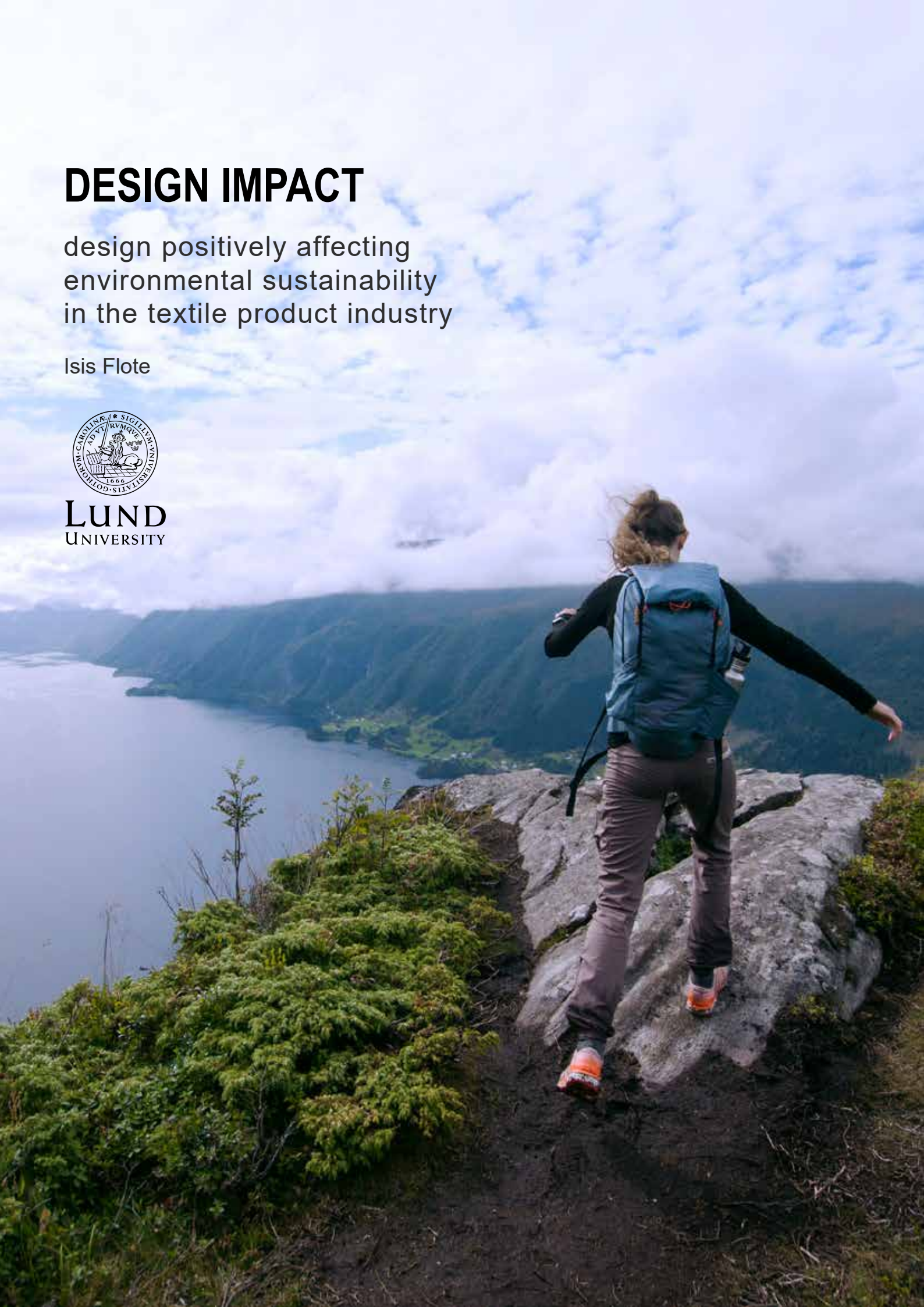
DESIGN IMPACT

design positively affecting
environmental sustainability
in the textile product industry

Isis Flote



DESIGN IMPACT

design positively affecting sustainability in the textile product industry

Isis Flote

Degree Project for Master of Fine Arts in Design
Main Field of Study, Industrial Design, from Lund University
School of Industrial Design

Department of Design Sciences

Examiner: Charlotte Sjödell, Senior Lecturer

Supervisor: Jasjit Singh, Professor

External supervisor: Jacob Von Matern, Industrial designer

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thank you

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to all my interviewees for your time and for enthusiastically sharing your personal stories.

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to Farfar Sven-Erik, for inspiring me to become a great designer and for letting me inspire you.

Abstract

The textile product industry has many challenges and all designers creating products using textiles will have an impact on the environmental sustainability in the world.

The project investigates state of the art textile product design today, the challenges of environmental sustainability in the future and how the designer plays a role in making a positive difference.

Qualitative research was done through interviews, in situ meetings with users and study visits. To present the research result in a tangible way, a textile product (a hiking backpack) was made.

There is a consensus among the users and the industry that we need to strive to consume products in a more sustainable way, but also a common feeling of not knowing where to begin to unravel the issues of environmental sustainability. This feeling comes from the issue being a wicked problem and it is therefore impossible to solve by looking at it from only one viewpoint. The backpack that was made in the project gives a few ideas to how a designer can make a difference in their part of the development process.

The topic was wide and therefore this report only scratches on the surface of what could be investigated and discussed to add to the greater knowledge in the world. If there was more time and resources in this project a good continuation could be to visit countries that manufacture textile products and get deeper knowledge into the issues.. Also, continuing to understand the user - the consumer, as I see that a big part of making sustainable products is connected to the usage and re-usage of each product.

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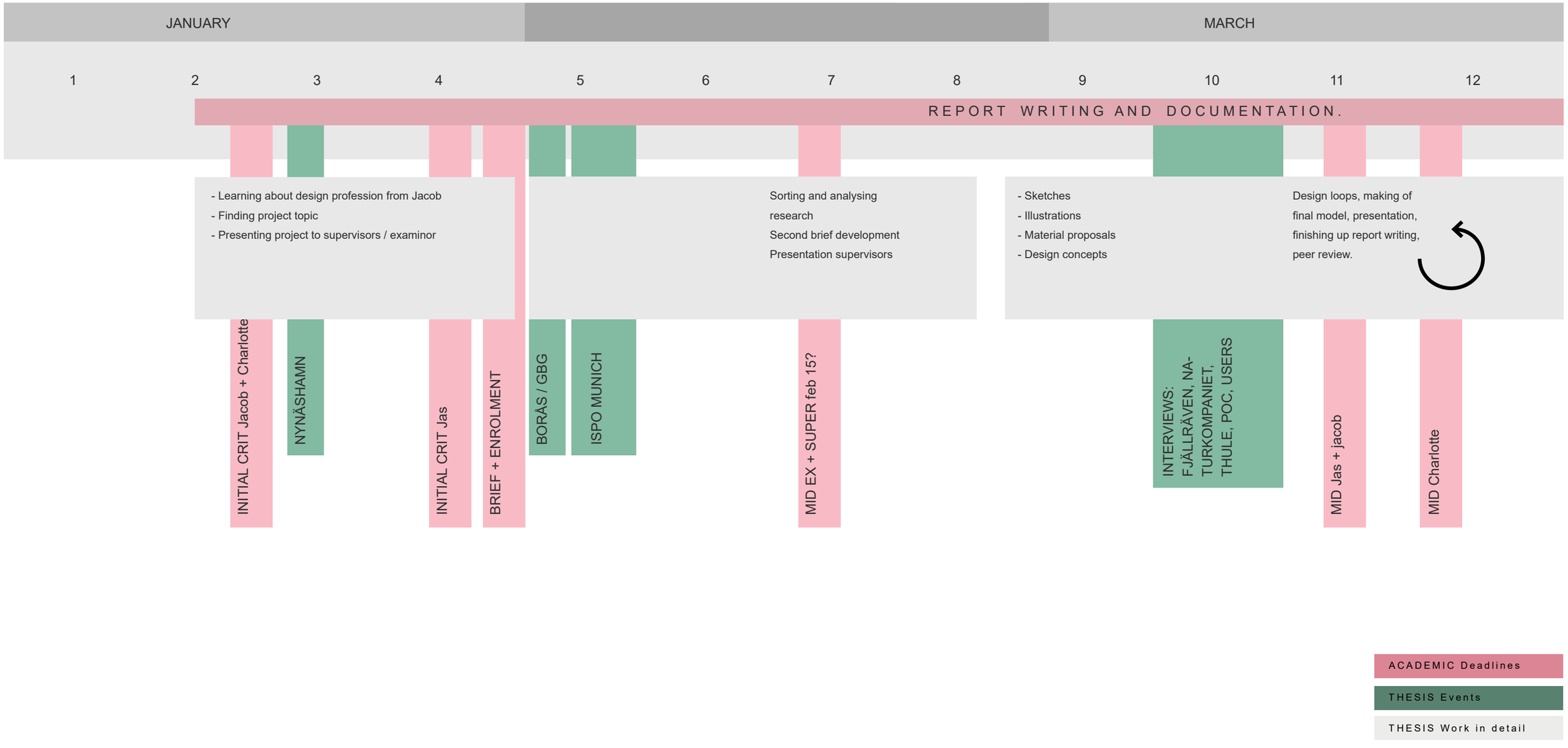


Introduction to the background / issue

This Master Thesis Project is an exploration of the soft product (products made out of textile materials) industry to find out how a designer can contribute to positively impact environmental sustainability in their profession.

The motivation to explore this industry specifically is that I am hoping to focus my career on textile products and at the same time make the industry more sustainable. The industry today is highly unsustainable, with long and complex supply chains that are linear rather than cyclic. Consumption of products made from textiles is also highly unsustainable - today a perfectly functioning textile product can be thrown away long before it is actually worn out and recycling possibilities are minimal. Production and raw materials are other big concerns.

Product development today is not the work of a single artisan, but a process involving multiple stakeholders who work across geographical, cultural, and professional borders. Each product we will work on in our careers as designers will have an impact on our environment. Sustainability within the textile product industry is a wicked problem and will not be easily solved.

How can I use my role as a designer to positively affect the way we work with soft goods development in the future?

Introduction to the project

Project Goal

Research and discussion on the topic of sustainability and design can easily become overwhelming and abstract. In order for this thesis projet not to become too abstract it focuses on developing a physical product to make the discussion more tangible.

The focus is to look at the best practice for how to develop a textile product today and understand where the designer can positively affect the environmental impact of textile products in the future.

The product created within this project is a hiking backpack and you can follow it from idea to finished product in this report. The reasoning behind choosing this specific product is:

1. It explains the complexity of developing a textile product
2. It is easy to relate to from a consumer perspective.
3. It is a good symbol for the balance between man and nature, products and sustainability.

Research methods

To be able to understand how a designer can affect sustainability in a project it is important to understand who the other stakeholders are and how the product development transitions from one person to another.

Where does design fit in the supply chain and how can it contribute towards making sustainable products? The research phase is divided into the following parts:

PART 1 - Understanding the production & supply chain

PART 2 - Choosing a target market and understanding the end user

PART 3 - Defining key findings from research and creating a manifesto for the development phase.

Product development

The second part of the project covers the development of the product, where the conclusions on design and sustainability from the research phase is woven into the design of the bag.

Final product design

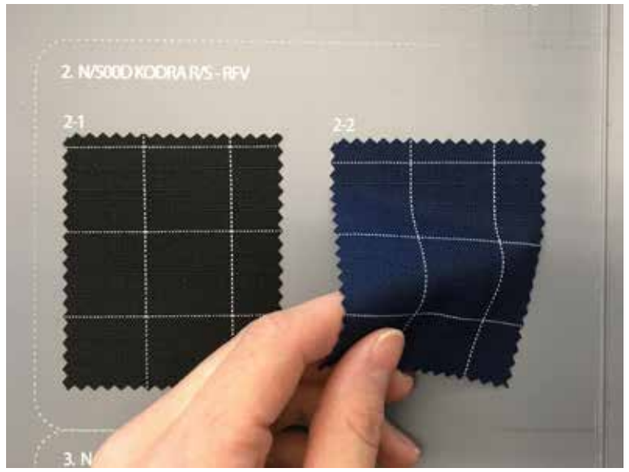
This part of the report shows the final product and how it could be marketed to the chosen target consumer.

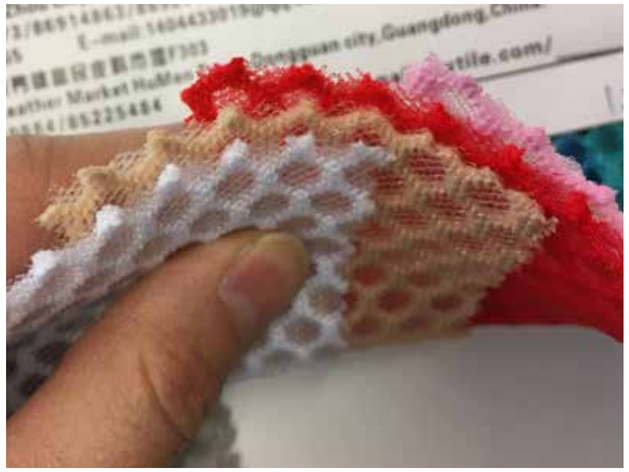
Conclusion

Reflection and conclusion of project.

Part 1

Understanding the best practice development process
& supply chain of textile products today
- using a hiking backpack as an example product.

