The Joy of Riding

Fredrik Aaro
This Master Thesis from Umeå Institute of Design is setting up and exploring a future city where driving has been made illegal.

In a world only allowing autonomous cars, the thesis aim to give an answer to what the role of a future “sports car” can be.

I detail we’ll be looking at the topics of control of the autonomous car (how can we give the human agency in a situation when she actually isn’t allowed to directly control?) and how the relationship with this smarter future car could look like.

The conclusion is a vision for a future control device. This use of this device is less defined than the steering wheel; allowing the human general control and the ability to give suggestive input on a macro level, whereas the machine has detailed control and make all decisions on a micro level.
Introduction

Reading on changing regions spawned ideas for the location of the city of the project.

The Arctic region is used as a case in this project, because it is in “a flux” (Larsen, 2014) and the potential of its effects are hard to predict, but interesting to speculate. The coming social changes are results of one catalyst: direct environmental impact - rising temperatures. Its effect-span can be ranging from more workers needed in the region due to new shipping lines, or exploitation of “unlocked” natural resources, to growing cities in the northern regions.
"How does a BMW look like in a world where driving is illegal?"

In this project I intend to explore possibilities for autonomous driving, and the relationship we’ll have to our car after we’ve outlawed driving.

I will construct a positive version of the future in a made-up city which has decided to completely ban driving within its limits. This city is a forerunner, and a test bed for future tech and future politics alike. It is relevant for me personally to consider politics and solutions for sustainable living when designing this future city. In some ways the project will - inevitably - be touching on what is called “Critical Design” (Anthony Dunne, 1999) since I have the opportunity to touch on challenges for mobility today by describing how to make maybe make it work tomorrow.

The thesis subject is relevant to BMW since the brand have such a strong foundation in driving and car culture, and because autonomous driving is posing challenges to these historical values. There is strong need to look into future possibilities and the many different directions a brand like BMW can take. My proposal in this speculative scenario is to keep the brand like it is and to make use of what will come instead of being afraid of it.

The BMW in this world still has the role of a premium car focused on delivering a hard core experience for the individual user, family, or group of friends who owns it. I believe that there is an error in the thinking of - many - automotive designers (and petrol heads) when we all tend to assume that driving will be “less fun” in an autonomous car. The danger with such a viewpoint is that we - as a profession - might overlook valuable insights and cool opportunities when we stubbornly strive to conserve old values. Hence I propose what I call “Active Riding” - a future BMW system that can bring the new possibilities, that comes with the autonomous vehicle, to the driver.

Instead of approaching autonomy as a problem - like trying to “lessen the blow” for the enthusiast - I will look at this new context - created by the outlawing of driving - as a possibility for an even closer relationship between humans and machines than what we have today.

My idea is to focus heavily on storytelling in my research to simulate the future. For example (not set in stone yet) I’ll write short stories, add sound, music and relevant imagery to them, and then use them as basis for ideation: Discussions based on my stories will be of use for me in ideating in the project.

Imagine the driving experience in a world without safety cages and regulations, where fail safe computing allow for incredible speed, seamlessly connected to your thousand kilo best friend who is translating your every move as you together race through the city.

**Presenting the project**

Welcome! My name is Fredrik Aaro and I’m a Swedish Industrial Designer.

At the time of writing this I’m working for BMW Group Design in Munich. On the following pages I’ll present my Master Thesis in Transportation Design at Umeå Institute of Design. I hope you’ll enjoy the read!
Collaboration

The Joy of Riding was planned and performed mostly from BMW Group Design Context & Strategy in Munich, Germany during the winter of 2014 and the spring of 2015.

The initial phase of this research was spent at UID (Umeå Institute of Design) in Umeå, Sweden. During the process, I kept visiting Umeå for a Mid-Review and the final presentation - including the "UID Design Talks". Throughout the process, experts from BMW, teachers and tutors from UID, and close professional friends were providing feedback and constructive criticism.

Software & fonts

Software used in the project:
Photoshop, InDesign, Illustrator, After Effects, HeavyM, Maya, Keyshot, Netfab, Pages

Fonts used in the project:
Bitter, Arvo, Avenir, Sansation

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My supportive parents, friends and very very very patient girlfriend Saskia!
Auto makers should take this cutie seriously. The Google self driving prototype is one in a long line of iterations in its project; posing a threat and a promise for the established players.

Rise of the autos

Autonomous vehicles has been on the horizon ever since we first let a machine do our calculations.

Already in the 30’s, carmakers were predicting future cityscapes with cars that drive themselves, notable is the automated highways of GM’s Futurama-exhibition (and ride) at the world’s fair in New York ‘39. Today the dreams of yesterday feel so real that they’re almost graspable, and a selected few have the opportunity to test or to work on these systems.

The largest difference today from the visions of the past is that back then it was mostly all about grandiose infrastructural solutions, and that we today focus on the challenges of the intelligence of the individual machine instead; the math behind it, and setting up a complex multidisciplinary organisation for solving the puzzles of individual intelligent machines.

Corporations are today solving what we thought governments would tackle yesterday and some say that we have lost the ability to dream as big as we dreamt in the post-war eras (Hieroglyph, 2014), but cheap flying robots are soon delivering packages and already giving us imagery we earlier needed a helicopter and its crew for. Semi-autonomous drone airplanes are an everyday sight in warzones around the world, and tiny smart unmanned gunboats will soon protect military vessels. In large cities fleets of shared cars are rolling out, each with the potential to replace up to 15 normal cars. Having these fleets automated can give us incredible new possibilities ranging from no time to look for parking, to safely being able to take the car home after a night out in the club.

How, and to what extent we will use these vehicles in the future is hard to predict but easy -and fun- to speculate, and considering the interest from societies and businesses alike it looks like we’re just in front of a transportation paradigm. First world countries will be affected to begin with, but as the tech gets cheaper and vehicles might trickle down through second hand markets, others will probably follow. An interesting question to raise: In video gaming, and in other media on demand, we see a more or less dead - or dying - second hand market. Will this be the case for the automotive industry as well? Is the future consisting of only car maker-to-consumer relations, where the big manufacturers directly reach us with services like DriveNow? Will companies like Uber lease a fleet of autos from BMW or Google, and is there still a want for personal ownership?

Looking into the potential gain for society as a whole, there are many cases to be made pro-autos if the solutions follow the theory: We will have a safer road and we will have less parked cars in the city. We will probably need fewer parking spaces per inhabitant. We will be able to drive regardless of handicap or age. We could cram more cars on less space due to more precise driving, and we could have higher speed limits. These are just a few of the possibilities with the autos, possibilities too good to pass.

