acknowledgments

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For sponsoring my project

FICTION DESIGN
For excellent CAD-modeling
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Three global trends are about to greatly influence the world we live in: collaborate consumption, a strong environmental awareness and a third industrial revolution that includes 3D printing, advanced robotics and open source software. This project is addressing these changes in order to evoke new enthusiasm for cars among the general public and again be a creative and positive driving force in our modern society.

The proposal is illustrated through a halo car for a local car sharing fleet targeted at the Norwegian market. The car seeks to create immediate attention through dynamic design elements as well as long lasting enthusiasm through non-compromised usability.

Armand Bentzen
Umeå, 2014
introduction
“Design is all about change. (...) If you rewind through design history, the most thrilling periods are the ones of the greatest change, when designers interpreted shifts in science, technology, behaviour and politics for the rest of us.” - Alice Rawsthorn (2008)
Early 1800’s
The First Industrial Revolution was.

1880’s
The Second Industrial Revolution. Most

1900’s
Art Deco and city growth.

Nicolas-Joseph Cugnot is widely credited for building the first full-scale, self-propelled mechanical vehicle in about 1769.

First practical electric car, built by Thomas Parker. London in 1884.

Personal transport with own mobile power source took off with Karl Benz’s motorwagen in 1885.

Ford Motor Company adopted the industrial assembly line in 1903. Ford mass production and a new era in industrial history had begun providing freedom of moving to the masses.

Henry Ford debuted his Model T in 1908. Model T was the first low-priced, mass-produced automobile with standard, interchangeable parts that enabled special shops to customise the cars to fit each owners’ needs.
In the shadows of the great depression 1930s had a stronger focus on design as a means to increase sales of consumer products. Streamlining was associated with prosperity and an exciting future in the states and in contrast European designers focused on functionality as a way to make products affordable for the growing working class.

The legacy of military technology resulted in excellent new engines, practical pickup trucks and economical smart cars. The Jeep started a SUV phenomenon in peace time.

US car makers, highlighted speed, luxury and power through ever increasing amounts of chrome, plating and wild styling excesses: fins, bullets and aircraft inspired details. Represented through Cadillac Series 62 in 1959.

1962: The first industrial robot was online in a General Motors automobile factory. The machine undertook the job of transporting die castings from an assembly line and welding these parts on auto bodies, a dangerous task for workers. Robots increased the precision during making and speeded up the production.
As we all know the only constant is change, and we are again living in a world of great change.

A new social revolution is on the rise, a revolution that will influence the way we act, move, trade and communicate. Moving us from a culture of “me” to a culture of “us”.

A new environmental revolution
People are getting increasingly aware of the damages we make on our planet and how personal transportation are contributing to this negative effect.

A new technical revolution is about to set the guidelines for how we harvest energy, design our products, build our homes, and manage our business. Most prominent is the 3D printing technology or rapid manufacturing that is enabling nearly anyone to produce physical objects from a 3D file to a relatively low cost. Materials used in the process seems to be unlimited and progressions are fast and is now capable of producing larger items for serial manufacturing. As an example a chinese company has made a 3D printer printer is capable of producing up to ten 650 sq. foot homes in just 24 hours. The 3D printing technology allows us to produce unique objects with integrated functionality without the need for assembly.

Bio-engineering is advancing and new ways of harvesting clean energy and producing bio-fuels are constantly discovered promising a green future.

Advancements in robotics and software opens up a range of new possibilities such as autonomous cars.
Cars has in many ways contributed to a positive development of society and has been a manifestation of technological advancements in material and technology. Improved transport accelerated the outward growth of cities and the development of suburbs allowed the working class to live in less populated areas. Cars contributed to more efficient distribution of goods and people and when they first appeared they contributed to better sanitary in the city with elimination of horse manure. In Europe, massive freeway building created a lot of jobs after WW2 helping the economy back on its feet.

Not only was cars a practical achievement, they also fast became a symbol of a wealthy and successful life providing the owners with the luxury of freedom. Individuals, families and small groups were able to vacation in distant locations.

Cars were incorporated into artworks including music, books and movies featuring heroes who found freedom and equality, rather than duty and hierarchy, on the open road. Cars where a tool for the up growing generation to break free from there parents and establish themselves as free individuals.
The strong selling points from the past has turned into downsides. Cars are not a symbol of freedom when you have to deal with massive congestion, insurances, maintenance and other expenses as rental parking and gas. They doesn’t provide you with better health, and they are to most people not a symbol of progression, but one of stagnation.

The OEMs (Original Equipment Manufacturer) are struggling with declining interest for cars, which results in poor sale figures. In Japan vehicle buying has decreased by more than 30%. In 2009, for the first time, the number of Americans who ditched their cars was greater than those who purchased new cars, 10 million people bought new cars while more than 14 million people got rid of their cars.
There is a general belief that by 2020 there will be well over 1.1 billion motor vehicles in the world. If they all lined up and drove past you at the rate of one vehicle per second, it would take 35 years for all of them to drive by. Imagine the immense amount of energy required to power all these vehicles and the atmospheric pollutants that they will be manufacturing, during making, under use and through demolition.

The main greenhouse gas is carbon dioxide. Others include nitrous oxide and methane. For every litre of petrol used, 2.3 kg of carbon dioxide (the main greenhouse gas) is emitted into the atmosphere. The average passenger vehicle emits about four tonnes of carbon dioxide each year and today approximately 10 percent of global carbon dioxide (CO2) emissions come from automobiles, according to the National Resources Defense Council. And according to Global Carbon Project emissions of carbon dioxide from burning fossil fuels are set to peak again in 2013, reaching a record high of 36 billion tonnes. This means global emissions from burning fossil fuel are 61 per cent above 1990 levels, the baseline year for the Kyoto Protocol. Numbers are hard for us to relate to, but bottom line is: Cars are seriously damaging our environment and our health!

Worth to mention when talking about negative impacts from cars is also the noise they make in urban environment, the space they require, the money they cost, the urban air they pollute and the infrastructure that has to be continuously developed. And as the environmental consciousness grows bigger in strength among the general user and governments puts larger taxes on pollution cars popularity decreases.

By making intelligent infrastructures and smart solutions for lighter, more fuel-efficient cars with clean power sources and materials that are made from renewable resources the negative impact can to some extent be reduced, but the most effective way to reduce negative impact would simply be to reduce the amount of cars in the world and design them to fulfill more specific needs.

A new social revolution is currently rising, growing rapidly stronger and influencing a wider and broader aspect of peoples life and the car industry; the trend is called collaborative consumption.
Collaborative consumption is basically a reaction to the world of hyper consumption we live in today and is defined by Wikipedia as "a class of economic arrangements in which participants share access to products or services, rather than having individual ownership".

Collaborative consumption is not only a passing trend but it is seen by many as a new social revolution. In June 2010, ABC Television's Big Ideas programme aired a segment describing collaborative consumption as "a new socio economic 'big idea' promising a revolution in the way we consume" and Time Magazine list it as "One of the 10 ideas that will change the world".