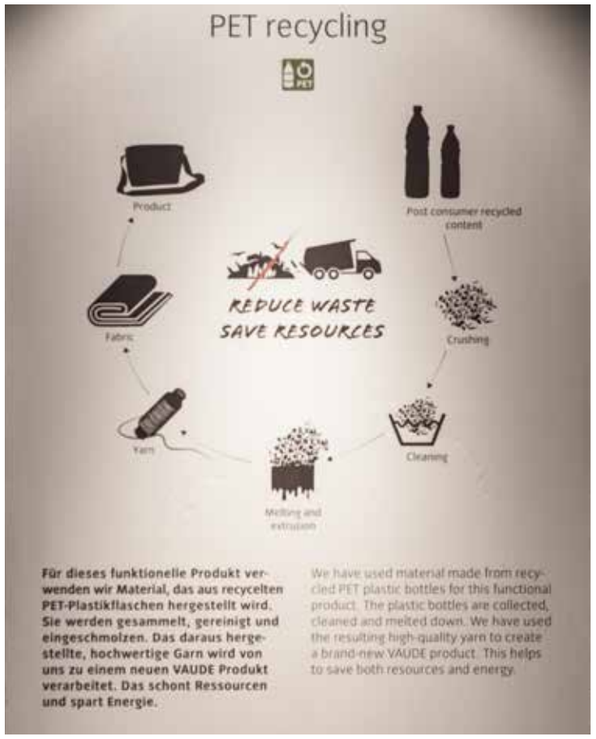


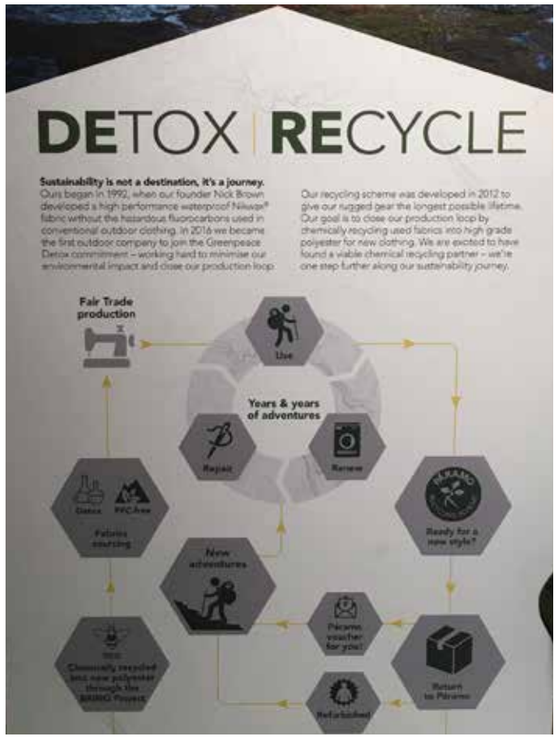


The beginning

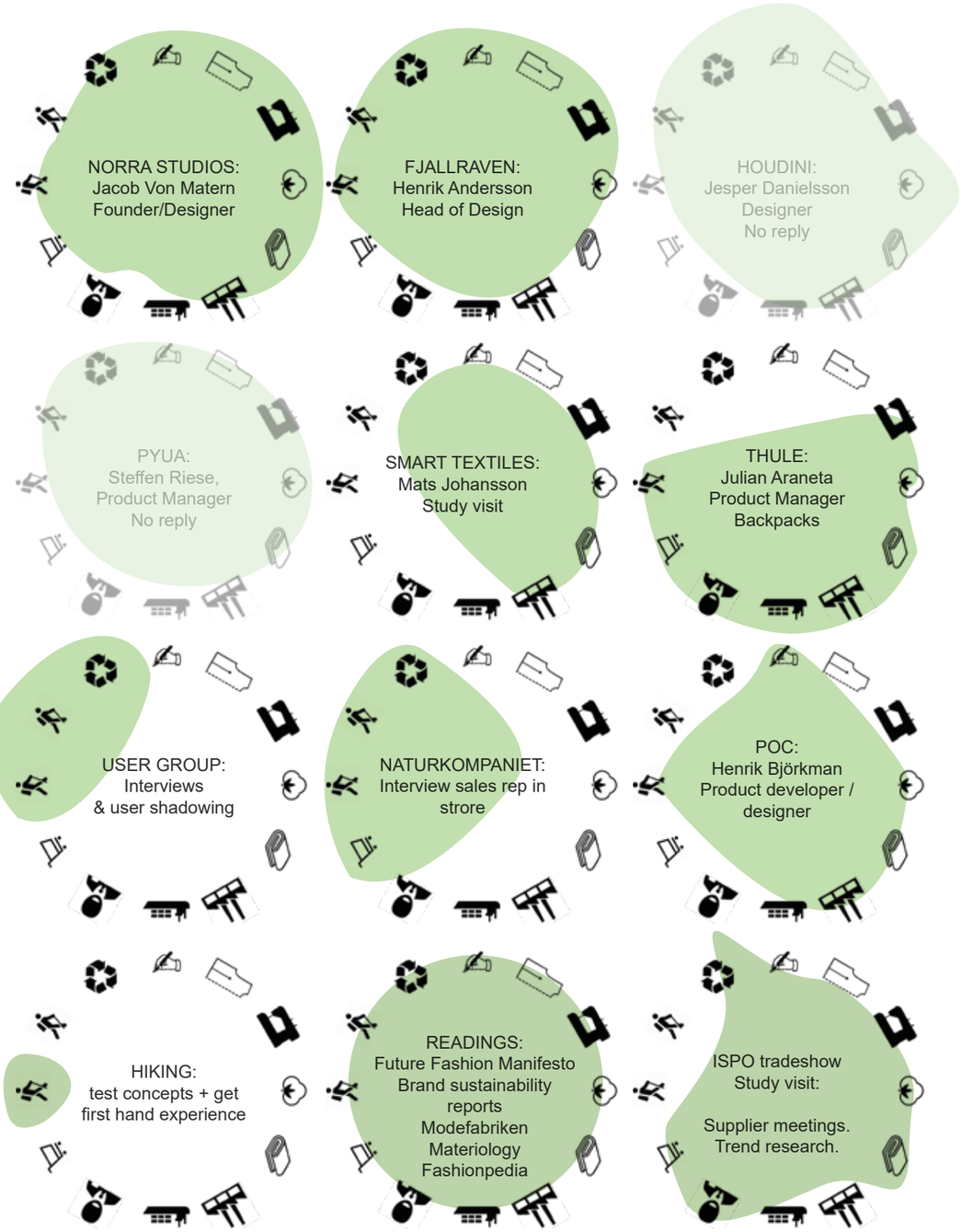
Throughout the project my mentor was outdoor gear designer Jacob Von Matern. The project began by joining him for a few work days, in his design studio as well as going to the ISPO Munich trade show for outdoor equipment. This gave me a good crash course in design, brand & material knowledge, and I could meet fabric and hardware suppliers and find valuable connections to reach out to for my work later on. Trade shows like ISPO are important sales events and all major brands are there to show their new collections. It was evident that environmental sustainability was one of the key messages that each big brand wanted to express. Each brand wanted to show how well they were doing at researching new materials, better production methods and alike yet they were humble to the fact that sustainability in the industry will only be solved if companies work together and they were also showcasing the many organisations that address sustainability on a larger scale.

In the design studio we discussed design processes used today, both in larger industries and as a freelance designer. I learned about the economics of designing for manufacturing and also how to go from idea to finished product using different design methods.





Different brand´'s approach to solving the industry issues with environmental sustainability, seen at ISPO Munich trade show.



Collecting data

People working in different fields were consulted to get a holistic overview of the supply chain. Each person contacted and each study visit was done in order to gain specific information about each part of the supply chain from experts within each segment.

Houdini and Pyua could not spare time for interviews in the end, but they share a lot of information on their supp-ly chain through their websites.

The supply chain

Supply chains are long and complex and (more often than not) linear. The one below describes the parts in a textile product development supply chain that are addressed within this project.

Follow it to see the steps that are taken to produce a hiking backpack.

The brief

Depending on the structure of a company, the initiator for a new product could come from people of different professions. It could be a designer, a CEO or maybe a brand manager?

On rare occasions the design and development of a product or a new material is allowed unlimited time and/or money, if there is a higher value to reach for. For example, POC and Fjällräven spend many hours on some key projects where the hope is to innovate and push the entire industry a bit further. This type of work requires a lot of investment and resources.

Most projects are to drive consumption, where trends, seasons and benchmarking new features are often more important than being innovative.

”The design process makes up to 90% of the decisions that affect the Environment”

Mistra Future Fashion Manifesto 2015

Design

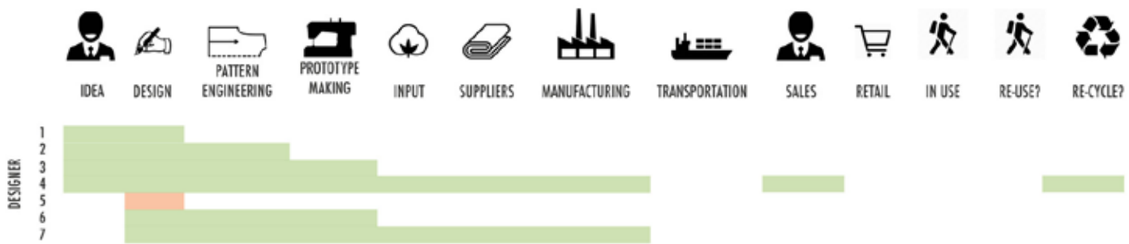
”The design process makes up to 90% of the decisions that affect the environment.” It is a highly provocative quote. How can the design process be responsible for 90% when the supply chain is full of stakeholders, and the product in the end falls into the hands of a single user dictating what happens next. It is provocative, yet, if we look at the design process and our role as designers with that number in mind, would we not think of our actions as highly important? Would we work harder to make an impact on the industry?

Depending on the form of employment, a designer can have a total overview over the design, or next to none. To work with sustainability issues in the design process might not be as easy if you as a designer are not involved in most parts of the supply chain.

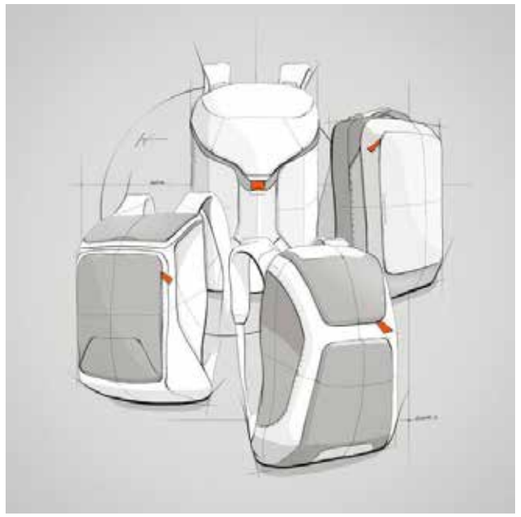
Designers involved in concept ideation, pattern making, material decisions and contact with the manufacturer, will have a greater impact on the design than someone who only works with form & colour. Scott Koritz, designer, says that “Design comes first, then we usually source material before going into patternmaking. We often work with the materials that the factories have in stock, due to short timelines. We outsource prototype and sales sample making, no sewing in house.”

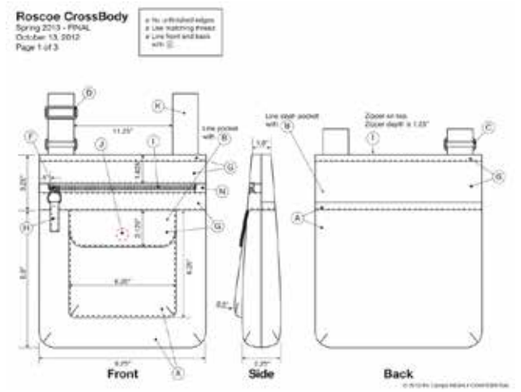
Depending on where we studied and which positions we end up having in the workplace, we might look at our roles differently. The quote below shows a different view on the industrial designer:

”The role of an industrial designer has diversified. Designers are now working in managing design processes in companies, working as researchers and contributing to consumer research.” (From the book ”This is service design thinking”.)



The red mark shows my hypothesis before going into the project, of where a designer is most likely to make an impact on sustainability in a product.





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Code	Part	Description	#/Unit	RC3613	RC4113	RC3013
A	Exterior Fabric	see SKU detail		Feathers print 600x 300D Poly PU Coated	Stripes print 600x 300D Poly PU Coated	Umber color 12 oz. canvas Wax coating
B	Lining Fabric	420D PU Coated Nylon		Pink	Pink	Olive
C	Rectangle Ring	1.5" Nickel	1	Nickel	Nickel	Nickel
D	Tri-glide	1.5" Nickel	1	Nickel	Nickel	Nickel
E	Wire Hook	45mm	1	Nickel	Nickel	Nickel
F	Zipper Pull	#5 Round Zipper Pull	1	Nickel	Nickel	Nickel
G	Accent Febric	12 oz. Wax Canvas		Umber	Umber	Umber
H	Logo	Woven Logo	1	n/a	n/a	n/a
I	Zipper	#5 Nylon Coil Chain	1	Tan	Tan	Tan
J	Hidden Magnet	18mm	1	n/a	n/a	n/a
K	Webbing	1.5" PP	1	Tan	Tan	Tan
L	Webbing	.5" Gros Grain	1	Warm Gray	Warm Gray	Warm Gray
M	Elastic	1" Braided Elastic	1	Pink, matches lining	Pink, matches lining	Olive, matches lining
N	Reflective Tape	.75"	2	Silver	Silver	Silver
O	Zipper	#3 Nylon Coil Chain	1	Tan	Tan	Tan
P	Zipper Pull	#3 Round Zipper Pull	1	Nickel	Nickel	Nickel
Q	Internal Fabric	600x 300D Poly PVC Backed .55mm Neutral Color		n/a	n/a	n/a
	Ball Chain	#3	1	n/a	n/a	n/a
	Printed Tag Set	2"x4" Tags (2 in set)	1	n/a	n/a	n/a
	Country of Origin Label	Made in China	1			

Pattern engineering, Prototype making, Manufacturing

Manufacturing of textile outdoor products is often outsourced to countries abroad with lower labour costs. Lower wages should not be mixed up with lower quality or skills. However, if the communication is poor between the stakeholders, the product can end up different than the expectations. Time Difference, language and culture barriers can all create complications in the communication.

For a soft product designer outsourcing the manufacturing of a product, it is therefore important to be able to communicate the design very clearly.

Just as designers have their own style of working, manufacturers have their ways, and their limitations. When starting up a new collaboration it is a good idea to figure out which way of communication is expected or preferred.

Listed below are common ways of communicating a design in soft product development:

Tech pack - An informative sheet that explains how to manufacture a product. It should include details such as measurements, materials, colours, trim, hardware and technical illustrations with orthographic views of the design. The more detailed the less room for error.

BOM (Bill of Materials) - is a list of all parts of the product, their description, amount and cost.

3D/CAD models
When sending the tech pack and BOM to the manufacturer, some designers also choose to send additional help such as renderings.

Prototype - If a final prototype has been created by the designer or developer, this can also be presented to the manufacturer.

Images - Photos of a physical product with explaining text is also commonly used. In many cases, the product is simply visualized in illustrations and later put into physical form by the manufacturer, through an iterative process, until it matches the envisioned result.

Patterns - In some cases all patternmaking is done by the manufacturer. In some, the designer or developer does this and hands them on to the manufacturer. In this step of the process, the designer plays a big role in defining and clarifying the level of sustainability in a product. This is where the materials should be clearly defined, leaving no room for interpretation. How much material is needed? How should it be cut in the factory to minimize waste? From which suppliers can we get sustainable fabrics?

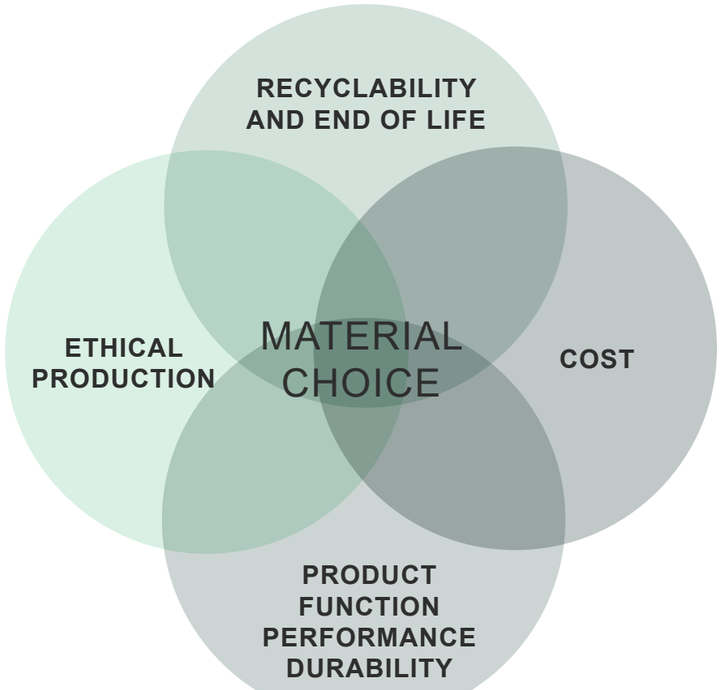
Material

Input is the raw material that makes up a textile. Since a textile is always a composite, it can be made out of almost any raw material that can be made into a fiber.

