Cars
The future is flexible
Abstract

Cars have been around for over a century and have grown to become an essential part of society with an increasing number of different models being sold and developed each year. Car manufacturers steadily expand the offered product portfolio and invent new market niches constantly. Often, this is not done to meet the customers’ expectations but rather to match and rival a competitor’s model lineup. The increase in model variety results in a significant increase in the complexity of production and manufacturing, more difficult and demanding work surrounding employees, and massive negative impacts on the environment. Not only are cars unsustainable in the way they are used, but also in the way they are produced. For a more sustainable future of and with cars to be possible, this practice of product portfolio expansion needs to be critically analyzed. It is, in my eyes, additionally necessary to evaluate the essence of the car industry, the car itself, and to re-think what defines a car. This paper critically analyzes the car industry and the production and development of cars, and it proposes an alternative to standard car design based on the idea and ability of speculative and critical design to highlight issues of today. The proposed concept is a speculative design alternative to car design, aiming to put sustainability and the customers back into the focus of car development, and discover what is possible, rather than probable, in the future of cars. The proposed concept aims at changing the understanding of cars and turns the car from being fixed and immutable into alterable and changeable objects, depending on the use-case and user. By analyzing manufacturing procedures and future trends, and interviewing experts from various disciplines, insights are used to evaluate the proposed alternative.

Key words
car design, car development, sustainability, future, speculative design, innovation
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Lennart Schmitz
Please Note

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Thank you,

Lennart Schmitz
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Cars are a divergent topic in today’s society, people either love them or hate them. Cars are something difficult to take a stand on because, on the one hand, they’re a major cause for global warming, and the infrastructures built in towns are all about cars and individual transport with personal vehicles. On the other hand, we value the independence a car gives us. It allows us to travel to places, and ironically enough, connects us to nature, the very place being destroyed by our demands to travel with cars. To a certain degree, cars turn us, to quote a participant from the workshop I’ve organized, into “individuals stuck in tiny individual boxes all getting poisoned by the exhaust of fossil fuels that are also poisoning the rest of the planet.” But despite this big dilemma about cars, we drive them, we buy them, and we use them. One could argue, that if they are so bad, it should be the responsibility of those, building these vehicles to ensure that they’re safe to use without any major impacts on the environment. Thus it should be the car industry’s responsibility to take care of sustainability, so we, as consumers, don’t have to think or change our behavior. And it seems as if the car manufacturers have done a lot, with one example being an increase in the number of electric cars on the roads, and the car manufacturers are constantly working on decreasing the impacts on the environment. But then came 2015, the year in which Volkswagen and soon after the biggest German automakers “were found to have manipulated nitrogen-oxide emissions from some of their diesel cars” (Petzinger, 2017, para. 1). Thus, it seems, as if the issue of sustainability does not seem to be taken seriously by the car industry, after all.

Coming from Germany and growing up there, I’ve generally had a positive attitude towards cars and the car industry, as the German car industry is one of the major reasons for economical growth in Germany. It is for that reason, that I have worked for several years during my studies for both the BMW Group in Munich as well as for the Daimler AG in the fields of design and innovation. Design with a focus on innovation has also been the focus of my studies during the Bachelor’s. Now, during the Master’s in Transdisciplinary Design and Sustainability, however, the focus is put much more on questioning and criticizing and using the ability of design to highlight and create change towards more sustainable futures. It is therefore my pro-
fessional, but also personal interest to be doing a thesis concerned with the future of and with cars.

This is what forms the starting point for this thesis project. Having had experience working in the car industry and just generally expressing interest in cars and the future, I’ve noticed something. I’ve noticed that seemingly everyone has a car, yet the car industry seems to develop a vast variety of different models and types of cars. The car manufacturers are constantly expanding their product portfolios. This is what I decided to turn into my research question, as I was wondering and questioning the reason for this product portfolio expansion. The question I asked is ‘How could an alternative car design make a product portfolio expansion unnecessary and production more sustainable, while at the same time giving the consumers more control over the development process of a car.’

In the beginning of the car’s popularity, it was mass-produced with little to no variation. Throughout history, however, the trend has gone more towards a mass-customization strategy and the development of additional cars, new models and different body forms. Car fairs and concept cars, regularly presented, like the recently presented 8-Series Concept by BMW (BMW Group UK, n.d.) display and describe the same picture as today, just with more modern technology and more modern cars. So, in a way, these concept cars are less for the customer and more of a way of showcasing what one car manufacturer desires the future to look like. The concept cars present-

ed, however, also show that there seems to be no end in sight. Product portfolios are growing constantly, which results in increasingly stressful and demanding jobs for the labor force (Hu, Zhu, Wang, & Koren, 2008), increased chances for quality failure (Wells & Rawlinson, 1994), increasingly complex manufacturing processes, and more importantly a significant impact on the environment and sustainability as a whole (Orsato & Wells, 2007). So, what are the reasons for car manufacturers to continue producing new concepts and adding models to the product portfolio? Simply said, it’s the ability and desire to sell more cars than the competitor to more customers all over the world.

To ensure a more sustainable future of and with cars however, one must critically analyze how it came to this irrationality. It is the purpose of this thesis project to do so, and to critically analyze and review the practices and the history of the car industry and reasons for product portfolio expansions. Given the time frame available for this project and the complexity of the topic of car industry and cars, there were some things that were impossible to include or take into further consideration. To create a functioning and working car design concept, one would probably need years. With my limited knowledge in technological aspects and my focus of creating change, it was therefore not possible to create or design a technical solution. So, instead of presenting a solution, I decided to use the ability of speculative design to "move design [...] beyond product, beyond technology, to the concept or research stage, and to
develop speculative designs, or “useful fictions,” for facilitating debate.” (Dunne & Raby, 2013, p. 49). My design concept is therefore a proposal and critical alternative to the status quo, aimed at showing what could be possible and illustrating that something needs to be done to achieve a more sustainable future. One which is customer focused and makes the need for product portfolio expansions unnecessary. It builds upon the possibility theory, as described in Isaac Levi’s Possibility and Probability (1989), and the uncertainty of the future. The design concept I developed uses this uncertainty to show that, despite other future scenarios being more probable or likely, one shall never rule out that other future scenarios are possible. It is the conflict between certainty and uncertainty, between rationality and irrationality, between possibility and probability, that I am aiming to highlight. Because only when voices clash and opinions differ is when future is formed, and change can happen.

