Athlete

Silvia, 29 years old

· Lives in Mexico City together with her two teenage children

· Working as a fitness instructor

· 57 mins. spent on daily commuting to work, normally alone

· Are using most of her spare time on running and going to the gym

28

Kanna, 38 years old

· Lives in Tokyo, with her boyfriend and child

· Working at a large research center

· Used to bike to and from work, but the office is now too far away

· 1 hour 20 mins. spent on daily commuting, normally alone

· Is not physically active. Never finds the moltivation and time

29

Tech developer

Sam, 44 years old

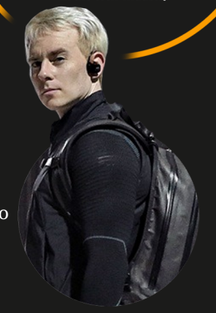
· Lives in Los Angeles, on his own

· 49 mins. spent on daily commuting, normally alone

· Is going to the gym from time to time, but not regulary

· Working as an exective manager in a global tech company

· Always up to date with the lastest trends and development in the tech-industry



30

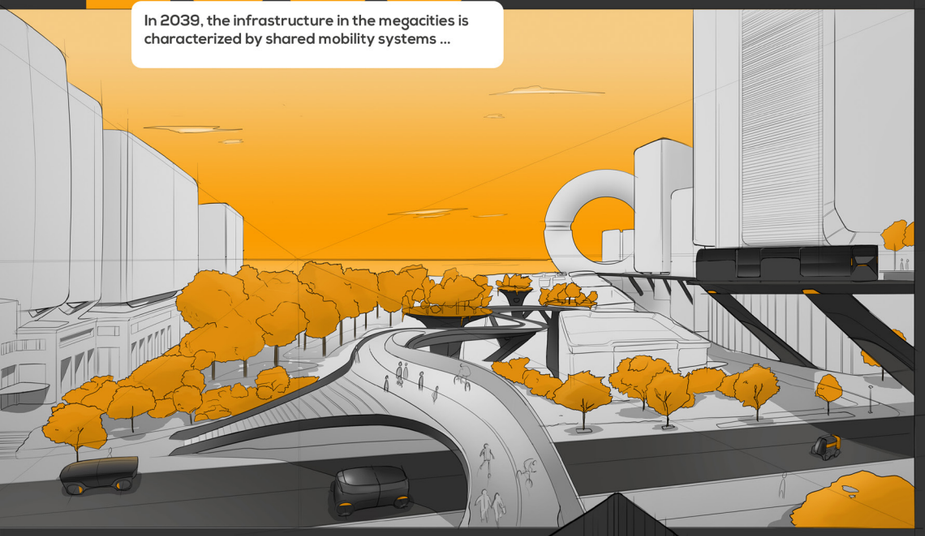
The obvious aim

The including aim

The narrow aim

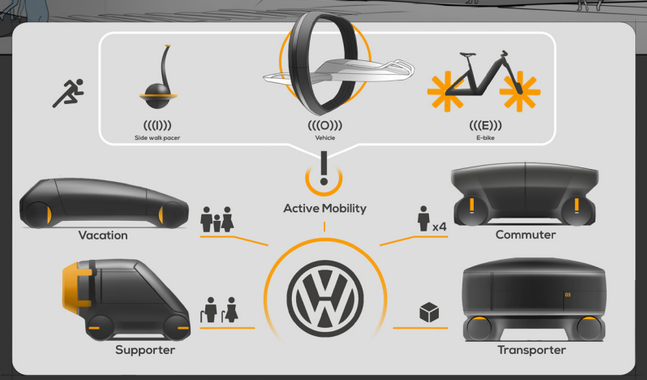
2039

In 2039, the infrastructure in the megacities is characterized by shared mobility systems ...

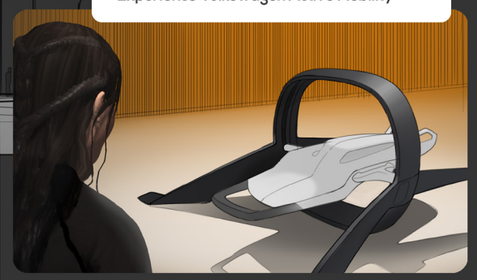


... such as subways and autonomous vehicles

Volkswagen Subscription Service Center



Experience Volkswagen Active Mobility



Emphasis on the 'Volk' in Volkswagen

Volkswagen is aiming to position themselves as the most accessible transport provider, by offering a subscription service including a portfolio of purpose specific vehicles for a diverse range of people

Receive personal wearables

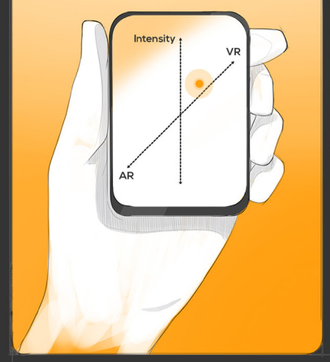
Schedule the week's transport

- Active Vehicle
- Commuter
- Weekend Trip

Select mode, route and intensity

Body Mode

Mind Mode



NEXT DAY

Change of clothes and off from work

Picked up after work

BODY

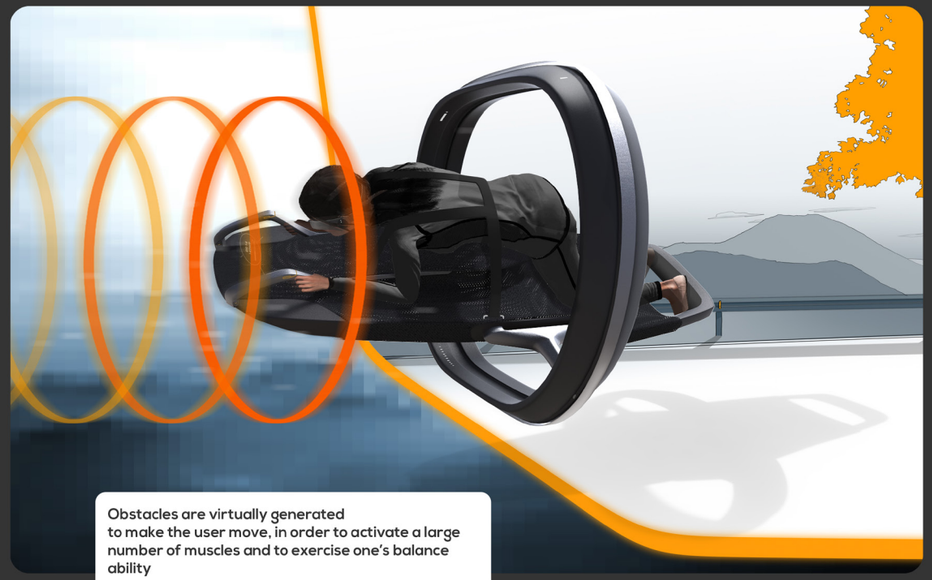
AR
(real horizon)

Obstacle Race

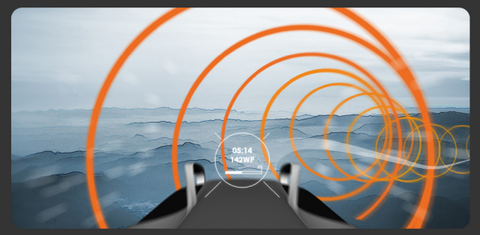
Tokyo anno 1929

Flying High

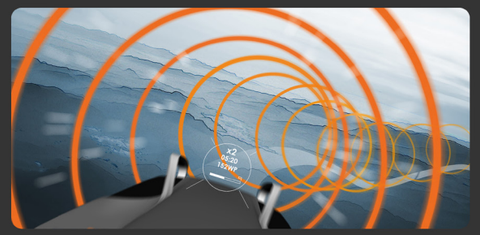
VR
(artificial horizon)



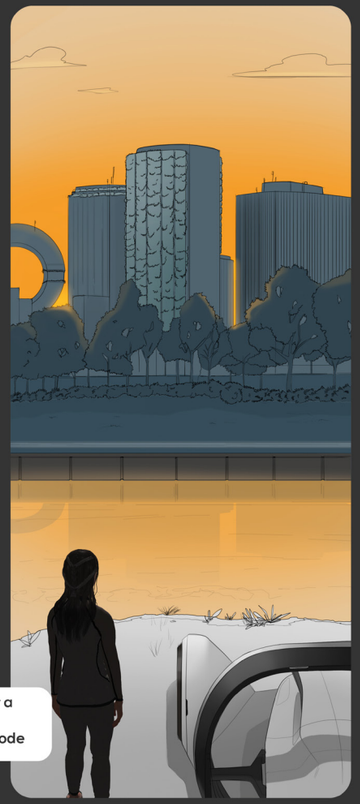
Obstacles are virtually generated
to make the user move, in order to activate a large number of muscles and to exercise one's balance ability



Real life g-forces are emphasised through MR



30 MINS. LATER



Stopping for a break and a change of mode

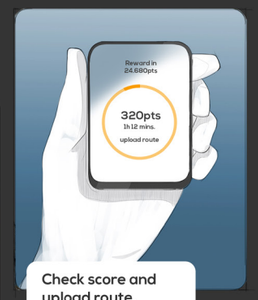
MIND

Mnemonic: Remember something complex by linking it to surroundings

Mindfulness: Focus on the moment

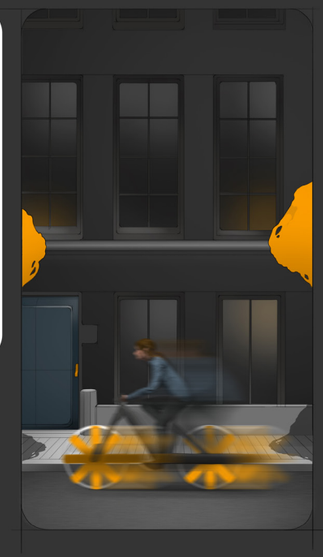
Creativity: Free hand painting

Arriving at home



Check score and upload route. Point-based reward

Points can be earned through different means of active transport



2 WEEKS LATER

Reward: Vacation vehicle for a weekend

Service Overview

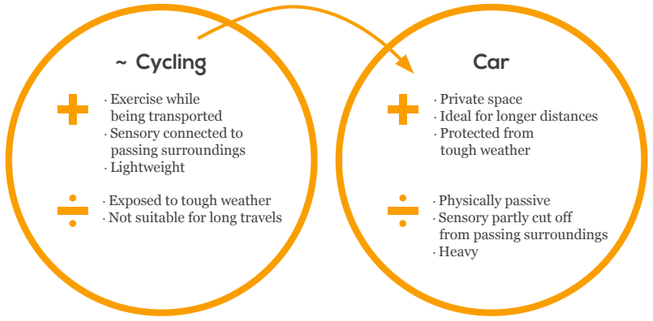
Twenty years from now, in 2039, Volkswagen provides a shared subscription service, in which a large selection of purpose-specific vehicles are available to the subscriber. This business model provides a opportunity for a wider spectrum of vehicles, which can full fill a broader range of people's specific needs. Within this subscription service 'Active Mobility' is considered a branch on its own. The term includes active means of transport for shorter trips such as cycling and running, as well a sidewalk pacer called, *(((I)))* and a vehicle named, *(((O)))* for longer routes.