Collaborative consumption is made easy through our connected society. The generation-z often called the "digital natives" or the "on-demand" generation was born sharing movies, music, pictures, stories, knowledge, even their inner thoughts and daily meals, online. They are, without knowing it, moving us from a culture of "me" to a culture of "we". This is happening fast, because of the fact that we are connected at any time through our carrying devices that possess both communication and computing capabilities.

The economic and social potential in the collaborative culture can be highlighted through collaborative companies such as Ebay, Air BNB, Crash Padder, Rentoid and Task Rabbit.

"The spreading success of Collaborative Consumption reflects the collective desire for a more efficient lifestyle and demonstrates how financial and environmental distress has caused the new generations to be self-aware of their role as consumers. Shared ownership is predicted to influence the way we go around many of our every-day tasks. And why shouldn't it be that way? The idea of sharing our resources is a symbolic reflection of our inherent role as members of society." - Fernando Ocaña, Creative Director at Semcon Gothenburg.
Also in the car market there is a trend that moves away from traditional car ownership to car-sharing, car pooling and peer-to-peer renting. Car-sharing is a type of car rental. What makes it different from traditional car rental is that it is designed to be convenient for people who want to rent cars for short periods of time and only pay for their usage. In order to use a car-sharing service you need to be a registered user in an car-sharing company e.g. Zipcar or Sunfleet. Another difference to traditional car is that you access to a car at any hour, not just business hours. And because the cars are spread around town, sometimes in reserved parking lots or randomly parked by other users there is a big chance that a car is located close to where you are located at any given time.

It is easy for most people to see why collaborative consumption is so successful when it comes to sharing products, information and services, but it might be harder to realize why this trend have the potential to revolutionize the car market because people is traditionally very attached to their personal cars. Owning a car has been a symbol of wealth, cars has provided the luxury of moving freely over great distances and they have tended to evoke a lot of good memories collected through long and loyal usage. The new generation, however, doesn't have the same relationship to cars as previous generation, however, doesn't have the same relationship to cars as previous generations. The new car sharing services has provided the mobility of moving freely over great distances and they have tended to evoke a lot of good memories collected through long and loyal usage.

A vehicle cost in average 715$ a month, but is used for only one hour a day in average. The rest of the time it only a burden that takes up space in our public space, in garages or in private gardens. Other downsides by owning a car is that you pollute more than necessary, you have to be constantly aware of how much gas or electricity that is left on your car, it is expensive and time assuming to maintain your car, you have to change tires, insurances are expensive, you need to find parking and it is hard to know where you can park it. Also in the car market there is a trend that moves away from traditional car ownership towards car-sharing, car pooling and peer-to-peer renting.

Car manufacturers can either decide to ignore the trend of car-sharing, fight against it or see it as an opportunity for changing their business model, but in order to benefit from this social revolution they will have to adapt. New car sharing services pops up frequently: Sunfleet is the biggest car-sharing service in Sweden and the biggest one in Europe and Zipcar is the largest car-sharing company in the world. In Japan vehicle buying has decreased by more than 30%. In 2009, for the first time, the number of Americans who ditched their cars was greater than those who purchased new cars, 10 million people bought new cars while more than 14 million people got rid of their cars. At the same time carsharing members in North America exceeded more than 516 000 in 2010.

Car manufacturers can either decide to ignore the trend of collaborative consumption, fight against it or see it as an opportunity for changing their business model, but in order to benefit from this social revolution they will have to adapt.

New car sharing services pops up frequently: Sunfleet is the biggest car-sharing service in Sweden and the biggest interest holder is Volvo. Mobility is the biggest one in Europe and Zipcar is the largest carsharing company in the world. And along with the growing interest for car-sharing the interest for owning personal cars are dropping.

It is the compliance to changing social behaviour, freedom, participant cost savings and convenience of location and use that is the key factor for how carsharing has gained its popularity.

"Ford, Toyota, Volkswagen, Renault and PSA/Peugeot-Citroen also have established car-sharing arms to take advantage of a sector that analyst Frost & Sullivan forecasts will grow to 26 million global users by 2020 from 2.3 million now. Europe is expected to lead with 15 million cars, more than 14 million users by 2020, from 1 million today.” - Nick Gibbs, Automotive News Europe

Frost & Sullivan, the global growth consulting firm which provides market research and analysis, predicts the global car-share fleet in 2020 will be 500,000 cars, with 240,000 in Europe. Even though the numbers are impressive this will not be enough to soak up excess factory capacity and poor sales among all the different car manufacturers. Therefore Franck Leveque, automotive and transportation analyst at Frost says: “It has to fit within a mobility strategy rather than a strategy to sell cars.”

Car companies appears to use their carsharing fleet as a way to make potential buyers loyal to the brand and also as a way to demonstrate electric vehicles and new technology. Robert Henrich, managing director of Daimler Mobility Services, says that it is difficult to make good business on shared EVs (electrical vehicles) because of low demand and lack of charging points. He adds that big expenses on street-parking and depreciation makes it hard to earn money also with fuel-powered cars. BMWs DriveNow, a two year old venture, are hoping to earn the first profit in 2013. Car2go, a car sharing service started by Daimler in 2008 as a pilot project is now out of the experimental stage, and is today profitable in three of the 18 cities where it operates. This two examples indicates that it is difficult and time-consuming to make carsharing profitable, but a company that can make it work, is pioneering a new way to make money by not selling cars.
Although electrical cars will have a positive impact on the local urban environment their reduced footprint will not be enough to cover up for the predicted amount of drastic increase in vehicles because the main energy source in growing car markets like India, South Africa and China is based on coal. The only sensible long termed solution is to reduce the amount of cars.

In 2009, carsharing diminished global carbon dioxide emissions by 482,170 tons. Carsharing members drove 31% less than when they owned a car. For every rented car, there are 15 fewer owned cars on the road the energy saved during production will be great.

Cars designed for specific needs will reduce the total emissions because people will not have to drive big cars when they don’t need to, and fewer cars on the roads equals a more efficient traffic flow, less congestion and idling, and less driving to find a parking space.

Future mobility concepts are often targeted towards city commuting (naturally, since 3 billion people today and 4.9 billion people by 2030 will classify as urban citizens), but a carsharing service need to offer a whole range of specialized vehicles to be a proper alternative to owning a personal car.

Examples of vehicles that would be needed include cars for communing inside the city, trucks for moving heavy goods from A to B and for sure vehicles that is meant for leisure activities which you can drive together with friends and family on vacations outside the city. If there is not such a broad range of vehicles offered to the customers, future car sharing services will never be more than a supplement to personal car owning.
Smart phones connect urban citizens with other information devices in the environment as well as with other people’s hardware. Extremely cheap microprocessors embedded in clothes, shoes and buildings allows invisible intercommunication. When they connect the tangible objects and places of our daily lives with Internet or managing software, hand-held communication media will mutate into wearable remote control devices for the physical world.