There are a few raw materials that stand out in the outdoor industry today: Nylon, Polyester and Cotton (mixed in with nylon or polyester). All of these materials have major sustainability issues linked to them and people are working cross disciplinary to solve them. Looking at the entire global market of textiles, cotton and polyester stand for 90% of all textile materials produced (Mistra Future Fashion).

For a designer choosing materials for a project, finding a sustainable option is not an easy task. The image to the right shows a few aspects that need to be taken into consideration when choosing a material. A product that is made from a sustainable raw material might not live up to the performance requirements, and a really durable material might make the product last long, but at the same time be harmful to the environment in the way it is processed. Unfortunately there is no golden solution. For many brands in the outdoor industry, the material choices are so important for their customers that they choose to showcase which materials they stand behind and which they avoid using. The circles in the image might be larger or smaller for different companies, depending on their core values and goals.

The future holds new fibers, more and better recycled and recyclable options, smart textiles and other innovations. The vision of the future is to create closed loop systems, where materials can re-enter the value chain rather than be burnt. Also closed loop systems within the production facilities to prevent water wastage and pollution.

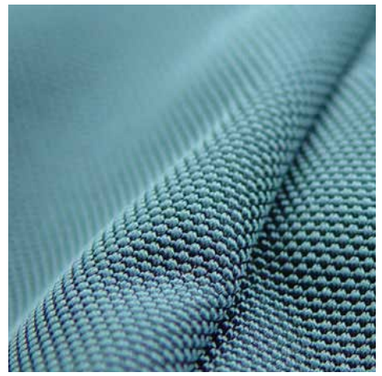


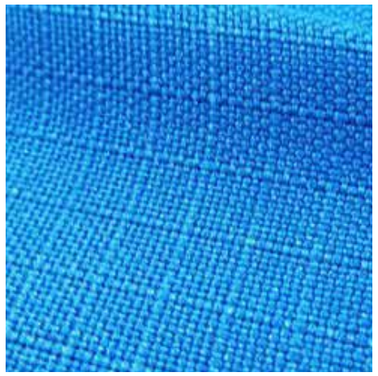
In choosing materials I believe that the designer has a lot of responsibility for the sustainability of the end product. What material is the right choice for each part of the product? How will the choice of material affect each part of the supply chain? How does the material perform over time - will the product have a second hand value? Is the user able and willing to recycle the material in the end? Many questions should be asked before choosing materials.

A designer should also remember to take a look at old products and see how well they performed over time and also stay up to date with new material inventions and ongoing research.

”Although we’ve been substituting non-recycled polyester for recycled versions for 20 years, only in the last five have we begun swapping out non-recycled nylon for its recycled replacement. For some reason locked deep in polymer chemistry, nylon is more difficult to recycle than polyester. ”

/Patagonia





Recyclable materials?

Recycled polyester has come a long way and companies like Houdini, Pyua and Patagonia use recycled polyester in their products. As long as it is their own products, they can also put them back into the loop and make new materials out of worn out products, since the material content of their own products is known. Nylon isn’t quite as far along, but the more we recycle it, the more we will know about how to do it more efficiently. Recycled nylon is something many companies want to be better at, since it is a very durable material and the raw material can be found in old nylon products that today are considered garbage. An example of a recycled nylon product is Tretorns rain jacket made from recycled fishing nets.

Material cost

How much money are you willing to pay for a hiking backpack? Do you relate the price to sustainability? To the brand? To fashion?

When it comes to materials in an outdoor backpack, the price can vary a lot. You can find two fabrics that seem very similar, but where one is certified according to bluesign standards and the other one, cheaper, but with no certification. This needs to be visualized to the end consumer, or they will never know the difference. Within each raw material group, the strength, durability, price and other factors can vary a lot. Then the weaving technique and coatings make different textiles vary in quality & price as well.

As a designer an important part of your role in the supply chain could be to explain the material differences and lobby for the ones that are better for the environment and everyone involved in the manufacturing of the textiles. Using a certification such as bluesign makes it easier for everyone to navigate through the material jungle and could help justify the higher price.

”Consumers are getting more and more aware of sustainability issues. They want to know under what conditions their textiles were manufactured. At the same time they do not want to miss out on innovation and functionality.”
/Bluesign

Durability

Durability is extremely important when it comes to designing sustainably. What is the function of the product? How do we expect it to perform, and for how long? This means looking both at physical and non-physical durability of the product. The physical durability is its ability to withstand wear and tear throughout its lifetime, for the purpose it is designed for. The physical durability requires high quality materials, making mending and care

Sustainability is tackled differently by different companies. According to Henrik Björkman, designer at POC, it lies in the word “Hållbar” which in Swedish is the word for both Sustainable and Durable. He means that sustainability is about making reliable, durable products. For POC, sustainable choices can never be at the cost of lowering the quality and safety of their products. Their products need to perform in situations where life is at risk, so the materials are first and foremost chosen with safety in mind.

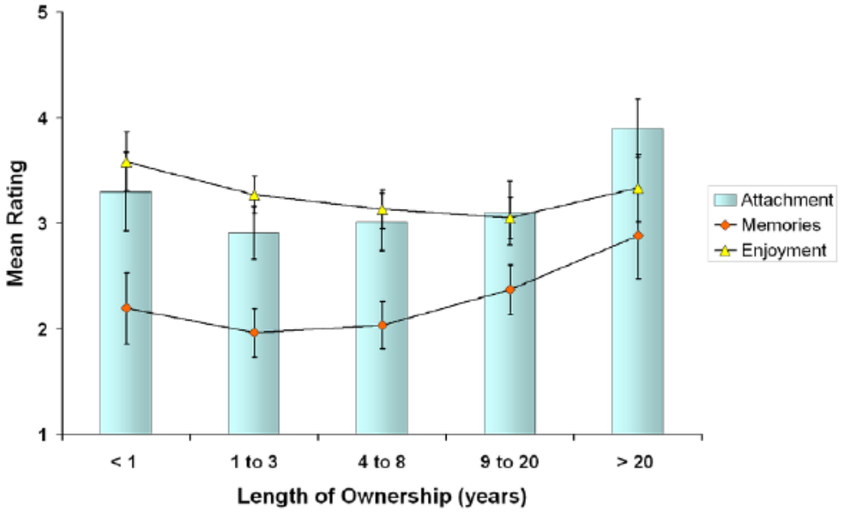
The non-physical durability is more difficult to define. I would describe it as how we relate to our products over time. Fashion and trends affect this, but also how our needs change over time. The bag we bought 5 years ago might be physically great, but might not meet our practical or emotional needs. We start to value it less.

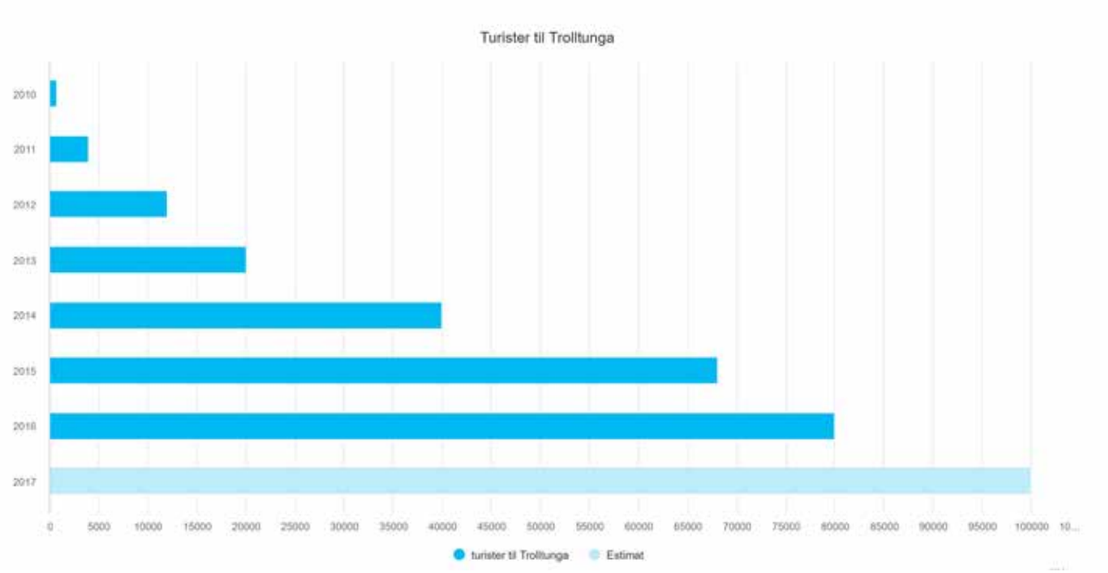
Caring for the product, passing it on for reuse or recycling when it is no longer desired are three things consumers are responsible for. The responsibility for the designer is making a product that keeps a high value, even at the end of life. Who is responsible for recycling facilities at the very end (or beginning) is a political question. Also here, it is a matter of giving value to the product, so that it ends up in the right place.

In the fashion industry, the development time from idea to finished product is 1- 1 1/2 years. The fashion life span for these garments is about one season, but the quality of the materials makes them last for a much longer time.

Outdoor bags are produced and consumed in a very similar way to fashion apparel, however, the outdoor industry and consumers might have a stronger focus on environmental sustainability.

Sometimes products are valued more by their customers after 5-10 years. ”We strive to make products that go from one generation to the next, through a timeless, durable design.”





The end consumer

In order to initiate development of a new product we should ask ourselves - is there a need for this product? Who is the receiver and why do they need a new product?

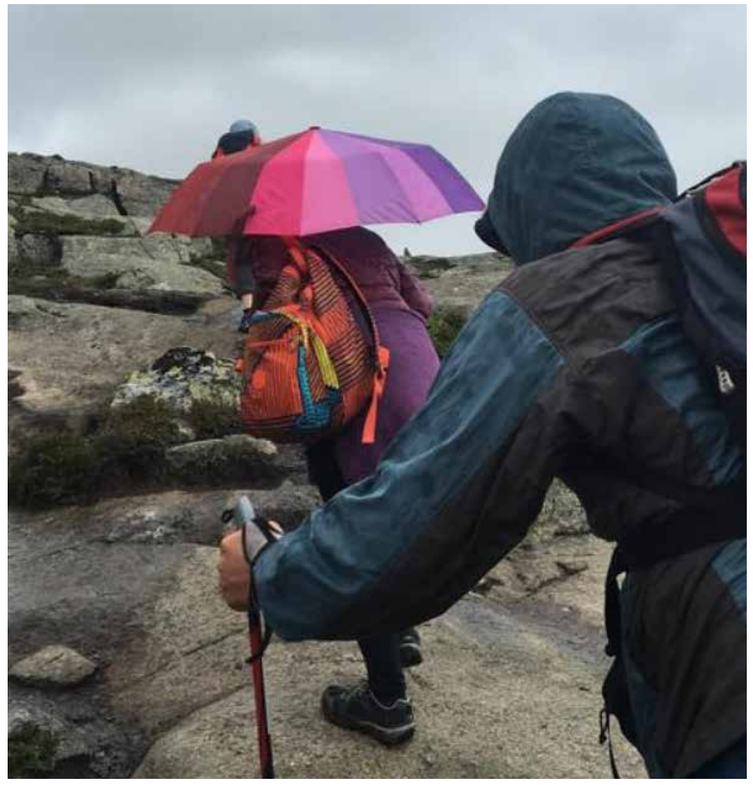
When looking at the market, there seems to be an overwhelming saturation with bags of different kinds. At the same time, there is also a rapid change in hiker culture. Social media is exposing hiking to people in an alluring and accessible way, creating a new group of hikers who want to travel the world to see the most beautiful spots. This new consumer group is larger than any previous one and it keeps growing. An example is the amount of visitors to the thrilling Trolltunga in Norway:

” From just 1,000 tourists in the whole of 2010, Trolltunga saw 1,800 visitors in one 2017 day alone.”

A large group of hikers are now hitting the trails due to this trend. There is a potential gap in the market for this new consumer group, and in this project I will let the design be inspired by them and my focus group.

“People want the same picture they see on Instagram and Facebook”

When we design products, we should never forget to anchor the design in reality. Who are we designing for? How do we foresee the product being used over time? What drives consumption in the specific group? What are their motivators for sustainability?



Reflection:
How design impacts environmental sustainability.

Idea

In the ideation phase for a new product, a designer can have great influence. The idea for a new product can come from the designer herself, a manager or from a client. When the idea is initiated by someone else and handed over to the designer as a brief, the designer can visualize a concept for the desired product. The stronger and more defined the concept and design is, the more likely it is to arrive at a desired result at the end.

The brief in this project was to create a daypack for hiking where the design was formed by conclusions from the initial phase of this project.

Design & concept development

In this phase the designer defines exactly what the product is, and explains it to whoever comes next in the supply chain.

In this step, the designer makes many choices that affect the environment in the end. Material selection for example can make a huge difference in the aging of a product, and how easily it can be recycled. Logistics is another aspect that the designer affects later on by the decisions at this early stage.

When it comes to the use of the product, the designer is the link between the user and the manufacturing process. To be able to create a product that is sustainable in the end, it needs to make sense to the end user.

For the daypack in this project, high quality materials, comfort & highlighted care instructions are some of the designed features that are intended to make the backpack last for a long time.

Pattern Making

Making the design clear and easy to follow, to leave little room for error. This means understanding how the pattern will be received by the prototype maker and manufacturer.

In the making of the daypack, my pattern making decisions were led by the idea that I wanted the bag to be easy to mend for the end user, and should therefore not be over engineered. The simplicity of the pattern should not make the bag less comfortable or practical. The comfort, practical functions and easy mending & cleaning were to me a way of making sure that the bag would be loved and used for a longer time, therefore making it more sustainable.

Prototype Making

Better prototypes makes for better products. The designer can here make it easy for the prototype maker to create a final prototype. The quicker you get to the final version of a prototype, the sooner you can get started with manufacturing. Being efficient means there is more room (buffer time) to solve potential issues along the way. This means fewer rash decisions that might jeopardize the design and sustainability of the product closer to the production start.

Input & Supply

The choice of material is extremely important when it comes to sustainability in a product. Here I believe it is the designers role to stay up to date with how the material market changes. What new innovations have happened? How does the design make use of the chosen material in the most optimal way? What happens to the material when the product is no longer desired?
It is also possible for the designer to in this step be part of the material innovation process as well. For a designer working with soft products the possibilities are endless. Textiles can be engineered to become stronger, lighter, more sustainable, more durable depending on the desired outcome.The designers role here is to be curious and find good solutions for each product created.