It will be the design of this vehicle, which will be the focus of this thesis.
When subscribing, the user will receive a set of personal wearables, which can be used during all the different kinds of active transport, and the different types of vehicles can be booked whenever needed.
The Active Mobility is an in-closed system where continuous use of these active means of transport will generate points, which can be exchanged for a reward within the VW-subscription - for instance in the shape of a vacation vehicle for a weekend.

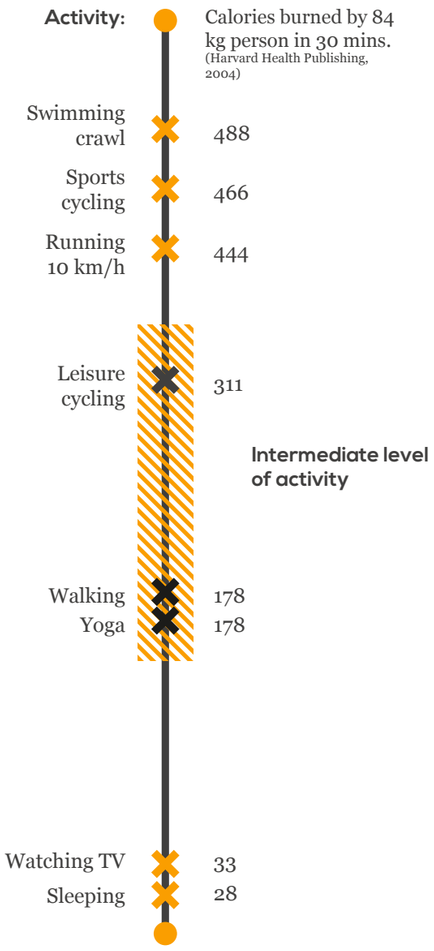
As seen in the storyboard, the user can engage in two different modes inside the vehicle. One primarily concerning activation of the body, the other, exercising of the mind. In both modes mixed reality is used as the interface and means of engagement.

The Body Mode is giving the user the option to select from a range of pre-designed experiences. The routes are characterised by their intensity and length and are placed along an axis going from augmented reality (which is primarily generated on top of the passing, real surroundings) to virtual reality where all of the envisioned space is artificially created. This gradient from real world into virtual worlds is a way to make sure, that not one ride is identical, and gives the user yet another reason to keep coming back to the service.

The Mind Mode on the other hand, deals with three main areas of exercising one's brain: Memory, skill-set and creativity. Inspired by the mnemonic technique, the memory challenges allows the passenger to use the mixed reality as a way to layer and link the passing surroundings with things one want to memorize. The mindfulness setup allows the user to revive and focus on the moment. And lastly, the creativity challenges lets the user create artworks influenced by the passing surroundings, through hand gestures.



The design of the vehicle will aim at adopting some of the positive elements from outdoor activities, such as cycling, into the context of the car. And will be focused around an intermediate level of intensity during physical exercise.



Design Brief

The storyboard and user journeys helped to understand the future scenario in greater depth and what functions the vehicle preferably should have. From here the following list of attributes were create.

Vehicles Attributes:
· Single Seater
· Light weight
· Storage area
· Autonomous drive level 5
· Compact battery pack (due to lane charging)
· Hub-engines

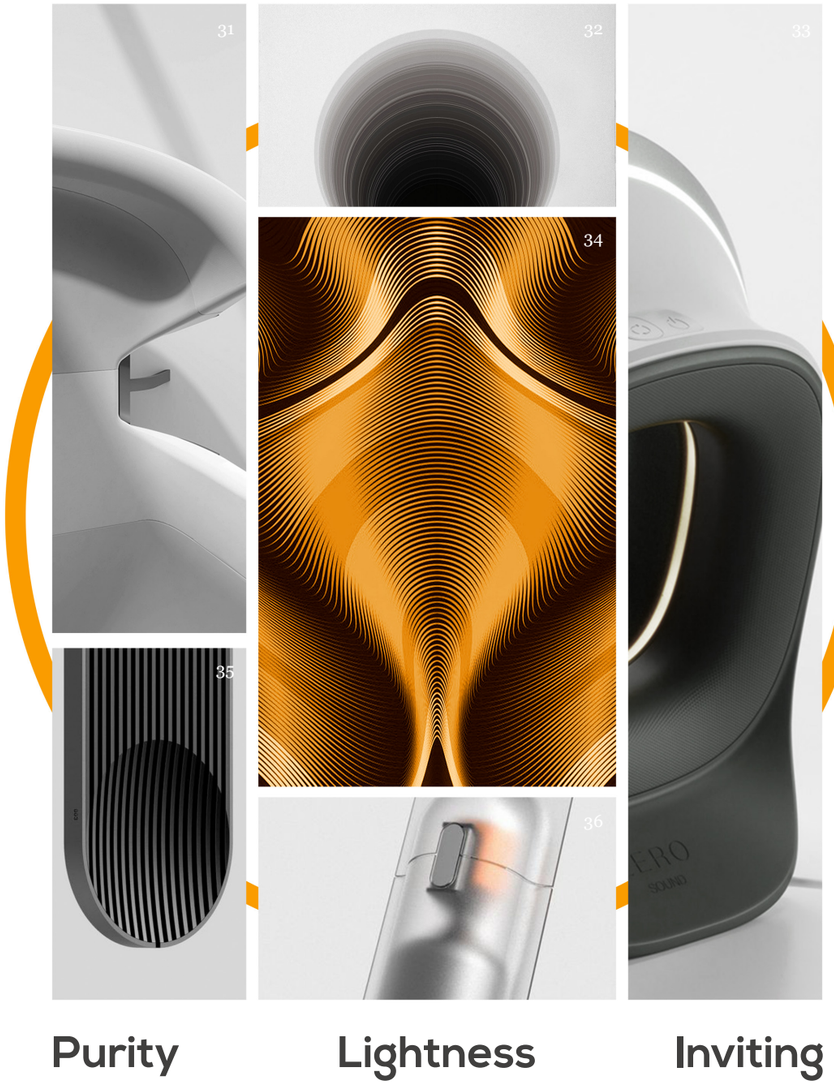
Seat Attributes:
· Extendable in length, to accommodate for different people
· Body Mode: Allow for physical movement
· Mind Mode: Revive and brain exercising
· Local cooling and heating
· Easy to clean

Material Attributes:
· Lightweight
· Breathable
· (Self-) Cleanable
· Recyclable

What if mixed reality is used in an autonomously driven context, in order to create an experience which would activate and exercise the body and mind alike?

Inspiration

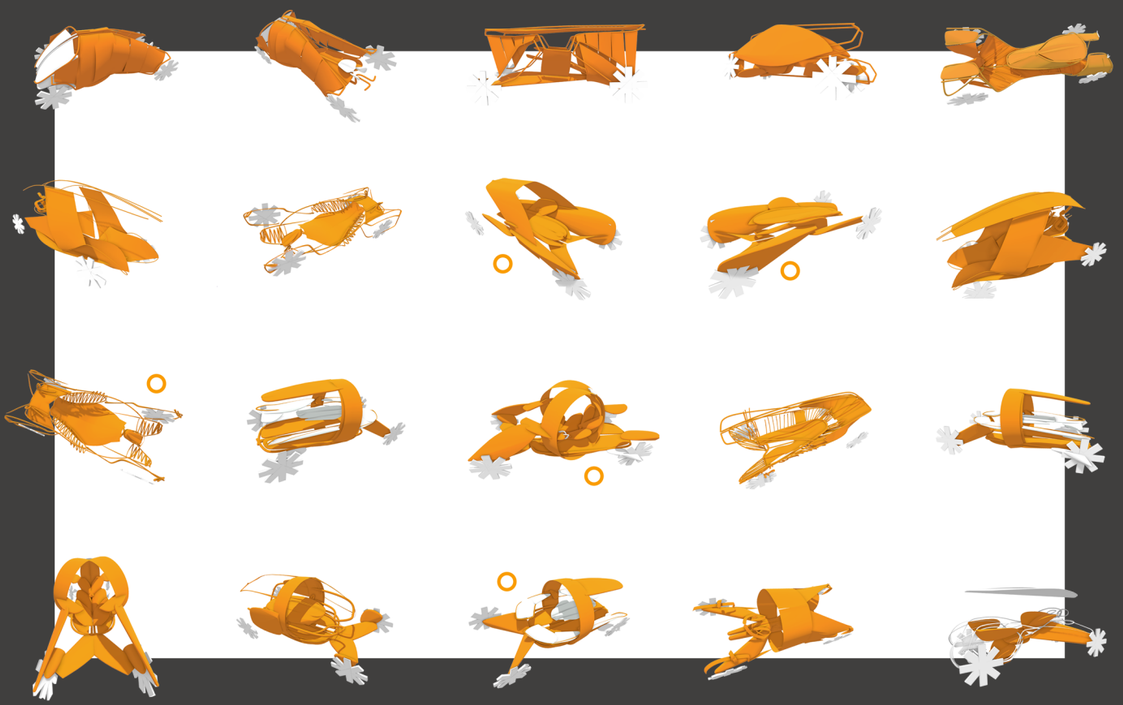
Moodboard



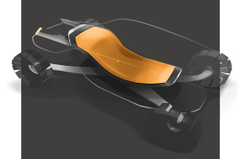
Ideation

Initial Sketches

The ideation took its starting point by sketching several 2 min. doodles in VR software, *Gravity Sketch*. Since the concept is partly about physical movement, the intention was to implement this physicality in the early stages of the ideation. As well as a way to generate unexpected ideas and shapes. Five doodles were afterwards selected and through classic pen-and-paper sketching developed into 5 different concepts. (See next spread) The concepts were afterwards evaluated against the design brief in a matrix. Here the rotating, hanging seat structure was selected, as it would allow for both the mind and body mode to happen in one unite.