The paper is structured in the following way. First, with the help of an extensive desktop research I will review the current practices and the historical development of car production. The done research is consisting of reading and reviewing studies and books covering the historical development of the automobile industry in Europe, the status quo and the impacts on sustainability, reasons and impacts of car production, as well as, mass-production vs. mass-customization. To understand the market and current situation, I have reviewed current product portfolios offered by car manufacturers. I have also talked to experts from various disciplines including the disciplines of production and manufacturing and life cycle analysis and from the fields of economy. After critically analyzing the findings, I will talk about my design process and how I came to the concept that I have designed. I have organized a Co-Design workshop, which will be explained in more detail later in this paper, to understand the customers and what it is they are looking for in cars. I then gather, analyze and combine these insights with the design concepts that I have developed to create a design concept proposal focused on sustainability, the customers, and how the need for product portfolio expansion can be reduced.
Historical Development of cars and context

When the automobile was first invented by German inventor Karl Benz in the year 1885 (Marry Bellis, 2017), it was a thing of luxury and wealth. The people who owned cars were usually of a higher class and used these first cars to have fun and seek excitement, amongst other things. The first cars were “large, fast, powerful, gasoline-fueled automobiles [that] made these vehicles potent symbols of wealth, masculinity, and skill” (McCarthy, 2007, p.29). So even though it was intended as an improved form of mobility, already from the beginning, the automobile drew a lot of attention to itself, making the car an object to show one’s own wealth and individuality, rather than a simple object of use. As McCarthy (2007) describes in chapter 1 The arrogance of wealth, the car has, since the beginning been a symbol for masculinity and wealth. It “offered intensified experiences in each of these areas for men to distinguish themselves further from their more timid fellows” (p. 6).

It wasn’t until Henry Ford, who wanted to develop a car that was cheap and reliable, that cars became available and affordable for the masses. It was him who “saw the automobile as an improved form of transportation destined to become an everyday necessity once the price became affordable” (McCarthy, 2007, p.30). So, in the following years Henry Ford was destined to create a car that was not only affordable but also of high quality and reliability. The result was the development of the Model T, a so-called world car, which was one car, that was mass produced and sold from the year 1908 onwards (McCarthy, 2007). By focusing on one model, the production could be streamlined, meaning “[t]o improve the efficiency of a process [...] by simplifying or eliminating unnecessary steps, using modernizing techniques, or taking other approaches”, which in turn made this car affordable but also of high quality (businessdictionary.com, 2018; Wells & Rawlinson, 1994). This strategy is highlighted by the quote by Henry Ford in which he says “My customers can have any color they want, as long as it’s black” (Fisher, Jain, & MacDuffie, 1995, p. 116), as any other color would have increased the demands on the labor force significantly. Enabling customers
to choose different colors, would have not only slowed down the production process but also would have significantly increased the chance of quality flaws (McCarthy, 2007).

As the car became affordable, the numbers of cars on the roads increased. People had higher, different and continually changing demands, making it necessary for car manufacturers to come up with other strategies to stay competitive. One of these strategies, which remains the main strategy of today, is the concept of giving the customers more variety not only in color, to refer to Henry Ford’s quote, but also in terms of body shape. This was not only necessary due to the changing and globalized market all around the world, but also due to the diversity of customers and their demands. So instead of designing one car that could do it all, this new strategy was to create a different “car for every purse and purpose” (McCarthy, 2007, p. 83). The car manufacturer Mazda picked up this strategy by selling and producing the Mazda 323 “for worldwide markets in 180 different colors, including four shades of black, an ironic twist on Henry Ford’s original offer of any color, as long as it was black” (Fisher et al., 1995, p. 117).

This strategy of offering a car and model for all different purposes and target groups remains the strategy of car manufacturers today, as the number of different models offered has increased significantly since the early times of the automobile. BMW alone offers nowadays a range of 58 models to choose from on their website (BMW.se, 2018) (see Appendix A). While some of these models only differ in terms of engine size and performance, it shows a massive increase in the number of models available compared to the amount of models offered by BMW in the year 1980, which were mainly the core-models, the 3-Series, the 5-Series, the 7-Series as well as the 6-Series and the M1, a sports car (automobile-catalog.com, 2018). While these core models, except for the M1, still remain in the brand’s product portfolio, many more models have been added including models and car types with a lesser defined role in the market like Sports Utility Vehicles (SUV) which can be described and seen as off-road cars with a higher fuel consumption compared to smaller personal vehicles. An example for such an SUV can be seen in fig. 1. It can be argued that there is the need for cars that allow the user to go off-road and to places where other cars aren’t capable of going. However, that can be seen with critical eyes, since a very small fraction of the sold SUV’s actually leave the road. “Market research in
the 1980s suggested that no more than 10 percent of four-wheel-drive vehicles did so." (McCarthy, 2007, p. 234) Despite these numbers and despite the generally higher fuel consumption of SUV’s however, car manufacturers not only continued to produce SUV’s, they have even decided to introduce more SUV’s, in all different sizes and shapes. BMW, for instance, is selling six different types of SUV’s as of today with an even larger SUV, the BMW X7 concept iPerformance being presented and likely being added to the product portfolio soon (BMW, 2018).

And not only do the car manufacturers build and introduce new models constantly, expanding their product portfolio, they also tend to renew existing models in short cycles. "For example, every one or two years, each car model generation undergoes a facelift, a marginal stylistic change, and every five years, each car model generation undergoes a full model change, a complete design change." (Hyun, Lee, Kim, & Cho, 2015, p. 491). It should be noted that the amount of time required to undergo such a change differs from car manufacturer to car manufacturer. Additionally, car manufacturers allow the customers to build and customize the cars according to their likes and preference, following more of a Mass-Customization strategy in contrast to Ford’s mass production strategy. With this strategy, the car manufacturers allow the customers to “choose their vehicle from a plethora of options, though the design of the vehicle may not be changed in any way” (Alford, Sackett, & Nelder, 2000, p. 103).
Reasons for product portfolio extension

Looking at the years of car development and the practices of developing cars, one can see that car manufacturers have gone from a streamlined production strategy of very few models towards a strategy offering all sorts of models and cars for all possible target groups and markets. In other words, the trend of car development is a product portfolio expansion, as I call it.

There are several reasons for following up on such a strategy. On the one hand, an increase of product variety and expansion of product portfolio is “motivated by the desire to provide [...] highly customized products in response to the diversification of customer needs and preference, and the fierce competition in the global market” (Hu et al., 2011, p. 1). By having a broad variety of car types, car manufacturers can meet the demands of different markets as well as different people, and are also more likely to quickly respond to changing markets (Kiunkke, 2013). On the other hand however it has been “innovations in technology [that] have also steadily increased the versions of cars available by introducing new features” (Fisher et al., 1995, p. 117). In this way, an introduction of models and the expansion of a product portfolio are also a way of showcasing what a car manufacturer is capable of.

Often however, an introduction of new models is a response to a competitor’s product portfolio expansion rather than the result of the motivation to meet the customer’s desires. An example for that is the invention of market niches and product niches like the BMW X6, a mixture of different car types, in this case a combination of an SUV and a Coupé. The market for a product like the BMW X6 is, in itself, already rather small with only 10,492 out of 823,587 BMW’s sold in Europe in 2017 (carsalesbase, 2018). Despite that, other car manufacturers released models that are targeting this exact same target niche as the BMW X6. Mercedes-Benz for instance has announced the GLC Coupé as a direct competitor to the BMW X6 (Mercedes-Benz, 2018b), which isn’t only targeted at the same group, but has a design that shows a clear resemblance to the BMW X6, as can be seen in fig. 2 and 3.
**Impacts**

The automobile and the car industry have become an integral part of society with models and cars for virtually every possible customer and purpose. The enormous growth and expansions of car manufacturer’s product portfolios and cars in general however, has consequences. While the car industry and cars are contributing significantly to climate change and other environmental impacts, one has to critically review and analyze the practices of car production and product portfolio expansion and what the effects of this trend are. Cars are having major negative impacts on climate change in the way they’re used. With only 3.2% of cars running on alternative fuels rather than petrol-based or Diesel, the emissions caused during use are extremely high (European Automobile Manufacturers Association, 2017). But the impacts on the environment of a product are much larger than just the impacts caused during its use. In order to understand how a product impacts the environment, one has to look at the entire life cycle of a product. And here we see that a car’s life cycle does not only consist of the use phase and the impacts of this phase, but also consists of the gathering and processing of materials, the manufacturing stage, the transport and the disposal of the product (M. Hauschild, J. Jeswiet, 2008). And this is where we see the full effects of a constant product portfolio expansion. In the following section I will be reviewing and analyzing the impacts the practice of expanding a product portfolio has, especially in the early phases of its life cycle. Specifically, I will focus on the material gathering stage and the production stage.

