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Grado en Ingeniería en Diseño Industrial y Desarrollo de Producto

Snøvær

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TFG REALIZADO EN PROGRAMA DE INTERCAMBIO

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RESUMEN

El presente documento recoge el proceso de investigación de actividades en la nieve, junto al proceso de diseño y creación de un producto destinado a este sector, a partir de reutilización de otros útiles. Se basa en la idea de dar una segunda vida a aquellos productos que dejaron de ser funcionales para su propósito de creación y así dar lugar a nuevas ideas. En la siguiente memoria del proyecto se encuentran las diferentes técnicas de investigación aplicadas y el proceso de diseño utilizado. Para este proyecto se tomó como tema principal las actividades al aire libre durante el invierno, comunes entre la población noruega durante una estación importante para ellos. Como resultado dio lugar a un nuevo vehículo de nieve destinado al ocio, teniendo en cuenta la cultura e historia detrás del entretenimiento durante el invierno en las zonas geográficas frías.

PALABRAS CLAVES

Vehículo, nieve, reutilización, diseño, producto.

ABSTRACT

The document consists of the investigation process of snow activities, next to the design process, and the creation of a product for this sector from the reuse of other objects. It is based on the idea of giving a second life to those products that are no longer functional for their purpose and thus give rise to new ideas. In the following project report, you will find the different investigation techniques applied and design processes used. For this project, we took the winter outdoor activities as the main theme, common among the Norwegian population during an important season for them. The result was a new snowmobile for leisure, considering the culture and history behind the entertainment during the winter in cold geographical areas.

KEY WORDS

Vehicle, snow, reuse, design, product.

FINDVÆR

BAPD 2210 Cultural understanding and communication
January 2021 - April 2021

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Ludvig Nygaard Juul

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Andreas Selnes

Celia Alonso

Håvard Sirevåg

Ludvig Nygaar Juul

Abstract

For this project, we started with some ideas that came to us from the collected objects, without expecting anything concrete. After combining our ideas and continuing to investigate the possibilities of our concepts we came up with several that had great potential. The chosen concept, a snow bike, finally motivated us to develop all its possibilities, so through mock-ups and sketches, we developed what we were interested in. During the whole process together we analyzed what we had to improve and look at in more detail.

All this led us to realize the first idea that had a solid base with consistent characteristics. In its construction we were faced with the fun task of building, creating, testing, and reflecting. The results of the tests made us realize the mistakes and corrections that had to be made to arrive at our final product.

Based on today's society we realized the empty value of sleds at certain ages and how to give them back the meaning they once had through products that will not be used. As the result of the project, we give a new look to the typical sled, physically and graphically to adapt it to society. For the new object, we designed posters, advertising video, logos, and other graphic designs to accompany the product and achieve the image we wanted for the user.

As we worked with second hand material for this assignment we needed to test the properties to ensure a certain level of strength. Which led us on a practical approach. This became difficult once Covid-19 related regulations became stricter. Despite the regulations we managed to finish the project digitally with 3D modeling and rendering.

Background

Nowadays, we throw away items even if they are only slightly damaged. Items that possess a variety of different properties worth re-using for all kinds of causes. If we wish to give our kids a future with a healthy planet, this must change. We must be more aware of the value of broken items.

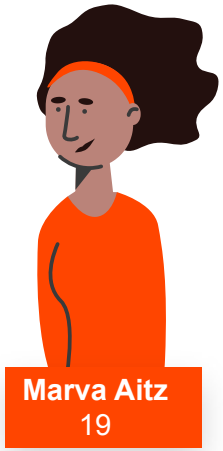
As designers we need to think of the reusability of materials. We started the course by watching the showcase of the Disney Pixar movie Wall-E. A movie about a curious little robot that was programmed to clean up the world. As Wall-E cleans up he finds different types of interesting objects, and reuses them in a totally new way to fulfill his needs. We as designers need to learn from Wall-E. A chair isn't necessarily only a chair.

We wanted to challenge ourselves to create something new out of discarded material collected at Haraldsrud recycling station.

We came up with this research question:

How can reclaimed material be used when designing for dynamic and harsh use?

Personas

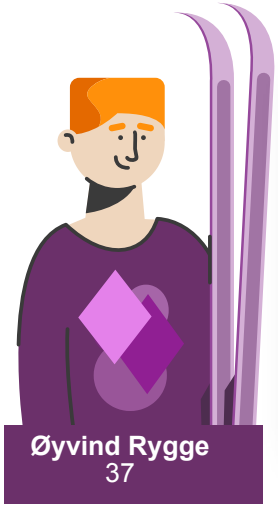


Marva Aitz

Living in Drøbak
Singel
Wants to learn skiing

Heidi Klepp

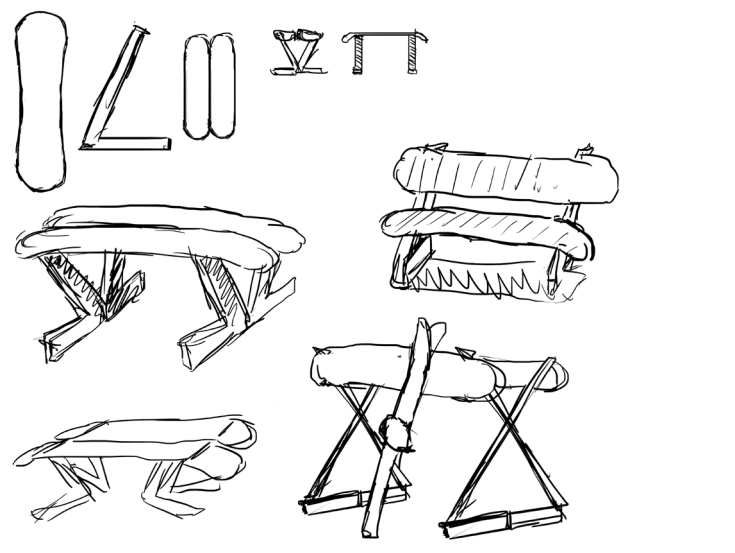
Living in Eidsvoll
Singel
No children but has a dog
Glad being outdoors

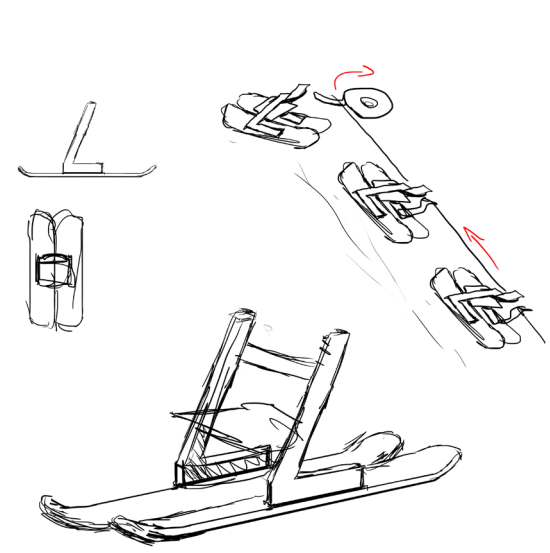


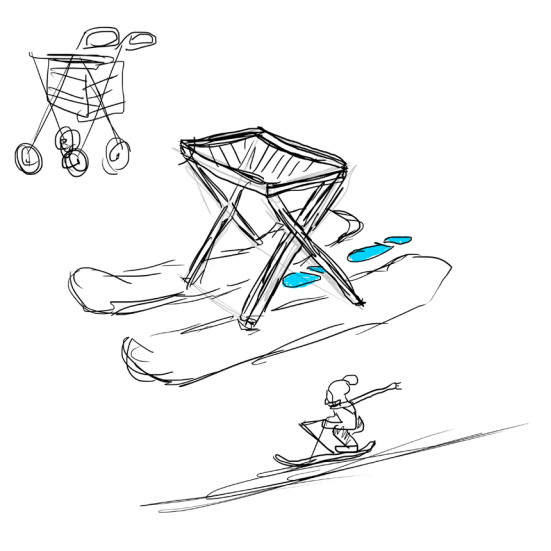
Øyvind Rygge

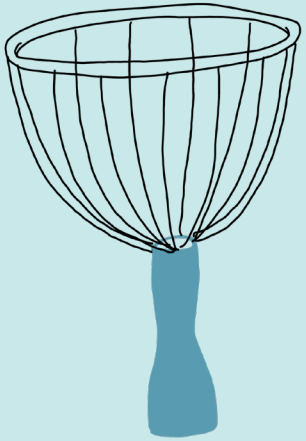
Living in Drammen
Married
Two children
Glad being outdoors