1



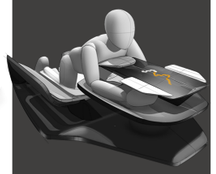
\+

· Spartan
· Lightweight

÷

· Limited comfort

2



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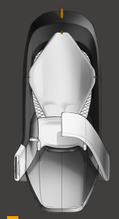
· Spacious

÷

· Limited body engagement

3



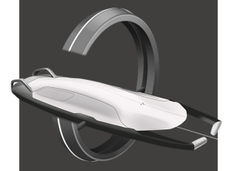
\+

· 2 zones
· Rotating interior

÷

· Small interior space despite large size

4



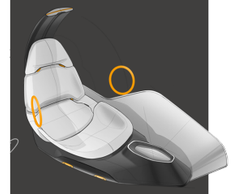
\+

· 2 seats in 1
· Simple
· Lightweight
· Full body engagement

÷

· Exit vehicle to change seating position

5

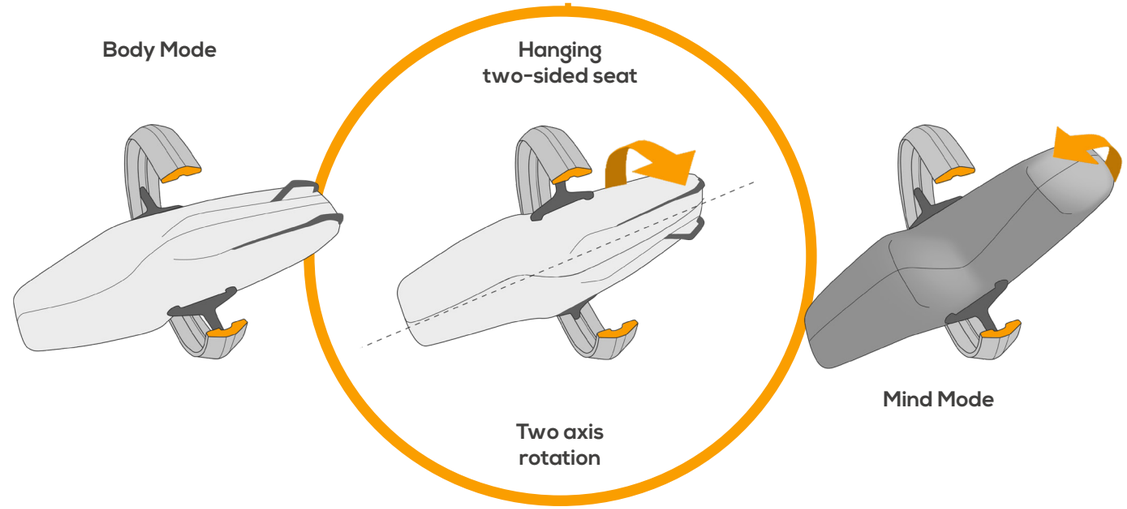


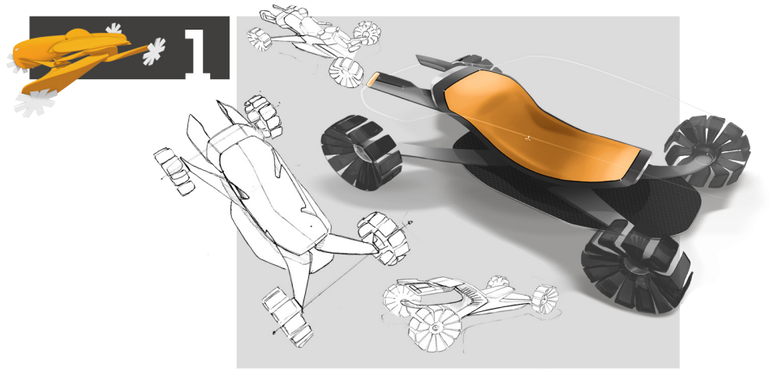
\+

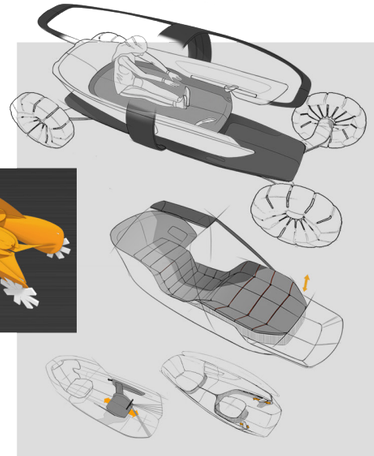
· Potentially compact
· Full body engagement