Auto /ˈɔːtəʊ/ - An autonomous vehicle.
“Let’s hail an auto so we can get home from the concert”
- The German word for car.
“Unsere Beziehung zum Auto wird rationaler”

GM’s “Futurama” in the 1939 World’s Fair envisioned a future with automated highways.

Auto

/nəʊn/

10
There are cases to be made for designers to read more science fiction. Design is a field in which professionals are taught to build believable scenarios by drawing relevant conclusions on trends and context research, and using thin-but-broad over head knowledge in fields like ethnography or anthropology to create fictional users - or “personas”. Writers of quality science fiction are often experts at making something fantastic feel tangible enough to immerse for the reader and suspend his disbelief. Especially those writing close-future sci-fi often have a keen eye for emerging trends and how technology and culture might evolve. These stories can (or could - by designers) often be seen as small scenarios for quickly testing new tech. “...much of my history with foresight for the Canadian government and army has involved using my talents as an SF writer to both filter and refine ideas that come from foresight.” (Schroeder, 2014).

Whereas advanced scientist-futurists like Michio Kaku are experts at picking out emerging future tech based on cutting edge science, the role of the sensitive design-futurist lies in trying to understand the life of the future user so that future design exploration can be made without aiming completely blindly. “Predictions for the future, with a few expectations, have always underestimated the pace of technological progress” (Kaku, 2012). An important part of this project from the beginning was using fiction to set the mood and define the scenario, partly as a tool for conveying the story of the experience being designed; partly because the author wanted to explore futurist methodology; and partly because he got the opportunity to criticise the current state of things when providing an alternative future where dramatic change had occurred.

Using fiction as a method in design is about conveying design or a scenario, or provoking an idea by using a fictional scenario and narrative. In “Design Fiction”, an artefact representing this future is often tested with users to create a “suspension of disbelief” - A state of mind in which the user understands your future and can give you valuable feedback.

“An important part of this project from the beginning was using fiction to set the mood and define the scenario.”

In order to be prepared when things happen, it might be worth exploring not only the most probable scenario but also the more extreme ones.
My inspiration for the scenario used in the thesis actually came from China, which is the country I most think a decision like the one that our city is taking could come from.

The reasons I didn’t want to use China as a basis for speculation is because I’m ignorant about its culture and because I don’t have the funds in the project to travel there and create a more educated understanding or guess. Basing a thesis on pure desktop research about another culture feels borderline disrespectful in my book.

I decided to look closer to home (though Thailand was a very interesting option, and I love the creative future Paolo Bacigalupi is creating in his book “The windup girl”) and instead of choosing obvious Switzerland, where dramatic political change might occur due to their special “direct democracy”, I decided to go for northwestern Europe as a whole since we have very large cities here, we have an advanced understanding of the ecological challenges facing the world, and we’re privileged enough to be able to make sacrifices in order to meet climate goals.

This was when I read an article about the melting arctic and came to think about the possible factors leading out of it (more on this in the chapter “A planet in change”). I have my fictional city being inspired by Paris, London, Copenhagen but with a flair of both southern Europe, immigration from the middle east, and a stronger-than-today wave of trend/fashion/work-immigration from east asia.

There are three reasons for me picking the year 2045 (30 years into the future from now):

- First of all we have the maturity of autonomous vehicles. With a 30 year time span I can be testing some boundaries of imagination without actually breaking them.

- Secondly I believe that our interfaces, and the way we communicate with our machines, can look very different in 30 years from now. I will bring up new technology and our relationship to it throughout the report.

- Thirdly I find it interesting to touch on a time span where the decision-makers of tomorrow might not even be born yet today, and where the ones in charge today will be long retired. Sure, the new people will be raised by the old ones and culture doesn’t shift over night, but they can not avoid to grow up in a new world with new values and parameters no matter how backwards their parents might be.

Musili, the inflatable instrument you play with hugs.
BMW (Bayerische Motoren Werke Aktiengesellschaft) is a car manufacturer with a long and dramatic history.

It started as three separate companies and was designing engines in the early 20th century. Right before the start of the 30’s the company started producing cars and was doing so successfully until the second world war forced a pause on the company for ten years.

After the war they slowly started with motorcycle production and began their car production in Bavaria anew in 1952. After some years of problems and a near-sale to Daimler-Benz, the current owner family Quandt took over and turned the company into what it is today: A global premium car manufacturer, owning licences to produce Mini and Rolls Royce. In the year 2012, BMW produced 1,845,186 cars among it’s 3 brands and sub-brands.

The interior approach of BMW is a driver-centered one.

This is both functional and a clear statement about an honest focus on sport. Crucial instruments and controls are angled towards the driver for easy reach. Horizontal lines and sculpted surfaces are providing width and a focus on dynamics on the inside as well.

For this project, the concept BMW Vision ConnectedDrive was an extra interesting case. The car is designed to showcase interconnectivity between driver-vehicle-world, and the aesthetics are following this vision by ending up in a roadster-package that is both beautiful and promising of a smarter future.

BMW exterior aesthetics can be split in two parts. Talking about proportions: there is a long wheelbase with a short front overhang; a long hood and a low seating position. This has historically been truths in creating a sporty and elegant stance.

When it comes to graphics and signature elements, some might differ, but the “kidney grille” and the “Quad headlights” that make up its face are probably the most characteristic. Another important form element is the “Hofmeister kink”, a bend in the C-pillar, named after former design director Wilhelm Hofmeister. It is both accenting BMW’s historical rear wheel drive, and helping the overall form by providing a more dynamic expression.
The autonomous field

To automate mobility can seem like a fad due to the hysteric focus everyone seems to put on it right now, but for every generation values shift and the car doesn’t mean the same for people growing up today.

One day these new generations will have their own kids who will care even less about the old values that the automotive industry seem to try to protect. Add that the trendsetters of tomorrow will have grown up around autonomous cars, and it’s simple to make the conclusion that they will have even less interest in driving than people have today.

Google has over 1,100,000 kilometers in their autonomous cars at this point in 2015 (700,000 miles). That is a lot of time and a lot of data. They are clearly trying to establish themselves as an important facet of autonomous driving. Their launch of the funny little auto devoid of a steering wheel is a provocation to the other players. Volvo is a small brand, but their restrengthened efforts backed by Chinese money are impressive, and their historic focus on safety makes them powerful in this new context. They promise 100 autonomous cars in Gothenburg by 2017.

Mercedes recently showed their autonomous Lounge-experience “F015”, and Audi are trying to claim a technological, and design consultants like IDEO are showing their vision of a future autonomous eco-system, inspired by infrastructure and architecture rather than by old automotive values.