Fact is that “smartifacts” (a device sufficiently sophisticated that it can be considered “intelligent” and “aware” of its surroundings) has transformed the way we communicate, but has yet to revolutionize the way we commute.

Understanding the full potential of mobile connectivity would make car sharing more convenient for customers and make it shaper, safer, and less maintenance demanding for the companies. Investment in smartphone-delivered technology that will help people get around town easier such as Daimlers Moovel application and apps that lets you find parking space easier such as ParkNow and Parkatmyhouse is a little step in the right direction. Other initiatives are for example Streetline, a project that offers market-leading technology to bring together all aspects of parking management technology in one integrated system. Urbanscale, a New York City-based urban systems design practice, consisting of urbanists, interaction designers, cartographers, graphic designers, interface specialists and software developers with a human-centred orientation and an ambition to improve the quality of metropolitan experience worldwide is another initiative. One of their projects are named Urbanflow, an interactive information service for urban screens, is a good example of their approach to the design of products, services, and spatial interventions wherever networked information technology intersects the urban condition, for the benefit of everybody who lives, works or for other reasons spend their time in the city. And we have Weeels, a new mobile app that promises to offer smartphone users quick and affordable means to order and share cabs.

Another spot on design challenge in order to make car sharing more attractive for the public is that the cars used for carsharing today are not designed for the specific purpose of being shared. People are sceptical because they do not know who have used the car before them and if the person left the car in good condition. Is the car dirty? Does it smell? Does it have enough battery or fuel? Legal questions to be asked, but new technology could solve this problems, and collaborative companies have demonstrated how strangers have learned trust each other through the use of technology. Sensors could let the companies now when the cars need to be charged, cleaned or moved to another location.
When I asked Lorenzo Davoli, Researcher & PhD Student at Umeå Institute of Design and writer of the thesis “Real Time Responsive Infrastructures: Investigating New Design Spaces” about what he saw as being the transportation industries biggest challenge he answered this:

“The challenge for them (the OEMs, editor’s note) is understand how to change their production paradigm. New technologies and concepts and service models require a completely different way to inform the design of vehicles. Otherwise you end up designing always the same stuff (...) such approach could maybe teach automotive how to shift from scale manufacturing standards solutions to provide specific solutions to certain communities.”

This belief is backed up by William J. Mitchell, MIT professor, founder of SMART CITIES in the following quote where he also attempt to give reasons for why it is so hard for the transportation industry to change:

“I don’t have a lot of hope for the traditional automobile companies, because they’re committed to their existing business models. There’s tremendous inertia, huge fixed investments in old ways of doing things. That’s going to make it difficult for them to be successful players. I think we’re going to see new players.”
The initial observations inspired this “What if...” question that have worked as my guideline throughout the project.

“What if cars were an innovation born from the third industrial revolution?”

Essentially I wanted to explore how a car could be designed, sold and produced to revoke a general enthusiasm for cars in society. The three main aspects to consider was 3D printing as a production technique, collaborative consumption and environmental concerns.
During my initial research I found that there is a great need in the car industry to design vehicles that intrigues the customers in a more profound way and harmonize better with their way of living, this need will only grow stronger in the years to come. Maybe could this project give the OEM’s some ideas on how to design and manufacture their cars so that they can revoke enthusiasm for cars among the general public and again be a creative and important driving force in our modern society.

My main goal in this project is to arouse a new enthusiasm for cars among the general public by making cars that is adapted to our modern society and is engaging the users in new ways.

I will investigate what the users in a specific context need and desire in material objects. Sketching will be my main tool in the creative phase. I hope to do a tape-drawing and a clay model to refine my concept before I move into Computer Aided Design.

I want to design a vehicle with eye-catching aesthetics and intriguing functions that might inspire other designers, design students and potentially even car manufacturers to approach transportation design in new ways.

The vehicle I create might have extreme and unexpected proportions and surface treatments, but I want to spend time refining the design so that the vehicle, although maybe unconventional, in the end will turn out to be a well-designed object. This is important for my personal satisfaction as a designer, but also important for the project to be taken seriously among professionals.

I hope to have a holistic product in the end, but my attention will most importantly be on the design of the exterior and secondly through the design of the interior.

It is my hope that the project in the end will emboss my personal manifesto and showcase my beliefs and principles as a future transportation designer. It would be great if at least some of my ideas could be understood through a physical interpretation of my concept.
reflections
Depreciation of a new car is the largest cost factor by far, on average accounting for about 46% of total ownership costs over five years. Carsharing companies earn money through use of their vehicles and so it is naturally in their interest that the cars last long, keep in fashion and are updated with modern technology. This observation requests a design which is dynamic and adaptable to changes.

The interior has to be easy to clean without room in the cockpit to store a lot of personal belongings and the materials should be resistant to wear and maybe repellent to bacteria. It has to be solid and hard to break because people tend to be less careful when they don’t have property rights. Packaging should be flexible to fit people of different sizes and light and colours would preferably be adjustable to individual preferences. Software could store information about the user like previous traveling information and height and size so that whichever car they are assigned or pick it feels like they have been driving it before.

The exterior should be clean and blend into the environment. When approaching the carsharing station the car should visually show how much power is left so that the customer can be sure to reach the intended destination, if pre-booked the car should tell you which one you have booked. If possible the exterior could change according to light conditions, weather and users preferences.

The system has to be cheaper than the cost of owning a personal car, which is about 750USD a month (in the states). It needs to be efficient and convenient, meaning that there always are cars accessible from strategic locations close to the users which are charged, clean and ready to use without any trouble. Therefore carsharing companies needs to understand how people will communicate in the future and how smart communication can affect the strategy.
The lack of interest in cars, shown for example through declining sales figures, indicates that the present way of producing, designing and selling cars is outdated. It is the author’s belief that big progress can only be made possible through rethinking the production paradigm completely.

The big investments in design development and production plants makes the cars a product of compromises because the cars has to be sold to a big market. As a result of this most potential customers will never get a car that truly fits their lifestyle and taste. The immense amount of cars today, all being produced the same way and meeting the same legal requirement, makes it hard to stand out from the crowd and the general public feel that they have seen everything before. The automakers still compete in the long tradition of making cars with perfect surfaces highlighted through glossy paint, but do this result in better user experience? Is this the key to re invoke enthusiasm for the car? Is this really defining what is desirable and what is not?
I believe that the secret to success is to make engaging cars, that is context oriented, fits a certain purpose, is integrated fully with the users lifestyle and is environmentally attuned. To accomplish this the producers also have to start thinking locally. By thinking locally the designers and engineers can avoid compromises that otherwise would have been taken during the making of a car because of the global cultural preferences. Also different weather, climate, geography and population density vary greatly throughout the world as well as the basic use of cars. Access to local green energy sources and local materials are important when designing from a environmental point of view. Not having to meet all global legislations will also make it easier to produce cars that satisfies the needs among a certain group of people.
“Everyone has an object with a story. It’s not about its aesthetic or monetary value; it’s chiefly about the narrative wrapped up in the object,” Erin Loechner

Experts suggest that emotional connection to an object does not occur as a result of visual attraction, but rather because of the personal stories connected to it and how they fit into our life and trigger our senses. What makes a non-animated object prized? Marius Kwint, Christopher Breward, Jeremy Aynsley, describes in the book Material Memories how objects, in essence, are not “blank carriers onto which humans project prior psychic dramas, but rather, place crucial importance on the precise materials from which they are made, their social, economic and historic reasons for being, and the way that we interact with them through our senses.”