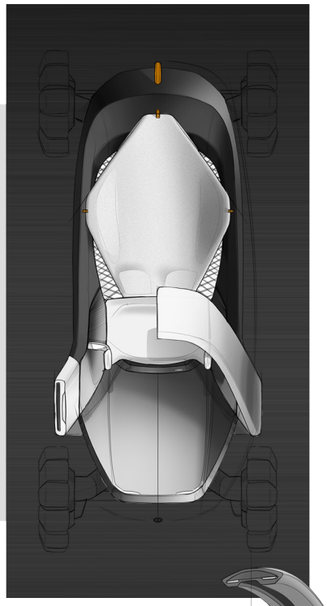
÷

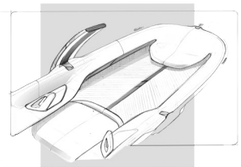
· Constant curvature in seat

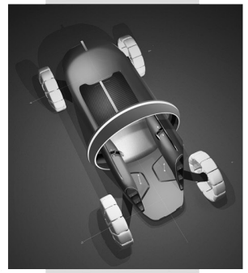


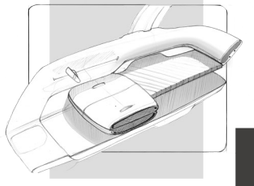


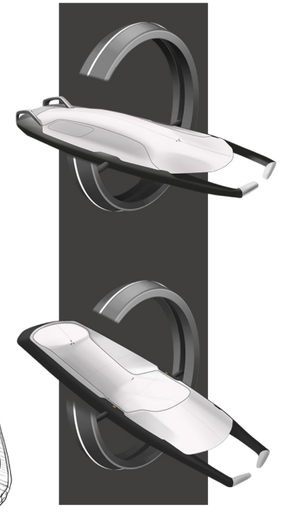


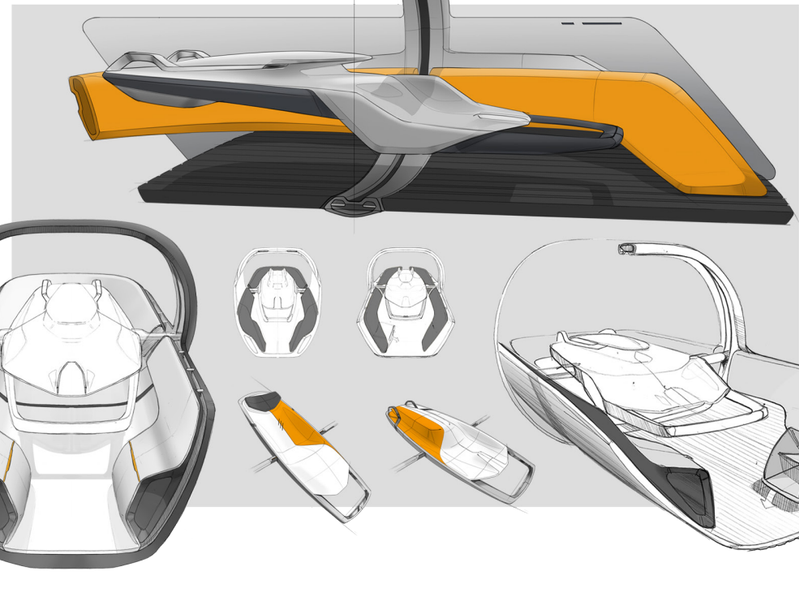






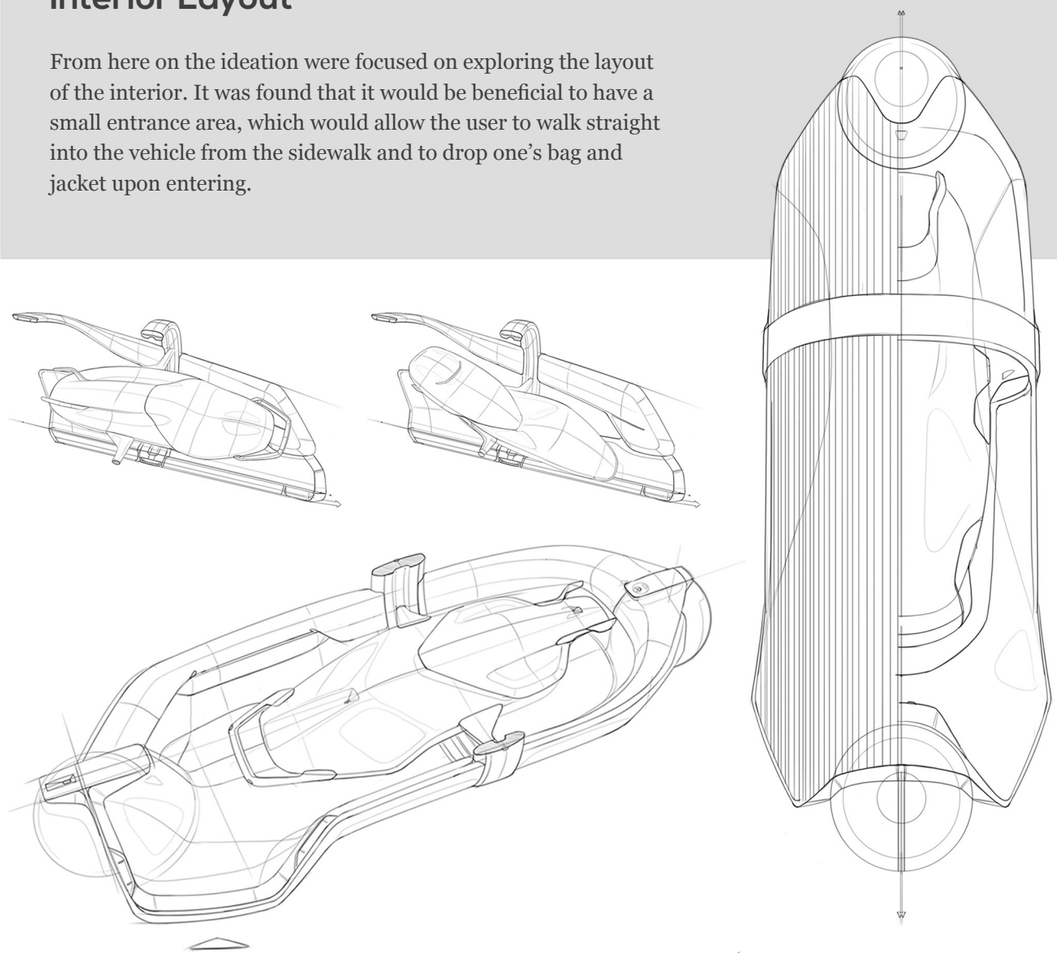




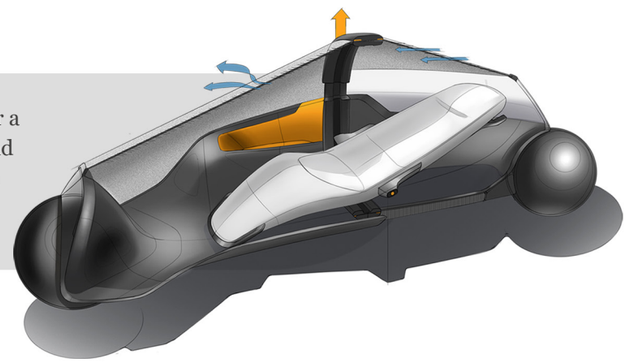


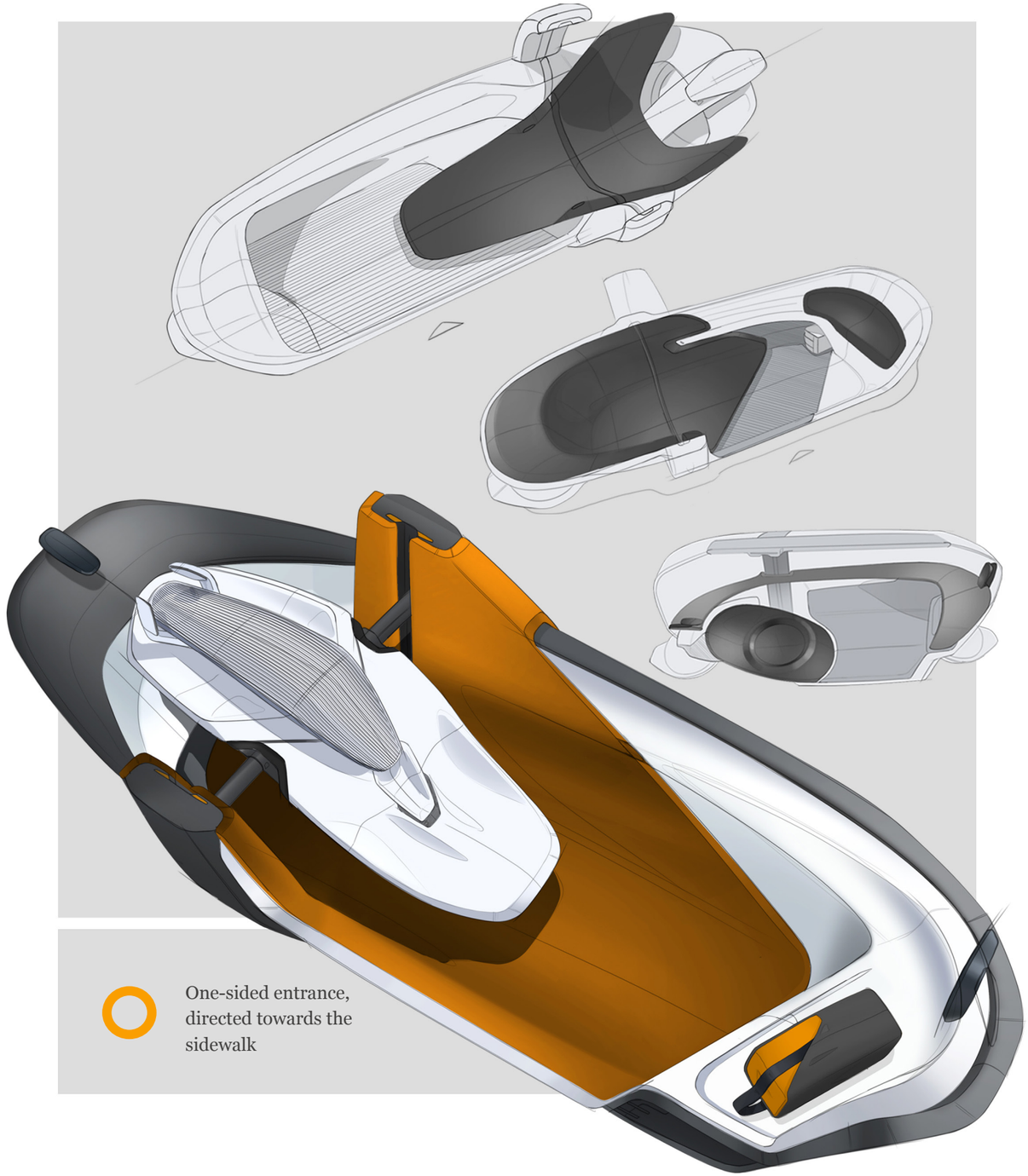
Interior Layout

From here on the ideation were focused on exploring the layout of the interior. It was found that it would be beneficial to have a small entrance area, which would allow the user to walk straight into the vehicle from the sidewalk and to drop one's bag and jacket upon entering.



360° Wheels for a slim package and agile navigation



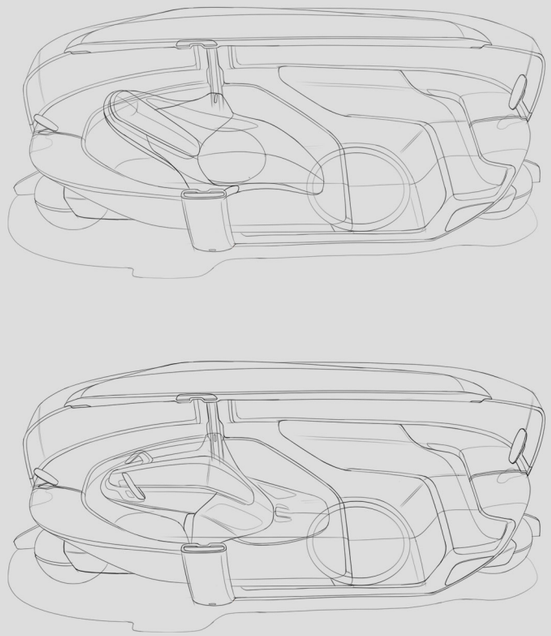


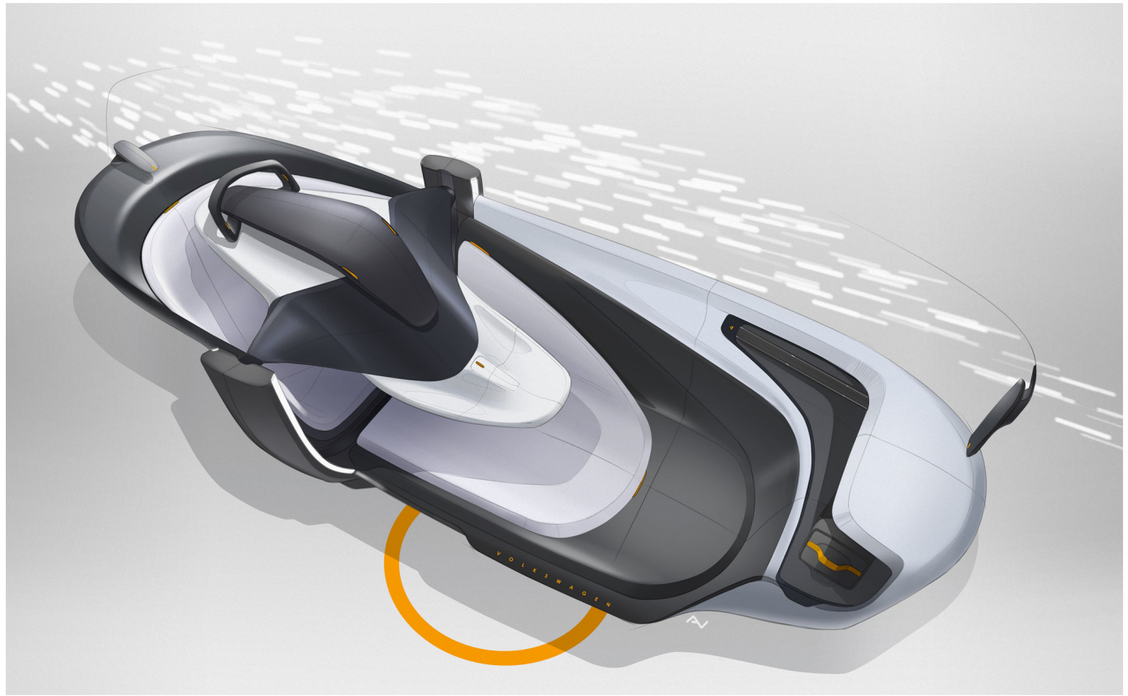
One-sided entrance, directed towards the sidewalk

Design Heritage

Throughout the ideation phase the aim was to implement a clear linkage to the Volkswagen design heritage, by putting emphasis on pure, rounded and sometimes geometric shapes, always rooted in the needs of the user.

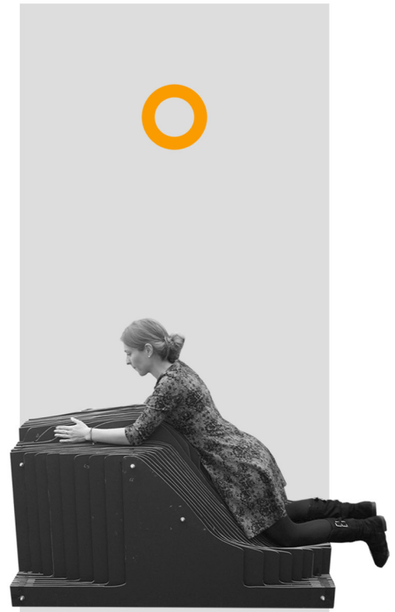
By dividing the entrance and seating area both in shape and material, the focus of these sketches were to find the right balance between practical concerns, such as it being easy to clean. And a feeling of the interior, as appearing inviting and friendly to enter.