**Impacts on Complexity**

In contrast to the beginnings of the automobile, where a car manufacturer had one car for all purposes and people, which enabled them to streamline the manufacturing process to not only save costs but also to ensure a high quality with rather low demands on the labor force, now the situation is much different. As each customer can practically have a car custom built, theoretically no car is ever the same, meaning the manufacturing process can not be streamlined in the way it could be for a mass-produced product. This does not mean that a car is built completely new for each customer. It merely means that the customers can change things such as material of the interior, color, extras, details on the exterior or engine size, amongst others. And while not only the number of different models available is very high, even different versions or configuration possibilities per model are possible, increasing variety even more. The BMW 3-Series in itself can be configured in four different ways in terms of body shape and size, in particular a sedan, a touring, which is a station wagon, a Gran Tourismo, which is a large coupé, as well as a M-version, a version particularly focused on power and speed (BMW AG, 2018b). On top of that there are different configurations per body shape possible, each time with differences in styling or accessories like in between the Advantage Line, the Sport Line, the Luxury Line, the M-Sport Line as well as an Individual model (BMW AG, 2018a). Additionally, the engine size can be changed and configured. However, in order to meet those demands or make this
possible, “production systems and supply chains must be designed to handle such high variety while at the same time achieve mass production quality and productivity” (Hu, Zhu, Wang, & Koren, 2008, p. 45). The enabling of different configuration possibilities and mass customization therefore makes the production of automobiles significantly more complex. To find out however, how big the impact of product variety is on the production, one will have to analyze each manufacturer and the models offered.

The impact on engineering hours depends on the design of the base vehicle, but a common rule of thumb in the [auto] industry is that each additional body type adds 10 to 20 percent to the hours necessary to design the base vehicle. Going from one to four body types may add as much as 50 percent (Clark, Chew, Fujimoto, Meyer, & Scherer, 1987, p. 745).

Modular Platform Strategy

One of the attempts of decreasing complexity while ensuring high quality is the adoption of a modular platform strategy, adopted by some of the biggest car manufacturers in Europe including Daimler, BMW, Volkswagen or Volvo amongst others (Ojeaga, Ojeaga, & Odejimi, 2014). This strategy means that the cars and different models consist of different modules and platforms which are streamlined and assembled in different ways to create the many possible configurations. “By choosing and matching different modules, different products can be made to meet the demand for different designs of the market” (Liu, 2011, p. 808). So, while car manufacturers have indeed developed methods of keeping complexity within the manufacturing and development process as low as possible one must analyze why this modular architecture strategy was implemented. Seeing as one of the reasons for a product portfolio extension is the ability to survive within the market, the car manufacturers have to save costs wherever possible in order to make this possible (Orsato & Wells, 2007; Wells & Rawlinson, 1994). As Orsato & Wells (2007) pointed out in their paper, “satisfying consumer demand for new models was relatively more important than the rationalisation of platforms” (p.1000). In this way it can be argued whether the implementation of modular platform strategies was a way of making production and working less stressful and complex or if the implementation of such strategies is just a way of saving costs. With a growing number of different models available one shall indeed ask to what extent a modular platform strategy is capable of keeping manufacturing complexity low.
Impacts on the environment

The trend of mass customization and constant expansion of product portfolio not only has significant impacts on manufacturing complexity and workforce but more importantly, also on the environment. With an increased possibility of configuring the cars also comes the necessity of having all different options and parts constantly in stock (M. L. Fisher & Ittner, 1999). Logically speaking, the more cars that are produced and the more diverse these are, the higher the usage of materials, which in turn has higher negative impacts on the environment. “It could be expected that more material resources are necessary to produce those [mass customized products] compared to mass produced products, since modular products cannot be optimized with regards to weight and thereby material usage” (Brunø, Nielsen, Taps, & Jørgensen, 2013, p. 177).

Additionally, as production becomes more complex and the number of different models grow, the number of firms and suppliers also grows. With an increasing number of firms and factories built and opened to ensure this constant production, an increasing amount of land is being occupied by the car industry. BMW alone has 31 firms all over the globe required only for production and assembly (BMW Group, 2018). The more firms and plants that are being operated, the higher the energy usage is and the bigger the environmental footprint. “The manufacturing of a car (Press, body, paint and assembly shops) may consume up to 700kwh/vehicle. This energy cost is about 9-12%
of the total manufacturing cost.” (Fysikopoulos, Anagnostakis, Salonitis, & Chryssolouris, 2012, p. 477) From 29 plants planned between 1986 and 1996 for the auto industry, only one was directly concerned with sustainability. In particular, land was purchased, for building a recycling plant (Wells & Rawlinson, 1994, p. 50/51), which again shows the lack of concern about sustainability issues within the automobile industry.

All of these aspects result in a high environmental impact of a single car even before it is put to use. “According to the German Environment and Forecasting Institute, before an average car is put into use, it has already produced 26.6 tonnes of waste and 922 m$^3$ of polluted air” (Orsato & Wells, 2007, p. 1001). The impacts on the environment of a car before it is put to use include the extraction of raw material such as iron ore, bauxite, oil, etc. and the production of aluminum, steel or plastics. Others include the impacts caused by the transport of materials and components, the energy usage of the plant, and the pollution caused during assembly of a car, the release of excess waste and the transport from the finished car to the consumer and customer (Orsato & Wells, 2007). The demand of constantly needing everything in stock or available not only increases material usage and waste, but also results in an increased environmental impact due to logistics and the transportation of goods to ensure the production. This in turn results in an increased fuel consumption due to more transportation of goods and material, even before the car is put to use (M. L. Fisher & Ittner, 1999).

In that sense, when taking into consideration the complete life cycle of a car, the impact it has on the environment and workforce is enormous. Yet, this issue isn’t new, as the environmental impacts of cars have been around for almost as long as the car. Already in 1969, people recognized and were concerned with this issue, including when Democratic Senator Edmund S. Muskie of Maine said “If we can put a man on the moon, surely pollution problems could be solved, too”, as cited in McCarthy’s (2007) Auto Mania on page 172.