In this project, I have chosen materials through looking at their properties combined with what ranks higher when it comes to sustainability, today. This part deserves a lot more thinking and I hope to work closer with people who are experts in material knowledge in the future.

Transportation

Although this step happens long after the designers work is done, logistics play a big role in sustainability, and having this in mind while designing is a good idea. Product design, manufacturing, sales, consumption and recycling often happen miles apart. To give an example, the designer could design for easy compression of the product during transportation.

Manufacturing

The initiator and designers' decisions dictate what kind of processes will be used during manufacturing. Just like when choosing materials, it is important to consider which manufacturing processes are better or worse for the environment. The textile industry has a really bad reputation when it comes to polluting areas around factories, poisoning factory workers and using processes that are not cyclic. As a designer, it is a good idea to understand how each decision affects the manufacturing.

Sales & Retail

The most sustainably designed bag in the world would not be of any use if it doesn't actually make it to the end user. Making it easy to sell, by making it self explanatory and attractive in a store or online store gives the product a better chance going up against competition. Having a trusted brand is even better.
In the daypack, I chose to use pop colours to attract attention to certain features. The first aid kit is one of the parts of the bag that makes it differ from other bags in the same category, and this part is highlighted - both to make it easy to find it if it is ever needed, but also to make it stand out in a store. The form and material choices are intentionally made to give the bag an expression that speaks of durability and quality.

Using, mending & caring

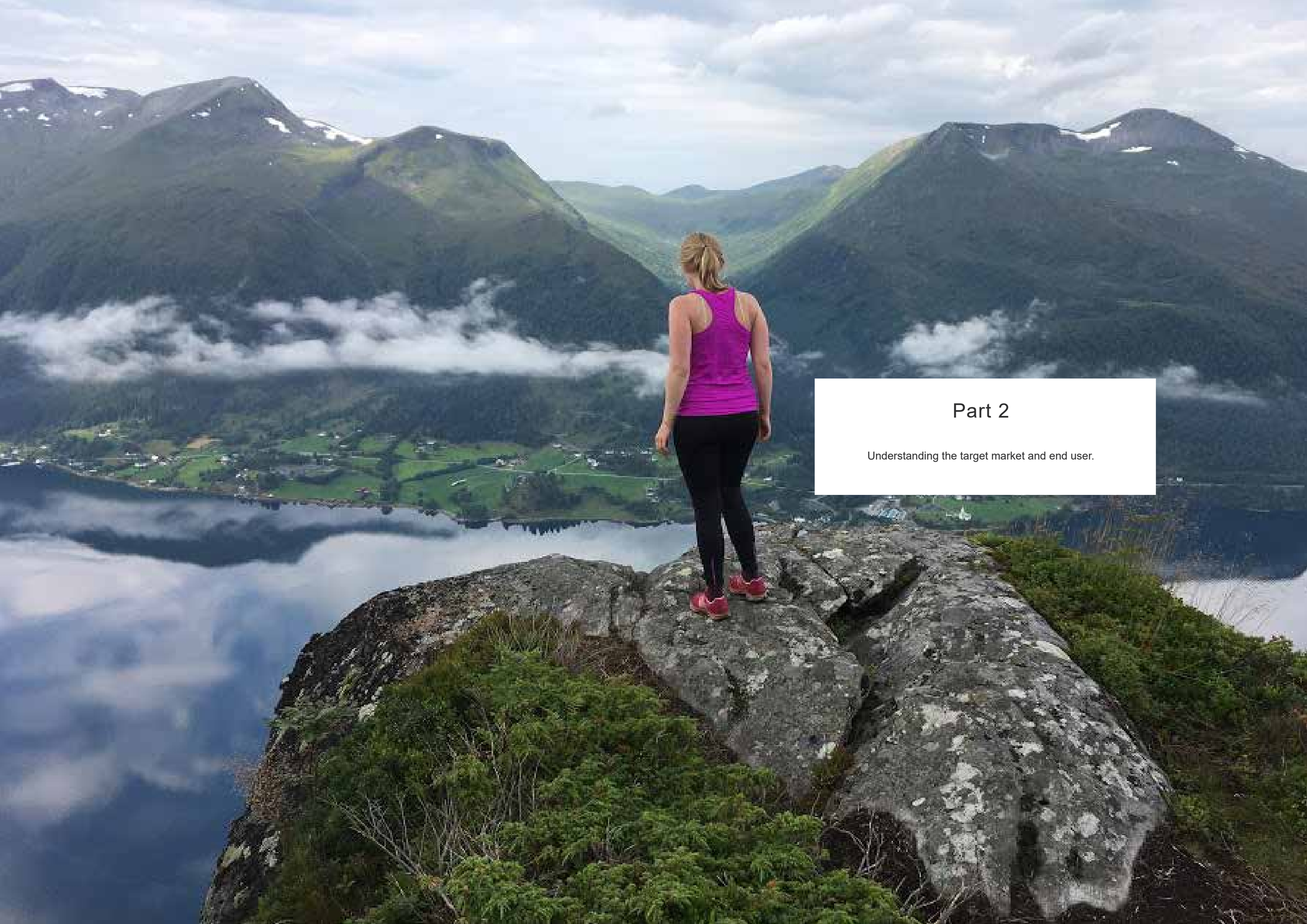
A product that is easy to mend and care for is more likely to be treated to live longer. I decided to place a guide on how to care for the product in the bag,

Recycling

Here, just as in understanding manufacturing processes and materials, it is important for the designer to stay up to date with the recyclability and origin of a material.

I would argue that it is also just as important to understand the end user and their behavior around consumption and disposal.

In this project, I tried to design for pushing the recycling as far into the future as possible, and for when it happens; giving information to the recycling facility on what the bag consists of and how long it took for the bag to get to the end of its lifetime.



Part 2

Understanding the target market and end user.

User group

The user group consisted of people who like spending time outdoors. Both hiking enthusiasts and occasional day hikers were included in the group to get an understanding of needs and behaviours of different types of hikers.









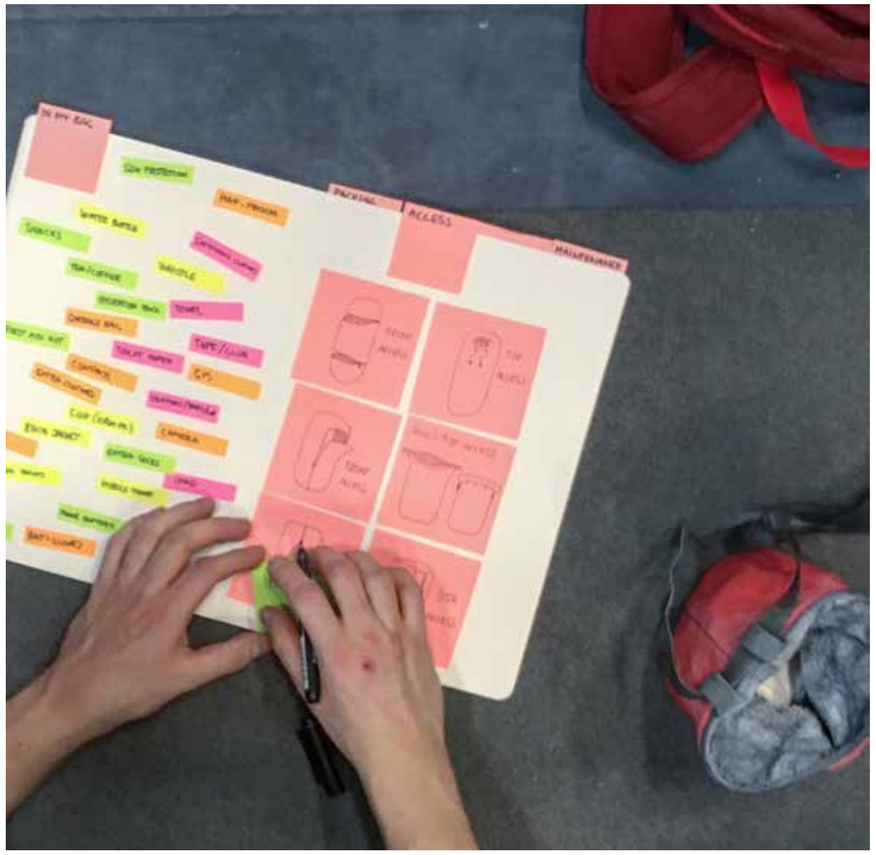
User group - shadow hikes

A few of the users were observed during day hikes and they shared the contents of their bags on the hikes combined with stories of hikes they remember. These stories gave valuable information on user behaviour.

Day hike

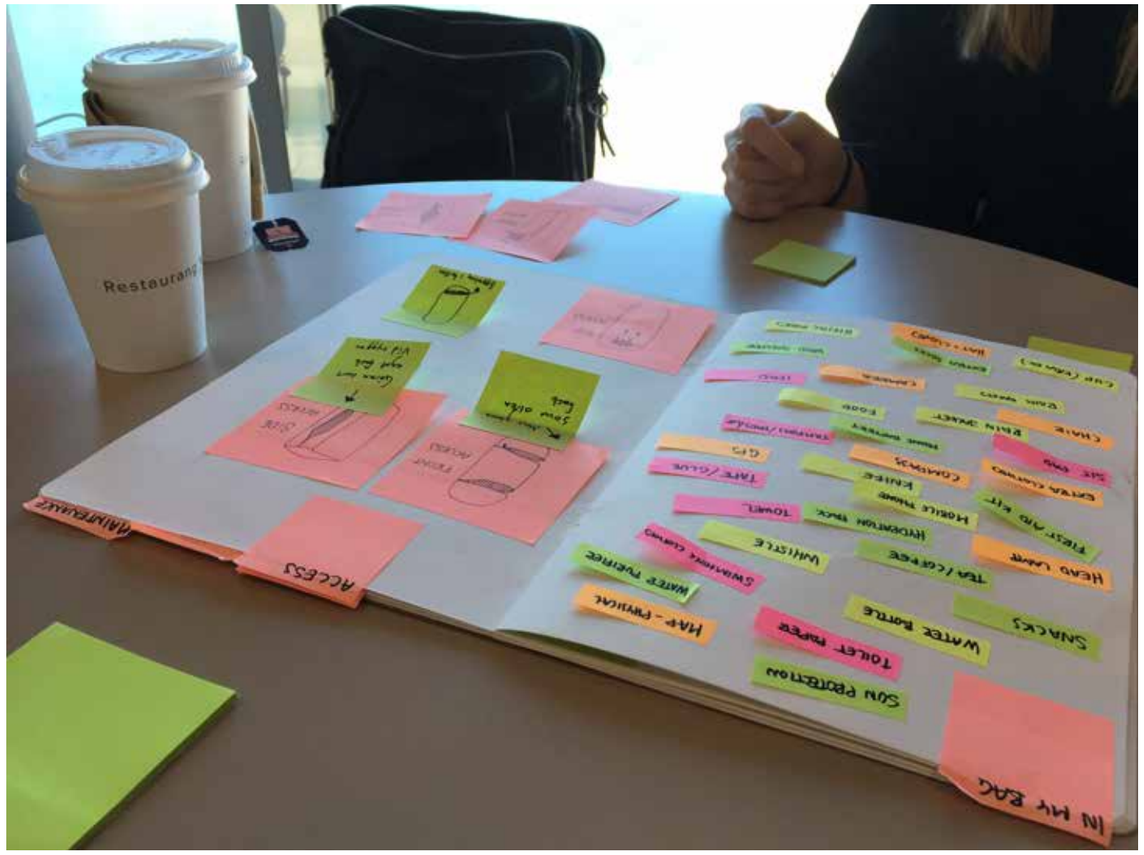
3 hour hike, with stop for breakfast. 4 People, in Skåne Region, Sweden.

Food
Snacks (fruit, nuts & cookies)
Seat pads
Water
Coffee & tea
Extra layers
Extra socks
Extra shoes (if new shoes would hurt)
First aid kits
Wallets
Sunglasses
Coffee mugs
Maps (irrelevant to the area, just left in bag since earlier hikes)
Pens
Toilet paper



User group - interactive survey

The entire user group individually did a survey, where they were asked to rank their own behavior and connection to their bags. They were also asked what they normally bring and which features are important for them during a hike. They were asked to to think out loud so I could ask follow up questions.



”All of us who love spending time in the outdoors find sustainability extremely important, but it is a very difficult topic. But nature is what we live for, that is where we spend our time and we all want to keep the outdoors safe.”

”A place to stash away things easily when I am on the go is so helpful. My favorite was a daypack that had a top lid with rubber band cord on it, it was so easy to just reach over and stuff items there even while walking.”

”If you design a water bottle holder, think about that a lot of us who spend time in the outdoors use a large Nilgene bottle, they are very wide, and not all backpacks can hold them easily accessible.”

defining the bag

defining what the product needs to be able to do to fit the market need

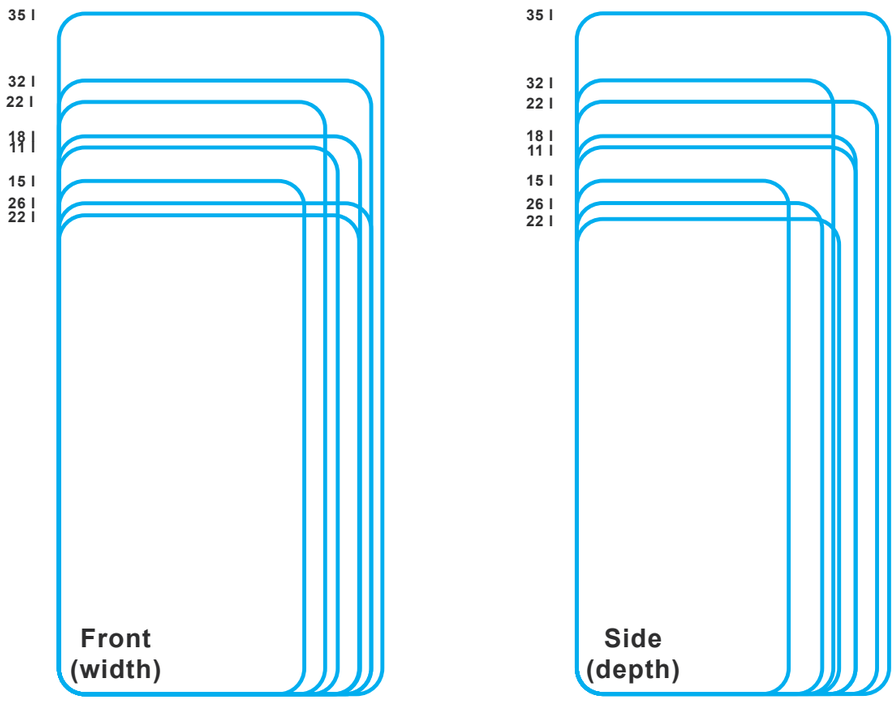
up to 30 liters

up to 1 day

Retail Price 300 - 3000 kr

holds essential items

300 - 1300 g



appropriate size for day pack based on market analysis

max: 61*29
min: 42*19

The web is full of guides and tips for what is essential to pack. Do people really bring what is recommended?

How much you need to bring on a hike depends on how long you are staying out, how difficult the hike is, if you have a special activity or special needs.