It’s a pattern shared in a PBS documentary entitled Objects and Memory: “Without the objects, the stories would lack vibrancy; without the stories, the objects would lack significance. Taken together, the images of the objects, the memories they evoke and the stories of their collection take the viewer on a journey where the commonplace is transformed into the remarkable and where the stuff of history is highly personalized.”

History and memories, traces from the past can therefore increase the value of an object. Not only emotionally, but quiet literally. For example, when Eric Clapton sold his favourite stage guitar from 1974 to 1985 “Blackie” in 2004 for 959,500 USD the prize didn’t reflect the actual monetary value of the guitar; the buyer wasn’t looking for a perfect, scratch free item, but clearly appreciated the history embedded in this product.
Steven Ståhlberg, a Swedish artist and illustrator, believes that the key to capturing our interest is variation and changes in the item we observe. Changes and variations, he says, is what natural objects like a tree stump, a rust stain, a coral reef and sunset have in common causing us to observe them over and over again.

Change, but more than that: Changes of Change. We prefer variation. But we like varying variation even more. And we like varying variations of variations even more... And so on.

A saccade is a special kind of eye movement, usually automatic, that rotates the eyeball a very short distance in a very short time. Here is a representation of the saccades an eye may do looking at this image; note the ‘jerky’ quality of the path. In 1950s researchers showed that if saccades are eliminated - an image is ‘frozen’ with respect to the retina and after 1-3 seconds we basically go blind, no longer seeing the picture. The same thing happens when the visible field is too uniform this is called a “blank field”.

But the opposite is just as bad: an “aggressive field”. An example: a wall with thousands of regular spots on it - the distance between spots about 15 mm. Looking at it soon gets extremely uncomfortable, if taken too far this can cause nausea, or even seizures in some people. So too little contrast is bad, and too much is bad. But medium contrast isn’t the answer either.

Another factor that keeps us interested is the amount of details we are exposed for. If the picture or object in observation have too few details, it’s not enough for us to investigate and we lose interest soon.

What attracts us and keep us interested is not necessarily the same qualities that we would define as beautiful. The philosophical question of what is beautiful is a much debated subject and the author is questioning the relevance of aesthetic beauty when it comes to modern car design.
Beauty itself is but the sensible image of the infinite”  
- George Bancroft.

Beauty is a hard and much discussed philosophical question. We perceive some things as “beautiful”, and other things as “ugly”. Research shows most of this is universal. Jonah Lehrer, an American journalist who writes on the topics of psychology, neuroscience, and the relationship between science and the humanities believe that beauty is a particularly potent and intense form of curiosity. It’s a learning signal urging us to keep on paying attention, an emotional reminder that there’s something here worth figuring out.

If there is something in this theory then making curious design would be a clue to create attention and enthusiasm among potential users/customers. Making the curiosity last for a long time require, again, a dynamic and changeable design so that the user can be presented for new aesthetics over and over again. This also relates to Stålberg theory about humans being attracted to changes, variations and details.

Researchers have found several biological reasons to why we see certain people as beautiful facial symmetry is one of the best observational indicators of good genes and healthy development. But even though you can argue that symmetrical facial features are beautiful, there is also something strange and unnatural about it *see picture too* the right( that makes it look alien and scary to us as human beings. Research also show that people with a distinct facial feature that set them apart from the average crowd is seen as attractive.

Professor Andrea Borghini says that:

“The appreciation of beauty takes place in an aesthetic attitude. This is the state of contemplating a subject with no other purpose than appreciating it. For most authors, thus, the aesthetic attitude is purposeless: we have no reason to engage in it other than finding aesthetic enjoyment.

Now aesthetic appreciation can be carried on by means of the senses: looking at a sculpture, some trees in bloom, or Manhattan’s skyline; listening to Puccini’s La bohème; tasting a mushroom risotto; feeling some fresh water in a hot day; and so on. However, senses may not be necessary in order to obtain an aesthetic attitude: we can rejoice, for instance, in imagining a beautiful house that never existed; in discovering or grasping the details of a complex theorem in algebra.

In principle, thus, the aesthetic attitude can fall under any subject via any possible mode of thought –senses, imagination, intellect, or any combination of them.

Suppose we agree that Leonardo’s Mona Lisa and a Edward Munch self portrait are beautiful, what do they have in common? And is this beauty the very same that one experiences when gazing down a valley from a mountain peak or listening to Beethoven’s Moonlight Sonata?

Plato was one of the believers in a universal beauty. If so is, it is reasonable to argue that we do not know beauty through our senses, because people sense in different ways. Some people argue, however, that beauty is a label we put attach to different sort of experiences. They say if we compare the beauty of snowboarding down a off-piste mountain slope to the beauty of watching a horror movie there is not a single common element attached to the experience, not even the basic ideas involved seem to match.

Whether Mona Lisa is beautiful or not, her mysterious smile have evoked curiosity through centuries, made people wonder and reflect. If it is a peace of art that never loses its interest. And personally, that is the aspect I find most relevant to modern car design.
Peugeot Onyx was released in 2012 and represents something very new and interesting. The car has extreme proportions, and a minimal chassis consisting of only 12 parts. Most interesting in relation to this project is, however, the copper bodywork panels fashioned by hand. After only one and a half years since production the patina is already present, making the car more lively with a changing appearance that visualises the time gone by in a very elegant way. It stands out in great contrast to the matt black bodywork.

Anne Forschner, a German designer who graduated from Pforzheim University with a Bachelor Degree in 2009. For her thesis project she was sponsored by BMW and made the concept Lovos. Lovos is a study into how many. The project is based on a philosophical idea, which asks critical questions about the design, construction and use of road vehicles, as we know them today. As Anne Forschner explains: “Contrasts, emotion and provocation are the main themes of the design.”

- carbodydesign.com (2009) The body consists of 260 identical, exchangeable pieces, which work like airbrakes and are also photovoltaic, following the direction of the sun.