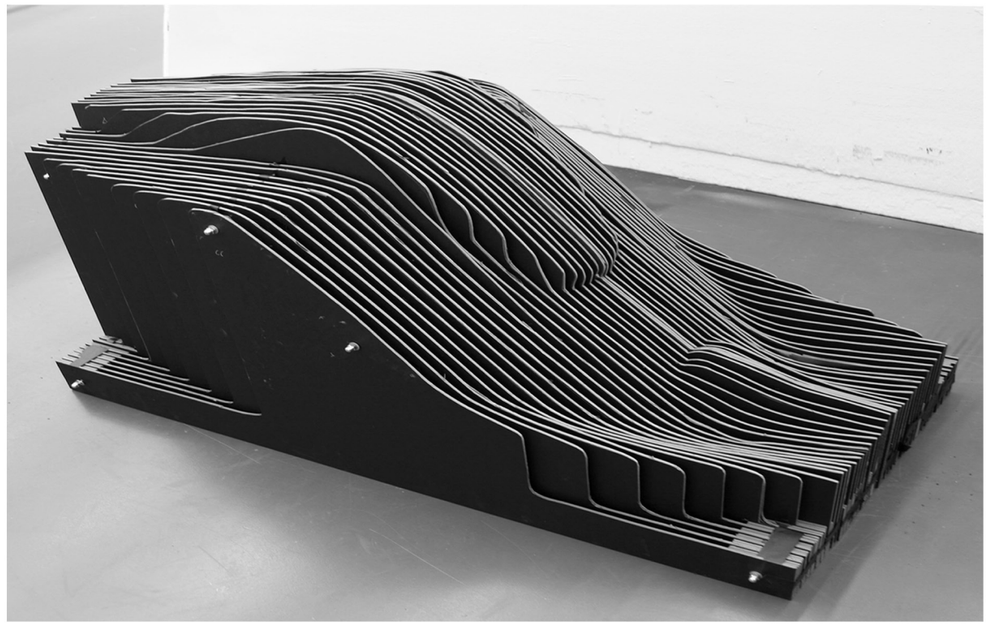


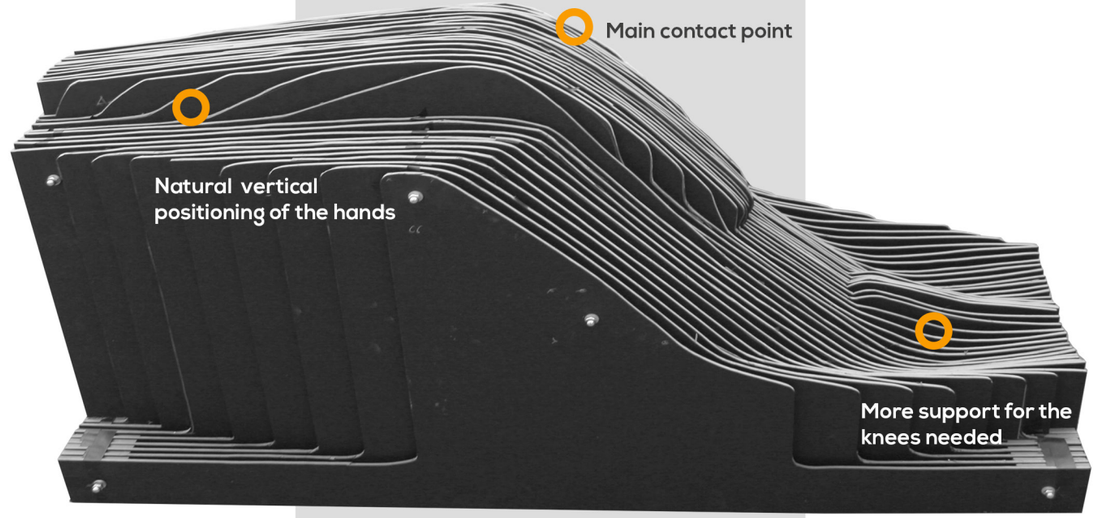


Seat Mock-Up

A full size section model was build in cardboard in order to evaluate the laying position of the body-mode side of the seat. It was found that the position felt engaging and comfortable as intended, as well as easy to enter. Additionally, a need for it to be height adjustable was raised, in order to accommodate for different people's heights.

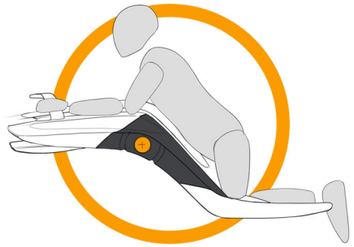


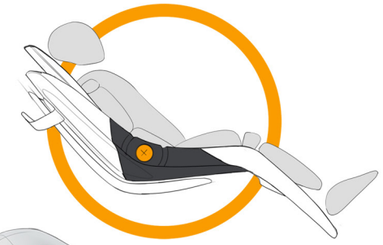




Seat Ideation

During the development on the two sides of the rotating seat, the focus was to explore how the seat could visually communicate the contrast between the two different purposes and functions, while at the same time belonging to the same overall design language.

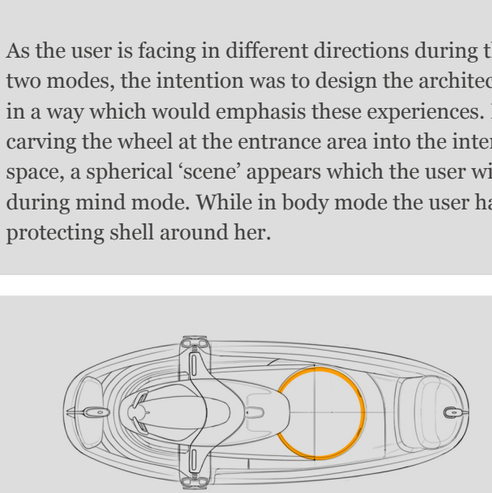


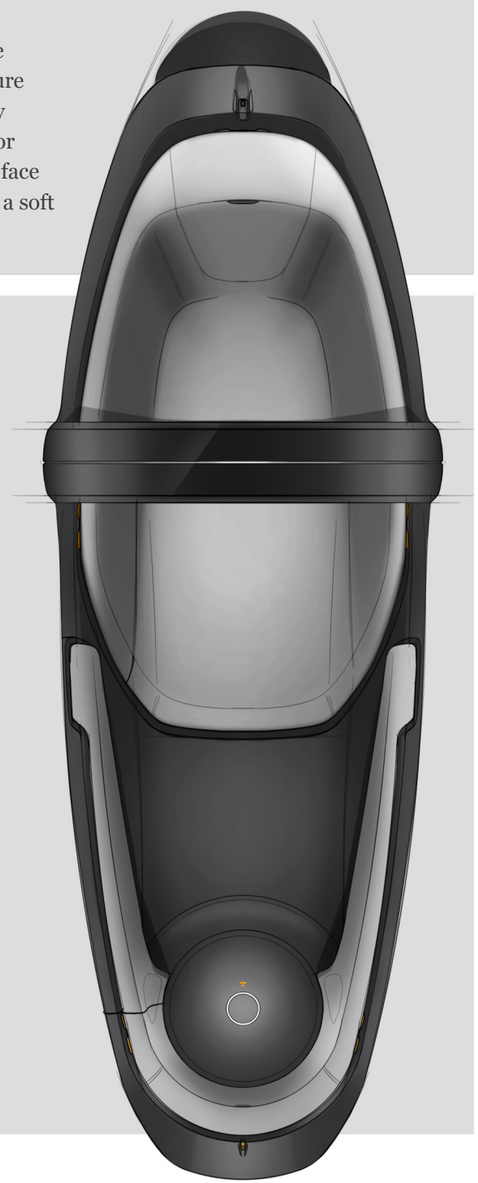


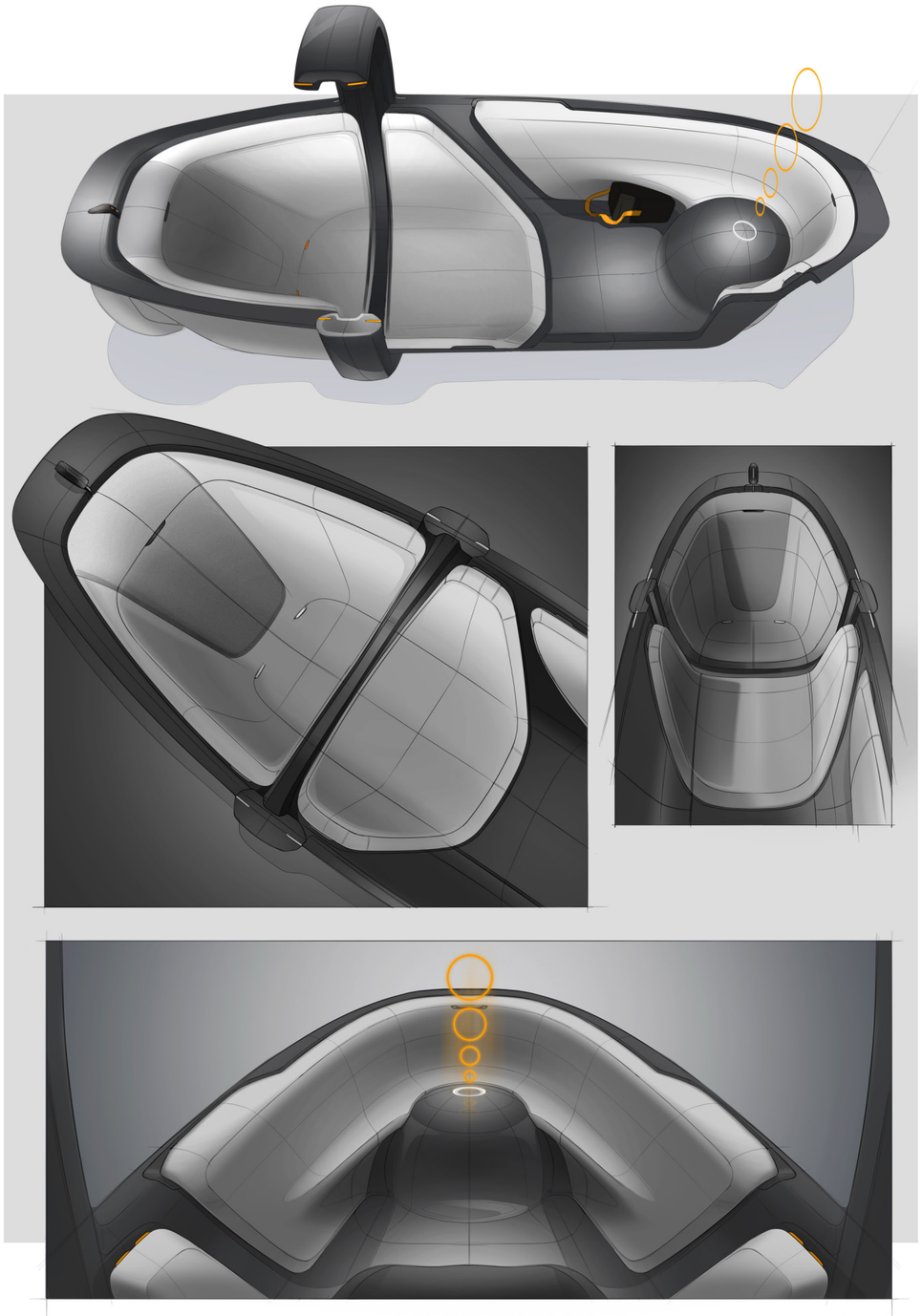
Building from the findings from the mock-up model, the extendable function of the seat, became a visual element, in the shape of a band, which connects the two sides of the seat. The body side is with its lean forward, motorcycle inspired tank-shape meant to be engaging. The mind seat, on the other side, is with its limited visual elements, mean to be laid-back and calming.

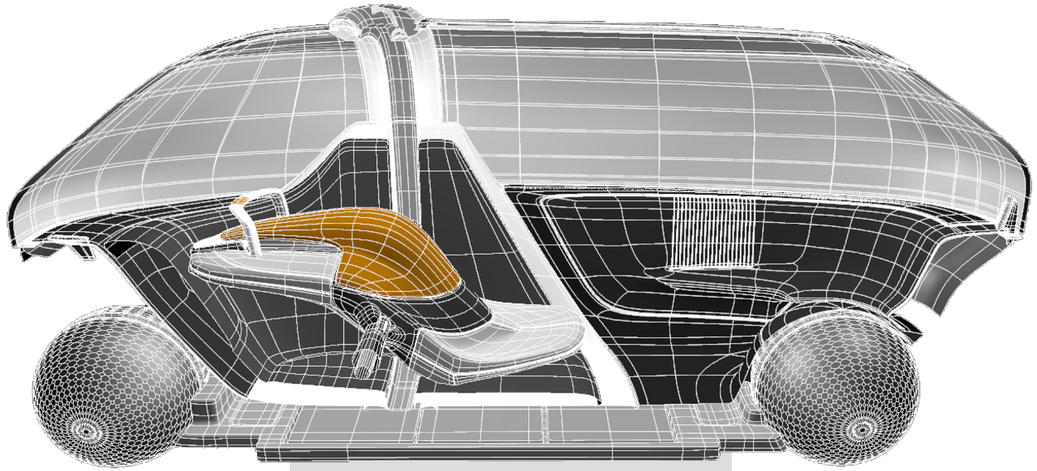
Architecture Refinement

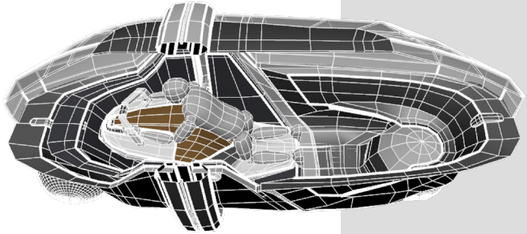
As the user is facing in different directions during the two modes, the intention was to design the architecture in a way which would emphasis these experiences. By carving the wheel at the entrance area into the interior space, a spherical ‘scene’ appears which the user will face during mind mode. While in body mode the user has a soft protecting shell around her.