The question to ask though, has this issue been solved? In my eyes, this issue hasn’t been solved. While without a doubt technology has improved and environmental impacts have decreased since the beginnings of car production, the car industry is still a major contributor to negative environmental impacts.
Looking at the historical and current practices of car development, the constant expansion of the product portfolio and the offering of option variety has become irrational. New models and market niches are created constantly not with the desire to meet the customers’ demands, but rather to sell more cars than the competitors do. In this way, the product portfolio expansion is more of the industries’ desire to sell more cars, rather than to focus on the environmental impacts of such practices and the meeting of actual customers’ demands. It is as if the competition and the increased consumption are “on which [...] prosperity depends” (Stengers, 2015, p. 32). Following a mass-customization strategy and adding products targeted at all possible markets and customer segments make it seem like customers are at the center of attention, but the truth seems to be different. One can indeed question how much the customers and the environment are actually the focus of the car industry. The recent Diesel emission scandals by German car manufacturers depict that it’s neither the customers that are the center of attention, nor is it the environment, but rather numbers and sales. So instead of acting responsible and trying to decrease the impact on the environment and meeting the customers’ demands, the car industry is instead its own entity with its own rules more focused on competition than demand. To some degree it seems as if the car industry, instead of going forward to responsible futures, is going back in times to when the car was about expressing masculinity rather than sustainability (McCarthy, 2007).

And to this irrationality of constantly expanding the product portfolio, there seems to be no end in sight, making it seem like the car industry as a whole is either blind to this issue or it is ignoring it. And while the expansion of the product portfolio for a single car manufacturer might be justified and understandable, if one looks at the entire car industry and compares the different products developed by the different manufacturers, an entirely different issue comes to light. To a certain degree and as already mentioned, many models are merely produced and developed to match or rival a competitor’s product lineup. So if one is comparing the offered models and products by the different car manufacturers, they all seem to have the same sort of cars and models for the same job. The Audi A8 (fig.4), the BMW 7-Series...
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Critical Analysis

This development has many different reasons, as discussed earlier, and therefore has many different starting points where one could try to change the course of direction or understand how it was possible for this course to occur in the first place. But in my eyes, the problem described here is not necessarily due to the desire of the car manufacturers to sell more, nor the competition-based production, but more the essence of it all, the car itself. Cars are in the way they are designed and built a rather unchangeable and immutable product. Once they are built, they maintain their shape and design and stay as they are until the user decides to get rid of it for various reasons, or until it breaks. And as the markets and consumers are so diverse and the consumers are constantly expecting something new and something better, the car manufacturers have to constantly re-design old models and develop additional ones. On top of that, while the consumers do have the ability to change for instance the color of the car or the material of the interior, it is impossible for the customers to change the shape, the form and the design of the car itself. And, as the customers are often not part of the design process, they have no control or influence over which models are to be produced and developed with which design. To a certain degree, it is the car manufacturers that decide what kind of models are to be produced and what form a car should have, and “[a]s product variety increases, so does the uncertainty in demand for individual models” (M. Fisher et al., 1995, p. 139). For car manufacturers to make money, more models are developed with the hope that they will sell well and gener-
ate a profit. Yet, since customers aren’t part of the development process, feedback concerning the acceptance rate of a specific model can only be gathered once the model is already produced and ready to be sold. And that is, in terms of sustainability, often way too late, since even if a car doesn’t sell, it has already been made and materials have been wasted in vain. Not only is the creation of models unsustainable and not consumer oriented, it is also a risky business practice. But the inability to change the car and the form of the car is what prevents the car from being updated, so if the sales don’t match the expectations or if the consumers have different demands in design language, nothing can be done except for an entirely new round of manufacturing and re-making what has been done before.
Needless to say, something has to change in order to guarantee a more sustainable future of and with cars. Since cars are a something used by consumers, produced by the industry and accepted and regulated by politics, there are some ways one could go to influence the future of cars. Yet, as history shows, trying to change the consumers behavior is an almost impossible task, even if the impacts on the environment are involved or concerned (McCarthy, 2007). Demanding the customers to change towards a more sustainable behavior, therefore proves to be a merely impossible task. Especially with 70% of today’s journeys being made with a car in one form or another, showing how the consumers and society as a whole are bound to the automobile (European Automobile Manufacturers Association, 2016). While this number does not give information about the willingness of customers to change their behavior, it does bring light to the dependency of society on cars. This dependency on personal transportation via automobiles also shows the influence the auto industry has on us as society.

Thus, the automakers do exert a powerful influence on our behavior – even more so, ironically, when we are not paying attention directly. But the actual emotions and motives behind our behavior are very difficult for us to discern. If we can’t recognize that an external cue has aroused our need for affiliation with a community, how can we control our behavior before acting on that motive to find a different and less problematic way to satisfy it? (McCarthy, 2007, p. 262)

For customers or consumers to change their behavior towards the car will take a lot as “[c]hanging attitudes is not just about enhancing perceptions. There are also psychological factors to contend with. One reason we don’t see the bigger picture is that we don’t want to” (Thackara, 2005, p. 23). To some degree therefore it is also possibly a lack of education or ignorance at play.

Another way one could go about changing the course the automobile industry is to change politics and governmental policies. Yet again, history shows that this is only to a certain limit effective, as legislations and acts with the goal of keeping emissions caused by the car industry at a mini-
Cars - the future is flexible

Call for change

Maximum have been around and in place almost as long as cars themselves have been (McCarthy, 2007). It is yet to be seen to what degree the bans of diesel powered vehicles in some German cities (Wehrmann, 2018) will affect the overall impact on the environment caused by the car industry. As the problem is a global one, politics seem to have a relatively small impact on the sustainability and the course of the car industry.

So, what can be actually done to make the future more sustainable? Either way, there is no end in sight, consumers will most likely continue to buy more cars, the car industry will continue to develop vast variety models and market niches and policy will continue to walk along and accept rather than influence. Yet, in order to make the future with and of cars more sustainable, one has to think about what the automobile industry is all about. And as I see it, “the auto industry is a consequence, rather than a cause, of the invention of the automobile, systems of production essentially reproduce the outcomes of earlier theoretical conceptions about what should constitute a car” (Orsato & Wells, 2007, p. 1004). Thus, in order to have an effective and course-changing impact on the path of the car industry, one has to therefore re-think the essence of the car industry as a whole – the car itself.
Design Project

Design process

Based on my previous work experience in the car industry and my background as a designer, it was my initial goal to create a concept that would tackle these issues and try to solve these. In order to have a mentor and guidance from someone within the car industry, I contacted a senior Volvo Design Manager to give me feedback on my concept and this project. Throughout the course of the project however I’ve encountered various setbacks. On the one hand, the mentor was, due to a lack of time, not able to give me any guidance, leaving me without assistance from the car industry. The other thing is the fact that the car industry and cars are something that have existed and evolved into something almost non-changeable and incredibly complex. And without any deep knowledge in technology or marketing for instance, I, as an outsider, had seemingly no possibility to actually improve the car itself or the course of the car industry.

What I had decided to attempt turned out to be an impossible task and more overwhelming than encouraging. The research done only added to that insecurity in the process. Seemingly everything that came to mind already existed in one form or another, slowing down the process even more. It was with the help of my tutors and classmates, that I’ve started to understand that solving something isn’t the only possibility. Rather, I should use this uncertainty and overwhelming feeling and turn it into something good. I realized that design does not always have to be about presenting solutions but “can also be a gentle refusal, a turning away from what exists, a longing, a wishful thinking, a desire, and [...] testimonials to what could be, but at the same time [...] offer alternatives that highlight weaknesses within existing normality” (Dunne & Raby, 2013, pp. 34-35). In the following weeks I then combined my idea of creating a solution with the concept of critical design to propose an alternative concept rather than a solution.