The question is if the values in our business will last or if we will need to change and adapt to survive? It can look like while all these modern things are going on, BMW Group wants people to do autonomous doughnuts.

Goals and wishes

When I pitched the ideas I had to BMW, I could instantly feel how this was a topic worth looking into. There are many sides to “The Joy of Riding” and I’m partly getting the opportunity to explore a lot of themes and methods that I wanted to try for a while, but I also get the opportunity to sum up my education so far, and to create a project that is representative of my skills and what kind of designer I would like to become.

In the end I want the project to tell the story of a possible global change in driving behaviour. The physical representation of my work could become a somewhat interactive sculpture perhaps using different media alongside modeling to further convey an image of the future and to immerse the audience in my vision.

My wish is that my research phase will be smoothly transitioned into ideation and that the ideation will be naturally connected with my form process. I understand that I have been grasping for a lot but I hope that the result will be inspirational and exciting!
Method

The method of the project has been divided into three chapters: “Research, Context, Ideation” in order to separate things in a more pedagogic way.

This first chapter is summing up parts of the initial desktop research and sorting it into digestible topics relevant to the result.
Quadriplegic Ian Burkhart could clench his fist using technology that is rerouting brain signals.

**(An) Alternative (to) control**

Trying to reinvent the steering wheel is like trying to reinvent the shovel. It’s not impossible but it seems close to perfectly solved already.

This is because the function of steering is so directly linked to the means of input and vice versa. Look at the differences between the steering of a car, a helicopter and an airplane and how logically the means of human input tend to the different needs of the machines. There are not many reasons to reinvent the steering wheel for its current use, but if we will create a new kind of relationship to the car, there is all of a sudden logical reasoning to look at alternatives to the input we take for granted.

Today we use the steering wheel in a very direct way. We perform an action that demands a millimeter-precise reaction from the car because of the potential dangers involved with driving. If the car of tomorrow is driving for us instead, we get the opportunity to interact with it in new ways and the important question is if the perception of being in charge trumps actually being in charge? Or do we create a situation where part of the relationship dynamic with the auto is to hand the perception of control back and forth? Since several years, research is being done on having paralysed people being able to interact with computers with the help of different kinds of neural control, and even if this is at an early stage, we already have consumer games and toys using crude EEG-tech to let us manipulate objects.

Visionary mobility concepts like the Honda CARpet takes future generation of vehicles to mind boggling extremes with ideation that makes sense even tough it is very far out technologically speaking. The autonomous google car doesn’t even have a steering wheel while concepts like the SAAB Prometheus from 1993 challenge the wheel but doesn’t replace it with something better, just something different.

This is a trap to avoid. Benchmarking the concept-field confirms the idea that a concept falls flat unless it’s solving a real problem, attempting to a need or challenging the current standard in an interesting way.

In the Anime-series Evangelion the drivers of enormous semi-organic humanoid war machines are neurologically linked to their machine and have a completely augmented interface.

**The Honda CARpet, an interesting vision of future mobility.**
Nest Labs is a very successful adapter of the “Internet of things”. Co-founded by former Apple-engineers, the company was bought by Google in 2014 for US $3.2 billion.

Computers started as mainframes, each shared by several users. Two decades ago we entered the era of Personal computing, and we are now on the threshold of entering the “Ubiquitous Computing”-paradigm (Weiser 1988).

Ubiquitous computing is the basis of the computing-evolution which we now call “The internet of things” where small and networked processors are spread out in our environment to make products talk to each other. Potentially, they can together make up what we today use single powerful personal computers for. The future network will theoretically be able to communicate and solve problems as shifting clusters of computing power. Having microprocessors and sensors alike being extremely affordable and tiny will allow us to enable completely new ways of interacting with our environment.

Augmented reality is already here, and has been here for a long time.

Augmented reality is very soon a reality for our homes and offices. Google-glass has to be seen in the light of being a prototype (rather than a commercial failure); asking the questions how and why do we want to use it? It has also been the first project to truly bring to light – in the eyes of the public - the social problems with having information and video/photo recording secretly available on demand. Another close example of similar tech is the Oculus rift, but where Glass is putting a layer of information on our reality (annotated reality), Rift is immersing us in virtual realities. The author had the fortune to demo Rift, and it was an experience beyond any regular video game. As tech continues to shrink - several companies are currently exploring ways of enabling augmented reality with contact lenses – and becomes cheaper, we will soon enough be able to leave our current smart phones at home in favour of interacting with the digital world through our own eyes. Hologram technology is another thing coming on stronger and stronger as we want more information, and more interactivity with our information, but that constantly requires larger screens, and they are locked to 2D imagery. Holo tech is expensive and complex today but that is soon to change.

Gamifying everything

The author as “IXDS pre-work talks” in Munich, 18/06/14.

“This augmented reality helmet doesn’t just track where your head is at – it knows where it’s going next.” - Wired UK December 2014 on the Striker II by BAE Systems, a fighter helmet creating a virtual environment for the fighter.
The field of haptic technology is rapidly growing and it will play a larger part in the future, allowing us to interact with each other and with our technology using more senses.

Haptics means interaction via touch. It can both be used to communicate something or to perceive something. Many interesting projects - often in the field of interaction design - are today using solely haptic feedback to communicate something, often to a wearer of a certain device or smart clothing. It can for example be used in shoes or wristbands, silently and tenderly giving you GPS information about your rout without having to look at your smartphone or map; or it can be used in video games to further immerse the user in the experience by giving the user a reaction to her action.

“Smart” materials

“Smart materials” is a buzzword right now and it isn’t strange considering the potential future use for them.

When we talk about smart materials, what we talk about is specially designed materials able to somehow change based on input or stimuli. There are a plethora to look at and the field is growing by the day but a good example is shape-memory materials, alloys and polymers alike.

Shape memory materials are smart materials able to take a predetermined shape when needed to. They are traveling from a temporary or deformed state back to an original one when exposed to a trigger. This is something that can be successfully applied - at least theoretically - to everything from construction to aviation, and in the future we will probably see more of these kinds of materials coupled with other growing technologies.
Reading on changing regions spawned ideas for the location of the city of the project.

The Arctic is used as a case because it is in “a flux” (Larsen, 2014) and the potential of its effects are hard to predict but interesting to speculate. The probable regional social changes are results of one catalyst: direct environmental impact - rising temperatures. Its effect-span can be ranging from more workers needed due to new shipping lines and exploitation of “unlocked” natural resources, to growing cities in the northern regions.

Extraction operations in such extreme environments would probably need a very specialised set of new jobs and a very specialised working force. This coupled with desert spread and increased mass emigration from desert regions could lead to the arctic region becoming a truly desirable place to live in the future, further multiplying the population.

