

cut, make, trim - research phase

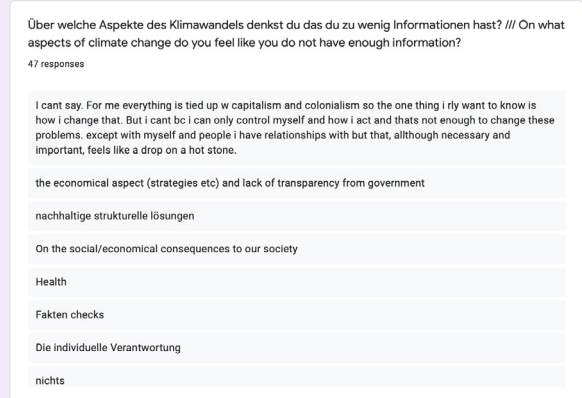
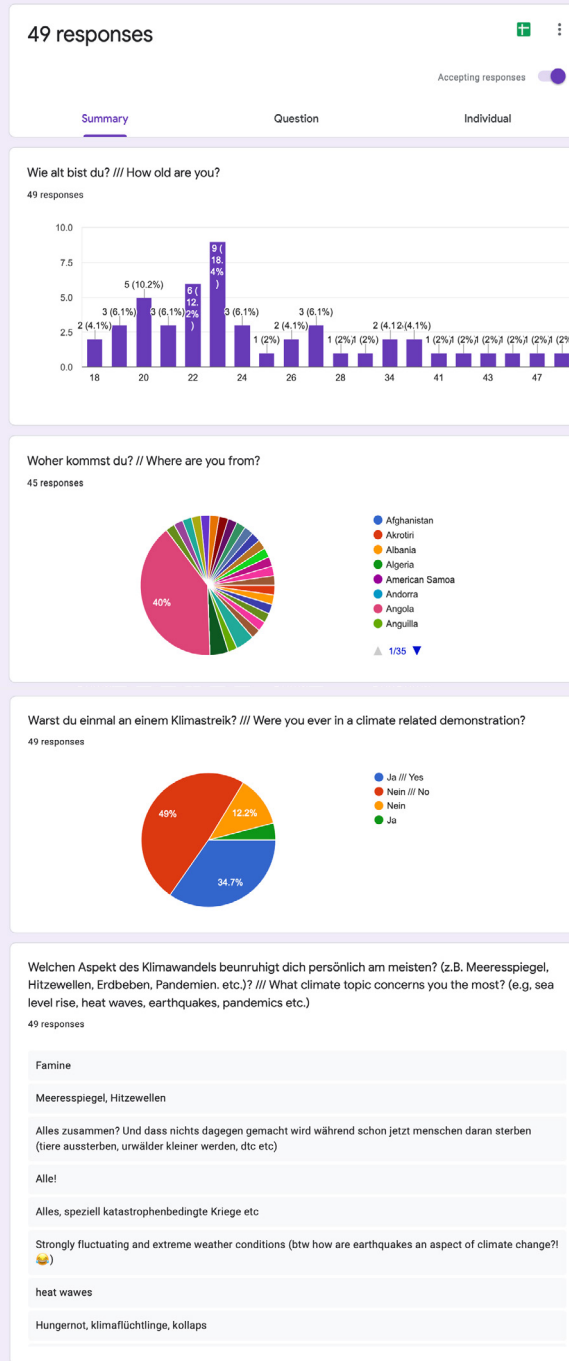
# Climate Survey

One of the first things we did on our journey to create an interactive data visualization regarding co2 emissions, was to create a survey.

We wanted to get a feeling on if and how people are concerning themselves with the climate crisis. Our impression of the survey was that people already know a lot about the problem, even down to individual behavior adjustments.

In the end this questionnaire help guide our hand into not wanting to scare people with figures if imminent doom, but rather help them to inform themselves even further in a pleasant and maybe even playful manner.

Next we started to research possible subject matters and corresponding data sets. We were interested in the fashion industry from an early stage, but we also focused on subjects such as meat consumption, insect- and general biodiversity.





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# Miro Board of Doom

## BEES



www.pronatura.ch

### Biodiversität - Vielfalt des Lebens nimmt rapide ab

Wir sind auf die Vielfalt von Lebensräumen und Arten angewiesen. Doch die biologische Vielfalt ist stark bedroht und der Klimawandel beschleunigt das Artensterben weiter. Was für die Klimakrise gilt, gilt auch für die Biodiversität: jetzt handeln, bevor...



www.theguardian.com

### Revealed: the 20 firms behind a third of all carbon emissions

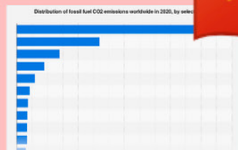
The Guardian today reveals the 20 fossil fuel companies whose relentless exploitation of the world's oil, gas and coal reserves can be directly linked to more than one-third of all greenhouse gas emissions in the modern era.



www.nytimes.com

### The Science of Climate Change Explained: Facts, Evidence and Proof

Definitive answers to the big questions. Credit... Photo illustration by Andrea D'Aquino The science of climate change is more solid and widely agreed upon than you might think. But the scope of the topic, as well as rampant disinformation, can make it ...



www.statista.com

### Biggest polluters in the world | Statista

China was the biggest emitter of fossil fuel carbon dioxide (CO2) emissions in 2020, accounting for 30.64 percent of global emissions. The world's top five largest polluters were responsible for roughly 60 percent of global CO2 emissions in 2020.



opendata.swiss

### Raum und Umwelt

Das Portal opendata.swiss ist ein gemeinsames Projekt von Bund, Kantonen, Gemeinden und weiteren Organisationen mit einem staatlichen Auftrag. Es stellt der Allgemeinheit offene Behörden Daten in einem zentralen Katalog zur Verfügung. Das Bundesamt für S...



www.openaccessgovernment...