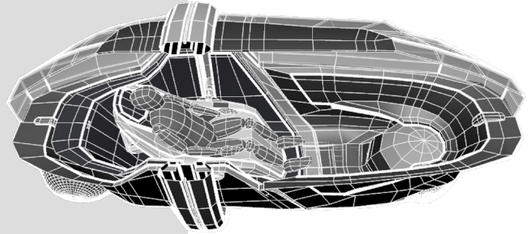










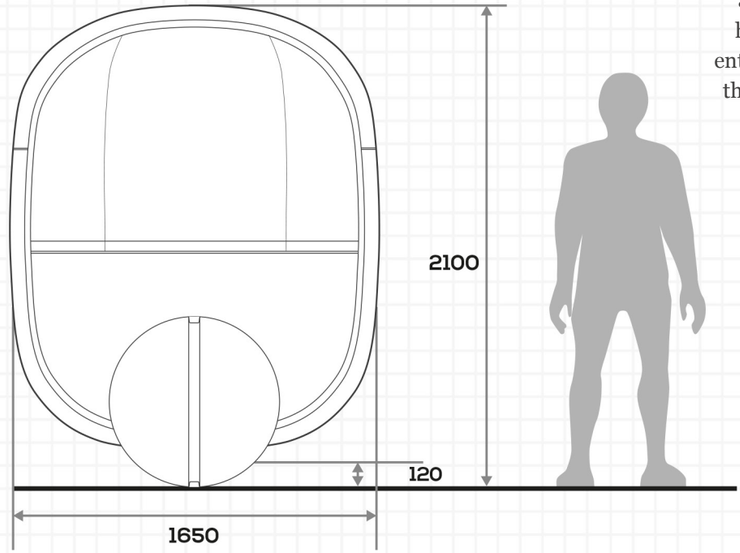


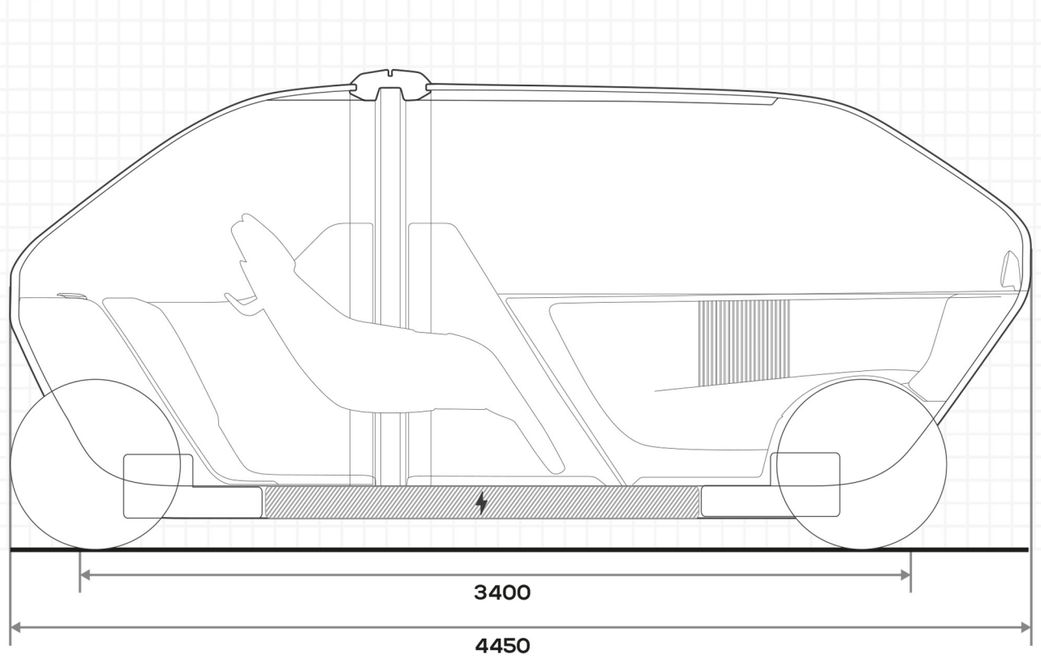
CAD Modelling

Throughout the ideation phase several digital models were developed based on the key sketches. This was done to ensure that the space was matching the human proportions. As wells as to confirm, that the rotating parts would be able to move as intended. Illustrated here are some of the later iterations of the design process, modelled in the software Maya.

Package

The final package was adjusted to fit a standing person inside (180cm in height). This was done to make the entrance more convenient and to give the interior a spacious feeling, which allows for movement to happen.



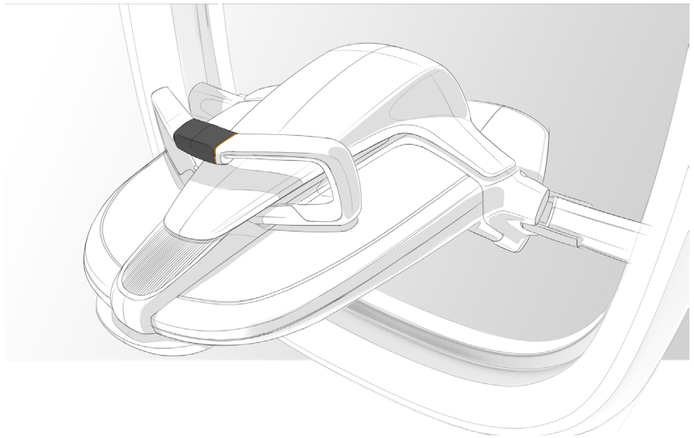


Results

(((O)))

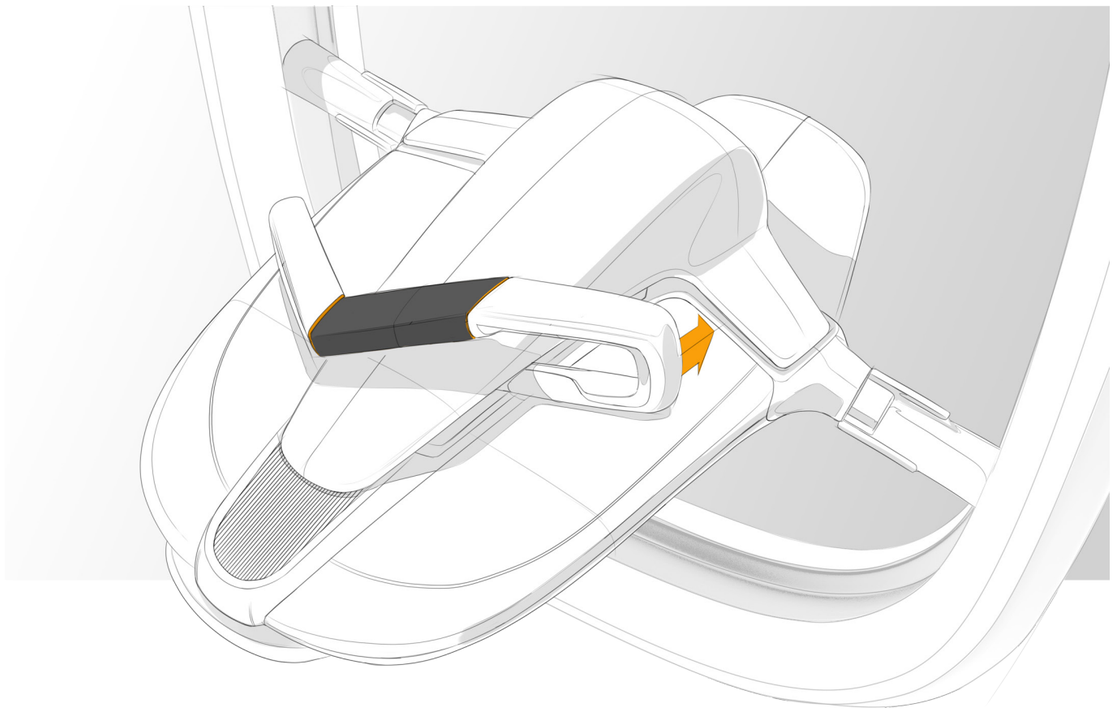
The result is an active mobility vehicle concept called, *((((O))))*, which allows its users to spent their transport time in an more engaging way. Through two modes the user can decide to exercise body or mind while being transported. This is done by the usage of mixed realities which connects and relates to the passing surrounds.