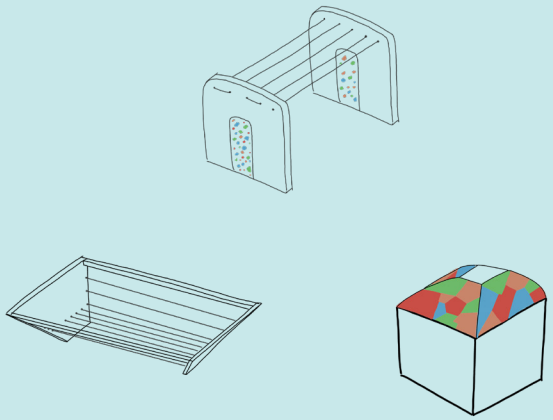
Initial Sketching

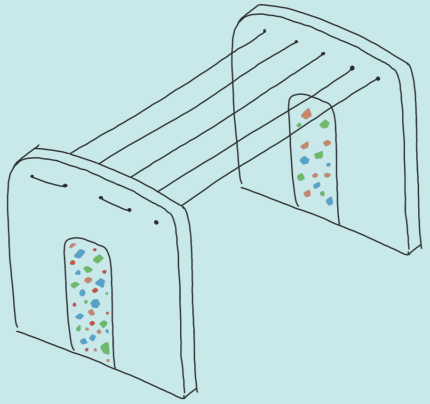


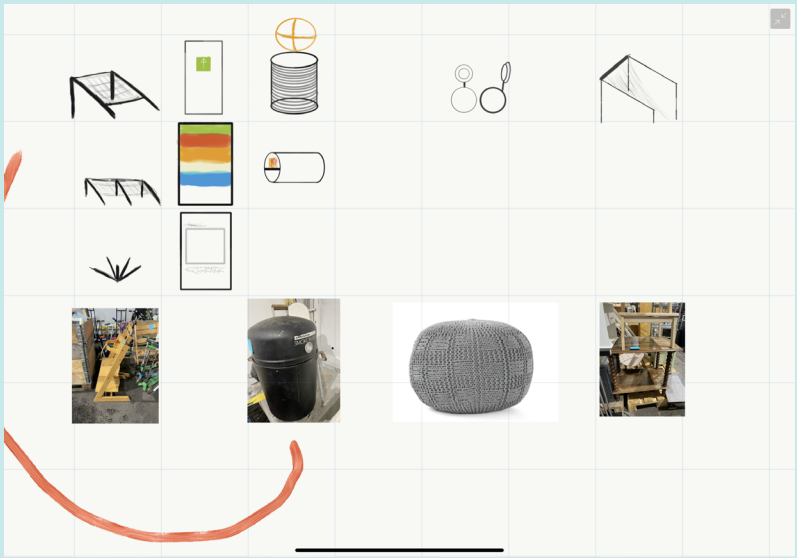


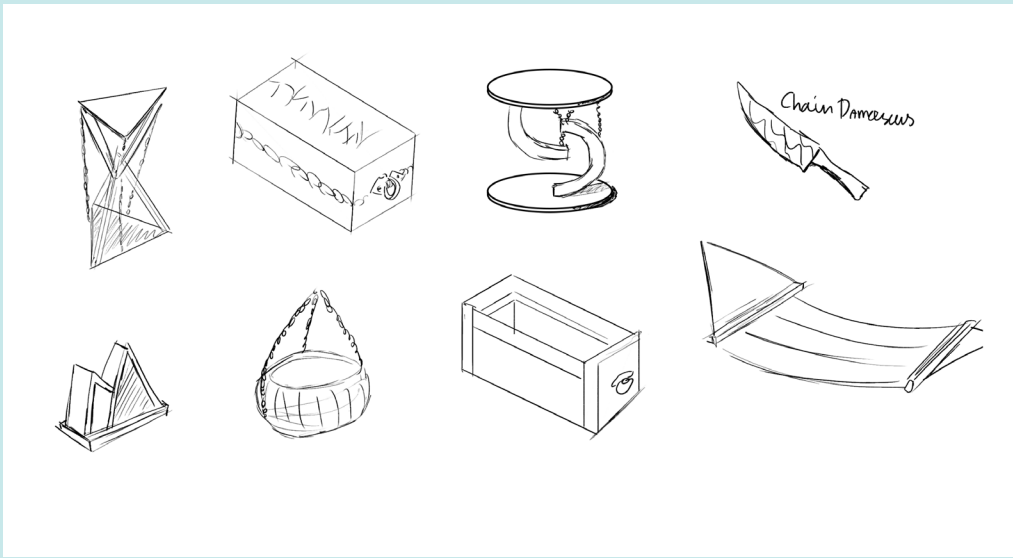






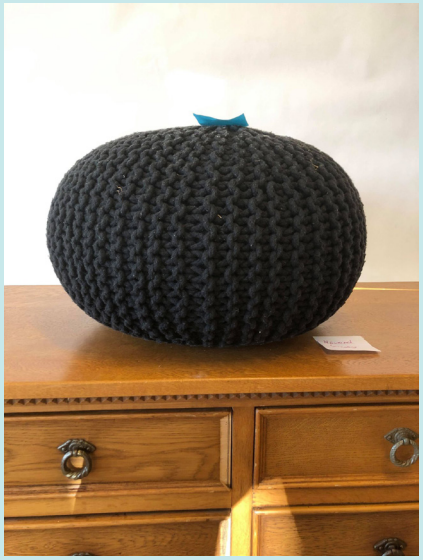





Chair Damascus

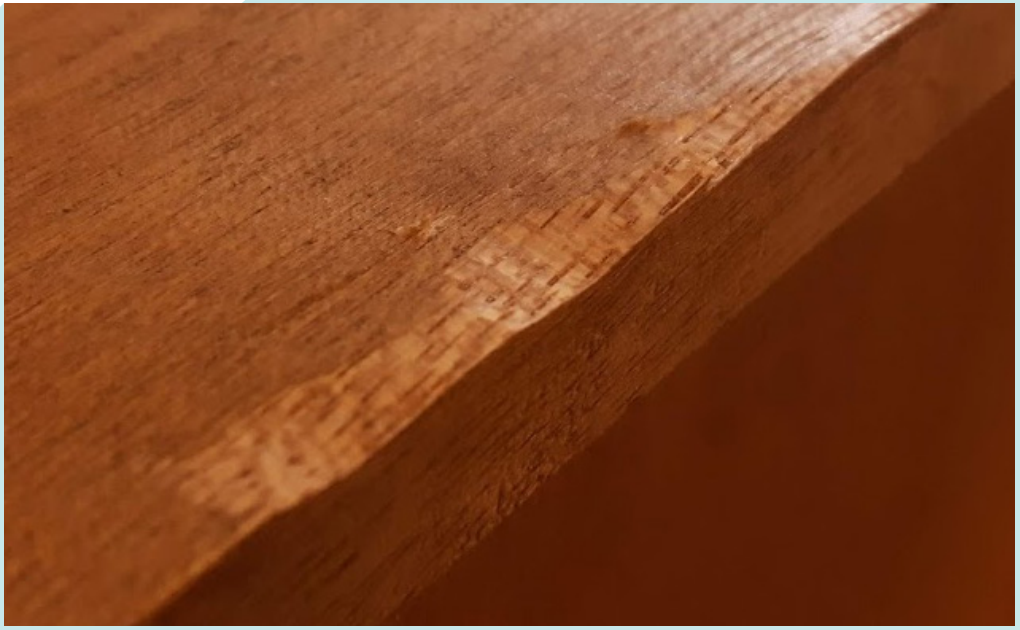
Gathered Materials


BRINKMANN
SMOKE 'N GRILL




Harvard
Stevens

Material Analysis



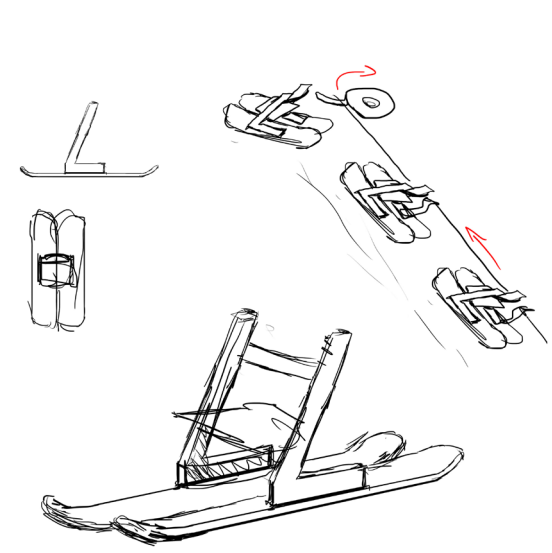
When we picked out the materials from haraldsrud, we focused on the reusability and the potential of the different items. To begin with, we had around 30 items before re-evaluating the need for everything.

The material we wanted to keep all had potential and different properties that we saw fit in our main concept.
The material was as follows:
Three tripp trapp chairs out of beech wood to provide structural integrity and sturdiness. Simple forms. Already made for modular use.
Two sets of tire chains. Mainly focusing on the chain itself. Sturdy and strong. Nice for the tensegrity principle in our concept. Raw metallic color.
Two snowboards. Snow sliding properties. Flexible and rigid. Meant for flex. Bendable without losing its shape. One of the pairs is deep blue and the other dark grey green.
Chest of drawers. Quite a lot of reusable wood. Darker wood. Strong and sturdy. Hinges and other metal parts.

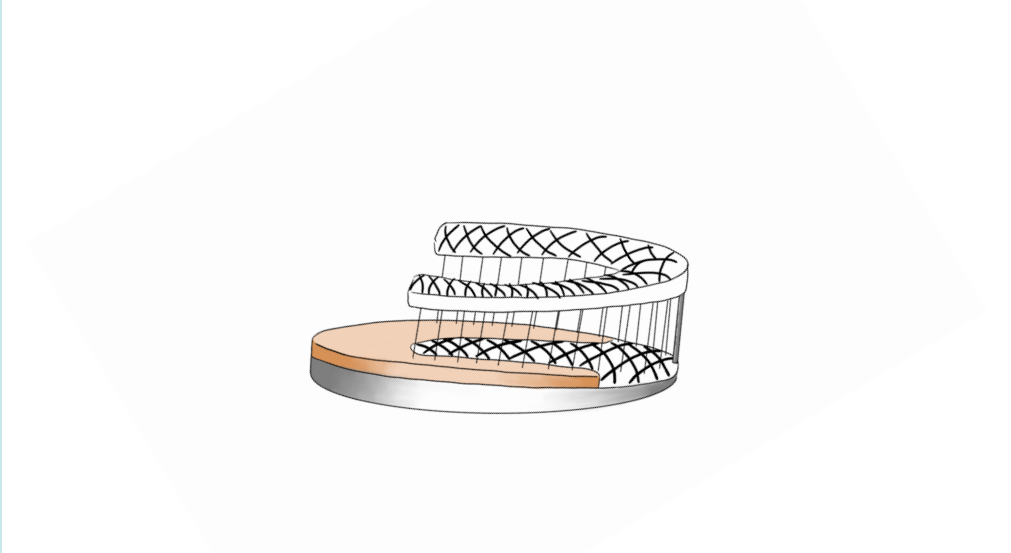
As a part of our prototyping, we made a test rig for testing the possibility of using snowboard material as suspension.
The rig's purpose was originally only meant for testing flexing on the spot, but because of covid limitations we needed to reuse this rig for later testing as well instead of a more developed rig.
The material used in creating the rig was picked out from wood scraps and leftovers. The same goes for the screws and bolts.
The assembly of the rig was sturdy enough to keep the frame and legs as rigid as possible as the only movement we wanted was from the suspension.

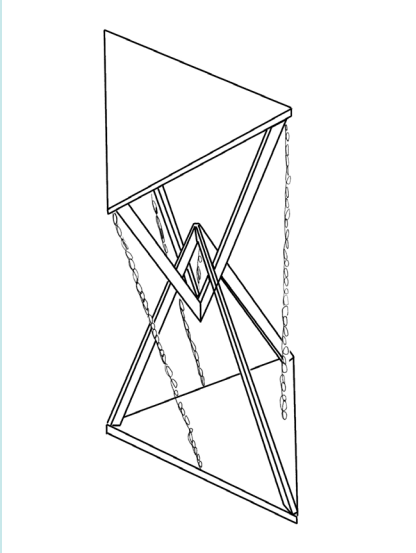
Some modifications were made to make it possible to test outdoors.
The results from the original test suggested to double the snowboard material. This was done in a leaf spring fashion.
The final test of the slightly modified rig provided a suitable result for the concept.

Selected concepts

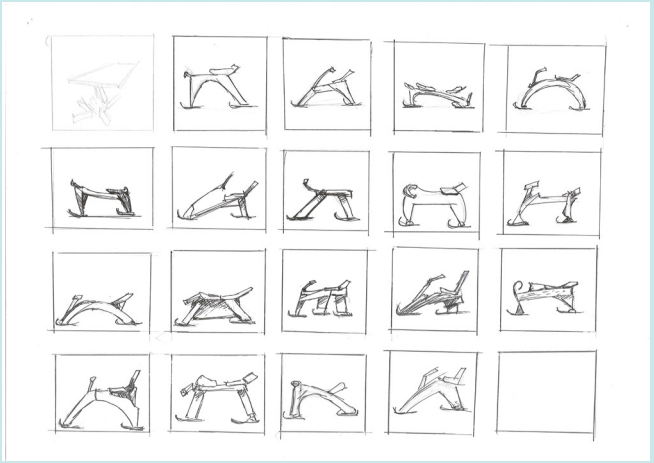


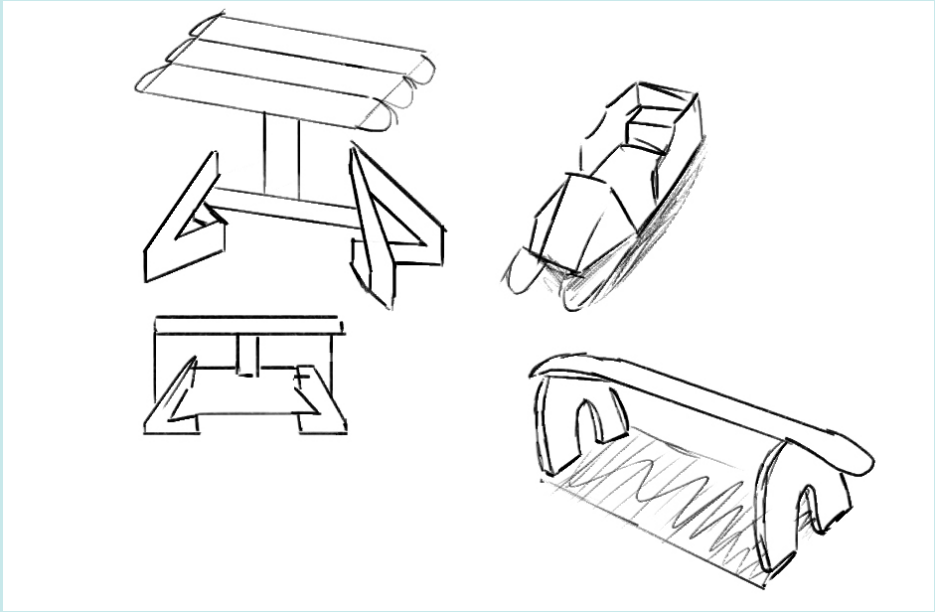
During the design process, we decided which three concepts we found more interesting among all the sketches we made to develop after the second part of the assignment. The three chosen concepts were the bicicle, the tensegrity tables, and the lounge chair which you can see in the attached photos. Then we continued sketching more ideas from all the concepts to see what they suggest to all the members of the group. Using this method we had more different views of the concept that we could research and develop later.