To note, as I explained earlier, the auto industry is not necessarily the cause of the issues surrounding it, but more of a consequence of the invention of the automobile itself (Orsato & Wells, 2007). So, in order to change the course for the auto industry and in order to change the understanding of the car, it is, in fact, beneficial to not have any ties to
the auto industry. If I would have had any ties to a car manufacturer it would have made it harder to get an external perspective, to think about the industry and concept of the car as a whole, as the main goal would have then been to design something for that specific car manufacturer.

To maintain focus throughout the design process I set myself a few requirements. These requirements were also a way to validate my concepts and to ensure that the concept would be an effective seed for change. These requirements arose from the issues I’ve discovered during the research phase as well as what I’ve discovered when working for the BMW Group and the Daimler AG.

1. The concept should change the direction, or at least propose an alternative path, for the car industry as a whole rather than for one specific car manufacturer

2. The concept should drastically change the course of production and car development towards a more sustainable one

3. The concept should drastically reduce the need for variety and number of different models produced

4. The concept should give control of car production and development back to the customer

5. The concept should make the car itself more flexible and alterable

The first point means that it is not my desire to help one specific car manufacturer, nor is it my goal to help the car industry to sell more cars. It merely means that as the whole car industry is part of the problem, it is the entire car industry that requires examination. While the car industry is taking a path to the future increasingly distant from being sustainability and consumer oriented, this concept should try to open up a different path that is focusing on these two aspects.

I analyzed the different product portfolios offered by the car manufacturers to see which of their customers’ desires they fulfill, and how they differ. I then deconstructed these models to come up with five main points that, to put it very simply, are the key differences between different models as well as cars offered by different car manufacturers. These points are in my eyes:

1. Interior design and style, including the number of seats

2. Exterior design including the design language and the form and body type of the car

3. The engine, including the power and how it’s fueled

4. The suspension and the way a car drives

5. The level of innovation and tech included in the car
Given my background as an Industrial Designer, I figured that my knowledge of technology in cars is not profound enough to be able to propose an alternative for the engine, suspension or level of tech and innovation in a car. Instead, I looked at the points of interior design as well as the body form and shape of the car. When looking at different models offered by car manufacturers and cars on the street, usually the main difference between those is the shape and the design language of the car. And if the exterior in itself is the key difference between several models, could that point be elaborated to make an expansion of the product portfolio unnecessary? Another thing I thought about is the inflexibility of a car. When trying to transport something, it’s often the lack of trunk space which is hindering, so I asked myself, is it necessary to have a fixed and rigid shell for the car body? It’s this point of questioning the exterior and shell of a car where I started off with my design concept.

As one of my requirements was that the development of cars should be more consumer-focused and controlled, I organized a co-design workshop with five representatives of my target group, which is students, living in Europe. I used this workshop to find out which types of cars are the most useful and desired and what a car is mainly needed for. This would allow me to generate an alternative car design concept focused on fulfilling the customers’ demands, making it customer and consumer-focused.
Co-Design Workshop Set-up

The workshop took place in a spacious room in my university allowing the participants to walk around and move. Coffee and snacks were provided for the participants and before the start of the workshop I made it clear that participation is voluntary, that personal information is saved separately from workshop outcomes and that each participant would be treated anonymously and could leave at any time without further questions asked. Also, I, as the workshop organizer, walked the participants through the schedule, introduced myself and the purpose of the workshop and listed the rules of engagement. These rules of engagement as well as the schedule were written on a whiteboard, always visible for everybody. The rules were

- no judgement or criticism
- everything is possible
- the messier the better
- encourage rather than discourage
- creativity is key
- English as common language

All together there were five participants, three self-identified male, two self-identified female, all were students at the Linnaeus University in Växjö, Sweden and were from the ages of 21 to 31 years of age, with various backgrounds and demands towards cars. The workshop was scheduled for 2 hours and I guided the group through several activities aimed at getting the participants engaged with the topic, to encourage their creativity and empathy and to develop a customer journey map.
The first thing I asked the participants to do is briefly introduce themselves, and to say the first thing that comes to mind when hearing the word car. Afterwards I used an advanced version of the brainstorm method, in which I asked the participants to write down in five minutes all the different car brands, car models and types of cars that they could come up with or remember. In order not to guide the participants into a specific direction that was all the information given to them. The reason I used this method is to get the participants engaged with the topic as well as to test their knowledge towards the topic of cars. After everybody has written down their thoughts I asked the participants to take a red, a green as well as a blue marker and go through the list in front of them and evaluate everything that’s written down. I asked them to mark what they wrote down with a green marker if they felt represented or trust by the brand, the model or the type of car or if they liked it or if they generally linked positive feelings with a brand, model or type of car. Mutually, the red marker was to mark everything where the participants had negative feelings with or if they felt a lack of trust or if they didn’t feel represented well enough by the brand or model or type of car. The blue marker was for neutral feelings. I used this method of evaluating the brainstorming list in order to find out the level of trust and the feelings the participants have towards specific models and brands.

Afterwards I used a persona method to open up the discussion and field of cars. I hung six A3-papers onto the wall, each with a different photo of people and asked the participants to write down the first thing that comes to mind, what kind of car that person might drive, what this person is looking for in a car and the reasons for owning or not owning a car. The associations did not have to necessarily be about cars but could be anything the participants felt like writing down. The photos showed a range of people, one middle aged man with two kids, one female likely to be student, one man in a suit, one teenager, one middle aged woman in a suit and one young woman in outdoor clothes. I used this method to encourage the participants to think about other people and their demands on cars, since cars are not only for one target group.
After that I gave them a 10-minute coffee break. Then I guided them through an activity that I called *idea forest*. For this activity, I prepared eight big sheets of papers which I put on separate tables across the room. Each paper had one question on it, and I asked the participants to walk around the room and write down anything that comes to mind to that specific question on the sheets of papers. I did this for 20 minutes, allowing the participants to walk around several times to add things if they felt inspired by something someone else wrote down. The questions that were on the paper were the following:

- What comes to mind when hearing those words: *car industry, Diesel, traffic jam, SUV’s*

- What should be changed in a cars life cycle to be more sustainable? Material production – assembly – Use – After Use

- What should a car do, if it couldn’t drive?

- How can the future of cars be made more sustainable?

- Why would you buy a car vs sharing?

- What do you dislike about cars?

- When do you need a car the most?

- If a car could change its *form/shape/design language* depending on the use/user, what would change and what would you like about the idea?

The reason for this method was to encourage the participants to think in different directions, think outside the box and be creative. I wanted them to think differently about cars, but also wanted to encourage them to think about the issue of sustainability.