“The potential in the Arctic is very, very significant” - Ben van Beurden, CEO of Royal Dutch Shell.

In an interview with author David Barr Kirtley, the discussion drifted to rising unemployment rates and minimum guaranteed income.

Some thinkers are stating that the current system for economic growth aren’t applicable on a context in which machines and computers are replacing human workforce - if we want the world to be socially sustainable. Sociologist James Hughes is saying: “We are now entering the beginning of an era in which technology has started to destroy employment faster than it creates it” (as cited in Dvorsky, 2014).

A decision on using some form of guaranteed income in the future society of the project was made as the author didn’t see any way that the current system could solve its problem and since it can’t be called a positive future with massive unemployment rates and people being thrown out in the cold as a result. According to Marshall Brain of How Stuff Works, in his article Robotic Nation (Brain, read 21/01/15): “By 2050 or so, it is very likely that over half the jobs in the United States will be held by robots.” We are now used to programs assembling our cars using physical limbs, sifting through the vast internet with complex algorithms, and even assisting us in surgery or driving. We don’t have to dream up completely human-mimicking automatons to imagine a situation where most of what we do will be replaced or heavily assisted. The mines and forests of tomorrow are soon harvested by fleets of specialised machinery supported by few human caretakers. The ocean trade will be run by robot ships, drones will fill the sky, and when the autonomous car is truly here, most driving professional will be without a job. The techno-future is leaving humans - which are used to labor - without purpose, and increased social unrest is sure to follow unless we dress the issue somehow.
The activists at “Occupy Wall Street” in 2011 gathered to protest and lift the topics of - among other things - greed, consumerism, environmentalism and the influence that especially banks were supposed to have on government and economic system.

Defending the idea of man made environmental change is a no-brainer, but somehow it still is controversial in many camps to criticise capitalism’s role in ecological and social sustainability.

Many intellectuals claims that in order to achieve true sustainability, there is a need to disembark somehow from the current western economical system. “Canada, for instance, is a liberal democracy renowned for its internationalism – no wonder, then, that it signed on to the Kyoto treaty, promising to cut its carbon emissions substantially by 2012. But the rising price of oil suddenly made the tar sands of Alberta economically attractive – and since, as NASA climatologist James Hansen pointed out in May, they contain as much as 240 gigatons of carbon... ...that meant Canada’s commitment to Kyoto was nonsense. In December (of 2012), the Canadian government withdrew from the treaty before it faced fines for failing to meet its commitments.” (Mckibben, 2012).

Basically: left to its own device the market might not achieve the environmental goals that the citizens of Earth together has been trying to pin down in the Copenhagen accord 2009.

On the other hand, modern visionaries (or convincing actors, time will tell...) like Elon Musk are trying their hardest to adapt a kind of next gen environmentally friendly capitalism; combining product with better service focus and with a promise that the money you spend will be reinvested into something good. This is the route to go for a company wanting to earn its money from a increasingly concerned generation.

Sustainability vs. the market?

“My Pacific Garbage Patch sits near the surface of the ocean. Dense debris can sink centimeters or even several meters beneath the surface, making the vortex’s area nearly impossible to measure.” - National Graphic Education

(“There was, however, no agreement on how to do this in practical terms.” (UNFCCC)), and the projected environmental impact despite these low-set goals being met is already dramatically high according to leading scientists.

“But the rising price of oil suddenly made the tar sands of Alberta economically attractive”
One situation designed for finding thrill when riding shotgun to a machine is the field of Roller Coaster design.

There is a lot of work in roller coaster design going into sequencing and into creating and breaking patterns (Thompson, 2013). This is because of the human mind’s ability to perceive a group of events as stronger than the sum of their individual parts if there is a carefully orchestrated narrative to the thrill. On reading about this, thoughts were also surfacing considering eventual different persona among the population, and how they might react differently on “thrill”.

In a survey about risky driving behavior (Sarma, 2011) it is clear that young males are overrepresented when it comes to both risk-taking behavior in traffic situations, and in injuries/deaths due to accidents in traffic. They are also the ones most interested in “sporty” cars.

Combine these numbers with studies like “Gender differences in risk assessment” - “The meditational analyses revealed that perceptions of negative consequences and enjoyment significantly partially mediated gender differences in likelihood of engaging in risky behaviors. Judged severity of potential negative consequences was an additional partial mediator of the gender differences in engaging in risky behaviors in the health and gambling domains.” (Harris, 2006) - and an exploration was forming: the idea of a future with more female premium car drivers due to extraction of severe consequences from the driving situation i.e. Smart cars make the context safer so people who aren’t drawn to real danger might find it increasingly interesting.

“...because of the human mind’s ability to perceive a group of events as stronger than the sum of their individual parts”

This was not taking into consideration the social aspects/priorities going into investing a large part of ones personal currency in the car and how males and females tend to differ on that point, but new business models will tend to new kinds of potential customers and already today mobility is being bought and used like a service for more and more people.
Method

Context

The following chapter will describe how the context which the design project takes place in was created.

The first pages are about world building, interviews and how to deal with the previous research. Then key aspects of life in the year 2045 are presented. The chapter ends with a set of conclusions.
Trying to create a believable scenario for the future is a complex task. Since you don’t know when you are right or wrong with your guesses - which is everything it ever can be - it’s extra important to make the guesses as relevant as possible.

There is no final scientific level to reach so what to do is to ask oneself how to achieve the best possible understanding based on the budget/timeframe. The author has always been interested in futurology and has a good understanding of the current trends and thoughts in the field, but to give a bit of extra oomph to what’s being proposed in the project, a decision was made to consult a few experts in the fields of futurism, sci-fi and prototyping, and to use qualitative interviews and discussion to tweak the author’s future scenario.

After the experts were selected and contacted, the interviews were performed via Skype or Telephone. Based on the interviews and reading (in futurology/technology/sci-fi/trendspotting), a far future scenario that made sense for the author could be created.

3 short stories were written directly after the interviews, and made into expressive videos in order to help sum up this part of the research in an emotional package to return to later in the project as a basis for ideation (videos and stories located on the next spread).

“The beauty of these scenarios is that you can explore potentials” - Bettina Schwalm

Building the context

Jonathon Porritt
Jonathon Porritt is an environmentalist and writer. He is one of the founders of “Forum for the future” and has been director of “Friends of the earth” and chair of the UK Sustainable development commission prior to that.

Karl Schroeder
Karl Schroeder is a Canadian Science Fiction writer, specializing in far- and short term speculative scenarios. He is famous for the term “Thalience”, and he has been acknowledged with several awards for his books. He is a consultant in Future Studies to both governments and large organizations.