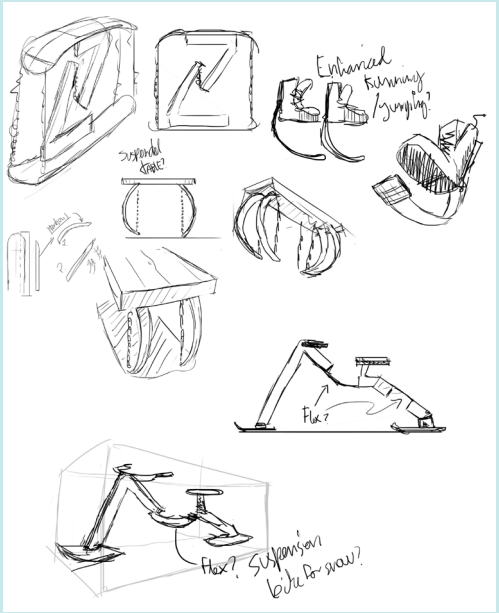


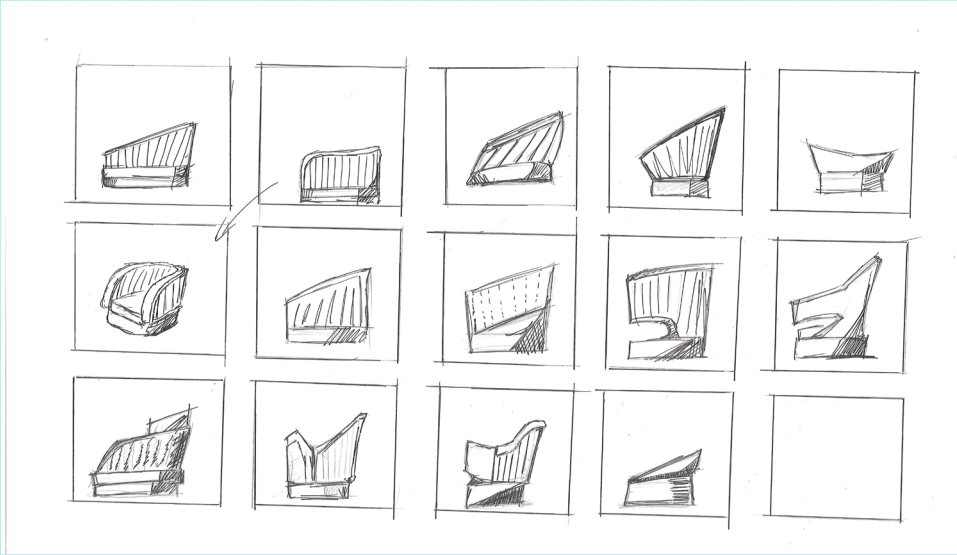


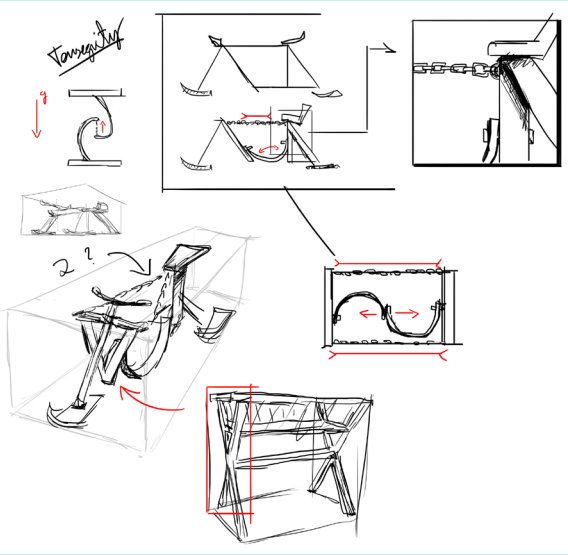
Coninued Sketching

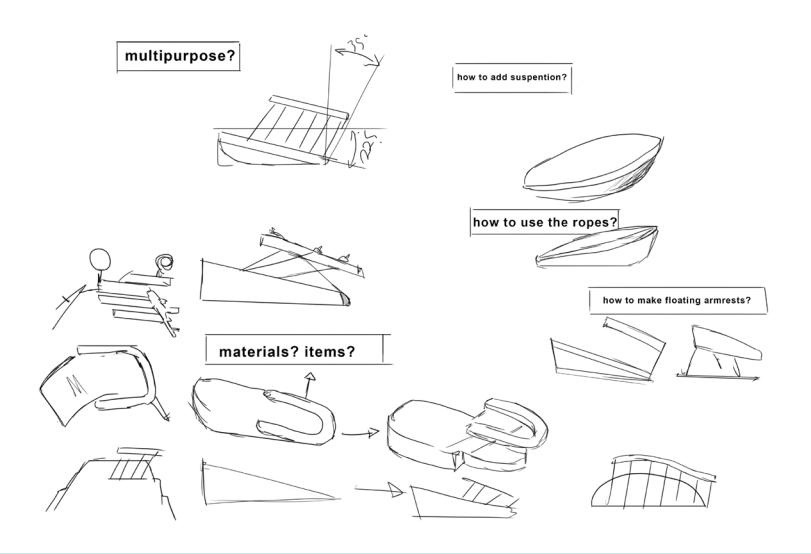


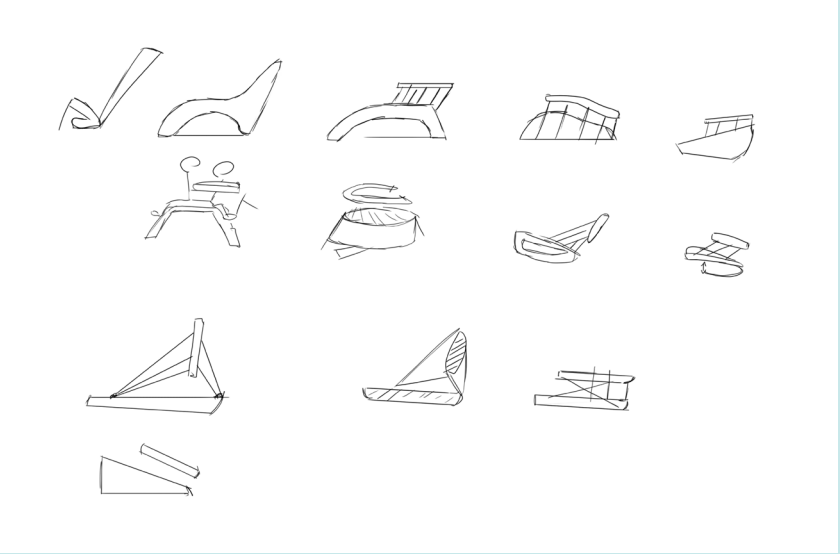


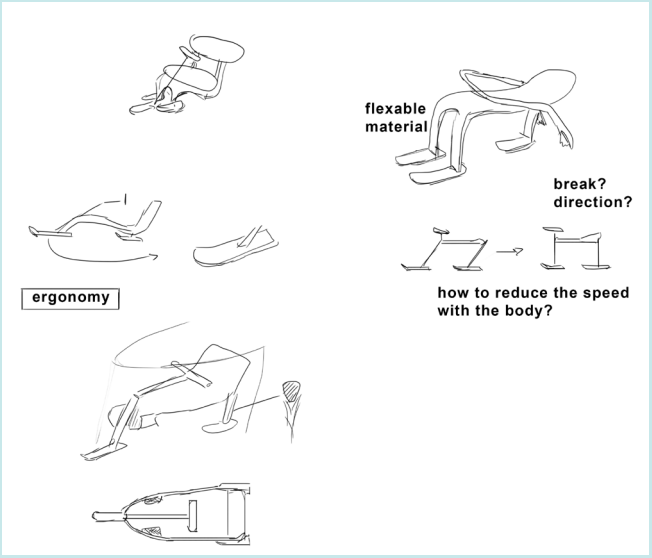


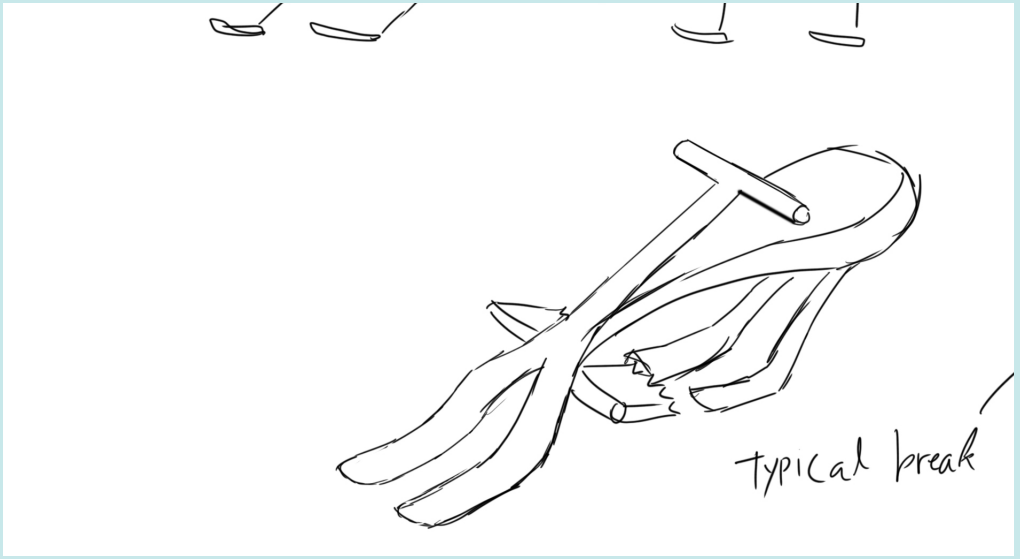


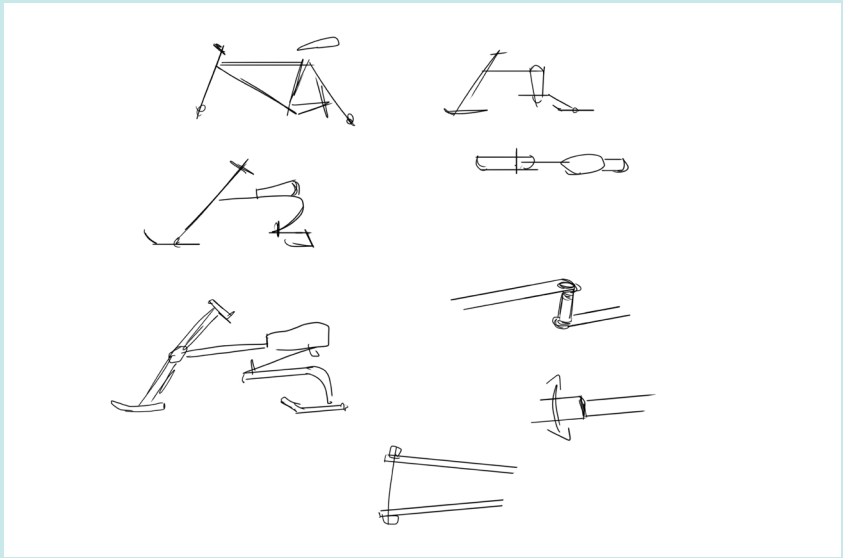


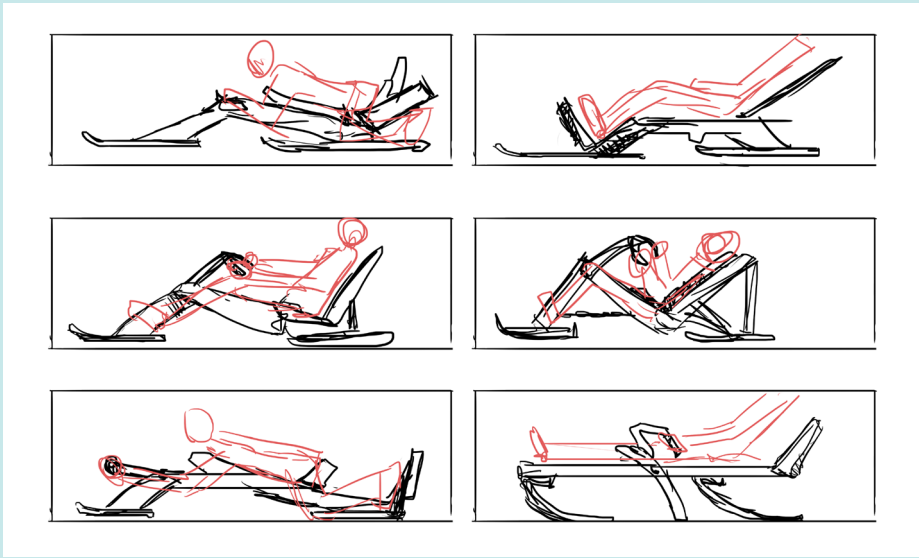

multipurpose?
how to add suspention?
how to use the ropes?
how to make floating armrests?
materials? items?