The idea behind the concept car Gina by BMW was born in 1999 when Fernando Pardo at DesignWorksUSA had the idea of putting clothes on a car for the purpose of making it emotionally and sexy. It was built in 2001 but not released before 2008. The car responds to you by open and closing the headlight like and human eye. When the doors opens the fabrics folds and creates wrinkles. Suddenly wrinkles was much cooler than 3mm door gaps and perfect surfaces. This is proven by the incredible responds the car got, people where amused. 4.5 millions hits and the hottest thing on YouTube when launched. It is very interesting how this car managed to be so popular, not only among car enthusiast, but by people that generally doesn’t care at all for cars. In addition to the emotional attraction, fabric is also good from an environmental point of view. 1m² of the fabric skin is 1/10 the ecological footprint of 1m² painted steel and on third of unpainted steel, no matter how you measure it.
The generation z is a common name in the US and other Western nations for the group of people following the Millennia generation and commentators use birth years ranging from mid 90’s to present days. Wikipedia defines the generation-z as:

“(...) the cohort of people born after the Millennial Generation (...) This is the generation which is currently being born.”

If we agree to this definition we can calculate that the generation-z will be everything from 16 to 35 by the year 2030 and a potential user group for this project. They are the “digital natives” which means that they are born into a digital age and the World Wide Web and interconnectivity is an integrated part of their lives. They are able to grasp and master advances in technology more quickly than previous generations. Unfortunately, this has also led to a more sedentary lifestyle that may lead to physical illness.

They are social and creative and have no problems sharing information about themselves to strangers. They are good at multitasking and expect the information they need and the pleasure they seek to appear immediately. The flip side to this is what experts call “acquired attention deficit disorder” which means that their ability to understand and research bigger and more complex problems are reduced as this requires more time. They are motivated to serve, particularly through volunteerism, but appear to be quiet uninterested in politics. Experts have pointed out that they are uninterested in political issues, particularly those that affect them more directly and even if they are interested, they are more likely to participate in social or community events rather than at political gatherings.

Tamara J. Erickson, a McKinsey Award-winning author and widely respected expert on collaboration organizations has written an interesting article about Gen-Z. Here is a few of her findings that are especially interesting for this thesis:

They save and are reluctant to incur debt. In comparison to the optimistic and immediate Gen Y’s, re-gens save and defer gratification. They will rent. Re-gens will apply their comfort with technology and financial caution to access capital goods in new ways. Renting on-demand, spreading costs over a broad network of individuals, will become the norm. They recycle, share, trade and barter. Gen Y’s are considered curators; they often like to have multiple versions of an item in various styles or colours. Not re-gens. They already easily exchange toys and other belongings with friends, without sentimentality. Companies must move away from variety-dependent strategies to products that provide value through unique utility or relationship options.

Designing for generation z

Her findings supports the idea of making a car that is designed for sharing, and because the Gen-Zs are so accustomed to connected technology this thesis project should take that seriously and could be added by incorporating interactive elements and smart-data to the concept.

Should the fact that the users are separated from the vehicles history have any effect on consumers? Cars have always been one of our most emotional products and proud designers and craftsmen have invested a great deal of effort in making every car a piece of art that appeals to different people and help them describe themselves as persons. As a car owner you learn to love and hate all the difference sides of your car and you develop a relation to your car that gets stronger as long as you have it. When this relationship is no longer valid, how would the customers choose among the different providers and will they threat the car carefully and with respect? Would they choose one car-sharing company over another because they are more attracted to those specific cars and not because they have a cheaper or more convenient offer than the competitors? Maybe the cars should be designed in a way so that they can easily be customized to attract a bigger group of people? And maybe the cars should be designed sturdy and tough with technology that can deal with careless usage?
By the year 2030, 4.9 billion people will classify as urban citizens. That makes city dwellers of Gen-Z the most essential market group for a collaborate mobility project, but according to marketing firm Frank Magid Associates, (who uses 1997 to the present as birth dates) are the generation-z the most diverse of any generations in the U.S and in Europe and this is why they are also commonly known under the name “Plurals”. They are comfortable with working and taking their education abroad, they are influenced by cultures from all over the world and they might have parents who are from different nationalities which of course shapes their lives and interests. Since the overall aim of this project is to incorporate change into the design and showcase the proposal through a specific car it is important to define more in depth who this vehicle will be designed for.

Among the modern, urban, social elite in Scandinavia the act of demonstrating economical wealth will not be important in 2030. Instead a lot of energy will be spent on self-realization through building their social network and participation in leisure activities that is seen as cultivated, sporty or adventures. This becomes evident even today when we browse through blogs, Facebook profiles and twitter accounts.

The sporty, urban citizen that will be the main target for this thesis project will enjoy city life but also feel a strong need to travel outside the city to see new places and enjoy his or hers favourite activities.

Cities will continue to expand and most likely become denser with people, public transportation, advertisements, cafés and everything that belongs to a city environment. Therefore it is reasonably to believe that it will be harder and harder for the user to practice their favorite sports and escape from a hectic environment. It is therefore obvious that a big group of people will need a car to take them out of the urban space to places which might not be accessible by public transportation, e.g. ski resorts, beaches, fishing lakes and mountain climbing locations.
Will the leisure activities in 2030 be the same as they are today? Will people still want to travel far away during their holidays? Or will they experience the world through virtual reality in their sofa? According to Ray Hamond, one of Europe’s most widely published futurist and author of the book “The World in 2030” our leisure activities in 2030 will be quite similar to those of today, even though our time spent in virtual leisure will be a lot more intense.

The mega trend of population growth has led to decreasing environmental quality. Part of the blame for declining environmental quality results from the travel age we live in. Energy is still relatively cheap but with increasing attention being paid to global warming and the emission of greenhouse gases, it is inevitable that things will change. Even with the advances in fuel efficient planes and motor vehicles, projected increases in tourist numbers will more than offset the saving in energy usage. Neil, H., Strauss, William (2000)

In the early days of communication technology virtual reality systems where expected to become a substitute for travel, given the extent of travel today, it can be argued that either the technology does not yet exist to simulate travel experience or that there is simply not a substitute for the real thing. In the book Trends in Outdoor Recreation, Leisure and Tourism edited by William C. Gartner and David W. Lime we get a good prediction on future travel and leisure trends because the prize for carbon-based fuel will continue to rise traveling will become more and more expensive. It is natural to make the conclusion that the pursuit for new experiences and leisure activities will be more local and land based, and so a car would be the perfect means of transportation.

One of their predictions is that a wider segment of society in developed countries will participate in leisure and travel activities because of flexible jobs and a greater desire to build travel, leisure, recreation and physical fitness into our lifestyle.
Today cars are usually designed for the purpose of being sold to a global market which means that the same car can be sold in places with cultures and environment as different as China, USA and Scandinavia with the possibility of compromising design and not give any of the markets total satisfaction. One of the main aims of this project is to move away from big scale manufacturing of standard solutions to small scale manufacturing for a more specific audience. Since the democratic rich countries of the western world are early to take on new trends it is natural to choose one of those counties, and more specifically: Norway

Norway provides an interesting context for this project because of the great access to renewable resources, the economical wealth, high happiness index, the diverse nature and the inherit interest for outdoor activities.