*fig. 9 - idea forest example page own photograph*
The last thing I asked the participants to do is to take a sheet of A3-paper which I prepared for them, to write down a day in the life or a customer journey map for themselves either now or in the future. On this paper I added questions including ‘Who am I? (Gender, Age, family status, …) & what do I do for a living?’, ‘What’s my requirements for a car?’, ‘How do I move from A to B? (owned car, carsharing, train, bike, …)’, ‘What does my perfect car look like? (Brand, model, quick sketch)’, ‘What do I want others to think of me?’ and ‘Describe my day with a car on a timeline (activities, times, …)’. I also provided them with cut outs of different car body shapes, allowing them to pick whichever one they felt closest to their desired car. The reason for this method was to find out what the participants themselves are looking for in a car, what type of models is most required or desired, what functions should the car have as well as the importance of status for the participants.
Final concept and design

Having no ability to actually present and develop a solution, I didn’t let technology or economics hinder me in developing a concept. Instead, I looked at how I can evaluate a design concept that uses the ability of speculative design to highlight issues and spark discussions. So instead of thinking about how things could be changed, I asked myself the question of what should be changed and what that could look like.

As mentioned, I identified the exterior of the car as a key player in terms of inflexibility and differentiation between certain models. It is the exterior in which the design language of a car manufacturer is most prominently displayed. And as the car is more of “a vehicle [that] might evoke emotions, and can be viewed as something more than just a means of transportation” (Gkouskos, Normark, & Lundgren, 2014, p. 67), it is the exterior that is, in my eyes, sparking these emotions. What this means is that people are looking to express themselves with a car, and they’re looking for cars that evoke their emotions in a specific way (Khalid & Helander, 2006). Design specifically the exterior design plays a major part in this as “the uniqueness of a product serves as a vehicle for differentiating the user from the majority of consumers. Design is a central element in differentiating unique from common products” (Bloch, 1995, p. 23). In fact, the design of an object plays such a major role in the decision making process, even more than the price does, that I decided to do something with this (Bloch, 1995).

It is this design as well that can fail, for example if people do not respond well to one specific form factor or design language. If that is the case, a car will not sell well, and the car manufacturers must change and adapt the design of the car which results in a change within the manufacturing process, resulting in an even higher material waste and complexity. So if the exterior of the car is such a major thing in terms of how a car, not only looks, but functions and sells, why is it the exterior that hinders the car from being flexible?
The concept that I have developed is inspired by the concept Gina, presented by BMW (Designworks BMW, 2018), but goes much further and would change the way we think about cars. Since cars are, as explained earlier, always rigid and fixed in the way they’re designed, the concept I have developed would change that. With the help of a flexible and smart shell, that can change the design language and the shape of the car even post-purchase, cars would no longer be fixed or immutable. Now, the car would always be up to date, in terms of latest design trends and demands. With the press of a button and an update in the software, the entire design language of the car could change depending on the customers demands. That would mean that cars, if they don’t sell well, would not need to be re-made or re-designed, but instead could just be updated and changed accordingly. As design is playing a major role in the expression of ones feeling and individuality, customers could use this same concept to change and express themselves by changing the design language and form of the car whenever they feel the demand or desire. In times of software updates and fast-paced designs, this flexible exterior concept would enable the car to stay up to date even post-purchase. With this concept it would no longer be the assembly process and designers of the car industry that define the purpose and design of a car, now it is the customer and the use-case that would define it. Instead of having a car for each purpose, now each car could do it all. The car would no longer be inanimate, but would instead to a degree become a canvas allowing each manufacturer and customer to express what’s desired and to give the car life and personality.

Granted, the car models have big differences in terms of size and purpose, making it difficult to have one model for everything. Yet, the ability to change design and shape of the cars, the need for having as many models as today becomes redundant. But in order to cover all possible customer demands and to have a significant impact of production, the amount of models produced will have

![fig. 10 - flexible material with pattern (own illustration)](image)
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Design Project

fig. 11 - car design proposal smaller trunk (own illustration)

fig. 12 - car design proposal bigger trunk (own illustration)
to be downscaled. To find out which models and what types of cars and functions the car needs to fulfill, I created the workshop explained earlier. The methods and activities done in the workshop helped me determine which models and types of cars are most required and demanded by the customers. Interestingly, the participants valued use, safety and flexibility of the car higher than status or design. In contrary to the beginnings of the automobile where it displayed wealth and masculinity, the car has become such an everyday thing, where the use and function of the car is valued higher. That is also displayed in the choice of the perfect types of cars and body shapes, whereas bigger station wagons and practical city cars were most commonly chosen in terms of ‘what’s the perfect car for you’. The participants however, despite marking SUV’s commonly as untrustworthy and negative, have seen SUV’s or at least cross-country vehicles as a necessity, once the city is left and the car is used to go travel off-road. SUV’s therefore do not necessarily represent masculinity or power, but rather are requested for their ability to go into terrain where other vehicles would fail. So again, the function of the car is valued more than the status it represents. Another type of car that had a high standing amongst the participants were vans and bigger personal vehicles, for their ability to transport goods and people when travelling. Other types of cars such as Coupés, sports cars in general or pick-up trucks were generally not mentioned and are therefore not further considered in the design proposal.

Based on my design proposal of a flexible exterior and the results of the workshop, four different models could be developed, to cover the most desired demands of the customers. These models should be a small practical city car, a family directed multi-purpose station wagon, an SUV or off-road version of the mentioned models as well as a midsized multi-purpose vehicle. With the flexible exterior that is applied to these models, these core models could then change the design and style and form factor depending on the customer’s preference, without having to change manufacturing process or assembly. In this way, each model can fulfil several purposes, as the form can change and the exterior is flexible. If large things would have to be transported the trunk space could be expanded to allow for a safe transportation. If the customers lose interest in the design of the car, they could then update the design language regularly to always keep the car up to date.

However, in order to have maximum effects on the production and sustainability, each car manufacturer should produce the exact same models. Depending on the car manufacturer, the interior design could change, the design language of the exterior could change, the type of engine and suspension used as well as the level of innovation. Yet the exterior form and the car itself should stay the same, to keep manufacturing as simple as possible. So instead of each car manufacturer having to produce their own models, these four core models are produced the same by each manufacturer, with only minor changes depending on each car manufacturers preferred style or demand.
Possibilities for future development

This concept has many more possibilities and potential when thinking further. A personalized exterior not only makes the car more flexible allowing the car to meet the customers demands much more than is currently the case, it could also make car sharing much more interesting. As each car can be turned into your car in a short amount of time without having to visit a garage or mechanic it could possibly make the concept of car sharing much more enticing (fig. 13 & 14). Although the participants of the workshop valued the function of the car higher than status, they were generally concerned about how other people see them and generally gave the design of the car a high standpoint. In this way, being able to express oneself through every car that one uses or shares, might make the necessity of ownership obsolete. The target group and participants also were generally very open towards the idea of car sharing, as long as the infrastructure was provided. To quote one participant, “we need to shift our thinking – understanding selfish needs over collective needs”. An increased use of car sharing services would reduce the number of overall cars on the street, in turn resulting in a less crowded inner city and a less polluted environment.
With a flexible shell, the car becomes a canvas enabling the customers to express themselves. That can take various shapes and can be used in different ways. On the one hand it could allow people to pimp their cars to express their individualism, but customers and car manufacturers could now also use the car itself to take make a statement against the meaning it had in history, which often resembled masculinity. The cars design language could now be changed to express a more feminist or neutral design language and shape.