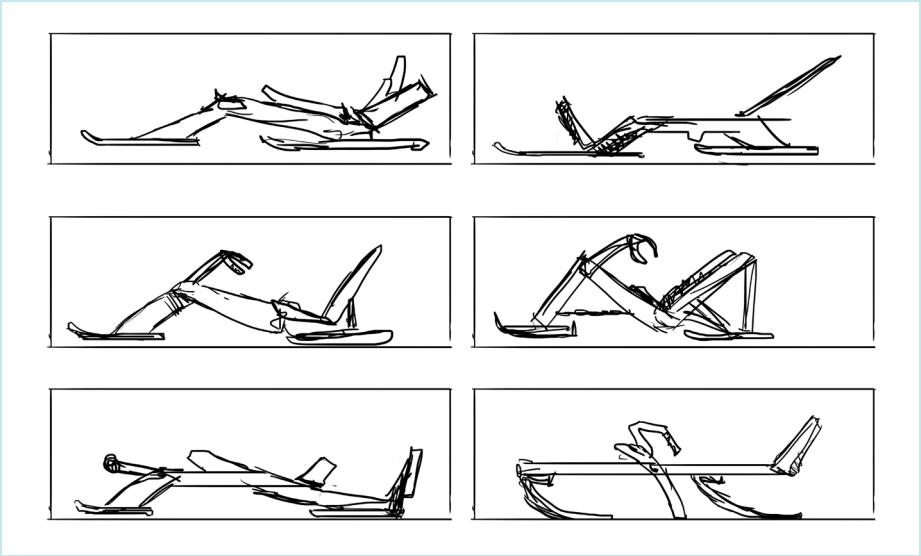


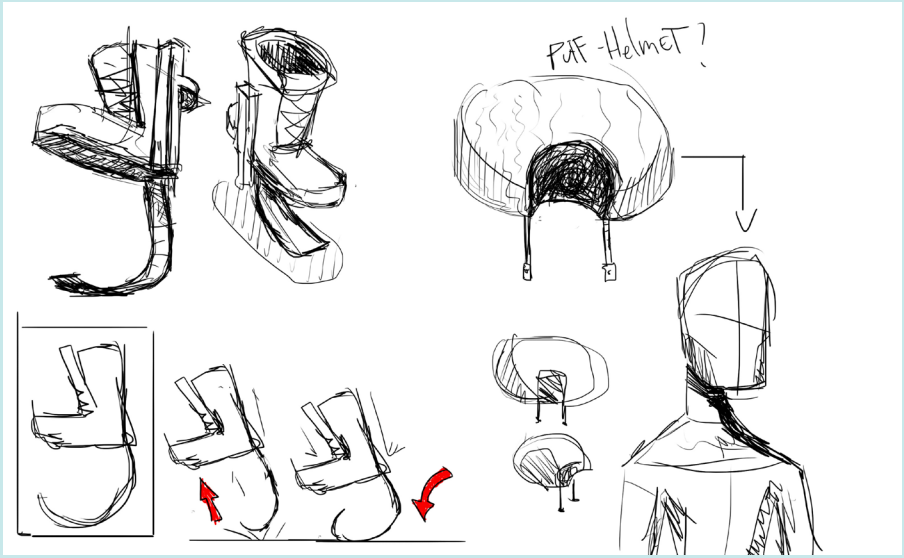

flexable
material
break?
direction?
ergonomy
how to reduce the speed
with the body?

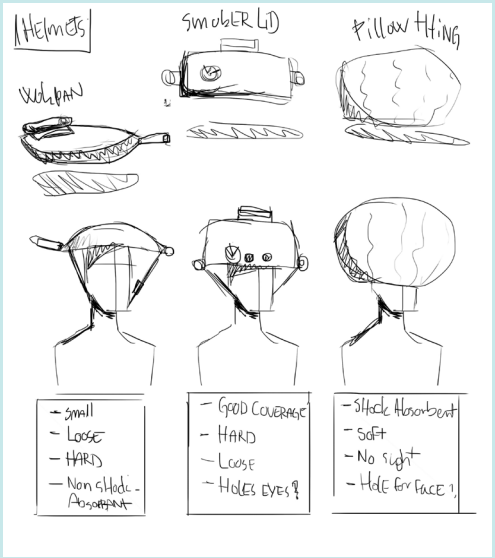

typical break

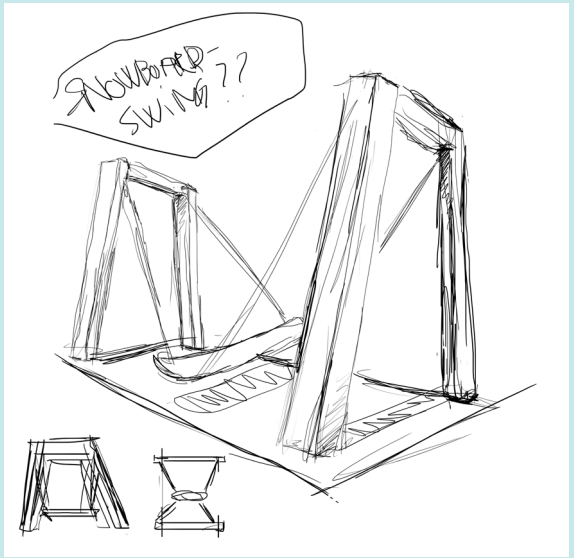


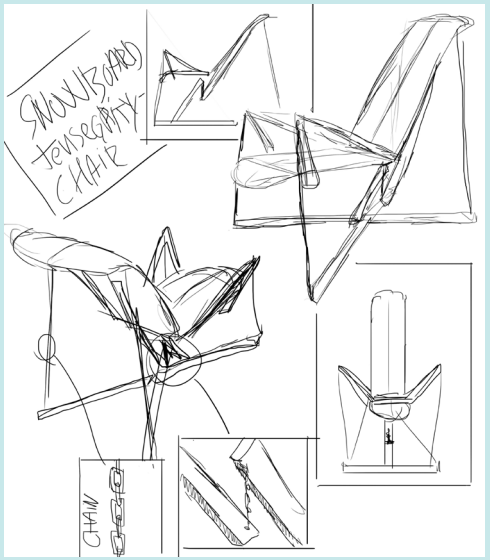


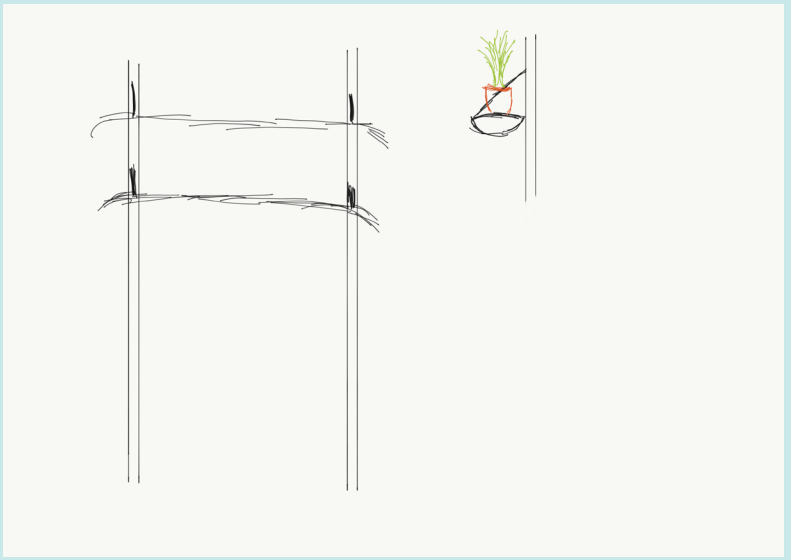


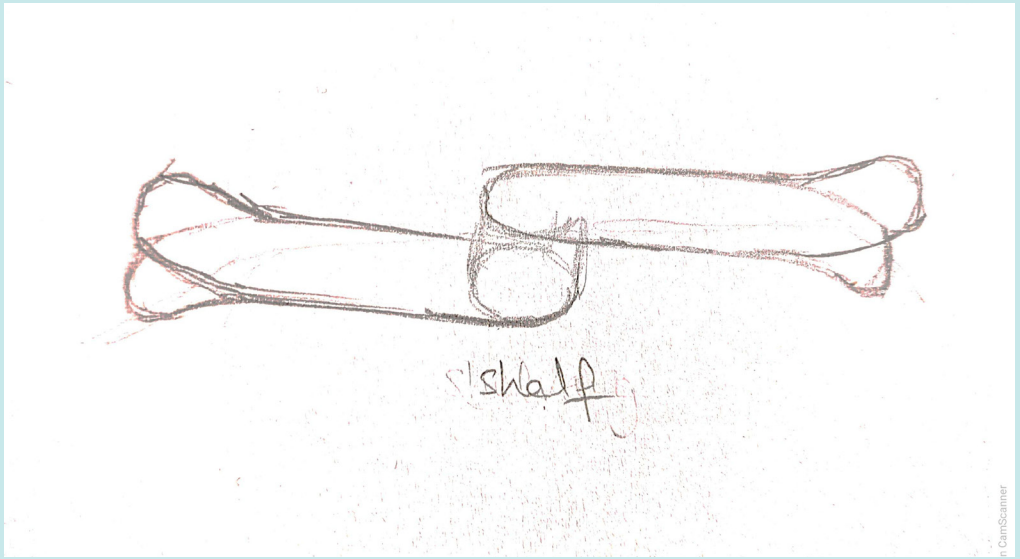

Puf-Helmet?

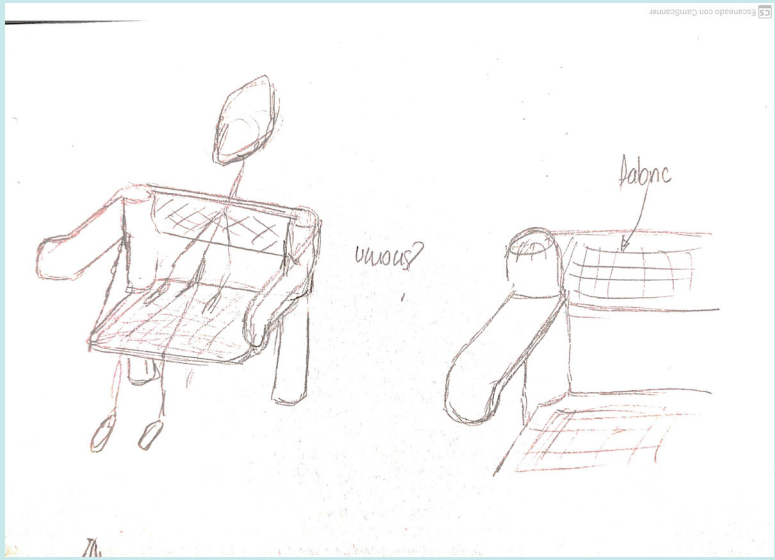

Helmets
Smoker Lid
Pillow Thing
Wolfpan
- small
- Loose
- HARD
- Non shock-Absorbant
- GOOD Coverage
- HARD
- Loose
- Holes Eyes?
- Shock Absorbent
- Soft
- No sight
- Hole for face?


Snowboard Swing??