Norway have good resources in hydropower and 99% of the electricity production in mainland Norway comes from hydropower plants. There is also a large potential in wind power, offshore wind power and wave power as well as bio-energy from wood. Norway also has more electric cars per citizen than any other country in the world. Several interesting projects are happening there at the moment. One of the most ambitious journeys in Norway is the ambitious aim to become carbon neutral by 2030.
As of January 2013, the population of the municipality of Oslo excess of 623,000 and is expected to reach 800,000 before 2030. As of 2010 the metropolitan area of Oslo has a population of 1,502,604, of whom 950,000 live in the contiguous conurbation. The population currently increases at record rates, making it the fastest growing major city in Europe. The city centre is situated at the end of the Oslofjord. Oslo is a “green-blue” city with a lot of parks and islands. To the north and east, wide forested hills (Marka) rise above the city. “Marka” is a popular recreation area used for hiking, fishing, hunting and biking during the summer and cross-country skiing, snowboarding and alpine through the winter. Oslo has a varied and strong economy and was ranked number one among European large cities in economic potential in the fDi Magazine report European Cities of the Future 2012 and it was ranked 2nd in the category of business friendliness, behind Amsterdam.

Oslo is a compact city and it is easy to move around by public transportation and you can access rentable city bikes all over the city centre. In 2003, Oslo received The European Sustainable City Award and in 2007 Reader’s Digest ranked Oslo as number two on a list of the world’s greenest, most liveable cities. In Oslo you will find electrical charging stations all around the city. Electrical cars are generally very popular in Norway and especially in Oslo, due to great subsidies from the government and benefits such as free parking and driving in the taxi lane.

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The City Council in Oslo approved a project in 2008 called “Fjordbyen” (the fjord town). Fjordbyen is the urban regeneration scheme of Oslo’s seashore which goal is to open up the city towards the coastline. The plans include 2,261 acres and will be divided into 11 new districts. The project is the biggest city development in Europe since the 2. World War and has a budget of more than 7 billion euros.

The new city area will consist of cultural centres, public spaces, offices and apartments. This scenario provides a good starting point for a future carsharing plan.
Oslo experiences great contrasting weather during the seasons and because the country extends from latitude 57 at Lindesnes to the 71 latitude of nowhere mainland Norway meats the Barents Sea in north the climate varies also greatly from one location to another.

Oslo has a “humid continental climate” which means that the area experience large seasonal temperature differences. Because of the city’s northern latitude, daylight varies greatly, from more than 18 hours in midsummer, when it never gets completely dark at night, to around 6 hours in midwinter. Annual precipitation is 763 millimetres with moderate rainfall throughout the year. Snowfall can occur from October to May, but snow accumulation occurs mainly from January through March. Oslo receives around 1,650 hours of sunshine annually, which is average for the northern half of Europe.

Due to climate change Norway need to be prepared for even more precipitation in the years to come and the average wind velocity is expected to increase a little in most regions.

Water level rising might cause floods and high flows while storms and intensive rain might cause erosion and landslides. Ice formation might damage communication systems and heavy snow fall and icy roads can make it hard for cars to drive on roads.

Convertible cars tends to be little popular in Norway and together with motorbikes their use are limited to a relatively short season. Maybe the challenging weather conditions also partly explains why SUVs, minivans and crossovers are so popular there. A good all year vehicle designed for leisure activities in Scandinavia obviously needs good insulation, an effective air conditioning and a proper greenhouse, relatively big wheels, a strong engine and preferably all-wheel drive system.
Scandinavian taste should not be confused with Scandinavian design as this might be two very different things. Scandinavian design is a design term invented in the 50s to describe a sense of style that appeared in Denmark, Norway, and Sweden at that time and is characterized by simplicity, minimalism and functionality. Today Scandinavians are as diverse as any other group so it might be wrong to generalize their taste, but a careful attempt could be made because every cultures beliefs, values and attitudes is reflected in their designs.

The Scandinavian countries differs from the rest of the world because they all have social democracy as their political ideology and the citizens are recognized as their most valuable recourse. This is seen in the social model where government take care of the people from cradle to grave and is reflected in a very user oriented design approach. Søren Petersen, an engineer, automotive designer and design researcher described Scandinavian design in an article for Huffington Post as being: “…authentic, calm, restrained, uplifting, practical and yet inviting, playful and whimsical. Scandinavian design shows love for the simple things in life and people.” And maybe does this quotation also describe Scandinavian taste? Because in order to feel well in the rather harsh environment of this northern countries you would have to value conformity and collaborative care.

The “Law of Jante” is a concept first defined by the Danish-Norwegian writer Aksel Sandemose and the term refers to a mentality common in the Scandinavian countries that criticizes individual success and achievements and places all emphasis on the collective. This group behavior is probably why Scandinavians don’t like to show off their wealth and prefer more subtle design objects. The close relation to nature, old craftsmanship and a late industrial revolution might be reasons for why natural materials and colours are so common in products and households. Also because the climate is cold and the nights long during the winter people appreciates products that emits warmth and care.

Most Scandinavians enjoy being outside. The pursuit for outdoor experiences is both a source to peace and to thrilling adrenaline rushes. In the summer people go hiking and fishing in the mountains and in the deep forests. During the winter people seek to the mountains for activities like cross country skiing, snowboarding and alpine. In fact the word “ski” is one of few Norwegian words that have been adopted by the international society.

In Norway the preferred palette often consist of natural colors, but take a look at traditional Norwegian houses and you will notice a variety of playful hues. Much of the interior is painted pale -a way to reflect daylight and candle light in the evening, but there is also a great variety of grays. In norway blue, red, and yellow colors have been much used in folk art and painting of house exterior, these are all by-products of copper mining that made their way into everyday colors. Gloss paint are rarely used, because it appears to hard and is less forgiving if you have uneven surfaces, which there was a lot of in traditional furniture’s and homes.
In 2030 all energy will be covered by clean energy sources and Norway as a country will be carbon neutral. The residents will enjoy a dynamic and green city and still benefit from a democratic welfare state that provides good education and social security.

The challenge will be to maintain this sustainable society, keep the young generation active and healthy and provide them with the tools they need for enjoying non-urban activities and learn from the nature.
**Meet Alma**

**Age:** 34  
**Gender:** Male  
**Area of residence:** Grünerløkka, Oslo City  
**Occupation:** Freelance graphical designer  
**Status:** In a relationship, two kids  
**Positive things in life:** Many hobbies, girlfriend, good friends, creativity  
**Negative things in life:** Feel emotionally disconnected to the objects around him  
**Likes to feel:** Free, in consensus with context, Sincere, Self confident

**Meet Kari**

**Age:** 27  
**Gender:** Female  
**Area of residence:** Majorstua, Oslo City  
**Occupation:** DJ  
**Status:** Single  
**Positive things in life:** Good health, money, intelligence  
**Negative things in life:** Stress, feel constrained to urban and sociological systems  
**Likes to feel:** Amused, Alive, Progressive, Creative

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I enjoy urban life, but need to take my fishing gear and get out of the stressful city ever so often to rest my soul. I don't own a car so making it out to the wilderness is a demanding business.