Timeline

Analysis of what the bag might need to hold based on different users and different length of hikes.

0h

4h

8h

essential

desired

special

towel, swimsuit... etc.

Conclusion

The initial research phase led to the following **manifesto.**

DESIGN **manifesto.**

THE PRODUCT SHOULD BE EASY TO CARE FOR & MEND

To care for the product is the responsibility of the user. To design for easy cleaning and mending is the responsibility of the designer

- Create helpful care instructions
- Design for easy replacement of hardware

THE PRODUCT SHOULD BE FUNCTIONAL

Throughout the research, it was clear that functionality was one of the things users value most. A feature that feels unnecessary or gimicky does not belong on a hiking pack. Users value function over many other aspects.

THE PRODUCT SHOULD BE MADE WITH DURABLE MATERIALS

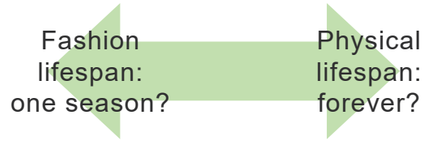
The materials in the daypack must be able to withstand usage in all kinds of weathers, over time. The bag should be able to handle normal wear and tear that occurs on a hike.

THE PRODUCT SHOULD ENCOURAGE CONSUMER PARTICIPATION

Much of the work that goes into making a sustainable product during the design and production phases could be wasted in the end if the end consumer is not involved. Therefore it is important to make it easier for the end consumer to take their part in sustainability.

THE PRODUCT SHOULD NOT BE HYPER TRENDY

Trends can be the enemy of sustainability, if it makes our everyday items look dull and out of fashion. The trends come and go but the material in the products we consume today is often very durable and lasts for a very long time.



Some trends, however, are good for the planet. In 2017, trend forecasts point towards a continuing trend of consumers demanding transparency from brands. The consumer today and tomorrow will be critical towards how things are produced

THE DESIGNER SHOULD MAKE ACTIVE DESIGN DESICIONS

A designer is often working at the beginning of a project. The design proposals that are made early can greatly affect the outcome at the end, so the privilege of working early in the supply chain should be used with care. To be active in your design decisions means to never do anything out of habit, but to reimagine what design could be in each product worked on. Be open to new materials and techniques, to new ways of thinking, to new generations of end users.

Part 3: Execution

Creating a daypack for hiking with the manifesto as

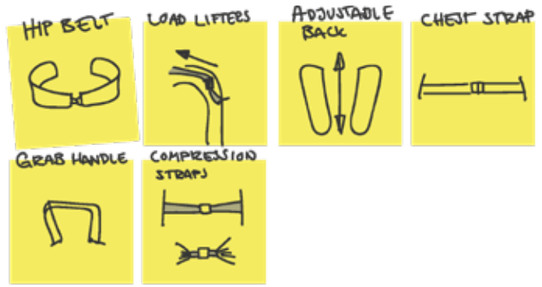
the baseline for the design.

State of the art day packs of today

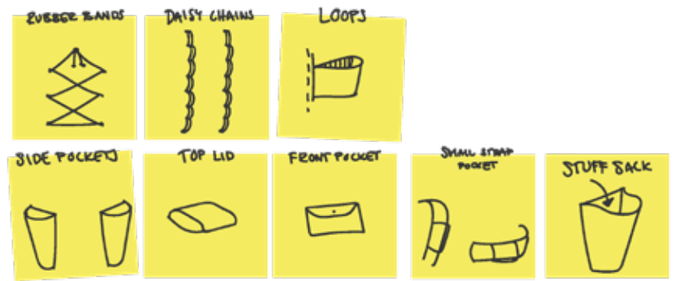
Which features are really needed?

Foundation

Comfort



Organization



”A place to stash away things easily when I am on the go is so helpful. My favori-te was a daypack that had a top lid with rubber band cord on it, it was so easy to just reach over and stuff items there even while walking.”

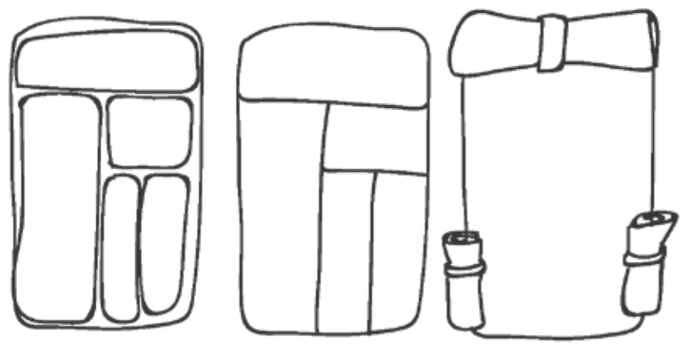
Features

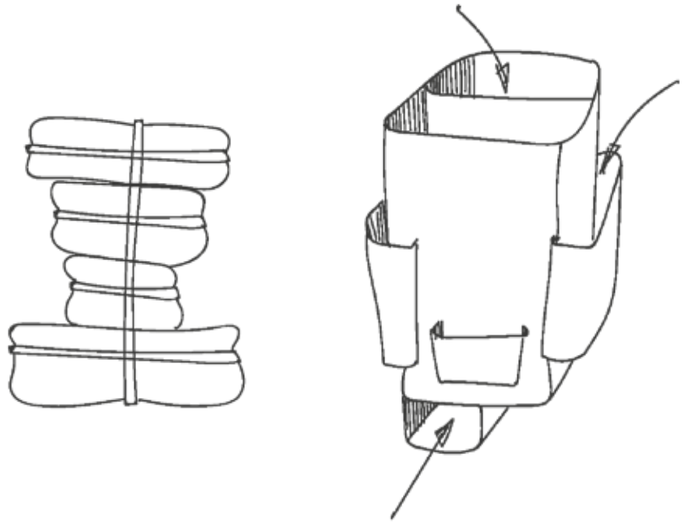
What are the essential features needed for a day pack? It is important not to add features that are not needed - but also important to not exclude ones that will make the end user question if the bag can really do the job. The illustrations abo-ve show features that could be seen on many of the current models of day packs. They were used in the end user interviews to see which features were needed, desired or unwanted.

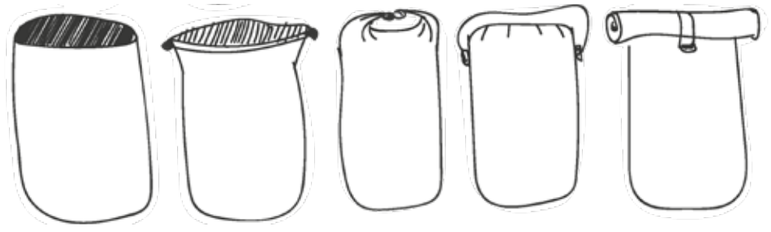
The answers differed a lot. The features and how they are used seemed very personal and each person interviewed had a strong emotional connection to some features, based on both positive and negative experiences. Not surprising considering that a backpack is a product that is used close to the body, almost as an extension of yourself and it holds the items that are critical for you to be comfortable and safe throughout a hike.

Versatile features that seem reliable were things the users looked for in a bag. Branding did not seem to be as important, but could give some comfort in de-cision making when purchasing. Some features can be excluded since the day pack carries lower weight.

Keeping a minimalist mindset already here is important to create a sustainable design. One extra feature or seam in a product adds up to many extra meters of fabric. We should always askf: is it really needed?



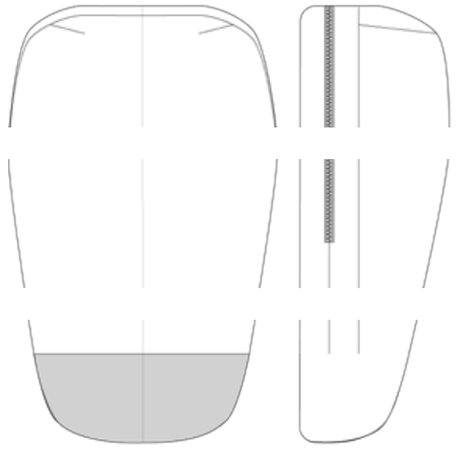




Organization

Based on the interviews, market research and first hand experience, it was easy to define the organization needs for the bag:

- Each hike is different, keep it simple and versatile rather than specific.
- Items in bag will not be difficult to find since a day hike requires minimal amount of gear
- Easy external access to most used / most critical items such as water and first aid
- Simple interior with room to stuff the rest of the gear. Interior compartment used to keep things dry and safe.
- One large opening good enough for most items
- One smaller compartment ideal to store small items such as keys and phones.



Overall shape

Top part larger, for quick stuffing of fluffier items such as sweaters/rain jackets.

a slim mid part that can keep heavier items (food, kitchen etc) in case of a longer hike.

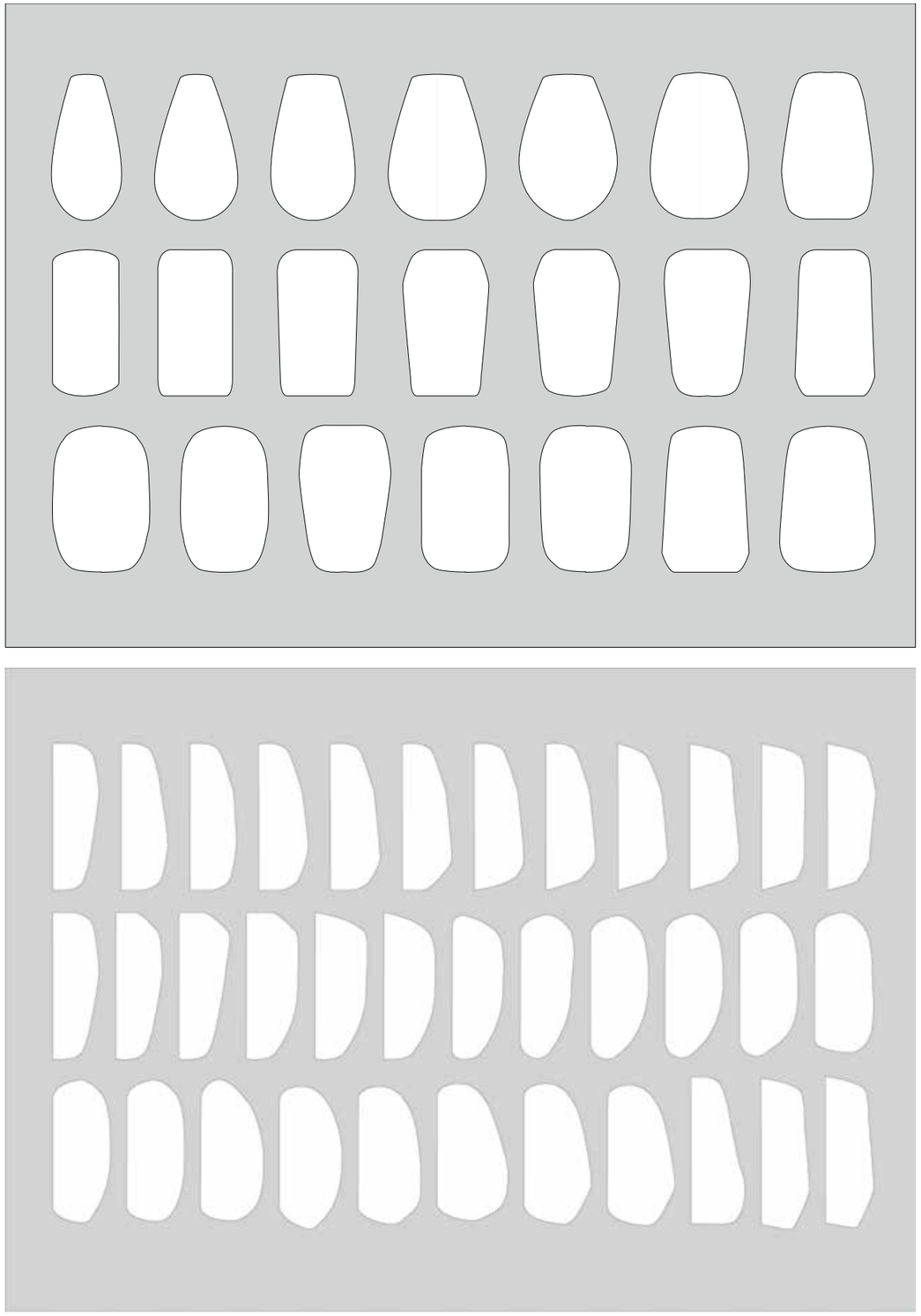
the bottom tapers off and the material here keeps water out.

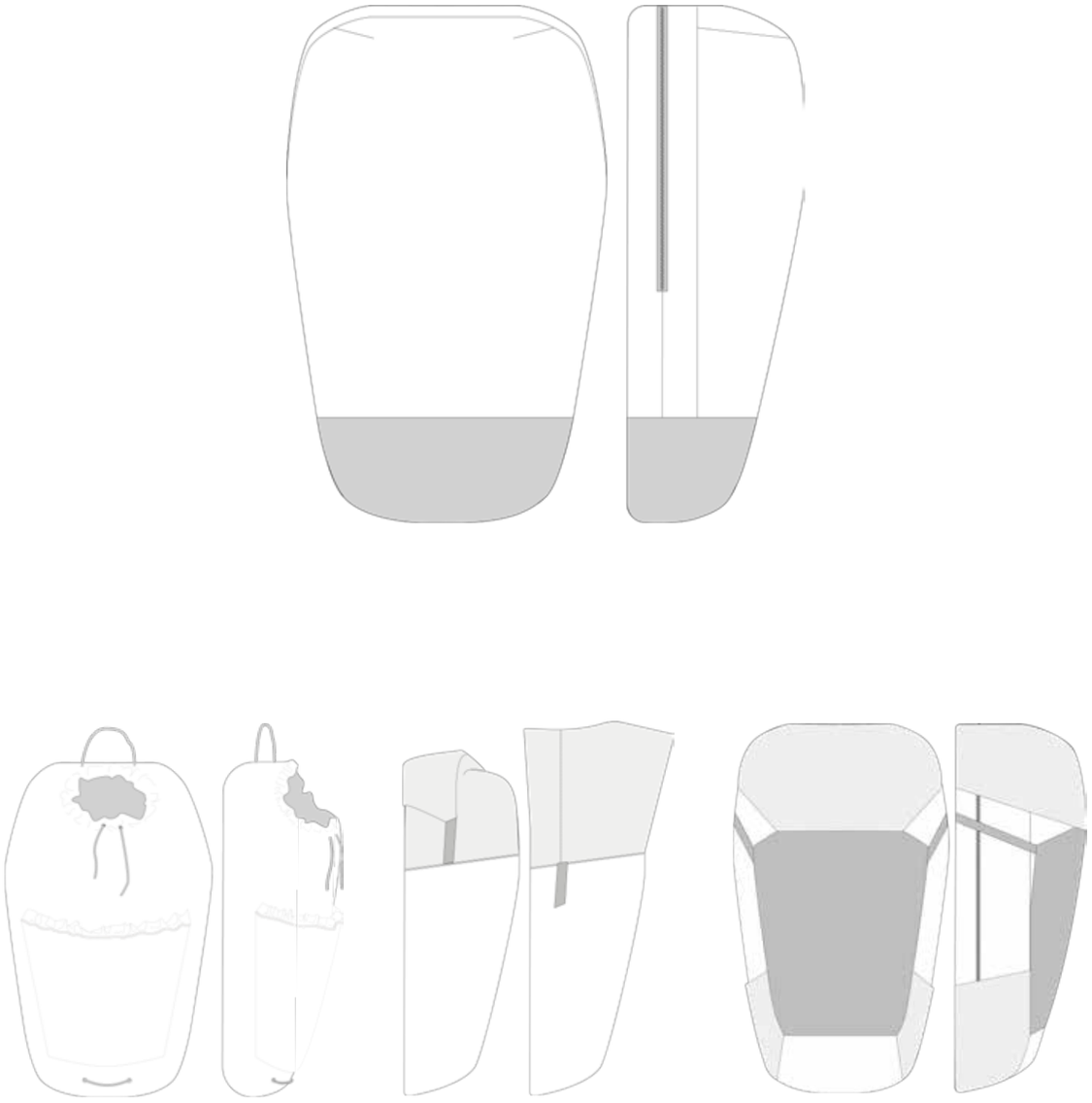
Sketch models

.Sketch models of the daypack where proportions, access and function were evaluated. Each function in the final design has to be there for a reason. Many ideas that are tested in a sketch model can be eliminated, and this step is therefore crucial. If skipped , these bad ideas can make it all the way to production and into the hands of an end consumer. A bad product is more likely to end up in landfills.