SNOWBOARD
TENSEGRITY
CHAIR
CHAIN




shelf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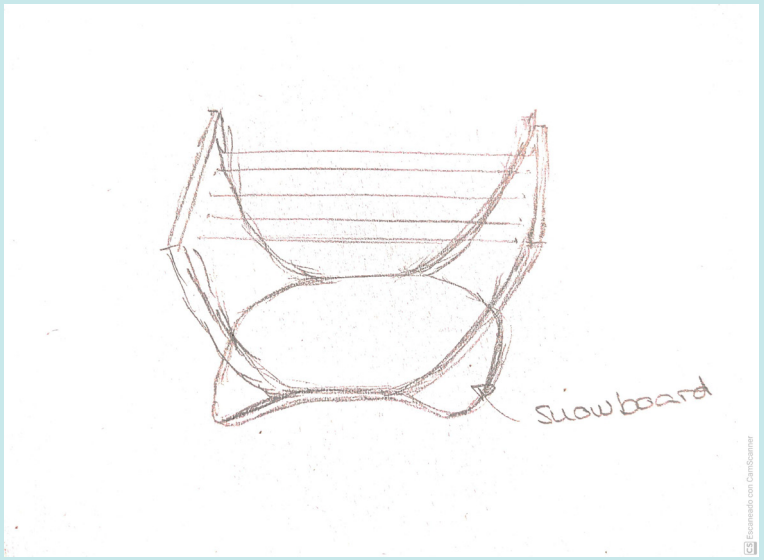
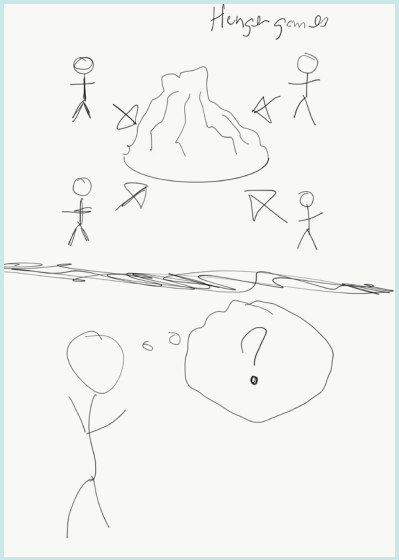
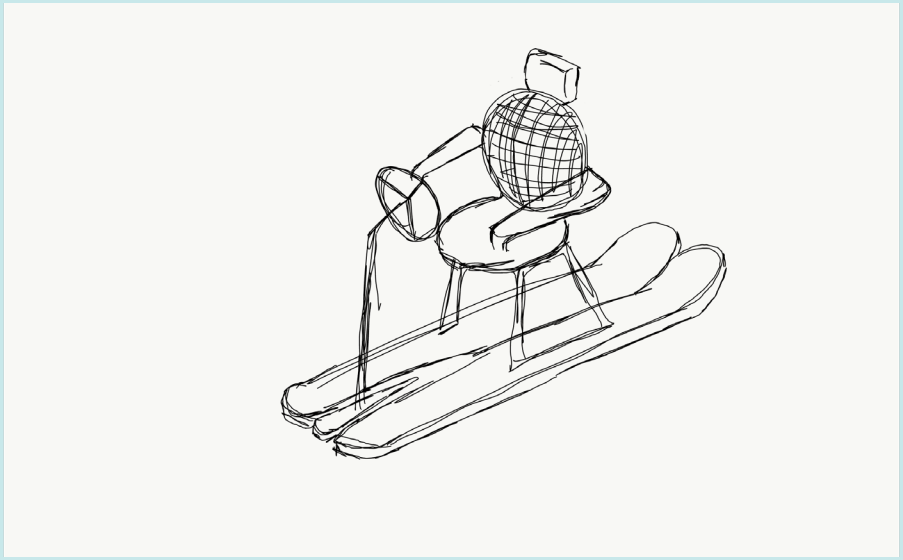
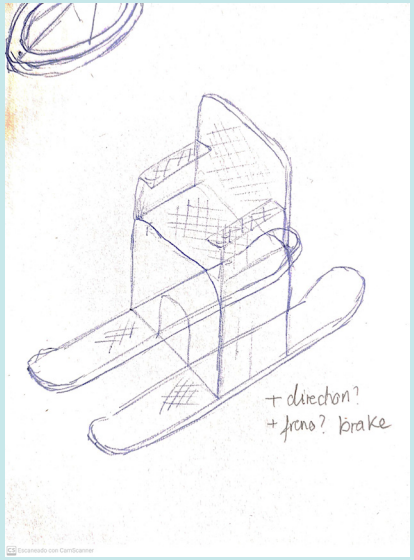
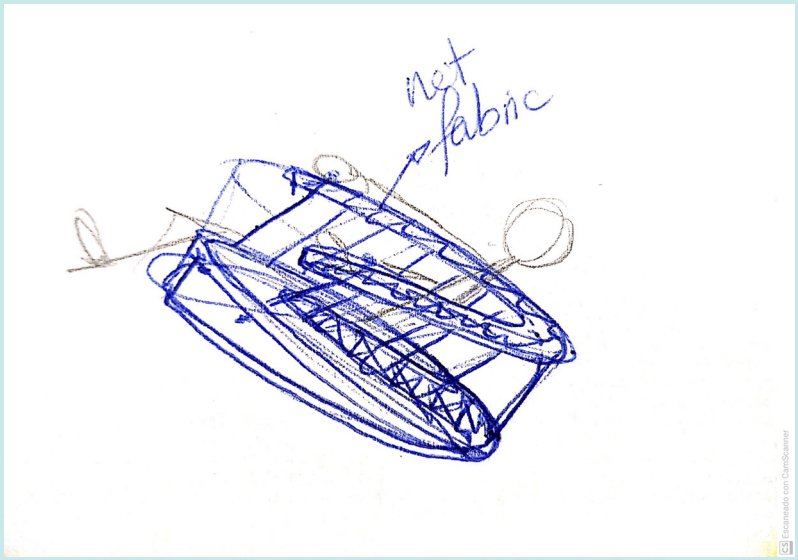
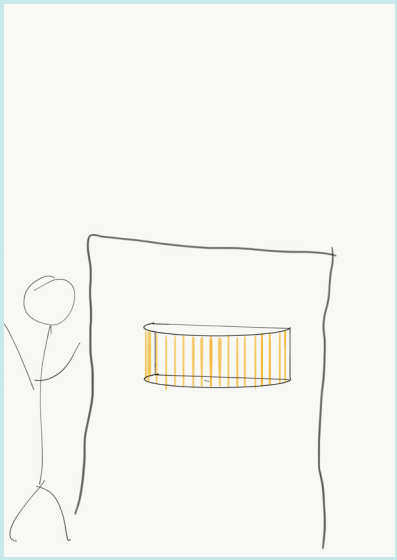

Snowboard

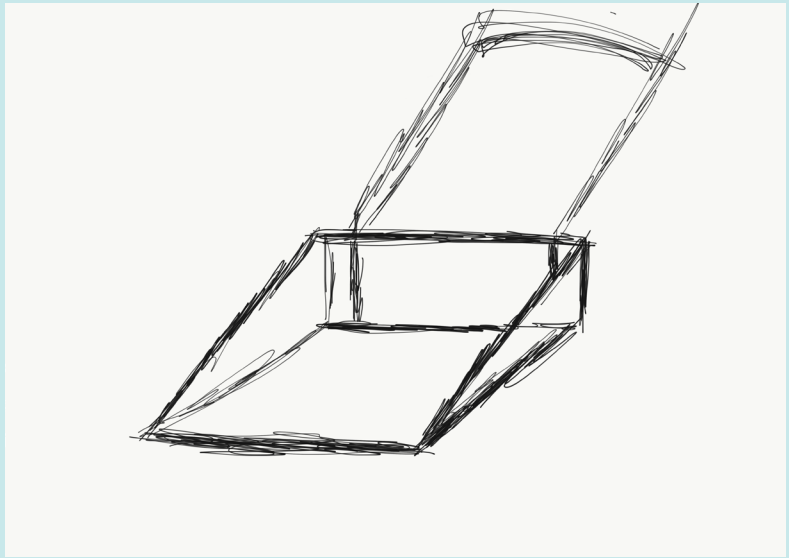

Hunger games
?