Bettina Schwalm
Bettina Schwalm is a Stockholm based experience designer, researcher and lecturer who is working - among other things - with prototyping futures.

David Barr Kirtley
David Barr Kirtley is the host of the Geek’s Guide to the Galaxy podcast on Wired.com, for which he’s interviewed well over a hundred guests. He is a fiction writer and a writing teacher.

All interviews are available in the Appendix.
“Steel poles are flickering by on the sides like someone is slashing my peripheral air with a whip. I love the morning commute! We are zig-zagging around the Autos down the highway at an insane pace. The sky is dark, I guess rain is not far away. As I think that thought it starts, no bars held. At this speed my vision becomes a blurry mayhem of water in an instant, so I relax and lean back again to take in the scene as I say “Yo Camille, Something old school and fucking thick!”. I don’t even have time to end with “A banger that woul…” before he starts blasting. Did I say I love the commute? This is the time of the day I enjoy the most. I take the reins again and throw us against the left of the road.

...Leaving the highway in 15 seconds at this pace. All right. Even faster now, 10 seconds and the greenery of the city-outskirts.

5, The foundation of a newly built double-skyscraper.

3, 2, 1. Anticipation.

A breathtaking break. It feels like the air is sucked out of my lungs and time seems to go slower for a while, but I twist to the left and start drifting down the exit as Camille embraces me and tries to keep my body balanced.”

“The constant click of dripping water. It is softly echoing in the great hall, and it’s one small part of this amazing ambience I feel so at home in. A smell of spring forest, wetness, clean air, and organic matter in all stages of life. Fresh, maturing and decaying.

I am working as an on-site biologist for the largest supplier of protein in the country. We own five facilities in this city alone, and the one with my laboratory is reaching three hundred meters down in the ground beneath our most successful vertical garden.

I alter a few parameters in the algae-bed software, stretch my back and close my eyes for a few seconds. I’m taking brought lunch in the sunshine, and after that I need to be thirty floors down for a meeting.

Something is funky in the early stages of our new product line and it has been a hard enough public sale over the years for us to screw up too much. God I hate having to do other people’s work for them... It’s difficult to be annoyed now though. The reheated dumpling dish from yesterday’s reunion dinner, and celebration of the Chinese new year, is the perfect hangover treat, and the weather is warm enough to not even require a jacket.

I wonder if we grew this pork in my building?”

“I’m looking at an old pink facade, or is it closer to being salmon-colored? Why would anyone paint their house in that? It makes me happy though. This house must have been standing on the hill for several hundred years...

Leaves are rustling above me and the air is so fresh after the rain that it makes my stomach jump a little with joy. The roof of the old pink - or salmon - building is reaching towards the sun as the clouds slowly scatter. I never get tired of watching the dance of autonomous topography. Like kittens stretching after a nap.

I request any close-by friend to come and join me for the walk and Sarah will be here in ten minutes. There is a bench in front of the old house, I use my glove to wipe the pearls of water away from the nonstick so I can sit down for a while, a cold tingling, but my hand is as dry as it was before. From this hill I can see the heavy belly of the passing thunderstorm. Man, the colors are epic. It is so deep grey that it’s almost velvet!

On the horizon a vertical garden is unfolding its arms again, and it almost mimics the movement of the stretching solar panel on the old pink house.

Yeah, I’d call it pink.”
In the year 2045, the arctic region has gone through lots of changes. Exploitation of its natural resources has entered a new phase. Newly established new trade routes through the previous polar ice, and jobs in construction and extraction are drawing workers and experts from around the globe. At the same time increased global warming have pushed temperatures up by over one degree, and locally over two degrees. We see super heat waves in parts of southern Europe, and the Sahara has grown. This has led to increased ecological emigration. Mid and northern Europe has grown a lot lately, and is sprouting new mega cities (cities with a population of >10 million in the metropolitan area). With such a rapid growth, fueled by a strong new economy, interesting things are happening. The old city we lived in has to make room for the new and fresh while trying to preserve its ancient culture and architecture.

With the arrival of the Internet, influences from far-away places of the planet grew stronger in the West. Our city is a progressive and ultra-secular place where all kinds of people are respecting each other and living together. Global social media started to slowly homogenize youth culture in the early 2000’s by easily linking trendsetters with the mass. But at the same time, unique creatives has an easier time than ever to reach out with their craft and messages. In the year of 2045, our city is both a melting pot of people and a melting pot of fashion and taste. You see outlandish colors and patterns - the new norm is to find your own expression - the streets smell of food from all around the world, and things look very surreal for a person from 2015.
The transparent society

Gränssnitt is the Swedish word for interface. It basically means “the place where the cut is made”.

Interfaces in the future are not gone but they are more often invisible, and due to Ubiquitous computing, the computer as a physical device is not always present or obvious. Young people are used to seamlessly interacting with their environment, and used to computers predicting their intentions. Being offline and online are terms that are almost lost as the natural state is to live in both worlds at the same time. In our city of 2045 the culture has embraced what we now call “The transparent society” much due to personal augmented reality-devices. Many of us see the world though complex invisible interfaces like smart contact lenses displaying information about everything on demand. What surprised many is that as a result of this, the society became more tolerant and open. Everyone has a skeleton in the closet, be it an embarrassing audition, an old crime, a weirder sexual preference, a drunken stupor or a horrible taste in music. When we couldn’t hide, we had to stop judging.

Sustainable consumption

Our ways of life have shifted towards austerity and quality over quantity.

People still love hand crafted goods and luxury products but most countries have – according to the views of their populations – applied effective green taxes to reduce overly wasteful consumer goods. A lot of the protein we consume comes in the form of lab-grown meet. It’s produced on location and you get exactly the kind of meat marbling you want for a fraction of the price of “real” Kobe. The amount of global cattle has been reduced by a lot already and as the meat labs are quantifying, we will see this continue until only a fraction of the previous animal trade exists. Stronger trends towards local production and consumption were emerging in the early 2000’s but they were just grass roots compared to the situation we have now. The global trade of food is still active but incremental innovation due to political pressure has seen the trade transportation industry reducing their pollution and waste. Owning a car in this future is not considered a bad choice because of positive taxation.
Transportation and mobility in our future city is vastly different to what we people of today are used to.

The foundation for having everyone being easily moved around the city was set over almost two centuries ago with a state funded scaling network of public transport: Subways, Trams and busses have been in use by the city for a long while, and around the turn of the last century bikes were added to the mix. The rulers of the city soon found out that when it comes to “personal public transport”, having it run by independent actors seemed to be the better fit. As car-sharing grew and was made more accessible, the young were the first to say no to private car ownership. When the shared cars became autonomous the use of them quickly exploded, which means more autos on the road, which means an even easier time finding one during peak use hours.