Above:
Sketch models testing water bottle placement, different opening solutions, load carry strap components, and carry handles.

To the left:
Sketch model testing material and placement of different ways of carrying items on the outside of the bag.





Form

Development of form. Bags seen from front and side view. Images used in discussion to talk about experiences of how load is best carried on hikes. The form is important from an aesthetic point of view but also directly affects the ability for the user to move smoothly with the bag.

The chosen form in the picture at the top: Heavier denser load can be placed at the bottom of the bag, lighter more bulky items (such as a crumpled sweater) can be carried further up.
Below are images of possible different designs using this form as a base. A drawstring opening, a roll top or a top lid solution - all with the same form but very different looks and function.





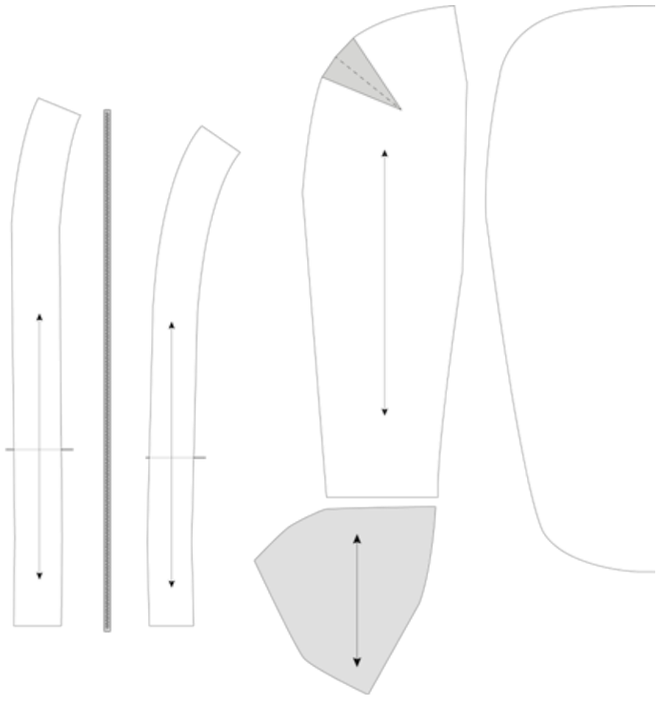



Details

Exploration of details on the chosen form (form only - seen in image top left). The bag was filled and different features were pinned and draped onto it. Working with real fabric rather than 3d modelling or sketching was a personal choice and all methods have their pros and cons. I believe that working with a physical material early can give a good understanding of the product in a way that other methods don't offer. Being able to try on prototypes are of importance when working with wearable products. Testing things early saves time and money later on in the supply chain and this means less material wasted and potentially fewer bad products on the market. Rushing products to market is unsustainable - every product made will be taking raw material from earth's resources and should be carefully considered.

Images on left page: Original form - no features. Exploration of front pocket. Exterior attachment strap test. Daisy chain placement, made it into final design.

Images on right page: Handle braiding for testing proportions and hand feel. Top view of rolltop version. Top lid and bottle pocket that made it into final design.



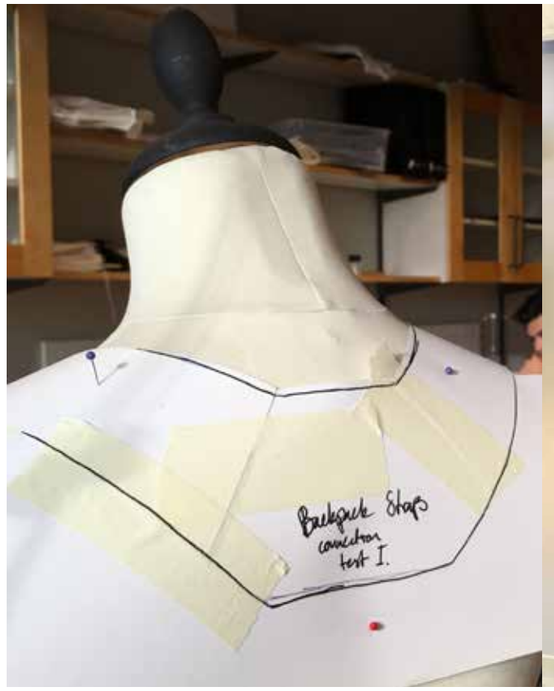
Pattern Making

Making the design clear and easy to follow, to leave little room for error. This means understanding how the pattern will be received by the prototype maker and manufacturer.

In the making of the daypack, my pattern making decisions were led by the idea that I wanted the bag to be easy to mend for the end user, and should therefore not be over engineered. The simplicity of the pattern should not make the bag less comfortable or practical. The comfort, practical functions and easy mending & cleaning were to me a way of making sure that the bag would be loved and used for a longer time, therefore making it more sustainable.

Pattern Making

Top row: Simple proportions sketched out with paper, cut open to find initial pattern pieces that were later drawn in illustrator.
Bottom row: compare initial shape in paper model with the result sewn in fabric. The 2 materials behave differently.



Top row: Pattern making using the form as a base and drawing directly onto it.

Bottom row: Creation of load carry straps. Many iterations were needed to ensure the bag could be adjusted to fit different people. A bag that does not fit perfectly will likely not be used as comfort is important on a long hike.

Product testing

The final design was sewn and tested on a day hike, to see where it worked well and where adjustments were needed. This step is important when designing sustainable products. The bag was almost finished at this stage in the process, but it was the last final tweak after the testing that made the bag go from almost good to just right.

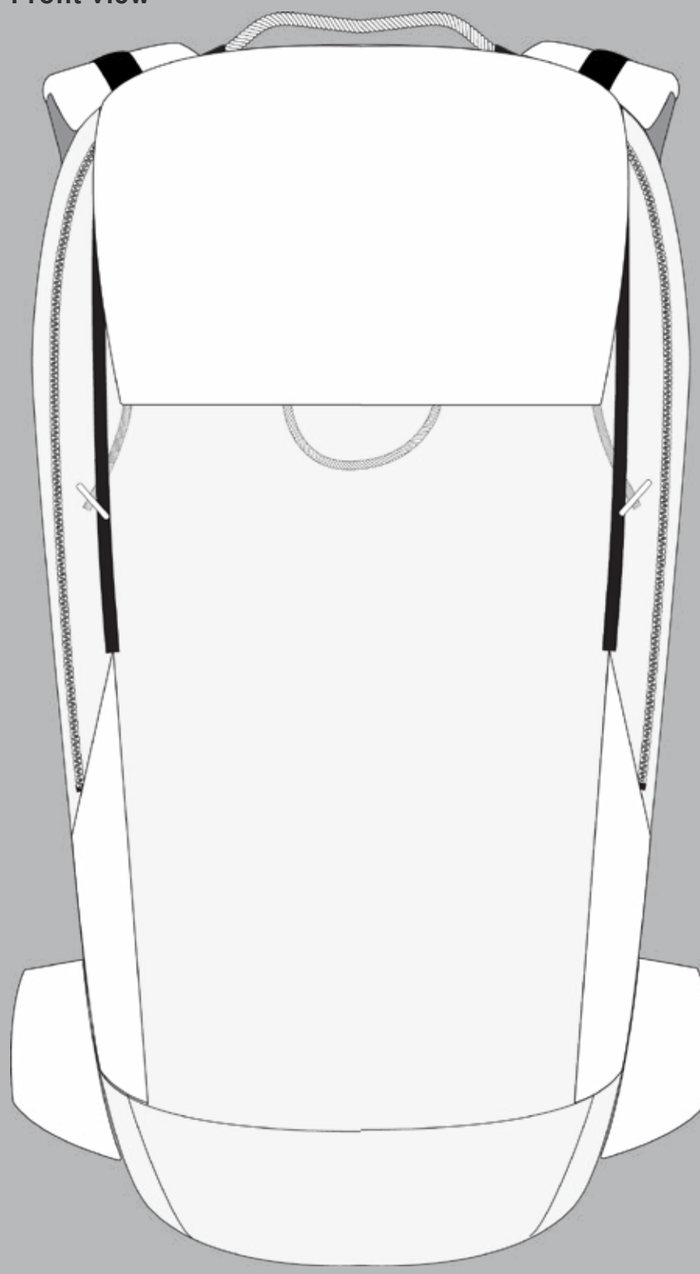
The bag was studied with load in the environment it is intended for.

Pattern pieces were adjusted to make the bag carry better, pockets were adjusted to make them more functional. The functions were tested and discussed with the user group who could easily relate to an actual product prototype rather than seeing only a sketch or a technical drawing.