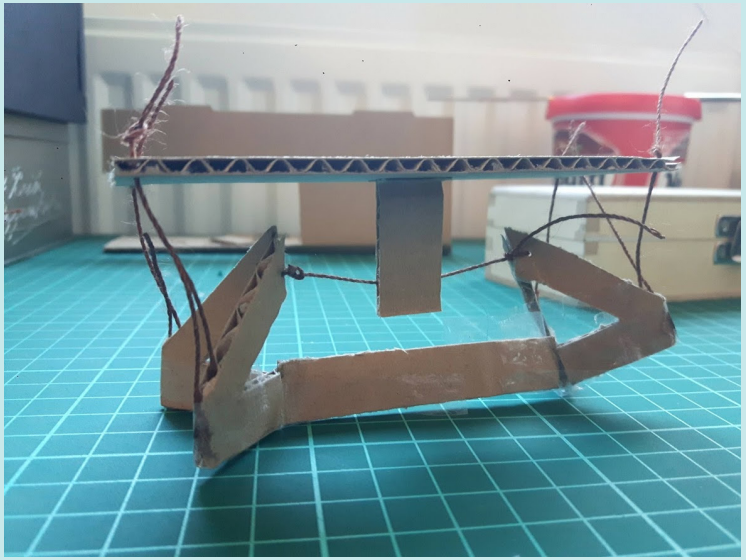

+ direction?
+ frena? brake

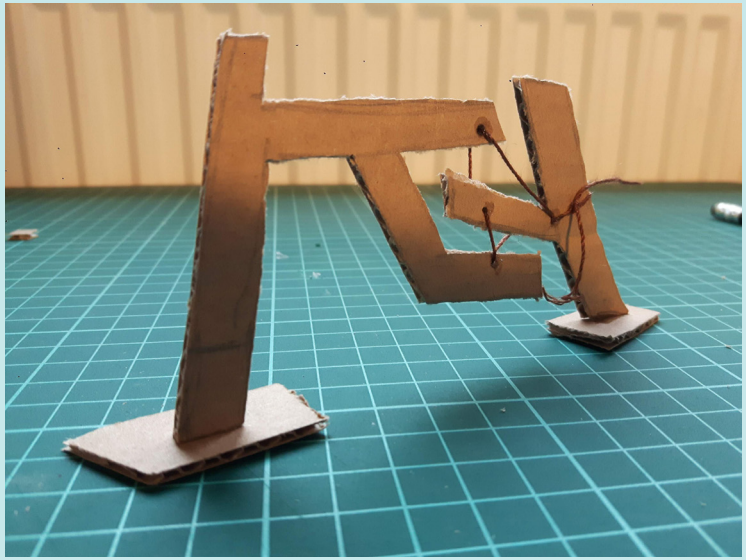

net
fabric

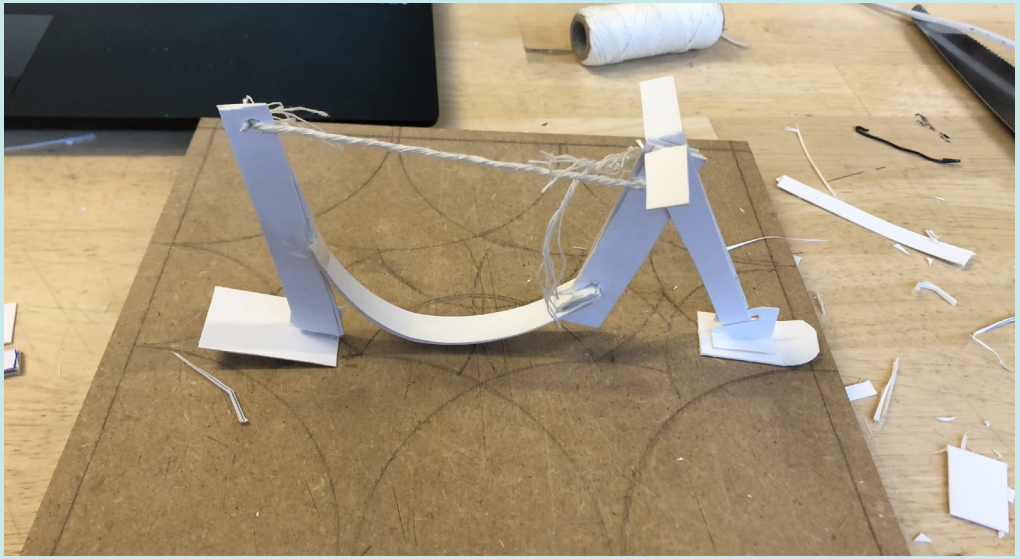




Exploration phase mock-ups

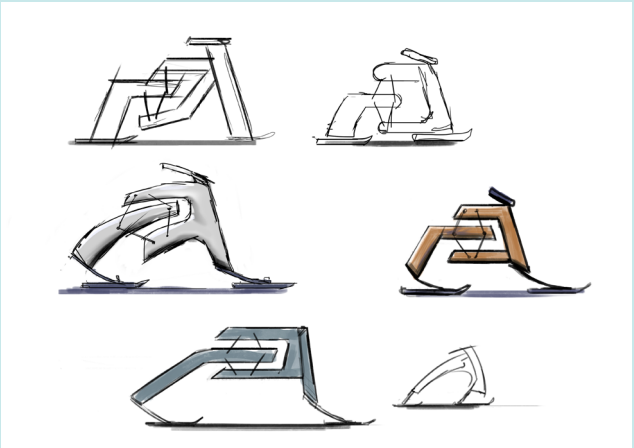


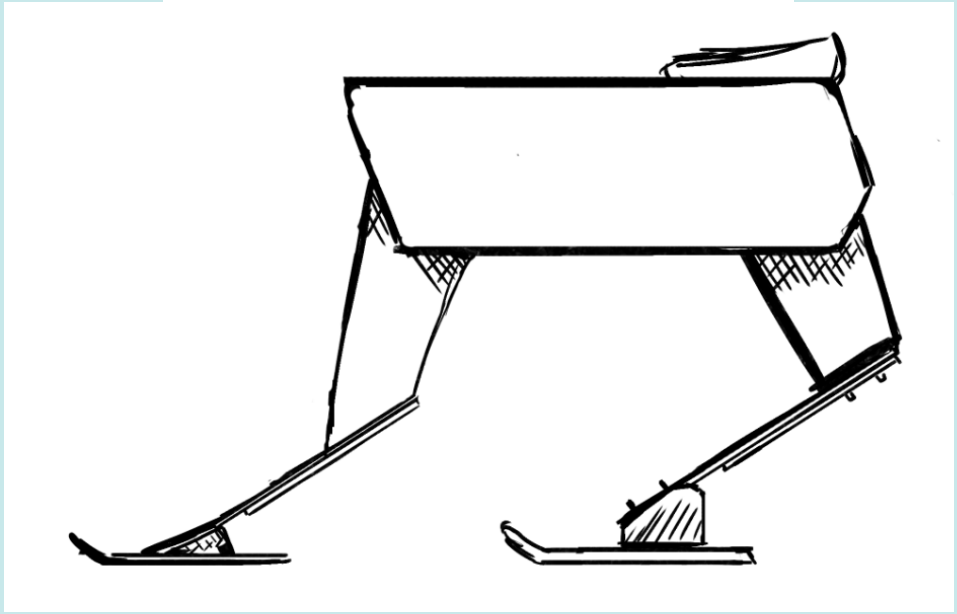


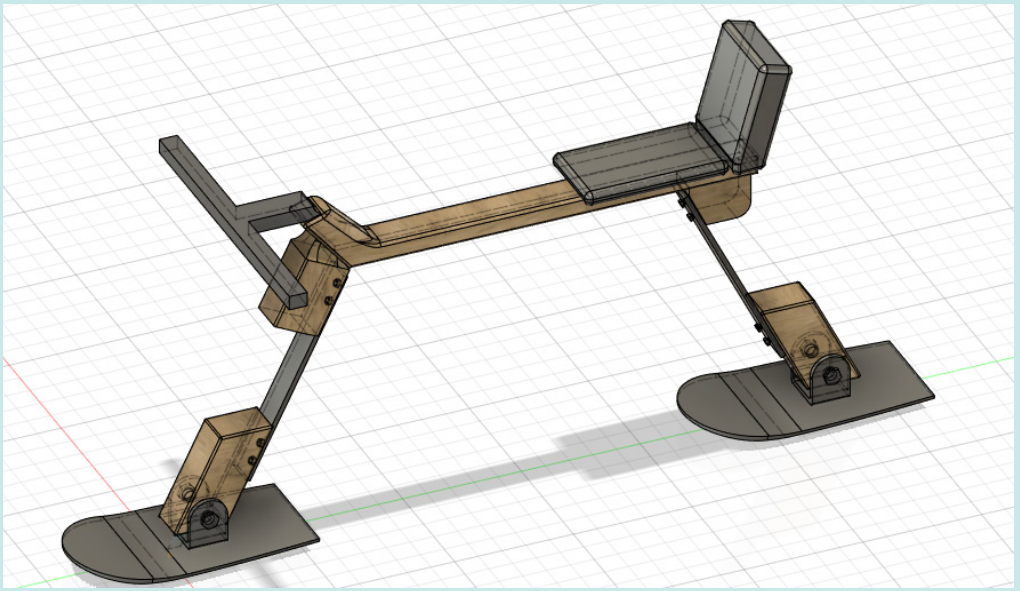


These little mock-ups, made of cardboard and thread, helped us with seeing physically the ideas we sketched and checking that the concept worked. Through them, we could be sure that the tensegrity could be applied to the snow bike. They also allowed us to see that we could apply the tension in different ways to the bike.

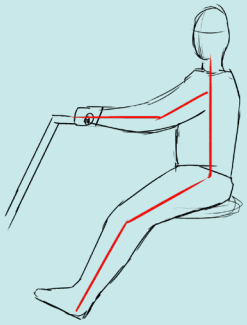
Further Development

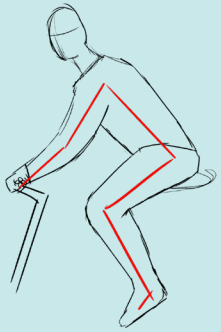






Ergonomics and Dynamics



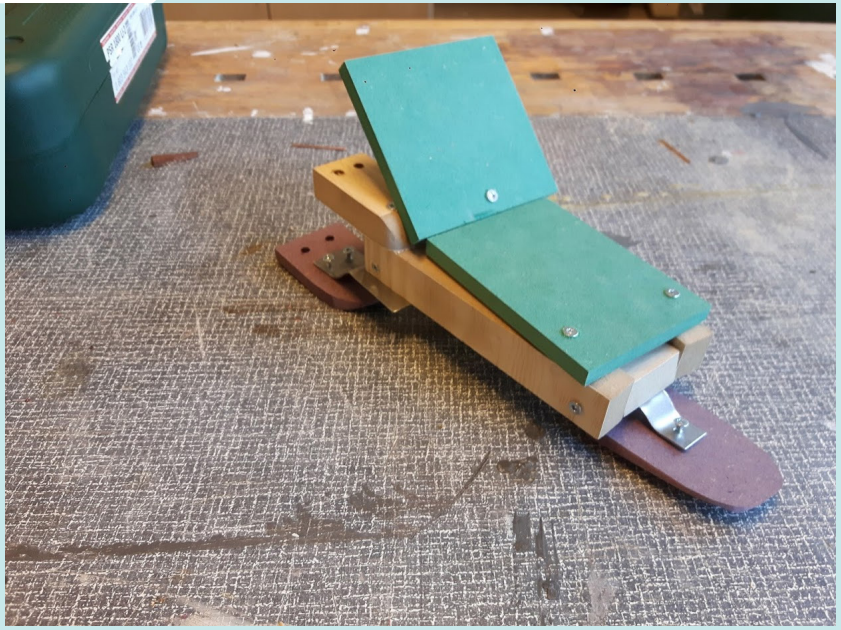


Adapting the product to the human body is one of the main characteristics of this project, it is important that the user feels comfortable using it as it is an object destined to interact with the users.

For the development of the ergonomic part, in the beginning, we thought about placing a seat and making it more similar to a bicycle or a sled, but after talking we agreed to make the object without it, making it more dynamic. This led us to investigate further into the ergonomics of the product and the position the body would be in when using it.

We started by analyzing the position of the feet and how it affected the stability and firmness when using it. We concluded that the feet should be placed at the bottom near the ground for better control. Then, for the handlebars, we were discussing how to position them for better grip and more dynamism. The result was to place it in front of the bar to exert more force and allow better steering control. Finally, to complete the study we took into account the general position of the body. We had the option of placing the elements in different places depending on how we wanted it to be controlled, but as we aided to find something more dynamic we decided that the body should be slightly inclined forwards as shown in the second drawing.

Refined mock-ups

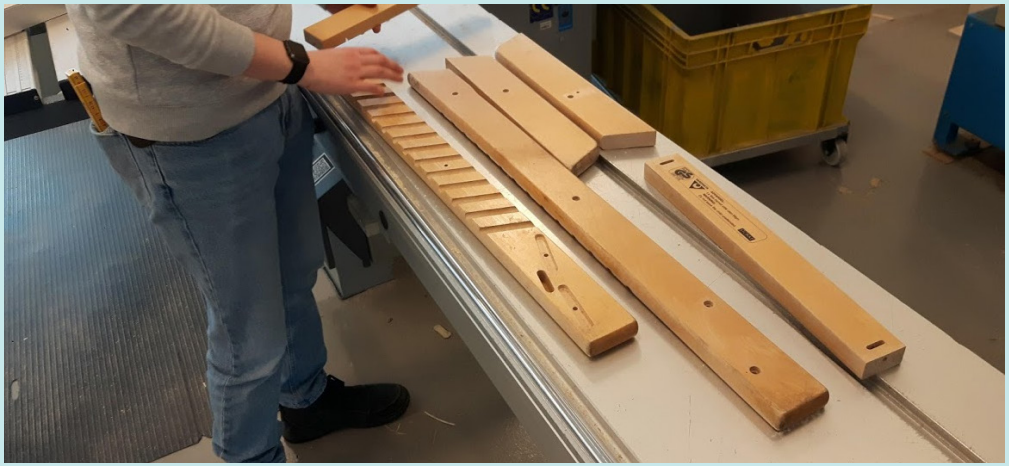


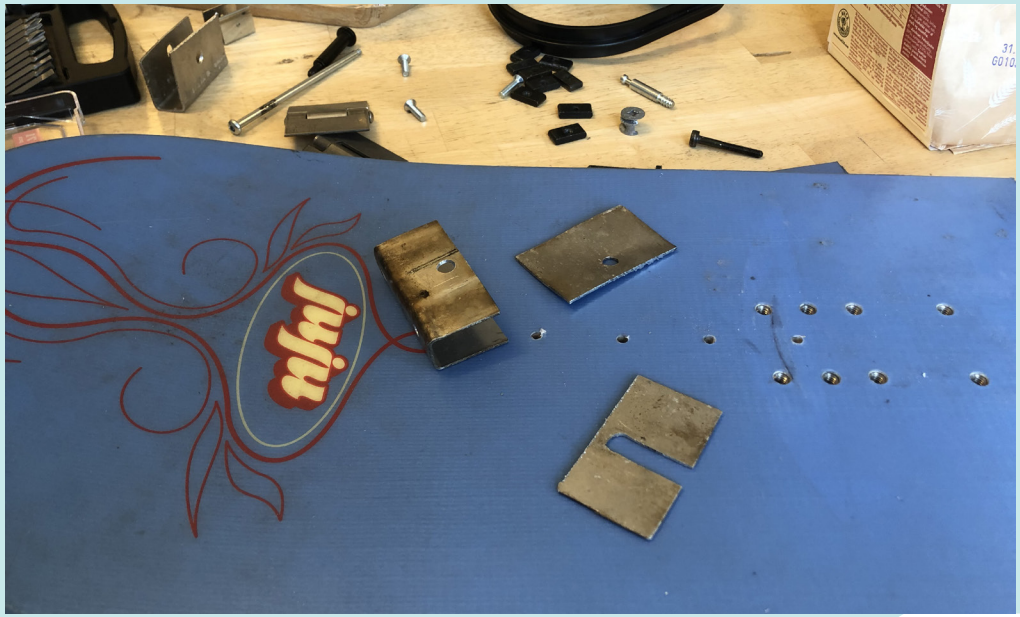
As a phase of the concept development, we made better mock-ups to see them with a more realistic appearance. Thanks to these mock-ups we could also check the stability and the options for the position of the rope, those characteristics that are basic for the concept we were creating.