Soon the youth were middle aged and a culture of partial austerity was established without anyone ever really noticing it. Currency is spent on demand, and private ownership of big machinery has drastically shrunk when the status of ownership shrunk, and when we realised how seldom we use certain tools, machines and vehicles. That is not saying that autos are not privately owned, or that there is no status in ownership! Only saying that there is not One desired way of life any more.

All the autos in the city are silently communicating with each other, with the infrastructure and with the architecture. The ballet is conducted by millions of Ubiquitous computers together forming a stronger logical entity. Travel during rush hour is handled by the transportation system with fairness and an invisible queue structure; where better and worse spots can be seamlessly leased or taken, enabling users to spend or gain currency as they choose by basically investing their travel time/speed.

“That is not saying that autos are not privately owned, or that there is no status in ownership! Only saying that there is not One desired way of life any more.”
In 2015, shared cars are a curiosity, something many can't access but also something that is growing fast in selected cities. The sharing economy and car-sharing has many facets, but every one of them, from carpooling, ridesharing and short-term rentals are on the rise.

Vehicle autonomy will take the obstacle of accessing the rented car out of the equation, and when you more or less seamlessly can own a car for a while with only minor planning, car-sharing will drastically rise. The math also shows that you often save money by only renting.

In the future city, most of the travel is being done in shared autos but there is still private ownership for those who can afford it and for those who are prioritising it. Even though other forms of entertainment - and an increased awareness of environmental problems - have stolen some of the demographic away from 'fun cars', there are still people around interested in them; and incremental innovation in material and production, green energy and environmental taxes (helping the local economy) on the cars have given some glamour back to owning one even outside of enthusiast circles.

Conclusions from 2045

- **Cultural sustainability shift** 2015
  - Arctic melting and desert spread
  - Slowly stronger counter movements
  - Cultural sustainability focus
  - Political sustainability focus
  - Sustainable individual mobility 2045

- **Intelligent systems** 2015
  - New relationships to technology 2045

- **Autonomous vehicles** 2015
  - Safe vehicles 2045

What’s stated above will lead to people in 2045 who are:

- Used to autonomous cars
- Used to a constant digital dialogue
- Used to emotional interfaces
- Used to invisible technology
- Used to anticipating technology
If the Context chapter was where the world our car exists in was being built, then this is the chapter where the car is created.

The chapter is starting with initial statements based on conclusions from the context, and from the research. I decided to narrow the project down to how to control the car in the future, and I added two extra interviews because of this. After the extra interviews followed low fidelity testing before creating the final result.
Research in the rate of technological progress show that the level of intelligence in technological systems has for a long while been following an exponential curve.

By 2045 our electronics will in many ways have surpassed ourselves (Kaku 2012) with the possible bottlenecks being the still human-designed software. One scenario for solving this is that computer assisted programming and design might open these bottlenecks, if we find ways to let the systems learn, adapt and decide by itself. For mobility this means that the car and services linked to it - could achieve contextual awareness.

Exponential intelligence

Traffic jams, your movements, your schedule, perspiration, pulse, eye movement measuring, vibration, temporary construction, broken down cars on the road, interacting with your smart clothes, wearables, your digital trail, health data, government data, track record, test results, weather, malfunctioning autos, smart clothes, hormone levels, stress level, DNA, cloud data, emotions, reactions, happiness/anger, focus...

In the last chapter we talked about that the intelligence of our cars [computers] will keep increasing exponentially over the course of the foreseeable future. But what to use it for, and how to use it?

The previously mentioned topic of ubiquitous computing (smaller and better sensors) has already unlocked a lot of new possibilities in computing power and new kinds of data to harvest for our cars, but we are still lacking in use cases. The modern car already has hundreds of sensors, but most of these are there to measure and understand the road and the city. Just as important and meaningful are the possibilities given by looking inwards for data. In 2045 the car can measure things we wouldn’t dream of today - both physiological and neural - unless denied access to it. It is always in awareness of everything going in its interior and everything going on around it.

This means that we have the toolset to create a closer bond with our cars.

An aware auto

Traffic jams, your movements, your schedule, perspiration, pulse, eye movement measuring, vibration, temporary construction, broken down cars on the road, interacting with your smart clothes, wearables, your digital trail, health data, government data, track record, test results, weather, malfunctioning autos, smart clothes, hormone levels, stress level, DNA, cloud data, emotions, reactions, happiness/anger, focus...
What is Active Riding?

Active riding is the name of the system which enables the driving enthusiast to interact with her autonomous BMW in the year 2045.

Active riding works like this: you give driving input to your BMW - like turning the wheel today. This input is then crunched by the brain of the car and seamlessly translated into an action or series of actions which might be thrilling but doesn’t put anyone in danger. This means that you decide where to go and how to go there, but the Auto is in the middle, translating your behaviour into safe action on the road.

This relationship would closer be resembling that of a rider and a horse than that of a driver and a car.

“Am I in control?” - “Yes.”
“But the car is also in control?” - “Yes.”
You and your car are driving together.

You can at any point let go of control, or make a mistake, because the car is already in the loop to catch you when you fall.

“You can at any point let go of control, or make a mistake, because the car is already in the loop to catch you when you fall.”

Thousands of microcomputers and sensors are constantly gathering information about what happens both inside and outside of the cabin. The car is always in conversation with other cars, with the city and with your digital self. In 30 years from now, the computational power of standard components will be dwarfing the best machines today, and the car will be calculating and recalculating possible routes and manoeuvres, opportunities and threats on the go, and it is always redo to deliver on your wishes no matter how crazy, as long as you don’t try to harm yourself or others.

Active riding is manifested in the physical world with a new control method which is emotionally and physically connecting you to your car in a more symbiotic way than today. The steering wheel is today one of the tools most representing ultimate human physical skill; and Active riding is tomorrow representing the evolution of the car and driver, from something that almost feels alive into something that more or less is alive.
**Package**

The package is a 2-seater setup for a single enthusiast with a partner or friend.

Both users are seated far in the front to have them as close to the road and the experience as possible. Two frames run through the car for mounting of equipment, and the front bottom - underneath the dashboard - is transparent. In the back of the car are batteries and a large trunk.

The forward seating position and smaller safety zones are possible because the autonomous cars make the roads in 2045 much safer; this led authorities to start relaxing certain safety regulations in order to enable more lightweight and less energy consuming - cars.

**Interviewing a rider**

Interviewing a colleague at BMW who is interested in riding gave a lot of insight into the relationship between human and horse. So a next step was to approach a professional rider for deeper information.