Final design

Dimensions - Final design

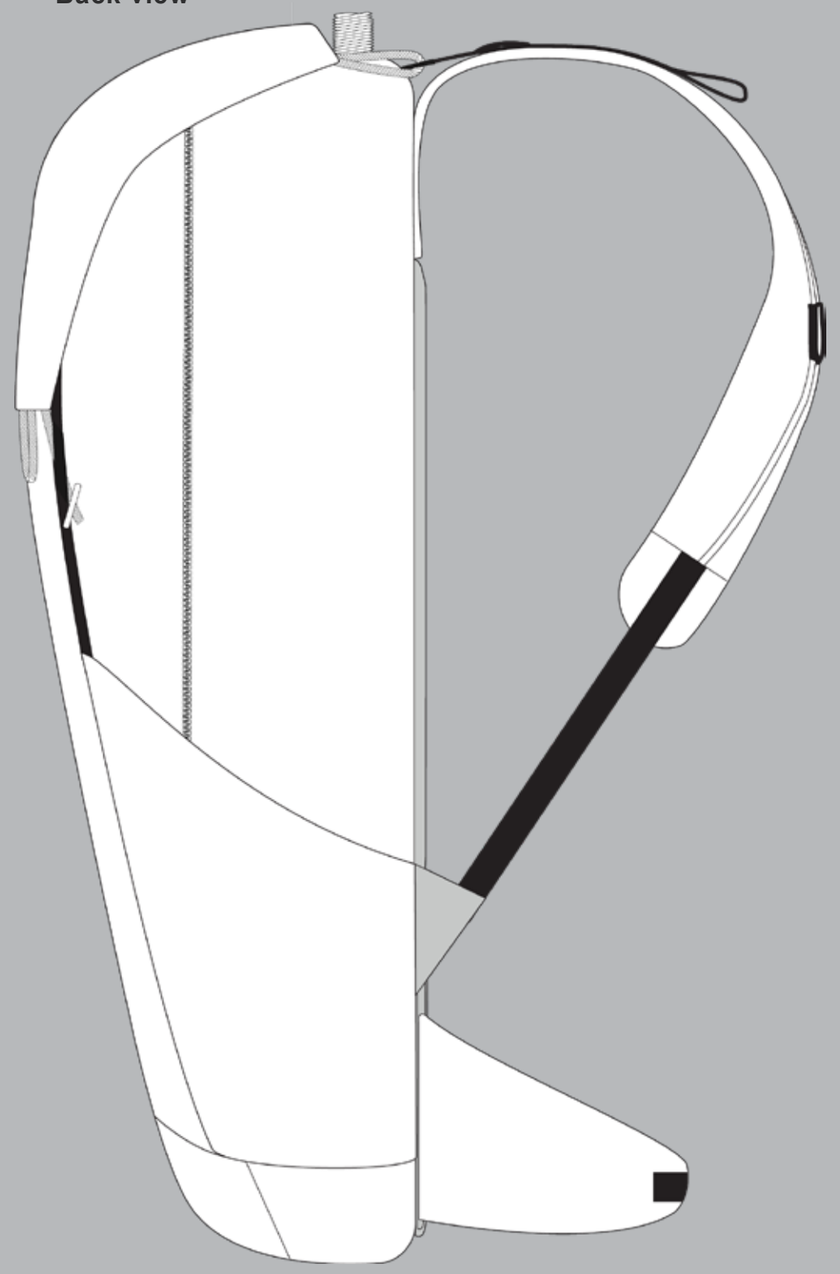
Front view



Height:
52 cm

Width:
32 cm

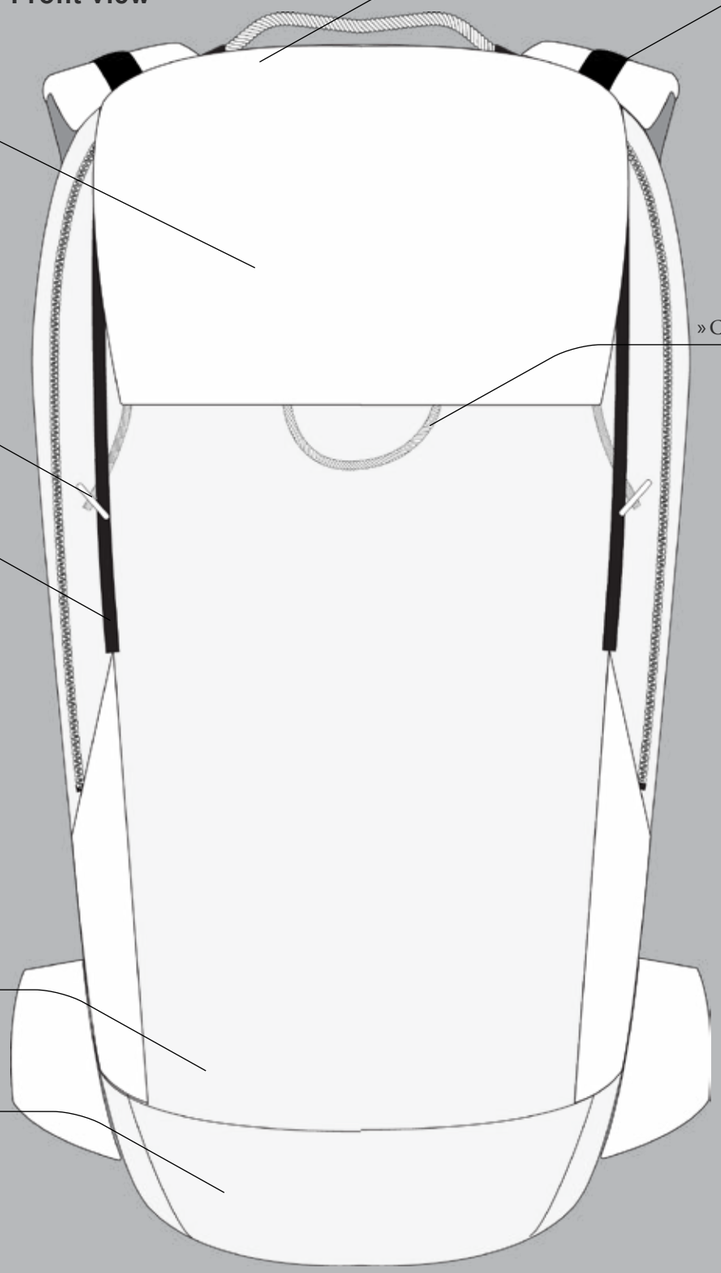
Back view



Depth:
22 cm

Features - Final design

Front view



» Easy access pocket

» Load lifters

» First aid kit

» Cord handle

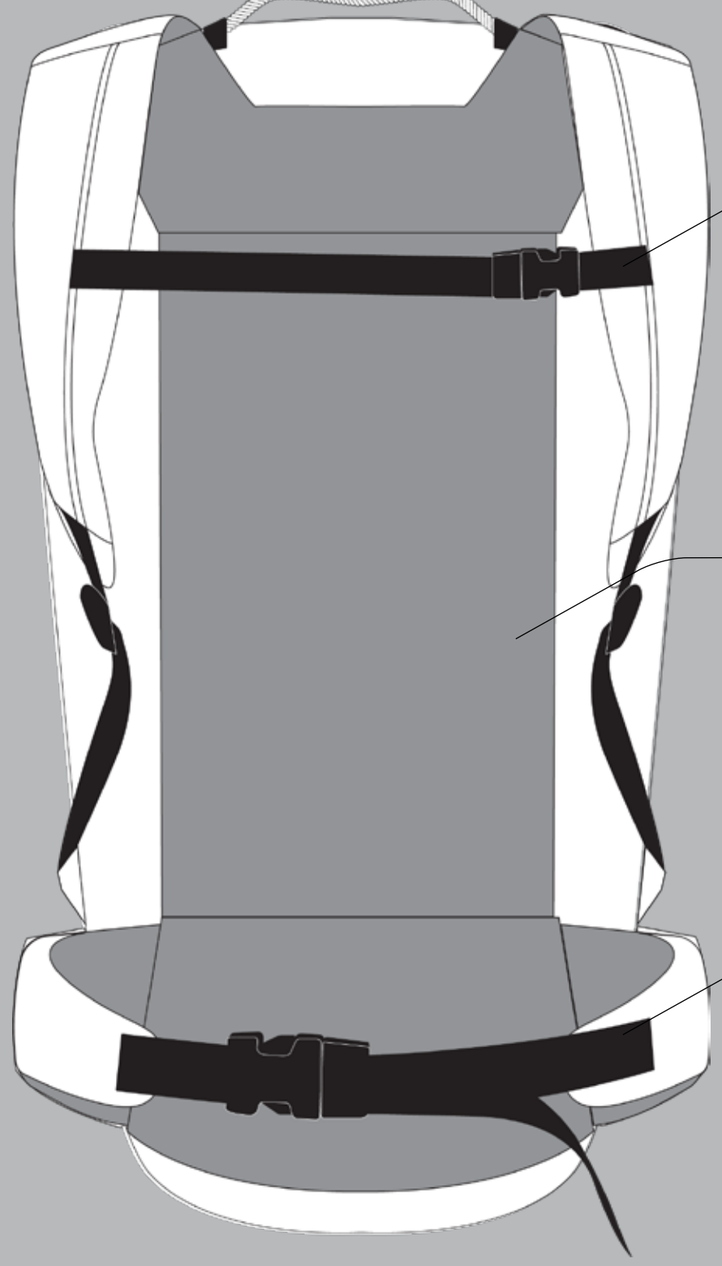
» Wooden buckles

» Daisy chain

» Main fabric

» Heavier denier fabric for bottom

Back view



» Braided paracord handle

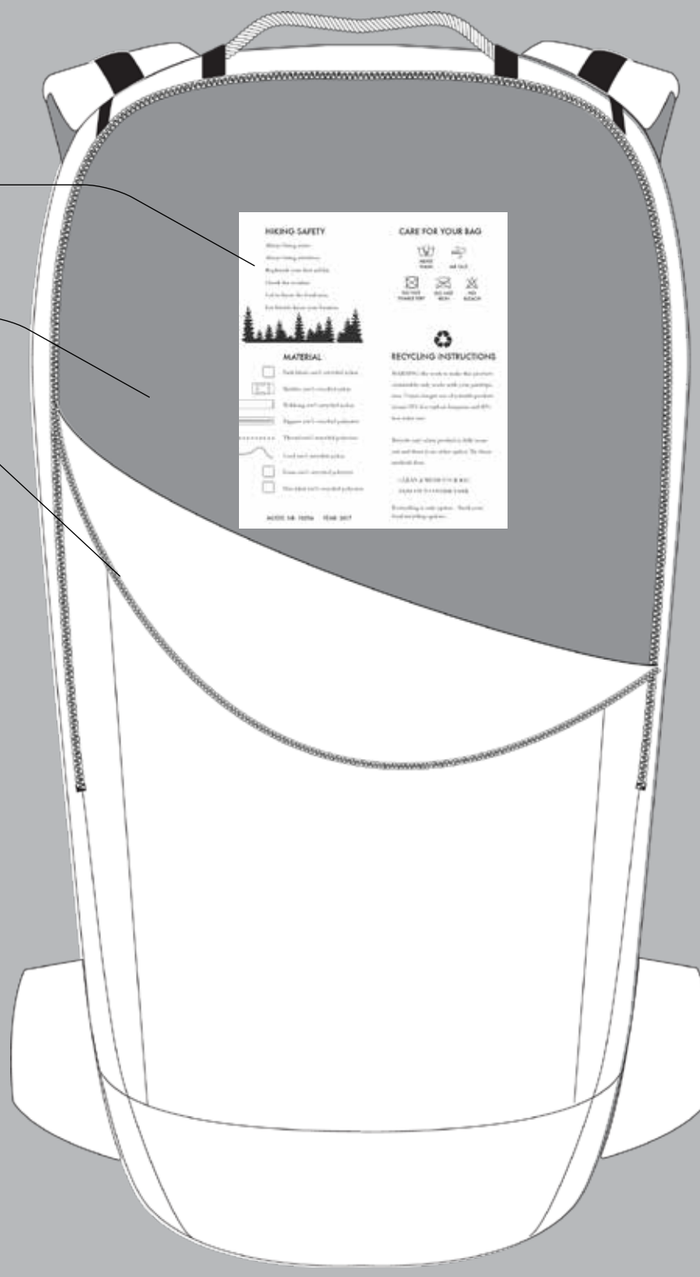
» Sternum strap

» Back panel

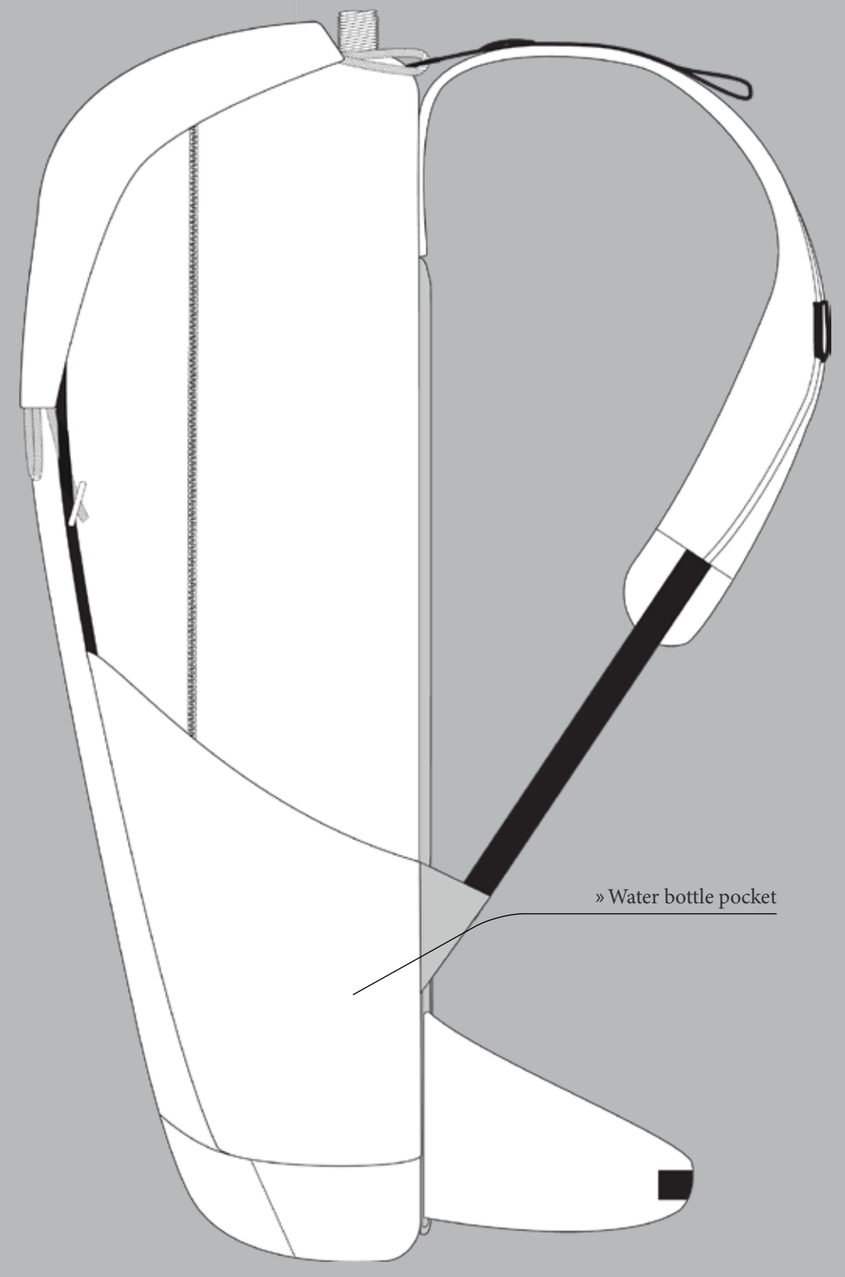
» Hip belt

Features - Final design

Interior view

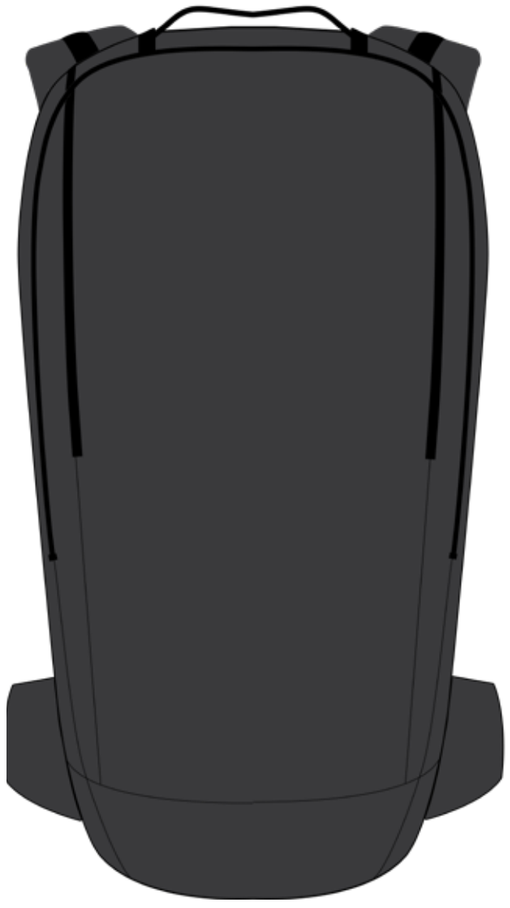


Side view

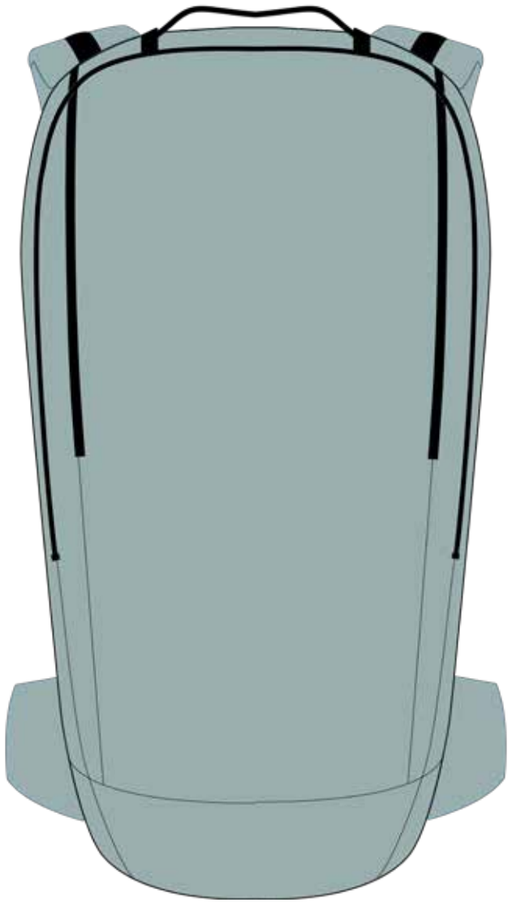


Colour Choices -Final design

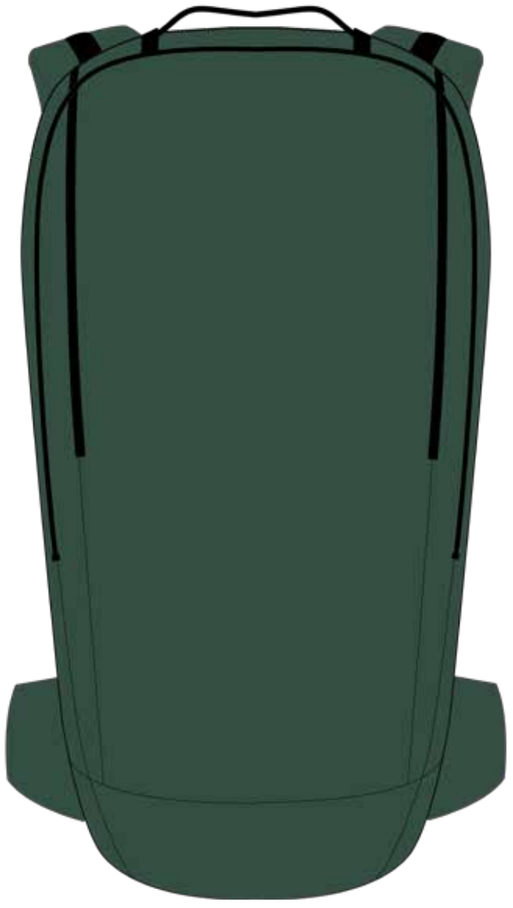
Thundercloud



Clearwater

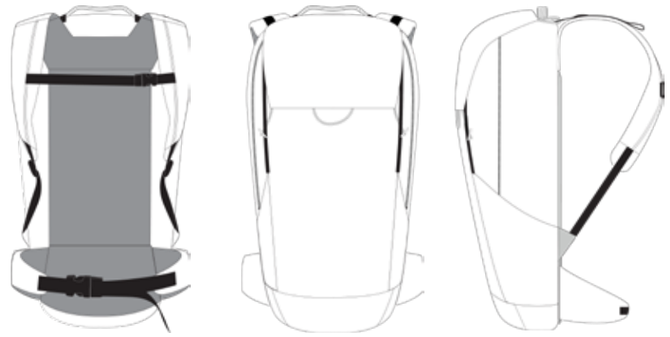


Rain Forest



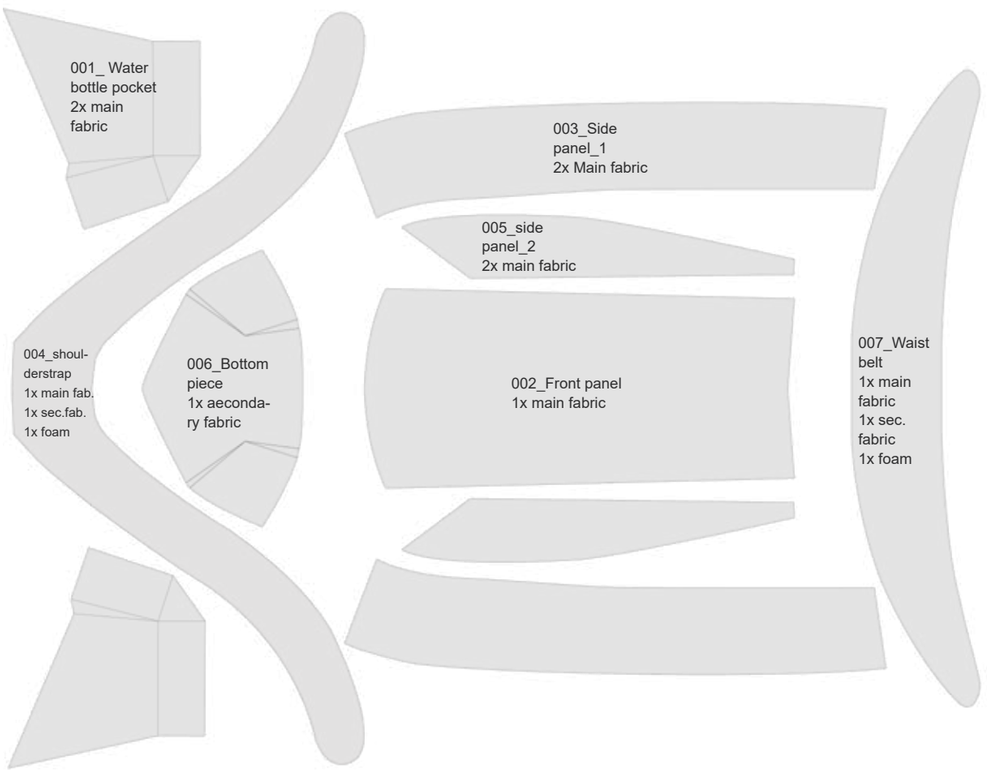
Tech Pack - final design

Ortographic view



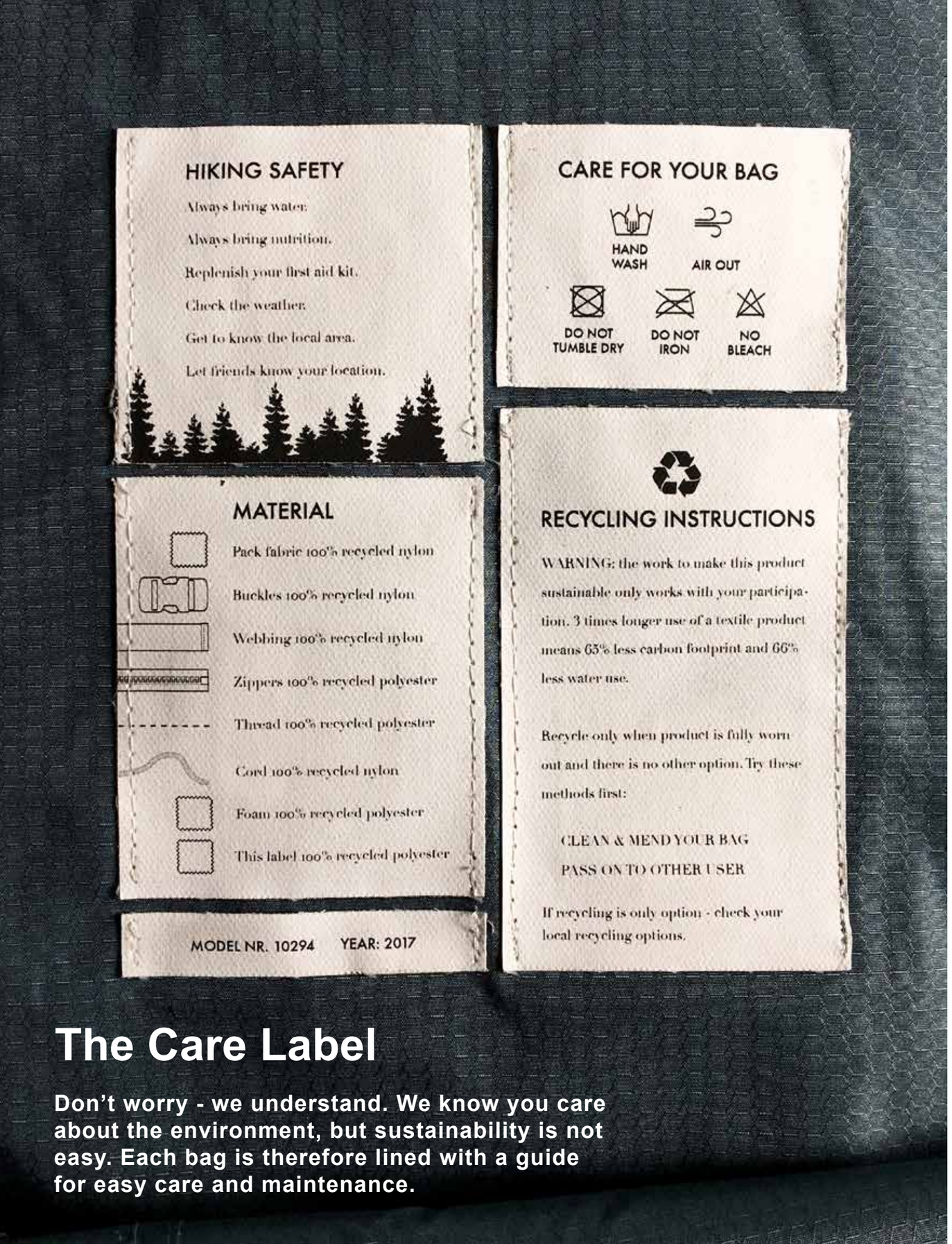
Colourways

Cutting Pattern



Part	Material	Colour and finish
Main fabric	150D recycled Polyester	**Model specific**
Secondary fabric	300D recycled Nylon	**Model specific**
Plastic sheet material	PU sheet	**Clear**
Zipper	Recycled polyester	**Black**
Sternum strap buckle	Recycled polyester	**Black**
Sternum strap clips	Recycled polyester	**Black**
Webbing 15 mm	Recycled polyester	**Black**
Webbing 25 mm	Recycled polyester	**Black**
Paracord 5 mm	Recycled nylon	**Black / reflective**
Paracord 3 mm	Recycled nylon	**Orange / reflective**
Zipper puller	Coated aluminium	**Matte Black**
Wooden buckle	Wood with bark	**Natural no finish**
Ladder locks	Recycled polyester	**Black**
Printed label	Recycled polyester	**White**

The following pages show each main feature and they could be marketed to the target group.



The Care Label

Don’t worry - we understand. We know you care about the environment, but sustainability is not easy. Each bag is therefore lined with a guide for easy care and maintenance.

The care label

The care label is sewn inside the bag, visible every time the bag is being used. It explains how to care for the bag and how to eventually give it a new life if not needed by the first user anymore. Hopefully the future will hold more second and third generation users, rather than products ending their life after one user.

The care label is traditionally placed hidden on a product, but here it is a part of the bag and is meant to be a daily reminder to the value of the product and the importance of keeping it going. As an addition, the bag also gives advice on hiking safety, to keep the consumer going further too!

The carry handle

Your helping hand in need.

Let it unravel and use it to tie something to your bag, to create a shelter from the wind or anything else you might need on your journey.

The carry handle

The carry handle is made out of paracord, a material commonly used by the outdoor community. It is braided directly onto the bag and can easily be taken off when the adventure calls for some material.

It can easily be replaced again with any cord of choice.

The wooden buckle

No matter how well designed a product is, there is always a risk that it breaks apart. The wooden buckle on the bag symbolizes how we can make procuts survive by simply saying - it is ok to break, we can fix it again!

The buckle

Backpacks are not indestructible, but they should be easy to mend.