The flexible exterior could also change shape depending on the surroundings and specific customer requirements. The car could change shape to become more aerodynamic during use and in this way reduce emissions or energy consumption, the car could also change shape according to different needs. If, for example, a fridge would need to be transported, but the trunk is a bit too small, with a flexible outer layer, it could change the shape according to the fridge to allow transportation of larger goods without requiring the purchase of a bigger car. An example of how this could look like can be seen in figure 15 and 16.

![fig. 15 - trunk expansion small](own illustration of car design proposal)
![fig. 16 - trunk expansion big](own illustration of car design proposal)
The issue remains that cars continue to be sold, yet with a flexible exterior, the possibility could be given to update your own car. That means that even old cars, without flexible exterior could be brought to a mechanic who replaces the rigid shell with the flexible one. In that sense one would not have to buy a new car, but could instead update the old one, extending the life significantly.

While this concept has very many different future implementation possibilities, the core of the concept is to change the understanding of a car. With this concept a car would no longer be a steady, fixed object. In contrast, it would be, to some degree, a live and flexible thing that can mold itself to customers demands without having to change anything in the production lineup and even after the car is sold. The car continues to be a car, however as it is much closer to the customers demands and expectations, it makes a large product portfolio unnecessary, allowing the car industry to really focus on these core products and how to keep them alive rather than re-making an entire new product line.
Impacts on sustainability

The massive reduction of car models down to four ultimate models for the entire car industry, would have significant reduction of environmental impacts. As these four core models are the same for the entire industry, the focus could be put on streamlining these to ensure high quality with a high degree of individualization. With an increasing focus on mass-production rather than mass-customization, the parts and materials that currently always had to be on stock could be diminished, resulting in lower material waste. As the car could be changed without having to adapt anything in the production or assembly, the job for the workforce will be much less demanding and stressful, which could result in lower defects per part. This would lead to a higher quality of each part and the overall vehicle, prolonging the life cycle of such significantly. A higher quality of a piece or a product does not only mean an extension of the life cycle, but also decreases the requirement for maintenance. According to Al-Najjar (2018), this is increasingly important as "operating and maintenance costs, receives a large share of the total life cycle costs. It is therefore important to plan this life cycle well".

Since the models can be mass-produced for the car industry as a whole rather than one specific car manufacturer, the number of plants and sites needed for car assembly and production can be reduced to a minimum and planned in a way to keep transportation costs and fuel consumption as low as possible. The number of plants and assembly factories that will not be needed anymore can, as a result be used in more sustainable ways, to decrease the impact on the environment.

With a flexible and updateable design language, the re-designing or re-making of the same car becomes unnecessary, as the cars can be updated in terms of design language even after they’re sold. This possibility of updating the design language and form of the car could also result in an increased life cycle, as the design now can always be the latest design, and meet the customers demands. The flexibility of the exterior shell also allows each car to take over more jobs than is currently the case, for example when it comes to transporting large goods, which would make a second car possibly irrelevant.
Discussion

understanding of making money or selling cars. Indeed, it would very likely make it harder for the car industry to sell more cars, but to move towards a more sustainable future with cars, it’s necessary to connect economy and ecology and not see them as two separate things. As a matter of fact, “[h]ow is one to maintain the imperative of “freeing economic growth,” of “winning” in the grand economic competition, while the future will define this type of growth as irresponsible, even criminal?” (Stengers, 2015, p. 21). If we think of economic growth as an indicator for a larger carbon footprint, it is a question to ask on how, or if, these two things shall be seen as separate entities.

As the car industry is a major industry responsible for many people’s employment, an implementation of this concept might have negative impacts on the employment situation. With fewer plants required to produce the models, fewer people might have to be employed, increasing the unemployment rate.

And what kind of material is it that could form this flexible exterior, how will it work, and how will it be produced? Also for that I have no answer, and I am aware that it could be very difficult to produce such a material. That would mean that such a car could potentially increase the complexity in the manufacturing process, adverse to my objective. To answer these questions though, it is necessary to do more research and testing.

The ability to change the exterior and design language according to one’s own liking would pos-
sibly support an individualistic society in which one’s own individual needs and interests are valued higher than collective interests (Hofstede, 1984). And while the concept of a flexible exterior might be a feature for some, for others it could become a burden or an unnecessary feature. It might become a feature that they are required to pay more for. And indeed, all these aspects will have to be considered if one decides to follow up on the proposal of a flexible exterior, but with the time available and the knowledge about these aspects, it was not possible to take everything into consideration in the frame of this project.

So why have I nevertheless decided to follow up on this concept and proposal? I did it to address the necessity for a new concept on how one can approach the car industry going into the future. The society is built around consumption, and a society without cars is simply not easy to imagine. But if we, as a society, and the car industry continue to take the same path that we have started to take, the future might be darker than the present, so it is a necessity to re-think, to re-imagine, and to question.

And even though, in this project

[t]here are no solutions [...] or even answers, just questions, thoughts, ideas, and possibilities, all expressed through the language of design [...] [t]hey probe our beliefs and values, challenge our assumptions and encourage us to imagine how what we call nature could be different. They help us to see that the way things are now is just one possibility and not necessarily the best one. [...] It is [...] a place where the future can be debated and discussed before it happens so that, at least in theory, the most desirable futures can be aimed for and the least desirable avoided. (Dunne & Raby, 2013, p. 66).

I want to propose an alternative possibility to how cars are developed. I want this project to be a proposal and something that sparks a discussion about the past, the present and the future. It’s not intended to show what the future should be, but instead show what it could be. Cars and the car industry is complex and it’s a major driving force in all parts of society. This large influence is what has to be taken seriously when discussing and imagining the future.
Car manufacturers develop a wide variety of models to sell more cars and to match or exceed their competitors’ product portfolios and offers. As cars are fixed and immutable objects, this is exactly what stops them from progressing or developing with the user and the intended use. So in order for a more sustainable future to take place, and for the car industry to take on an alternative path than the current, I developed this concept of a flexible exterior shell that changes according to the customer and their use-cases, and which can change the design language even post-purchase. This concept could possibly make the production of different models redundant, decreasing the impacts on the environment and workforce significantly. But more importantly, the car would no longer be immutable, but instead could change shape, form and design language depending on the customer and the surroundings. However, there are several shortcomings and issues that one will have to take into consideration when further developing this concept. These issues include the future of the economy and ecology as well as what will happen with the workforce. How will the infrastructure be in the future, and what will be the main role of car manufacturers? Also, how will it work, and will it have any of the mentioned effects?

Possibly not, but the concept differs drastically from today’s practices and it shows that alternatives and room for improvement or change indeed exists, even in an industry as vast and complex as the car industry. That is what I wanted my project to show. I wasn’t aiming at changing the car industry or at showing what had to be done. I wanted to show that something can be done, and that something should be done. And I learned that although everything seems to exist when one thinks about cars, there is always something that hasn’t been done, and something that hasn’t been taken into consideration. There is always, if one takes the effort, space for change and improvement.