"I'm fascinated by the beauty of nature... And by art and architecture. It's interesting how these disciplines succeed in reflecting our changing world time and time again."

"Modern cars really don't touch me! I mean, c'mon... It's a long time since anyone got impressed by "perfect" surfacing. Beauty is a subjective perception..."

"I'm tired of designers dictating form. Static objects are so superficial! My life is dynamic, I'm drawn to objects that reflect my life."

"The public transportation in the city works perfectly, within the city boundaries. The trams and buses doesn't go where I want to go... Even the city's free electrical cars don't stand a chance!"

"Why can't car manufacturers look further than to the sheer appearance of a car, and investigate what really trigger desire among the users. I want to discover, be surprised by changes and feel like I'm dealing with a friend."

"Why can't car manufacturers look further than to the sheer appearance of a car, and investigate what really trigger desire among the users. I want to discover, be surprised by changes and feel like I'm dealing with a friend."
Even though certain companies have already started to mass produce products by using 3D printing as a manufacturing method in 2014 and other companies earning money without selling their products it is hard to imagine an existing car company changing their production paradigm in the near future without having someone leading the way and proving that it is possible to earn.

Because of the development of 3D printers anyone with design- and technological competence, capital and knowledge about consumer behaviour can start to produce cars.

IBM is such a company that potentially could enter the car segment. They are one of the biggest companies in the world, and are already heavily represented in the transportation sector. They have a great turnover (IBM's 2013 revenue was reported at $99.8 billion for a five percent decline, with Net Income of $16.5 billion).

Aside from the big capital they also have the technological capacity and they are visionary. They have recently published an article called “The new software-defined supply chain- Preparing for the disruptive transformation of Electronics design and manufacturing”. In this article they reflect over the coming changes in the manufacturing paradigm affecting different sectors:

"Over time, three major manufacturing and product design trends have emerged, shaped by the physical reality of the industrial supply chain: parts continue to become more standardized; assembly has continuously shifted toward modules from basic components; and complex mechanical controls continue to be replaced by simplified digital intelligence. More than a century later, these same rules still drive industry strategy, not just in Electronics but across a variety of manufacturing industries. Now, the historical rules hardened by a century of experience are being overturned by three emerging technologies: 3D printing, intelligent robotics and open source electronics. Together, they are creating a manufacturing environment that can be defined and executed through managing software and data files – a transformation we describe as moving from a hardware-based supply chain to one that is "software-defined."

These newer technologies can produce an average 23 percent unit cost benefit and reduce barriers to enter manufacturing by an astounding 90 percent. Yet half of our survey sample has no manufacturing strategy to manage the impact of digitization."
IBM establishes a car division that has local manufacturing facilities in several countries. The manufacturing consist of 3D printer farms and the material is delivered from local resources. At every site there is several designers and engineers working which has great knowledge of the local culture. They are free to design and modify the vehicles, but has also access to IBMs technological cloud where they can download blueprints and manuals that can be used.
Micro car
For personal commuting inside the city

Compact car
For family and friends on shorter trips

Mid-size family car
For holidays and longer trips

Mid-size pickup truck
For moving heavy goods and large items

Halo car
Very specialized car for each single location used to create attention and attract customers
The “halo car”, also referred to as the “flagship” is often used to describe the top-end volume vehicle manufactured by automotive marque.

In this scenario it would be the car in the car sharing fleet that evokes attention and desire not only on a practical level and makes people interested in IBMs car sharing programme.

The halo car should represent the extreme capabilities of the new manufacturing technique and be a car that people desire, but could never afford to own if they had to buy it. It should be very context oriented and designed for the very specific market. In this case Norway.

So what do Norwegians want?
“Norwegians are born with skies on their feet” is an expression often used in Norway. Norwegians live close to nature and use it actively in recreation to keep their mind and body healthy and to nurse social relations. But they are careful not to harm it and “slow sports” such as hiking and cross country skiing are popular.

This concept should provide people with the thrilling adrenaline and peaceful mind-set achieved when skiing as well as offering users the ability to enjoy the experience together.

Unlike traditional off road vehicles that seems to be fighting against the nature, destroying it and leaving big marks behind this vehicle should work in harmony with the surroundings, so that it doesn’t become an intruder, but a friend.
how the car sharing service would work

1. Find a vacant car from the segment you need
   2. Book it
   3. Pick it up

2. Smart phone application register you entering and leaving the car
   1. Pay per day, hour or minute
   2. Return to defined area within the city borders

3. Once a month expenses will be drawn from your account.
I started the creative process by making experimental collages in order to come up with some new interesting ideas by combining structural-, dynamic- and interactive elements.
Off road cars usually have big wheel arches, giving impression of big muscles and heavy weight, like the car sinks down and press the volume out and over the wheels. Round wheel arches gives the impression of a stable vehicle that sit solid on the wheels, while as a more angular wheel arch with a forward wedge give impression of movement.

Body to DLO ratio is usually about 1/3 contributing to a strong, tall appearance and a protective feeling for the occupants. The Wheel to body ratio is normally 1/3 of the overall height of the vehicle, but on the for example the Parcours Concept by Giugiaro and the Rally fighter by Local Motors the wheels have a diameter about half the height of the car itself, which gives them an extreme sporty attitude.

The canter-rail is relatively thick, providing security and contributing to a good body DLO ratio. And the greenhouse stabilizes in the middle, peaking above the driver usually a little rear of the actual centre point of the car. Ground clearance is much greater than on-road cars, usually exceeding more than 200mm. Jeep Wrangler provides ground clearance from 220mm to nearly 270mm. The rally fighter have an extreme ground clearance on 400mm and the BMW X6 has a 212mm. Panel brakes and colour differences is used as a visual trick to make the LM Rally Fighter appear lighter.

On the most dedicated off-road vehicles the front over hang are extremely short and the approach- and departure angle steep. As an example the Jeep Wrangler Sport edition has a 38.7-degree approach angle, a 28.9-degree departure angle. Because of the great size of this vehicles panel brakes and colour differences is sometimes used as a visual trick to make the car look lighter and faster, as on the LM Rally Fighter.
The first thing I did in the development of the actual car was to explore different packaging possibilities and seating position and how different solutions would affect the driving experience. It was also important for me to find a distinct profile that could be easily recognisable.
Shading in the most interesting thumbnail sketches, trying to look for the greatest potential.
Unique selling point: Extreme "cab forward" design combined with big wheels and high ground clearance gives a feeling of flying.

Untraditional profile reminiscent of a strong animal, but still feels lightweight.

Interesting contrast between big round volumes and edgy surfaces.

Stable and good visual weight distribution.