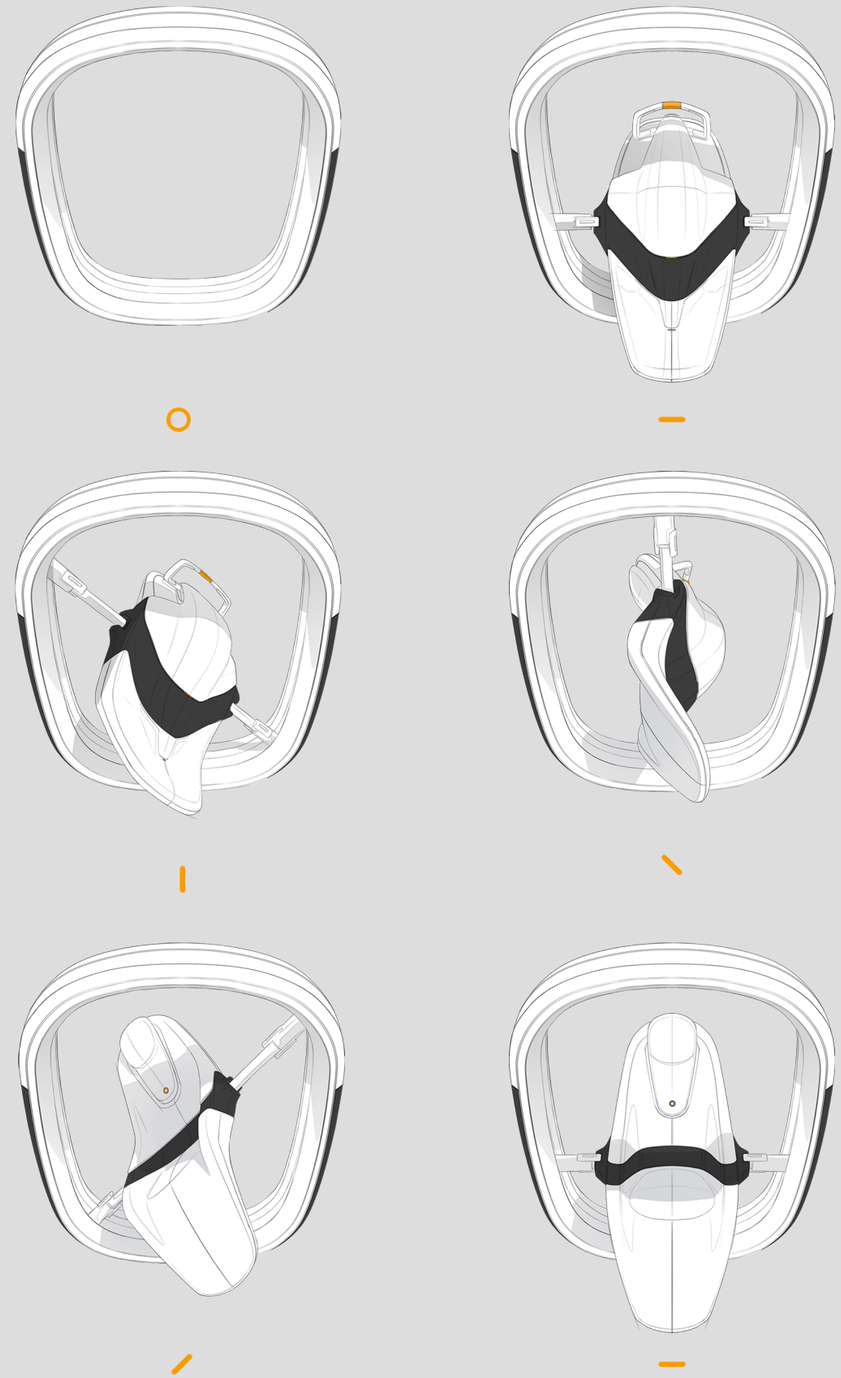
Entering a virtual landscape



Body Mode

In the body mode the user lies on top of the seat. The handles can be pulled in order to rotate the seat from side to side. Furthermore the users can use their balance to tilt slightly forward and backwards, in order to engage with the virtual content in their vision. The virtual world is linked to the real life surrounds, so that g-forces are felt throughout the journey.





The seat is equipped with telescopic arms, which allows it to rotate in the framework's rails

Push/Pull - handles
with haptic feedback

Local cooling & heating

Height adjustable

BODY

Height adjustable
head rest

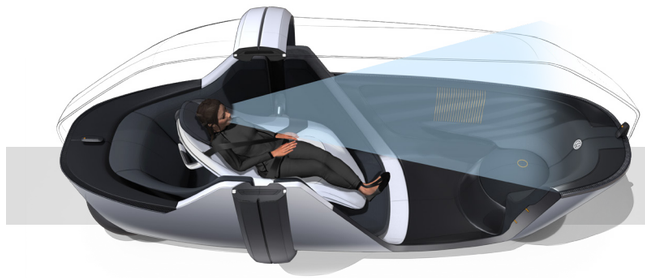
Stretchable area

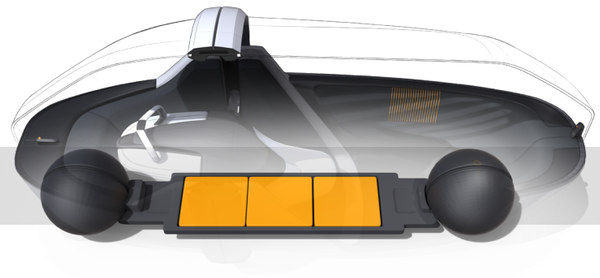
Motion Sensor

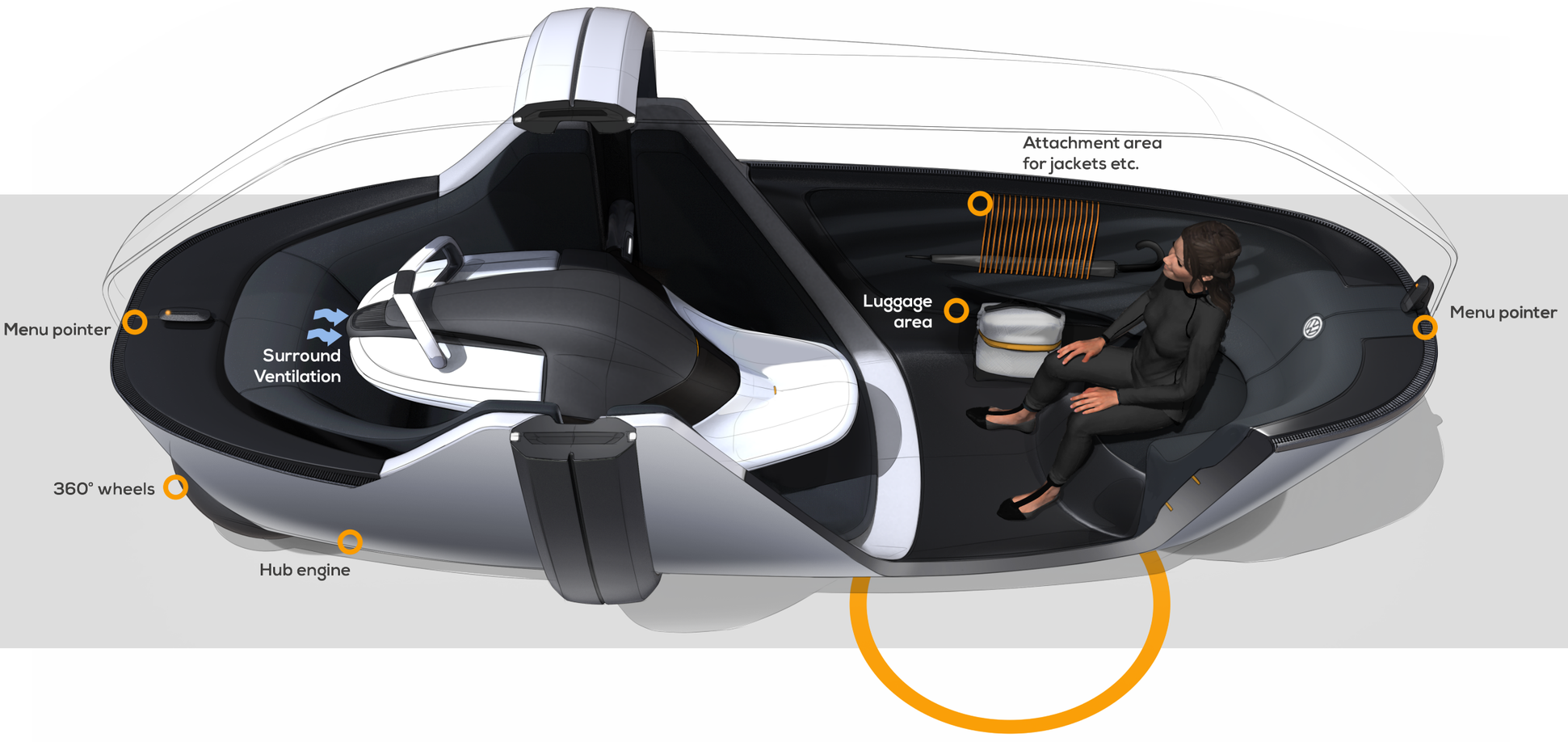
MIND

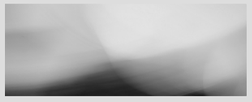
Mind Mode

The mind mode allows the users to exercise their brain through different challenges with different degrees of intensity. From mnemonic games, which strengthens the users ability to memorise complex information, to recreational activities such as creating virtual sculptures out of visual elements from the passing surroundings.

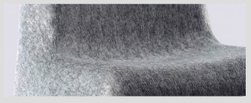








Switchable Glass



Recycled Plastic

Breathable
bio-hybrid fabric

Conclusion

Reflection

Throughout the creation of this thesis several insights and learnings have been gained.

The initial VR-doodling, turned out to be a good way to loosen up on the usual way of sketching. The three dimensions of the sketches made it easier to get ideas on how things could connect to each other. On the other hand, the three-dimensions ironically also made it easier to loose a sense of scale and proportions, since everything were constantly scaled up and down within the software.

The hand made section model in cardboard turned out to be worth the effort, as it gave valuable insights into the proportioning of the seat. While the more traditional design development through hand sketching and CAD modelling constitute the spine of the project.

It is the author's believe that the creative process benefited from being approached through these different sets of mediums and tools in order to advance the design. An approach which normally might be neglected in the rush for getting to a final, working result. It is therefore this author's hope to keep investigating frameworks (like the VR time-limited doodles, which only partly generated something unexpected) where the outcome only to a certain extent can be predicted before hand. This could potentially be a way to break monotonous work routines and hopefully also to achieve original results.

Working on a thesis project in a big studio like Volkswagen's, can feel like working in your own bubble sometimes. In addition to setting up feedback sessions within this author's team, it also became evident that printing and hanging up of one's sketches were a good way to get spontaneous feedback from a lot of different designers passing by. To pin-point the meaningful feedback, which made sense for one's project, became another great exercise, from working directly in the industry.

The final design suggests a radically different type of vehicle and how Volkswagen could position themselves in a future mobility landscape.
To propose a vehicle which allows for physical and mental exercising to happen is opening up for a new spectrum of purpose specific transportation. Ideally this could lead to more meaningful and including transport for everyone.

Besides that the focus and nature of this thesis mainly has been on creating and pointing towards the potential positive impacts of creating an active way of being transported, it is not to be neglected that there may also be certain downsides. The proposed design itself doesn't solve the problem of infrastructure taking up much of the city area. Even though an autonomous subscription-based vehicle system could potentially, drastically reduce the number of cars needed, as these could be driving none-stop, without ever having to park in the city.

If it is desirable to implement the usage of virtual reality technologies into a wider range of our lives, is another question this project arises. The usage of virtual realities makes parallel realities possible, which can be said to be equally frightening and exciting, depending on one's point of view. From working with it as a key element in this project, it has become clear to the this author, that the opportunities within the medium are potentially endless, and that it is very much the intention behind its usage which makes the difference.

The main goals and wishes set at the beginning of the project can hereby, to a large extend, said to be achieved. This was possible due to a tight, yet realistic time scheduled. Only would the author have liked to be able to go more into depth with the exterior and interface parts of the experience. But due to the time-constraints, the design and communication of the interior-focused core of the project had to have first priority throughout the project.

Lastly, it has been made clear to this author, that designing for the future is as much about imagining the context in which the design exists.
During the initial phase, where the researched topics were condensed into a believable concept, it became stressed how complex mobility systems are. Setting up the scenario became a balance act, which aimed to hit within an area, that was both believable and complex, yet still simplified and framed enough, for it to be used as a starting point for a design with a clear purpose and message. Shaping a future context, as in the case with this thesis, therefore often comes down to personal beliefs and which validated research one wants to point towards.

The role of the designer, in this case, becomes to envision futures in which one would like to live , and subsequently design something that belongs to that future; hoping that the context will somehow follow and 'grow' around it.
Thus the value of design lies within converting abstract ideas about how the future could be and turn them into fictional yet tangible objects and experiences. This allows them to be questioned and evaluated, before they potentially become reality and in one way or another influence the world around us.