Mariah Bengtsson (professional horse rider) said: (somewhat altered translation, original in Swedish in the appendix)

“The special thing with riding is to get a 700kg animal to behave in the way you want... ...You need a feel for it, being subtle and refined to get the animal to give everything for you. When you succeed, the feeling is indescribable”

Combined with the previously mentioned colleague’s comments, this idea surfaced: People in 2045 can “sync” with their cars. The system is giving them abstract and emotional feedback on how much in sync with their cars they are at any given moment.

**Conclusion:**

“A tactile bond”

Abstract and emotional feedback based on level of synchronisation with the car.

Mariah Bengtsson - Professional horse rider.
An interview with Swedish airforce pilot John Adamsson gave interesting insight into the relationship between human user and one of the most complex machines we can create today.

John especially talked about something that fighter pilots refer to as an OODA-loop (Observe Orient Decide Act). It can be explained as a decision-cycle in a dogfight: the pilot who is able to go through his loop first takes the initiative. This is something taught even in business schools today, and it is interesting to try to apply to the future road as well. While driving we are orienting, we make decisions and then we make actions based on the decisions. In a setting where your car is constantly plotting and re-plotting its decision loops parallel to yours we get the opportunity to create a system in which the driver actually is “choosing” among alternative actions (the possible successful routes through the traffic).

This is represented (for the driver) by annotating the road with information about where there is a possibility to go, and a driver who is familiar with her car can of course turn this off for added effect or less visual distraction.

Conclusion:

“Parallel loops”
The car is constantly re-evaluating the road and the user is making decisions within these frames.
Repetitive non-repetitive motion. Every action is different but familiar, like controlling the seams of a horse vs controlling a car.

How to visualize my ideas is form and interaction? Over 15 initial concept ideas were selected from, and clustered into 3 main themes:

The Artifact
The heart of the auto. A mysterious ‘force’ giving the impression of being alive and that the interaction goes both ways.

The Blanket
Very physical full-body control, using your surroundings as means of input. The auto as a totally tactile control surface.

The Mane
Like a warg-rider from the Lord of the Rings is grasping the mane of the beast you grasp the neck of the auto.
Selection of concept was made, and winning became a combination of “The Artifact” and “The Mane” from the previous chapter.

The idea is that of a Bond between user and auto. It was called “BMW - BOND, a living sculpture and a tangible bond”. The reasoning behind the selection was that the author and his tutor had a long conversation on what would be interesting for the company and what we had not seen much before. “The Blanket” fell away because we felt like we had seen similar concepts before and because the chosen combination felt most intriguing and exciting.

Prior to sketching, some frames were set: The BMW - Bond is a tactile surface that you can manipulate with your hands in order to guide the autonomous car. The bond is able to communicate back to you through haptic feedback and abstract visuals. It should feel like it has a life of its own, and due to the safe nature of the future roads in the city, the focus will be put on interaction devoid of screens and concrete information.
After decisions were made in the previous two chapters - and during sketching on the Bond - an afternoon was spent doing a series of ultra low-fi prototypes to quickly test basic form, texture, shape and proportion of the tactile control device.

To get even further away from the steering wheel of today, it made sense to separate the grips and not force the hands to work symmetrically. The parts also had to be moveable, and I wanted the controller to “open up” towards the user, like a flower. Further enhancing the idea of something living.
As one of few emotional bridges between the world of machine thinking and the world of human thinking, The Bond should give the impression of being alive, and represent something new and otherworldly. More than a few creatures on earth has this magical emotional feature to them, where translucency and transparency works together to hint of things going on beneath the surface.

A soft futuristic material similar to shape memory foam, and natural classic leather together provide contrast and a way of letting the concept stand with one foot in the 2045 reality, and the other in old Europe. The overall proportions of the device should give the impression of a strange creature, opening up to meet the user as stated in the last chapter.
After the idea had fully formed, it was a perfect opportunity to mock it up more properly (in my apartment) to get a loose idea about how it could feel like.

It was set up by building a frame made from kapa board, and by using dense building insulation to carve out a control. With a simple wooden hinge, rubber bands and tape, some resistance in the controller. The projection mapping software HeavyM (which I helped kickstart) was used, and set up with a macbook and a mini-projector, hence the grainy images but darkness was needed due to the relatively low lumen of the projector.

On a Kapa board representing an interior screen mounted on the “frame” of the car, a road scene (found on Youtube while researching material for previously mentioned Movie 1 - Commute) was loaded up.

The controller “reacted” to things which went on in the scene (Due to time constraints, I didn’t program HeavyM to react to Youtube but just timed the HeavyM loop and the clip). I then “acted” out simple scenarios to get a feel for the controller.

The testing led to the discovery that it would be cool for the controller to use a combination of color and lighting, and to somehow achieve a contrasting change in texture and firmness - in order to give the user a second-to-second update on how much “in sync” she is with her Bond and the car.

Different color could indicate different situations, reactions needed or the amount of synchronisation between rider and Bond.
The form of the interior should convey a lightweight and “modern” feeling in 2045. This means two things:

1) A reduction in material used compared to today, using thinner, smaller and fewer volumes. The users of 2045 are culturally tuned to this aesthetic which might look strange to us. The forms are quick, thin and resemble tense rubber bands.

2) Sustainable color, material and finish to match the volume reduction. Sustainability in future materials happens in these two ways:

a) New ultra light and strong semi-organic hybrid materials which are designed cradle-to-grave, being grown and also being degradable or recyclable

b) The upcycling of old material. In our age we tend to expect traditional and familiar materials (like fabric or leather) for surfaces meeting our bodies; but in the future, different organic polymers can deliver an equal message of quality even when they are recycled.
The selected design was modeled in Autodesk Maya 2015. The model was measuring 650mm in length, and it was exported to be 3D-printed (every piece) in SLS - standard. A higher definition model of the Bond controller was later modeled for better keyshot renders. This enabled better detail for close-up shots for the "Result" section of the report.

The 3D model was printed at BMW, then sanded, sprayed with primer, sanded again, and finally painted (whole process supported by the fine gentlemen of BMW’s Hufelandstraße modelling workshop).

After this the model was packaged carefully and flown to Umeå to be assembled on site for the Design Talks ’15.

Projection mapping is a technique where one uses a normal projector and specialized software to map video or images of any form on any kind of surfaces. Then benefits of this technique is -among other things- that it makes certain kind of visual prototyping easy. For example: Testing layouts of different screens in an interior, visualising smart materials, animated parts, orchestrated interior lighting, etc.).

The projection mapping software allow us to mask surfaces and project any content on a detailed level on them. So multiple videos from the same projector can be shot onto different surfaces at the same time.