How likely is it that the proposed concept will be the future? In order to answer that question I would like to refer to Isaac Levi (1989) once more. Levi is using the example of a coin that is tossed into the air to explain the difference between probability and possibility. It is probable, that the coin which is tossed in the air, will fall back down, just like it is probable that the car industry will
continue to take its path and will continue to pro-
duce more and more different cars. But “[t]hat a
coin will be tossed forever is neither logically nor
mathematically inconsistent. Ruling it out as irra-
tional is to impose a substantive constraint on our
conception of consistent or coherent judgments
of certainty” (Levi, 1989, p. 369). And just like it
is not impossible for a coin to stay in the air, it
is not impossible for other futures with the car
to take place. And it’s this uncertainty that I was
aiming at. No one knows exactly how the future of
cars will look like and it’s probably different than
proposed in this paper. But the question to ask is,
what is possible, not what is probable and what
can be done to make this possibility the future.
What can be done to turn undesired uncertainty
into desired certainty.
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Literature


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Illustrations


figure 4: Daimler AG. (2018). Mercedes-Benz G-Klasse 2015. Retrieved April 20, 2018, from http://media.daimler.com/marsMediaSite/Media/Y9650i1iX4dDLYxOGSwc-5gD32s3OZdKd7Ubq0Fq3hEi1GLmX79a-8cL1uN12V1148/40024536

S-560-e-Mehr-Leistung-mehr-Reichweite.xhtml?oid=29229536&ls=L3NlYXJjaHJl-c3VsdC9zZWFyY2hyZXN1bHQueGh0bWw_-c2VhcmNoU3RyaW5nPXmta2xhc3NIJnN-lYXJjaElkPTAac2Vh

Figure 6: Mercedes-Benz. (2016). Mercedes-AMG GLC 43 4MATIC Coupé, Outdoor, 2016; Exterieur: Obsidianschwarz. Retrieved April 2, 2018, from http://media.daimler.com/mars-MediaSite/Media/nW0EI70tf9P47xl88tnHk-2wD3337K175S0KfAM51f5bt23G6k79c-7G6VEbP6fm13/39990675
Appendix A - BMW Model Portfolio

All photos taken from: https://www.press.bmwgroup.com/global/photo
Appendix B - early illustration
Cars - the future is flexible

Appendix D - workshop results documentation
Exhibition Project Description

Process

Looking back at my thesis project I saw two main parts, the research result of the issue of irrational product portfolio expansion in the car industry as well as the design project of the flexible outer layer of a car. Both parts could be turned into an exhibition project, but my initial thoughts were to work more with the research results, rather than the design project. I thought about that at first because I felt like even though the issue of product portfolio expansion is known, the impacts it has and the awareness of this issue is lacking. The other idea however was to somehow turn the design project results in an installation of some sort, yet I was quite sceptical about that, since I didn’t believe this to be sufficient on its own and felt like exhibiting the flexible outer shell is weak in an exhibition context. And as I definitely did not want the visitors to have to read a big poster to understand anything, a combination of design and research project wasn’t an option for me either. (All ideas that I had can be seen in ill. 8)

When I saw that I have received an ‘F’ on my design project, I was more doubtful than ever and all of a sudden lacked a lot of confidence. As a response to that and to be on the safe side of things, I was discussing the possibilities, my ideas and the situation with Ola, Martin and Terje and took their feedback into close consideration when developing my exhibition project. Eventually after some struggle I got the idea of instead of presenting a result, I could use the exhibition space in a more interactive way. I looked at what the key elements of my thesis were and how I could translate that into an interactive installation. The key elements that I found most interesting were questioning the essence of the car and the function, the irrational car development decided upon by the car industry and the lack of customer participation. Based on these things I created my final concept, which is much more than just a part of the thesis, it is in a way an interactive research tool framed around my thesis project and put into an exhibition space.
**FINAL CONCEPT**

The final concept can be seen in the photos below. The focus lies on the blackboard and the 2 circles and 3 lines representing in a very minimalistic form the sides of a car alongside the text ‘draw your future car’ (ill. 2). This representation with this simple phrase aims at inviting the visitor to draw their car, what they would like in a car or whatever it is they wish to draw without any restrictions or guidelines to make it as free as possible (ill. 3). I provided different colored pieces of chalk and a sponge as well as a small A5-sized board with information about what to do as well as a few sentences of my decision to do the installation in the way I did. Since I wanted to document everything that happens on the board I build a structure which I hung directly above the table with a DLSR camera inside (ill. 4). I secured the camera to the structure and set it to take pictures throughout the whole exhibition in set time frames. During the vernissage I have set the time in between shots to 2 minutes, during the normal exhibition duration to 30 minutes and during the workshop to 30 seconds. This means that I can arrange the taken photos of the board in a time-lapse video to illustrate and to show the different demands and the changes of the car. As the camera is still at the exhibition space taking photos, I have unfortunately not been able to look at the photos yet.
WORKSHOP

The goal of this installation was to get the visitors involved in the process of drawing a car and finding out what it is they see in a car or wish a car to be. This exact point of making the process of car development customer-driven, rather than decided upon by the car industry was also one of the main aspects and goals of my thesis project. But I also wanted to test out how well the board and concept could be used as a research tool in participatory workshops, which is why I organized a workshop, which ran directly in Konsthall around my installation. I structured the workshop in three main stages, the first stage was just to draw on the board without any specific orders or tasks, just to get the participants comfortable with the material and the board. In the second stage I asked the participants to think about their demands in cars or the situations in which they would need a car in the future including noting down any items that they wish to be transported. The third stage was about visualizing and putting what was noted down earlier together on the board. This last stage was very fruitful as it turned out to be a very fun and interactive way of visualizing together (ill. 6). The participants started to actively listen and engage with the board and other opinions. The board as a research tool therefore has shown to be not only a good icebreaker for co-design workshops but also a good way of visualizing ideas and gathering feedback. Most importantly however it helped the participants to think about cars in a different way. All the workshop inputs can be seen in the appendix.
EXHIBITION CONTEXT

This changing the look or the mindset of visitors is in my eyes also what connects it to the overarching topic of the exhibition - change. While this word can on the one hand mean, presenting seeds of change or showing how things could be seen or done differently, another way to understand this concept of change is to try to change the mindset or view towards things in an interactive way. The way I illustrated the basics of the car with two circles and three lines is to some degree an almost absurd deconstruction of the car. By leaving everything else blank, this board with the illustration only focuses on what cars have in common, the wheels and the base. Everything else, the notion of design, appearance, shape or use is left out. It therefore questions the very essence of a car, what it is used for and what it actually is. It instead invites everyone to explore the notions of what’s possible or should be possible. It invites the visitors to discover the boundaries of cars and it explores the changes of demands, approaches and opinions, without ever judging or saying what should be right or what should be done. The board changes the perception of what cars are about. It asks the question of what cars should be, rather than saying what cars are. It is a research tool that uses design as a way to get people involved in discussion and participation to create change.
Ill. 11 - installation presentation ideas (photo by me)

Ill. 12 - exhibition stand side view (photo by me)

Ill. 13 - board in use (photo by me)
Cars - the future is flexible

Exhibition Project Description - Appendix

workshop input (photos by me)
Cars - the future is flexible

Exhibition Project Description - Appendix

Low Budget

- Groceries
- Party's?
- Weekend trips

(A2: 20-30)

- Self driving
  - opportunity to study?

- Multi functional car

- Moving a lot
  - from apartment to apartment

- Traveling to campus?
- Girlfriend / Boyfriend?

Food etc.

- Kitchen / under
- Fridge / freezer
- Big grill plate

Workshop input (photos by me)