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Image 6: https://unsplash.com/photos/xKakOOJ04ZM
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Appendix

Budget

Physical Scale Model	Sponsored by VW
Model Shipping to Umeå (est.)	45€
Poster print (Est.)	100 €
Travel Expenses:	
Train: Denmark – Wolfsburg	41 €
Thesis Kick-Off:	
Train: Wolfsburg-Berlin	40 €
Plane: Berlin - Umeå	337 €
Mid-review:	
Train: Wolfsburg - Berlin	42 €
Plane: Berlin – Umeå	167 €
Delayed plane = Overnight stay in Berlin (Hotel and new train ticket)	102 €
Examination:	
Train: Wolfsburg – Berlin (Return)	40 €
Plane: Berlin – Umeå (Return)	240 €
AirBnB, 4 nights:	135 €
Degree Show:	
Train: Wolfsburg – Berlin (One-way)	20 €
Plane: Berlin – Umeå (One-Way)	200 €
Total:	1509 €

Time Schedule

WEEKS	4	5	6	7	8	9	10	11	12	13
	FEB					MAR				
DAYS ▼										
MO	Project Kick-Off 21	28 Additional Research	04 Storyboard Sketching Inspiration Moodboard	11 Sketching Package modeling	Research Review 16 Skype	25 Tutoring Sketching VR Sketching	04 THEME SELECTION	Prepare 11 Midreview Presentation	18 Sketching Details CAD Modelling	25 Digital Modeling
TU	Project Kick-Off 22 Tutoring	29 Tutoring Additional Research	05 Storyboard Sketching Inspiration Moodboard	12 Tutoring Sketching Package modeling	19 Moodboard & Theme development	26 Tutoring Sketching	05 Photoshop sketch renders Maya Model	Prepare 12 Midreview Presentation	Feedback 19 from VW Team Select Deliverables	26 Tutoring Digital Modeling
WE	Project Kick-Off 23 Research	30 Additional Research Inspiration Moodboard	06 Storyboard Sketching Inspiration Moodboard	13 Sketching Package modeling	20 Sketching VR Sketching	27 Sketching	06 Photoshop sketch renders Maya Model	Flying 13 to Umeå	20 Design Selection	27 Tutoring Digital Modeling
TH	Project Kick-off 24 Research	31 Storyboard Inspiration Moodboard	07 Research Done Potential feedback from VW	14 Sketching Package modeling	21 Sketching VR Sketching	28 Sketching	07 Photoshop sketch renders Maya Model	Mid-Review 14 DESIGN FREEZE	21 Sketching Details CAD Modelling	28 Digital Modeling
FR	Project Kick-off 25 Research	01 Storyboard Inspiration Moodboard	08 Sketching Package modeling	15 Sketching Package modeling	22 Sketching VR Sketching	01 Sketching	08 Photoshop sketch renders Maya Model	Mid-Review 15 DESIGN FREEZE	22 Sketching Details CAD Modelling	29 Digital Modeling
SA	26 Research	02 Storyboard Inspiration Moodboard	09 Sketching Package modeling	16 Sketching Package modeling	23 Sketching VR Sketching	02 Sketching	09 Photoshop sketch renders Maya Model	16	23 Sketching Details CAD Modelling	30 Digital Modeling
SU	Flying 27 to Wolfs-burg	03 Storyboard Inspiration Moodboard Report Writing	10 Report Writing	17 Finalizing presentation Report Writing	24 Report Writing	03 Sketching Report Writing	Photoshop 10 sketch renders Report Writing	Flying 17 to Wolfsburg	24 Sketching Details CAD Modelling Report Writing	31 Digital Modeling Report Writing

WEEKS	14	15	16	17	18	19	20	21	22	23
	APR				MAY				JUN	
DAYS ▼										
MO	01 Digital Modeling	08 Prepare for physical model	Design 15 Visuals Physical Model	Design 22 Visuals Animation Physical Model	29 Tutoring	Submit 06 Degree Report 12:00	EXAMINA-13 TION	Design 20 Visuals Animation	Going to 27 Umeå	Degree 03 Show Prep. Setup Exhibition
TU	02 Digital Modeling	09 Prepare for physical model	Design 16 Visuals Physical Model	Design 23 Visuals Animation Physical Model	30 Tutoring	07 Prepare exam presentation	EXAMINA-14 TION	Design 21 Visuals Animation	Degree 28 Show Prep. Prepare posters	DEGREE 04 SHOW
WE	03 Digital Modeling	10 Prepare for physical model	17 Tutoring	Design 24 Visuals Animation Physical Model	01 Design Visuals Animation	08 Prepare exam presentation	Going to 15 Wolfsburg	22 Internal Final Presentation VW	Degree 29 Show Prep. Prepare posters	DEGREE 05 SHOW
TH	04 Digital Modeling	Process 11 Gateway Skype	18 Tutoring	Design 25 Visuals Animation Physical Model	02 Design Visuals Animation	09 Tutoring	Design 16 Visuals Animation Physical Model	Design 23 Visuals	Degree 30 Show Prep. BANK HOLIDAY	06 Graduation Dinner
FR	05 Digital Modeling	Process 12 Gateway Skype	Design 19 Visuals Physical Model	Design 26 Visuals Animation Physical Model	03 Finalize Report Writing	10 Prepare exam presentation	Physical 17 Model DONE	Design 24 Visuals	Degree 31 Show Prep. Print Poster	07 Evaluation Setup Public Exhibition
SA	06 Digital Modeling	13 Prepare for physical model	Design 20 Visuals Physical Model	Design 27 Visuals Animation Physical Model	04 Finalize Report Writing	Going to 11 Umeå	Design 18 Visuals Animation	Design 25 Visuals	Degree 01 Show Prep.	08
SU	07 Report Writing	14 Report Writing	21 Report Writing	28 Report Writing	05 Finalize Report Writing	Prepare 12 exam presentation	Design 19 Visuals Animation	ANIMATION 20 DONE	Degree 02 Show Prep.	09 Take down exhibition

SCHOOL DEADLINE | PERSONAL DEADLINE | AT UID | VW Meeting

TUTORING | MILESTONE | BANK HOLIDAY | KEY DECISION

RESEARCH

CONCEPT IDEATION

SKETCH IDEATION

DEGREE REPORT

DIGITAL MODELLING

DIGITAL MODELLING

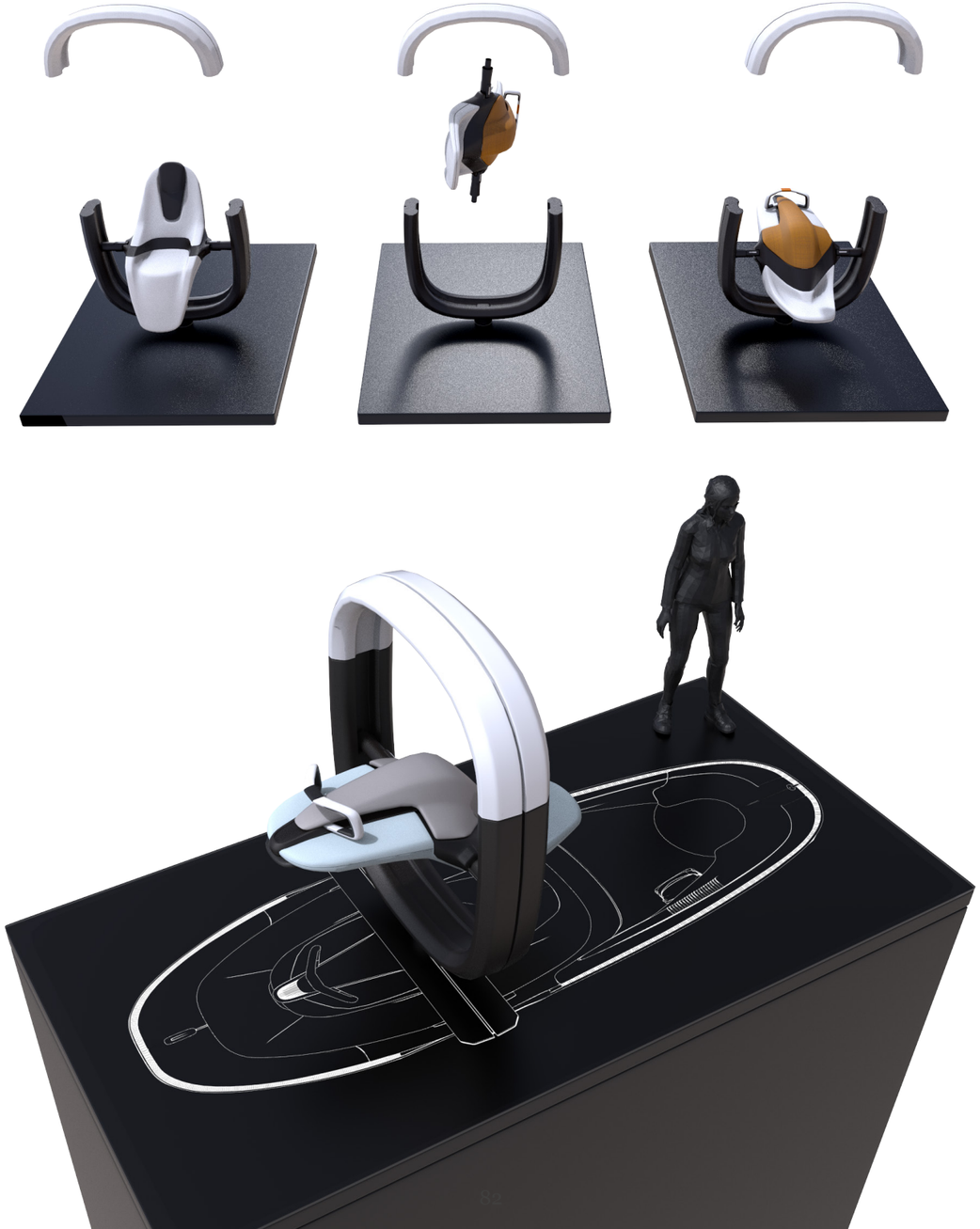
VISUALISATION & ANIMATION

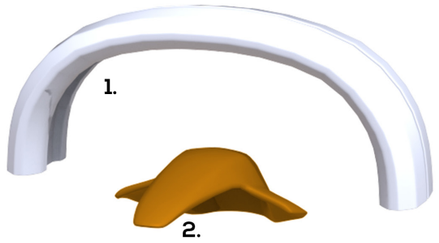
MODEL

UID 19

Seat Model

Scale 1:5
10 Parts including human model





1. Upper Ring.
Matte White

2. Upper Seat Rest
Matte Orange

3. Handle
Metal White Outside
Matte Black Inside

4. Handle Slider
Matte Black

5. Seat softparts.
Matte White

6. Seat Middle Section
Matte Black

7. Head Rest
Matte Dark Blue

8. Seat Arms
Matte Black

9. Ring Lower Part
Matte Black

10. Human Manniquin
Matte Black