A next level of realizing the ideas from the project would be to use several projectors in a 3D-space with a digital 3D model as reference. This can give really impressive output (A 3D object animated on several sides, maybe even moving), but takes a lot more time and effort.

In this project projection mapping is used on the final model to show the Bond’s reaction on road situations.
Result
The BMW Bond is a control device for the future autonomous car. It consists of two moveable soft touch areas which are linked to a main frame. The user interacts with the bond by holding the soft surfaces and applying pressure and movement to them. This is interpreted by the vehicle into actions on the road.

The Bond is communicating back to the user via haptic devices embedded in the touch surfaces, and via holographic projection.

The Bond serves as a connection point linking the human and the smart machine, and it is a representation of the “life” and all the invisible technology within the car (the bulk of user/car interactions would be controlled via voice).

The controller is made up of two gel-like touch areas connected to a central frame. The soft touch gel is emitting a faint glow as the user enters the car. When the user is adjusted in her seat, the controller “wake up” and physically rise en stretch toward the user.

The central frame is vertically split in two volumes between which a holographic display is providing extra information.
Interaction with the Bond is performed on the two “touchpads”. The Bond is able to provide force feedback through a device called the “Haptic Landscape” which is located beyond the surface of the outer layer. The haptic landscape can change its shape beneath the silicone layer and thereby provide contextually relevant feedback to its user.

Screenshots from an animation visualizing state changes in the Haptic landscape. Animation Hyperlink: http://fredrikaaro.com/wp-content/uploads/2015/05/bond-texture.mp4
You are driving in traffic and decide to make a left turn.

As you approach another car, the texture and color of the Bond switches to make you focus.

Even closer to the other car now and the Bond is reacting more strongly. You naturally pull it back to lower your speed.

**Bond - Steering**

The Bond is used by grasping the two protruding touch areas and steering with it in the way you feel comfortable.

As the car gets to know its user - and the user its car - the driving experience becomes smoother and smoother. During the initial calibration process with a new owner/user, the car observes and offers teaching and tutorials.

**Bond - Feedback**

The Haptic landscape is transitioning between different color, firmness of the gel layer, type of texture (topology) of the haptic landscape, firmness of the haptic landscape and speed of transition between changes.

The Bond is hinting at things to come by changing these parameters to demand more focus from the user or communicating that there is a bad synchronisation between user and car.

Softness is good, firmness and dramatic texture changes represent bad.

**Bond - Information**

You interact “multimodally” with your future car: Using voice in combination with touch and gesture is how you give input, and the car is communicating back to you with voice and transparent screens on the windows and dashboard. The car is reading your intentions with gaze tracking, different sensors and clever algorithms.
A shorter story in a comic book format helped structure and visually communicate the ideas about the car and its future driver.

It was drawn in the days leading up to the exhibition in Umeå, so that the posters and the model would be able to better speak for themselves also when there was nobody present to describe the project.

On the following side is the story in its entirety. It is telling the story of a user in a morning drive to work in her futuristic office building, and the type of interactions she might have with her car and the Bond.
UID
Degree show

Presenting my Master Thesis as the UID Design
Talks on June 3 2015.
Conclusion
Reflection

In this project I set out to reflect on the character of sports cars, and the role of its driver, in the autonomous future.

Post-project refelction

Writing this reflection quite a bit after finishing the project, I still feel that the questions that I raised here were and are interesting and important, both for the mobility business, and for the never ending design-discourse on how to relate to a smart machine or smart system.

I believe in the end my project is about control and trust in this context: 1) What it means to be in control, 2) The difference between giving it up and losing it 3) How possibly a higher level of trust can be reached by sharing control 4) What it means to trust a machine, and lastly, 5) how the task of driving is being shared with the machine.

I also had the great joy to think about how I’d like a relationship with a smart machine to look like in the future. As machines get smarter and potentially more human-like, we designers have the opportunity to responsibly create interactions and experiences which are engaging in totally new ways, but which are also entering new areas of ethical challenges.

Opportunities

In retrospect, I wish I would have addressed the questions of ecological and economical sustainability better, but I’m very happy that I spent time thinking about inclusivity in car culture - by making future cars more accessible (in this case through my control method, which is emotional rather than technical).

I believe this thinking is being applied to cars as we speak through the gradual additions of more and more clever assisted driving technology. When cars reach level 4 and level 5 autonomy, we have the opportunity to completely reconsider the way we drive them.

Planning & Details

Thinking about the project itself - how I planned and performed it - I’m happy to say that I achieved what I wanted, and in some ways even more!

That being said, I also had some tough learnings, mainly considering deadlines mid-project. More specifically I let my ideation drag on for too long when I should have trusted in my research to guarantee a nice and relevant result. Another learning is to reach out for eventual help early. In my case that would have been in modeling support and exporting for 3D-print. I ended up doing it all myself, but I could have had help had I planned better for it, with a tighter final product as the result.

I could reflect on the width of the project, and that I bit off quite a lot to chew on, but I think the width fit my chosen theme, and if I’d done it in another way it would have led to a very different project.

It would also have been cool to have a more interactive result, but I believe that that would have needed more time, or more focus on the technicalities of producing the model. Or I would have had to focus on specifically designing the driving method from the start: something I needed half a project to figure out for myself.
References


Expert interviews - Audio
Jonathon Porritt 41.8mb Apple MPEG-4 Audio
Karl Schroeder 116mb Apple MPEG-4 Audio
Bettina Schwalm 86.9mb Apple MPEG-4 Audio
David Barri Kirkley 100.7mb Apple MPEG-4 Audio

Movies
Story1_Commute 23mb Apple MPEG-4
Story2_Work 21.6mb Apple MPEG-4
Story3_Weekend 21.4mb Apple MPEG-4

Prototyping
Test1_1 864kb QuickTime Movie
Test1_1 544kb QuickTime Movie
fullscale 6.3mb Apple MPEG-4

Result
 bond_texture 3.3mb Apple MPEG-4
aaro_final_pres 14.8mb PDF
model_video 22.1 QuickTime Movie
aaro_posters 27mb PDF

Appendix

As I’ve tried to put most things I refer to straight into the report, my Appendix is consisting of the digital files I’ve created during the journey, like interviews, videos etc.

I’ll list the files here, and they are located on a USB stick, or - if you read this in the future – I’ll have them saved in the cloud so you can contact me directly for the files.

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Bettina Schwalm 86.9mb Apple MPEG-4 Audio
David Barri Kirkley 100.7mb Apple MPEG-4 Audio

Expert interviews - Text
Mariah Bengtsson 81kb PDF
John Adamsson 108kb PDF

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Story3_Weekend 21.4mb Apple MPEG-4

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