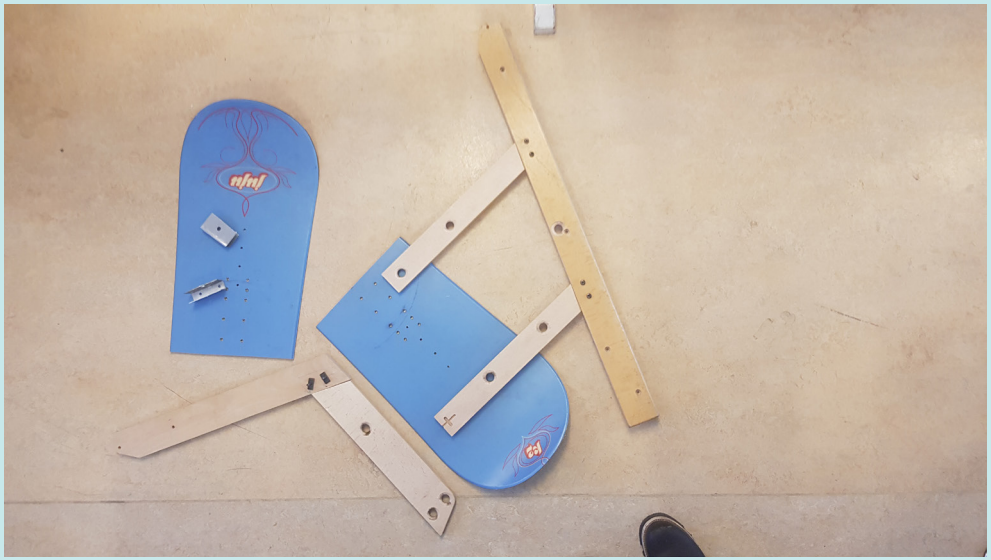
Desk Presentation

After the desk critique we started to discuss the aesthetic value of the sled, as in the cardboard models that we made. This was when Andreas came up with the idea of why we couldn't make it a challenge for ourselves. Inspired by the workshop "Making do with what we have". We found it hard to argument that this is something you could make on your own. First, it would demand the right materials, as well as the right tools. For the second, we as a group felt it was more important to encourage people to have fun in the snow with their kids and family.

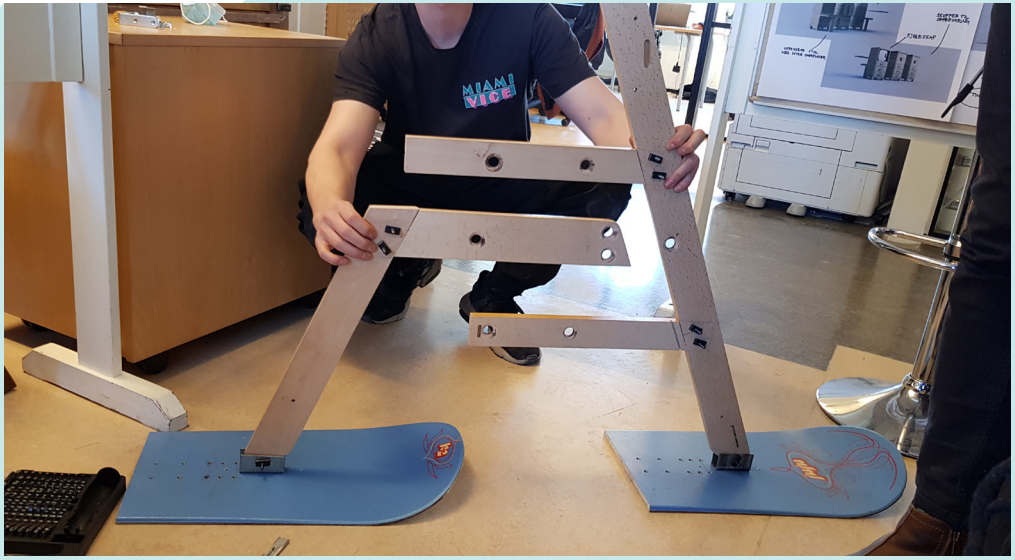
Constructing first prototype







Continuing with the tests, we started to make the first prototype with the materials we collected from the recycling point. Together we cut and joined the different parts with the tools we had available at that time. We used some parts of the chairs to make the bike frame, pieces of the snowboard for the skis, handles from the smoker, ropes from the puff and other little elements such as screws, nuts and sheet metal. The purpose of creating this prototype was to check that the idea we were developing made sense and that it was reliable, also to draw conclusions and mistakes to be able to implement it in the object to improve it further.


MIAMI
VICE

Prototype
CAD reconstruction

We Digitaly reconstructed the initial prototype after building it. We did this to have a digital refernece, help with analysis, but primarily to use as reference whn moving into the process of digitaly designing the next version.

Having a digital version also allowed us to create digital mock-ups of scenes we wanted to photograph.

Full Scale Model

Testing

Assembly of Mark I. went slower than expected. We were initially planning to test on Friday 12.03. However we were unable to complete the prototype in time. we then aimed for completion on monday the following week. Due to HSE courses in the workshops restricting access to tools vital to our process, this once again became undoable. We were however not far from completion at the end of the day, and decided we would do tests the following day, on Tuesday 16.03.
The test would go as such: after the lecture on graphic design By Sam Bannister we would ensure all components were in place. We would have 5 cameras in place on and around the prototype. initial testing would be done on a field next to campus. This would be done to ensure there were no catastrophic failures while we were close to the workshops. if this test was successful we would then move on to a prepared hill at Varingskollen. This would enable us to better explore the features of the prototype.
Camera placement plan:
Two gopro cameras mounted on the frame; one of these forwards, the other, one gopro mounted to the testers helmet, two cameras stationary, one at the bottom of the hill, the other placed along the test area. Lastly a remote operated drone will follow the tester.
Due to the sudden closure of campus monday evening and the additional class meeting on tuesday, we decided to do testing on wednesday from 11:00. This unfortunately meant that the entire team could not be present, nor did we have the equipment they were meant to provide for the test.
Regardless we still did the test.

When the first prototype was done we took it to Varingskollen Ski Resort for a testrun. We wanted to test the prototype in a controlled environment where there was prepped snow.
We brought a set of tools, so that we had the possibility to do minor changes as well as repairs. We also brought a lot of cameras so that we could document the testing in different views.

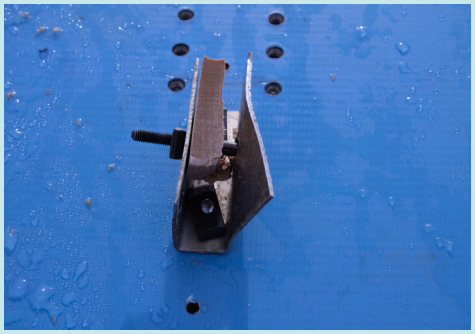
As a treat for all the work we had done we made a campfire where we made hotdogs.

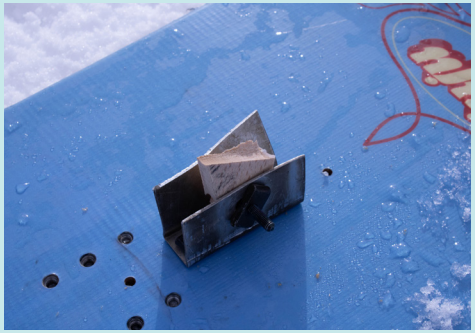
Faults

Weak points of the prototype
While testing we discovered several weak points of the prototype. At first we discovered that the way we had mounted the steering was too weak. One of the reasons why it broke could be the wood. We used the wood from the chest of drawer. at first we thought it was beech, but after discovering all the weaknesses in the wood we weren't sure anymore. One other reason could be the screws we used. That the screws was too short to handle the stress it was exposed for. As an easy fix we screwed the steering directly to the frame.

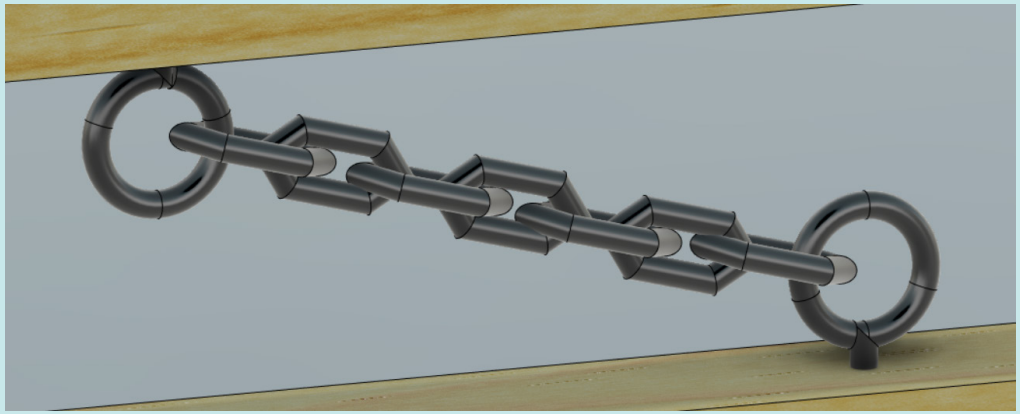
The second thing that broke was the mount that connected the front ski to the frame. This broke during our second test trail. When Celia lost her balance she used the handlebar to reclaim control. As she pulled the handles the handlebar mount broke once again, and she fell with the prototype.
The total stress the frame was exposed for made the mounting bracket for the front ski the weakest point. A reason for the damage could be that the skies were too wide regarding the height of the frame.
The damage of the ski mounting bracket was too big to be fixed without special tools. So the testing was stopped.