In nature you can solve anything with a bit of creativity!

Organization

Some things are good to have easy access to. Find your water bottle, first aid kit and shades quick with exterior pockets.

Organization

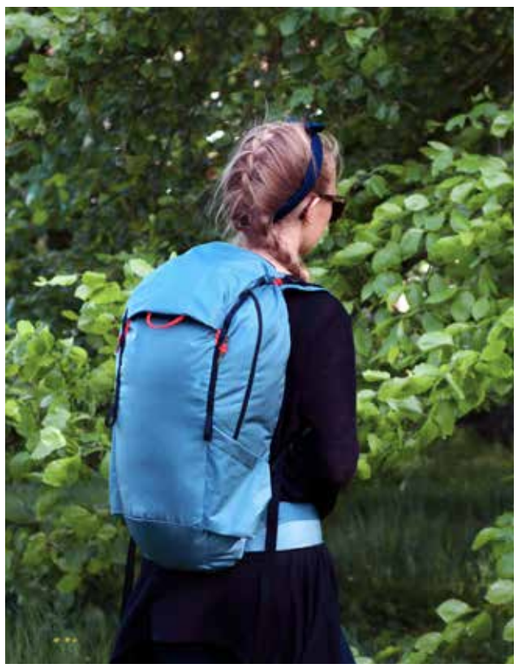
Just the right amount of storage for a bag for day hikes. The top lid holds a small item storage pocket. The side pockets hold your water.

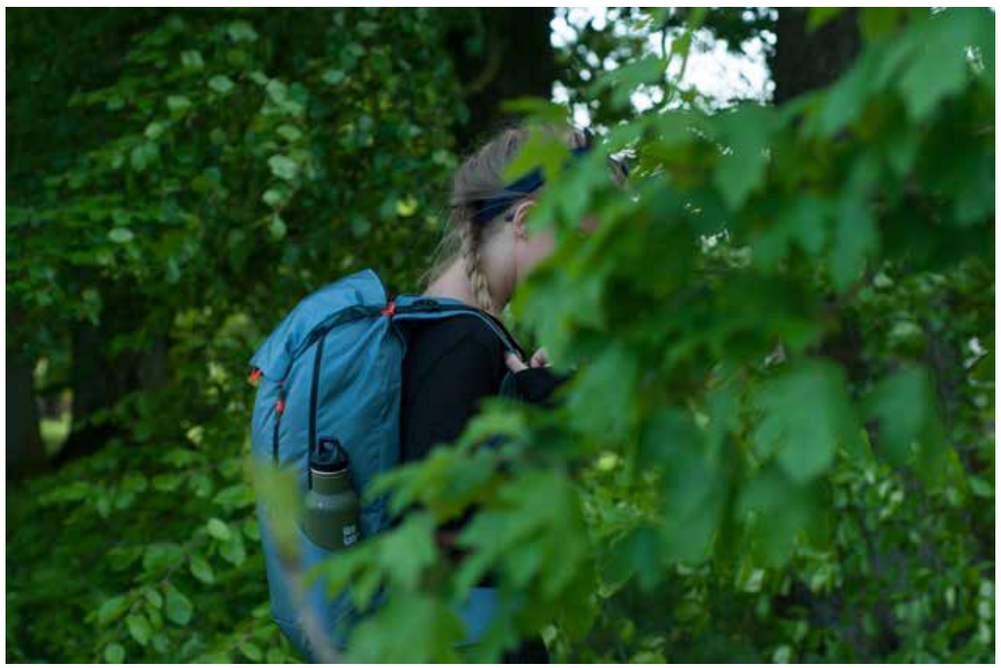
The First Aid Kit

Inspired by the new target group that may need a helping hand on the trail. A first aid kit easy to access and easy to remember to bring.

The First Aid Kit

Easy access safety on the trail





Conclusion

It is a wicked problem

Design for manufacturing and mass consumption is creating products that will be here for many years to come. They will pollute the environment in all stages of their life cycle - regardless of how well designed they are.

I believe that in order to solve the massive challenges that we face in the textile industry today we need to be open minded and try many different angles to slowly but surely dissolve the issues. In this, the industrial designer can and should play a key role. Designers are often working at an early stage in product development. That creates an opportunity to affect the product throughout the lifecycle. If a design is well thought through and well communicated, it gives the product nine lives - the best possible chance of survival. Making a product stay in the loop is one of the best ways to reduce the carbon footprint of the product.

In this project the product was reduced to as few components as possible. In order to do this it was important to understand the target user, their needs and desires. What makes you buy something, what makes you care for it and hold on to it? Having a carry handle and water bottle holders on the bag I thought could be eliminated to make a more minimalist bag. But cutting out too much could mean that the product ends up at the dump rather than being used for generations. The features are important in sustainability - they need to fit the purpose of the product.

The bag was designed to be easy to mend. In order to design for mending, we need to understand what can and will go wrong. As backpacks have been around for a very long time it is easy to draw conclusions on which parts will likely need mending sooner. The wood toggle, the paracord carry handle and the wide mouth zipper opening were all inspired by this. The label with care instructions on the inside of the bag is a symbol of the importance of the user/product relationship. If you do not love the bag enough to keep it anymore - at least give it a chance to keep going.

Adding a first aid kit and different bag colours to choose from adds to the story of the bag, the collection, the user and the brand. This is important in order to stand out in the sales channels. If these choices become gimmicky or too trendy, we have failed to create a product that will last and be relevant for years to come.

The decisions we make matter.

The designer plays a role and should take it seriously. Have the production plant, end user, second hand end users and recycling facilities in mind already at the start. Be mindful of what features and materials go into products being made. Keep an open mind - many solutions to the issues we face today are yetl to be discovered.

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