Important with space forward because of an unique sitting position.
The contextual dynamic element is a unique feature connecting each car to its habitat. Depending on country and use it could provide different functions as for example air cleaning or energy harvesting. In Norway there is a tradition for covering house roofs with grass and moss. People are also sun deprived after a long winter and so when the spring comes they seek out to the parks and beaches to enjoy the sun. So in the case of Norway the contextual, dynamic element would be a area on the roof covered with moss. Sitting on the roof while driving off-road the users would get a unique experience enjoying the ride from a premium spot. When not driving the users could stretch out and take a rest. In the city this element would create a great deal of attention and work as a rolling advertisement for the car sharing programme.

The moss would also change according to seasons and weather conditions rendering a car constantly in change.
More ideation based on the selected concept

Soft exchangeable top cover with some dynamic properties like changing colour or transparency mounted on a thin flexible frame (almost like a tent). The top cover will be in great contrast to the advanced technical, maybe organic, exposed frame revealed in the bottom part of the vehicle.

Integrate plants as a dynamic and contextual design element.
At this stage in the process I worked parallel with sketching and CAD to evaluate side and top view, trying to find the right stance. I also had to make sure that the package fitted two people in a tandem position and that it was enough space for all the technology and cargo. Eventually I decided for proposal number two.
At this stage I tried to combine some of the ideas from my moodboard that appealed the most to me. Could plants be used as air filtration as well as being a dynamic, contextual ever changing element that connects the car to the geographical place it is being used? Should I use swing arms with pneumatics that mimics animal legs and make the car able to jump and climb?
IN WHEELS ENGINE

DYNAMIC AND CONTEXTUAL ELEMENT
Dynamic design element by integrating living plants into the design.

SOFT TOP
Easy replaceable electro-chromatic fabric top mounted on a tubular frame.

EXPOSED FRAME
Advanced technical frame with optimized structure made by Computer Aided Optimization, Soft Kill Option or Finite Element Model.

PNEUMATIC SWING ARMS
Mimicking animal legs in order to jump and climb.
Conclusion of initial 2D phase. At this point in the process all the main features are designed and the bottom two orthographic views was used as reference for the clay development. Because of packaging issues the roof line was changed to...
Surfaces and small features were refined using the clay and proportions evaluated. Along the way I also sketched on top of the clay model to test out ideas and make quick ideation. The result was then scanned and used as an underlay for CAD (computer aided modelling).
As the car should be able to drive off road without doing any significant impact to the nature the wheels was quiet important for the design. In order to achieve this the wheel and the rest of the car had to be lightweight. I wanted to maximise the width of the tire in order to distribute the weight over a big surface as possible. Inspired by the constructions of snowshoes I came up with the idea of stretching a rubber padding around a inner frame. That way tyre treads and properties could easily be changed. The tire also had to be without big threads that would penetrate the ground, but it still needed to provide good grip.

I got inspired by snowshoes witch has all of these properties. The rims are inspired by a shark jaw that is, although thin, very strong.

Instead of having a regular tire with a inner tube containing compressed air I went for a non-pneumatic tire, a "tweel", because of its sturdiness, durability and visual lightweight.

The idea is that the tweel is covered by a rubber padding stretched around a inner frame so that the tire could easily be replaced if there is a need for other types of threads.
This is the final side view of my car. I tried hard to keep the essence from the popular key sketch and not loose too much in the development.

The sharp feature line dividing the top part is still there. I decided to emphasize the gap between the exchangeable top and the exposed frame, to emphasize the semantic properties and to provide a natural space for front and rear lights.
In order to make the car sit properly on the wheels I decided to move the rear wheels in a little bit more than the front wheels which I think works since the plan view of my car is tapering so much rearwards as it is.

The big lights is providing additional light for the dark nights and is placed as far from each other as possible to emphasize the width of the car.
From rear 3qrt view you can clearly see the dedicated space on the roof which provides an optional place to enjoy the ride.

Underneath the tail there is some magnetic rails where the occupants can attach luggage and backpacks.

The rear wheels are located so far rear to make climbing up steep hills easy.
1. Basic frame

2. Basic frame + interior

3. Basic frame + interior, swing arms, air filtration

4. Basic frame + interior, swing arms, air filtration and soft top in off-mode

5. Basic frame + interior, swing arms, air filtration and soft top in on-mode

Length: 4297 mm
Width: 2100 mm
Height: 18016 mm
Wheelbase: 3246 mm
Ground clearance: 440 mm
Ingress and egress is enabled through separation of top part and frame. The top part is pivoting from the low winch in the front.
conclusion
My main goal in this project was to arouse a new enthusiasm for cars among the general public by making a car that is adapted to our modern society and engages the users in new ways.

I proposed a new production paradigm that is oriented towards local production of specific solutions rather than large scale manufacturing of standard solutions. This transformation will be possible due to advancements in 3D printing, intelligent robotics and open source software. My proposal is exemplified through the design of an all-road vehicle for the Norwegian market.

This car makes use of growing plants to achieve a new connection between the users and the car. Not only do the plants connect each car to its habitat, but they could also enable several smart functions as for example air cleaning or energy harvesting. In the specific case of Norway moss would be used on a dedicated roof area to serve as a soft surface where the users can sit while driving off-road and thereby providing a unique driving experience.

While being exhibited at the degree show the model got a lot of attention and people were curious about the use of living plants. I think the interest shown towards my project to a great extent proves that I succeeded in making a car that engages people in new ways.

As a transportation designer I have developed a lot. Mainly because I have gained a much better understanding of traditional car proportions and styling cues which was necessary in order to create a different design that aimed to be what Raymond Loewy (American industrial designer, 1893-1986) described as; most advanced, yet acceptable. I have also become much better to communicate my ideas through sketches by emphasizing the right properties or functions. I have evolved greatly as a CAD modeller and I have proven that I am able to understand three-dimensional shapes and build advanced physical models which represent my original design vision.

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**JANUARY**

1. Project scale up
2. Research review
3. Initial talk with Ernst-Jan Muhl
4. Discussion with Ernst-Jan Muhl

**FEBRUARY**

1. Tutoring session 1 - Sketch review
2. Tutoring session 2 - Sketch review
3. Evaluation of ideas with Ernst-Jan Muhl
4. Selection of exterior and interior concepts

**MARCH**

1. Choose ideas
2. Prep for milling
3. Mid-review
4. Explore how nature could enable functional properties and inspire a "new" visual design
5. Dev. select. ideas
6. Project kick-off
7. Research review
8. Initial talk with Ernst-Jan Muhl

**Research, writing of design brief and portfolio layout**

- Assignment 4 & 5
- Biomimicry ideas
- Experimental sketches
- Explore how nature could enable functional properties and inspire a "new" visual design
- Dev. select. ideas
- Project kick-off
- Research review
- Initial talk with Ernst-Jan Muhl

**Tutoring session 2 - Sketch review**

- Exterior and interior

**Mid-review**

- Prep for milling
- Mid-review
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- **Prototyping by Semcon**
- **Make final presentation by students**
- **Final renderings**
- **Final CAD model**
- **Printing at model**
- **Illustration**
- **Design talks**
- **Send CAD data to Semcon**
- **Degree report**
- **Prep. for pres.**
- **Examination**
- **Design talks**
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