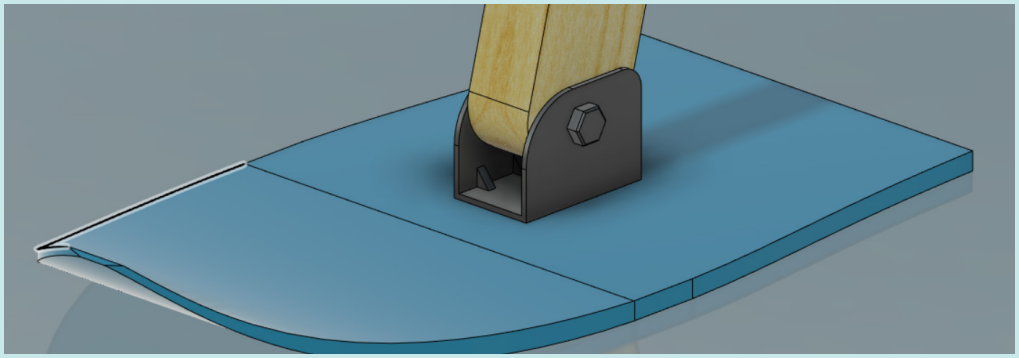


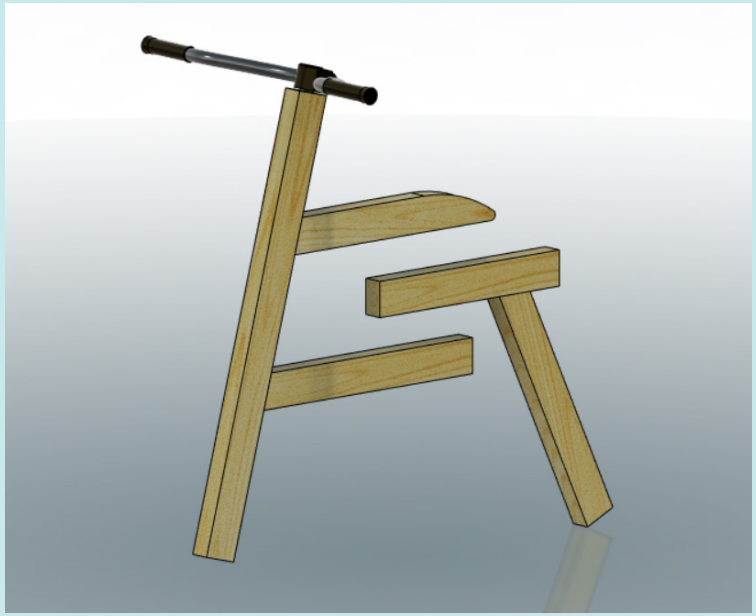



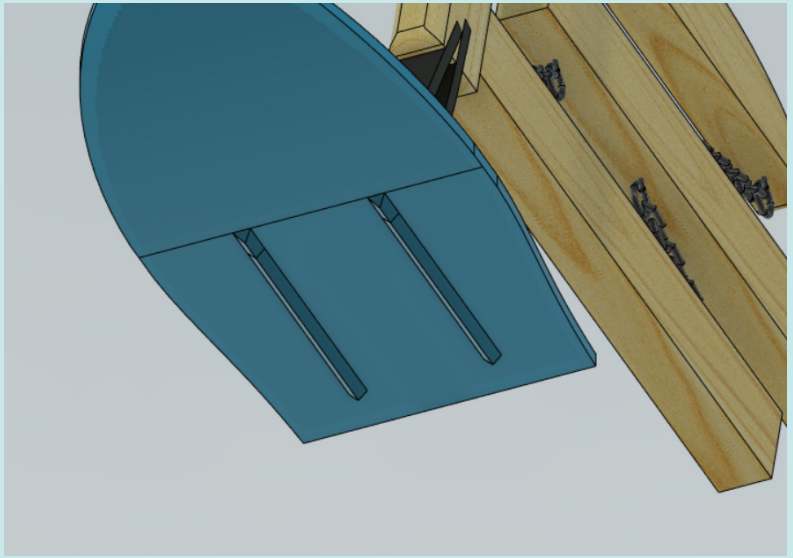


CAD V.2





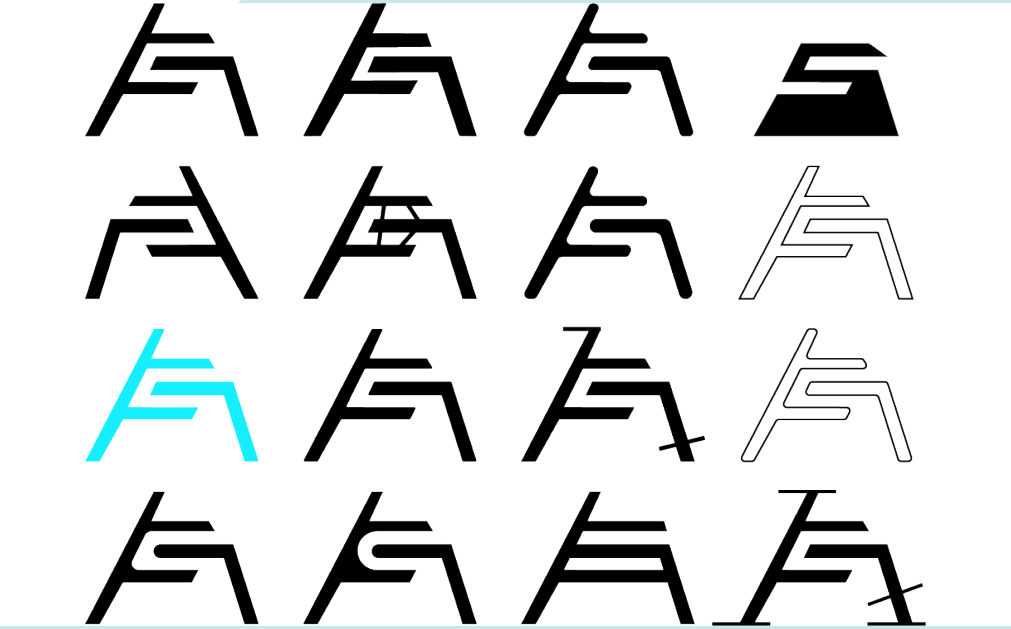




A series of changes were done for the second version of the sled. A new handlebar with a presumably sturdier joint was made. the handles themselv have a slight filet on the outer edge so to prevent the users hands from sliding off. the handle can also be raised by approximately 17 cm to allow the user to find a riding position that suits them.

The main body was made thicker to accomodate the shaft on the handlebar, as well as to make the body and its joints sturdier. the brackets holding the skis was made from thicker material and the breaks were ribbed for strenght. Leaf suspention was added to the front for a more comfortable ride, and we added rails to the bottom of the skis to improve directional control. Due to ropes slowly releasing tension over time, those were replaced by steel chain.

Branding

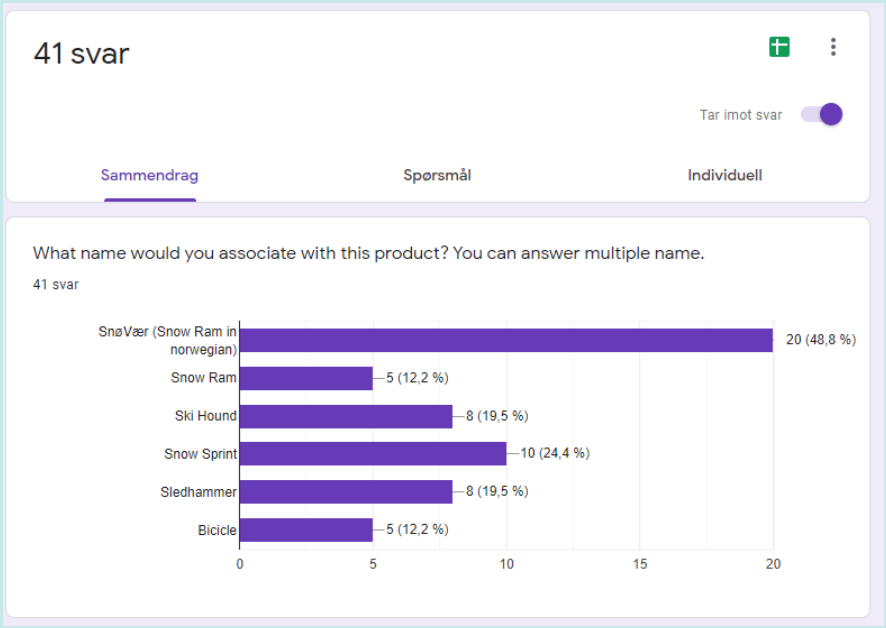


During the lecture on graphic design we got a comment regarding the logo of the product. The logo itself represents the product in profile. The comment said that the negative space in the logo had a resemblance to the letter ”S”. This would make sense if we named the product something with this letter.

We listed a few words that came to mind that could work to represent the product. Snow, Snø (Snow in norwegian), Ski, Sled. They all worked fine, but they did not capture the entire product’s characteristics.

We experimented using synonyms of the product’s properties . One being “Speed”. Some examples of synonyms for speed are pace, velocity, sprint and rush. They all work. We also tried using animals as a way to represent the product. To use the name of an animal like a greyhound is a great way to give the impression of speed. Switch the animal out with a ram and you’ve captured the shape of the product.

“Bicicle” was one of the earliest names we had for the snow bike concept as a play on words. Bicycle and icicle.



We made a survey with the different names combined with a few pictures of the prototype and some of the sketches for it. The meaning of the survey is for us to see which of the names people associated the product with. We also added an option for people to leave other suggestions if they thought of any.

The Suggestions that were suggested by people answering the survey did not all include a word with the letter S and/or had a well enough description of the product.

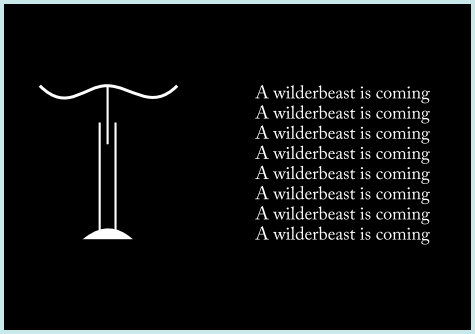
Advertising

The first poster is made for social media and is supposed to resemble repeated text artwork that you can find in popular culture. The poster is meant to be a teaser for the product. A comment on the poster brought to our attention that illustration looked too general.

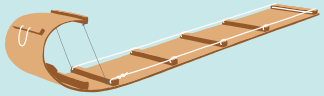
The second poster has text that says "Twist the Space" as a reference to the product's steering ability provided by twisting the tensegrity part. The colors of the poster resemble winter activity and the bike itself.

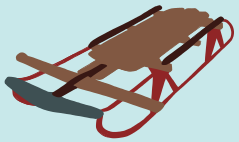
The last poster is of the prototype. The poster has the logo of the product and one of the first names we tried on it: "Mach One". The logo and the text is black. The poster is supposed to work as a sales poster that you could find at a bus-stop.

We also made a rough-cut video ad for TV or streaming services. This is attached to the report.



Cultural Aspects





The image that comes to our minds when we hear the word sled has never been the same over the years. The concept of sledding has been changing, it started as a basic transport to move things from one place to another in snowy places. They used to do simple ones from the natural material they had around them, but after the years it becomes an entertainment object made of plastic. It is the union of many children, reason of fun and bruises. This product has a big cultural impact with a lot of meaning and memories, it has been part of the lives of many generations. However, at certain point, people stop using sledding. Were they not young enough to use it? Is there an age to stop using it? Is not sledding adapted for adults? When people are teens their social life changes and they enjoy the time differently, they start to do other sports, they spend the time doing other things or maybe this activity starts to feel boring and uninteresting.

Due to the different idea of the sled in each generation, it is assumed that the evolution of this object has been influenced by society, it has been adapting to each situation. As a result of the social change and the increment of the number of people that have access to everything, it started a massive production of them which creates a linear economy. Nevertheless, people start to be more concerned about this little by little and it has started to be implemented in many aspects, but they still have a long way to go. There are many products around us that we occasionally use, why not produce our product? In this way we will not contribute to the massive production of a product we will use twice a year. There are also other items we will not use any more to which we can give them another life and build something more useful with them.

The users that we would be interested in would be young people and adults, who want to have fun, who are motivated to do sport and have a good time. They would be people who enjoy the outdoors and like outdoor activities, who are willing to take small risks and enjoy the time they have with their friends and family. In this way there would be a possibility of giving people a chance to enjoy the time again, motivating them to see how they can do stuff by themselves. But objects which can be used later, using it for entertainment, so you give a second chance for older products and at their own fun at the same time.

Final CAD Prototype

Our next protoype design is quite modified from our previous version. with more features and sturdier construction we have hopefully alleviated the issues from the last prototype. Sections of this design are intended for mass production and do not accurately reflect all those we had reclaimed, but would easily be emulated using those.

We made a few color variations to provide aesthetic options and possibly material options.

Final Presentation

To fully reflect the concept of our product we decided to make an entertaining and fun presentation that would capture the audience and create an interest in our design. The chosen form was a basic, simple presentation that did not distract the receiver of the message, as the important thing was the voice of the person who presented it, which in this case was Andreas. During the presentation, he created an atmosphere in which he interacted with the rest of the students by asking questions that they answered themselves and explaining the reason for our project in a more dynamic way.

Afterward, to create the image of the product we created renders and videos, to transmit the concept. With the help of video editing, music, speed, and colors we managed to create movement, dynamism and involve the user in the process, making them curious to try it and find out what it is all about.

Conclusion

With this project we wanted to encourage people to have more fun by making a sled for thrill seeking adults. Due to the Covid-19 regulations we weren't able to finish the product as intended. So we were forced to finish the product in 3d software.

As designers we have a responsibility to find the right materials for the right things. So when the wood broke on our first prototype we realised that the material we gathered might not have the right properties. In a product like SnøVær safety is extremely important, and we wouldn't risk that the sled broke during normal use. We chose to modify the second prototype with modules made out of metal and plastic. To ensure durability as well as safety.

Even though the project didn't end as planned we still fulfilled many of our goals. The main goal was to mostly use material from the stock we claimed at Haraldsrud; exceptions being consumable hardware (Screws, glue etc.). What we ended up with was to use the screws from the Tripp Trapp chairs. Something we are really proud of.
By using all the material we collected we also needed to explore the properties of the materials. And some of the material we collected turned out to be more porous than expected. We dismantled the drawers from the chest, expecting it was made of beech. It turned out it was made out of some cheap wood that cracked very easily. This was something we learned during the first testing where crucial parts of the sled broke.

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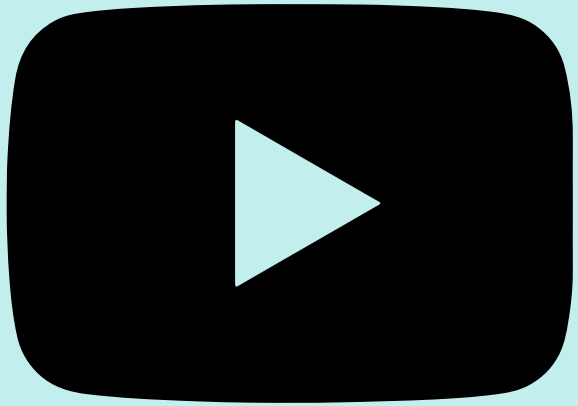
Video



https://youtu.be/PqYX8i_Lz4k