### Can artificial intelligence solve our societal issues?

There are, largely speaking, two camps when it comes to artificial intelligence. On one hand, there's those who are wary of the negatives that have been reported on in the press and worry that the future isn't as bright as we'd hoped for.



www.theguardian.com

### Going vegan: can switching to a plant-based diet really save the planet?

The UK business secretary, Kwasi Kwarteng, is considering a "full vegan diet" to help tackle climate change, saying people will need to make lifestyle changes if the government is to meet its new emissions target of a 78% reduction on 1990 levels by 2033...



www.theguardian.com

### Climate misinformation on Facebook 'increasing substantially', study says

The scale of climate misinformation on Facebook is "staggering" and "increasing quite substantially", a new analysis of thousands of posts has found. A report released on Thursday by the Real Facebook Oversight Board, an independent watchdog group, and ...



www.theguardian.com

### It's time to shift from the 'war on terror' to a war on climate change | Heidi Peltier

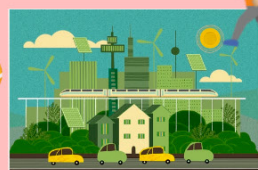
argue government bureaucracies are often slow to adapt to changing realities, such as the catastrophic threats we face in a warming world. The US Department of Homeland Security (DHS) is no exception. New research from Brown University's Costs of War Pro...



www.theguardian.com

### Equivalent of Covid emissions drop needed every two years - study

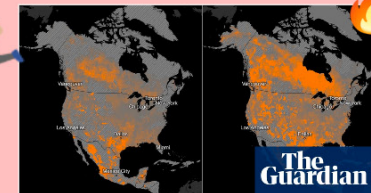
Carbon dioxide emissions must fall by the equivalent of a global lockdown roughly every two years for the next decade for the world to keep within safe limits of global heating, research has shown.



www.nytimes.com

### How to Reduce Your Carbon Footprint

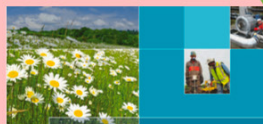
Illustrations by Adam Simpson, Animations by Fraser Croall Climate change can be overwhelming. The science is complex, and when it comes to future impacts, there are still a lot of unknowns. While real solutions will require action on a global scale, th...



www.theguardian.com

### The climate disaster is here - this is what the future looks like

Earth is already becoming unlivable. Will governments act to stop this disaster from getting worse?



ISWA WHITE PAPER



ISWA



www.theguardian.com

### Few willing to change lifestyle to save the planet, climate survey finds

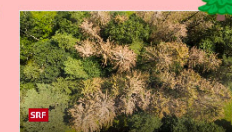
Citizens are alarmed by the climate crisis, but most believe they are already doing more to preserve the planet than anyone else, including their government, and few are willing to make significant lifestyle changes, an international survey has found.



www.theguardian.com

### 'Dangerous blindspot': why overlooking blue carbon could sink us

hen the ambitious plan to allow sea water to flood over the Steart peninsula in Somerset was completed in 2014, critics called it a waste of money. Floods had recently blighted the nearby area, and some local people argued the £20m spent on creating a n...



www.srf.ch

### Klimawandel im Schweizer Wald - Manchen Bäumen setzt der Klimawandel schneller zu

Der Klimawandel bringt das Gleichgewicht im Schweizer Wald durcheinander. Es gibt noch viel zu tun, sagen Experten. "Katastrophen haben unsere Vorfahren 1876 gezwungen, den Wald rigoros zu schützen. Die Schweiz hat den Wald retten gehört, seine Warnungen...



theconversation.com

### Tiny plankton drive processes in the ocean that capture twice as much carbon as scientists thought

The ocean plays a major role in the global carbon cycle. The driving force comes from tiny plankton that produce organic carbon through photosynthesis, like plants on land. When plankton die or are consumed, a set of processes known as the biological ca...



qz.com

### Algae might be a secret weapon to combatting climate change

As fires rage in the Amazon, people have latched onto the phrase that the Amazon is the "lungs of the earth." President Emmanuel Macron of France warned that "our house is burning." Celebrities from Leonardo DiCaprio to Vanessa Hudgens raised funds to s...



www.oxfam.org

### Carbon emissions of richest 1% set to be 30 times the 1.5°C limit in 2030 | Oxfam International

The carbon footprints of the richest 1 percent of people on Earth is set to be 30 times greater than the level compatible with the 1.5°C goal of the Paris Agreement in 2030, according to new research out today. It comes as delegates grapple with how to ...



www.iea.org

### Global Energy Review: CO2 Emissions in 2020 - Analysis - IEA

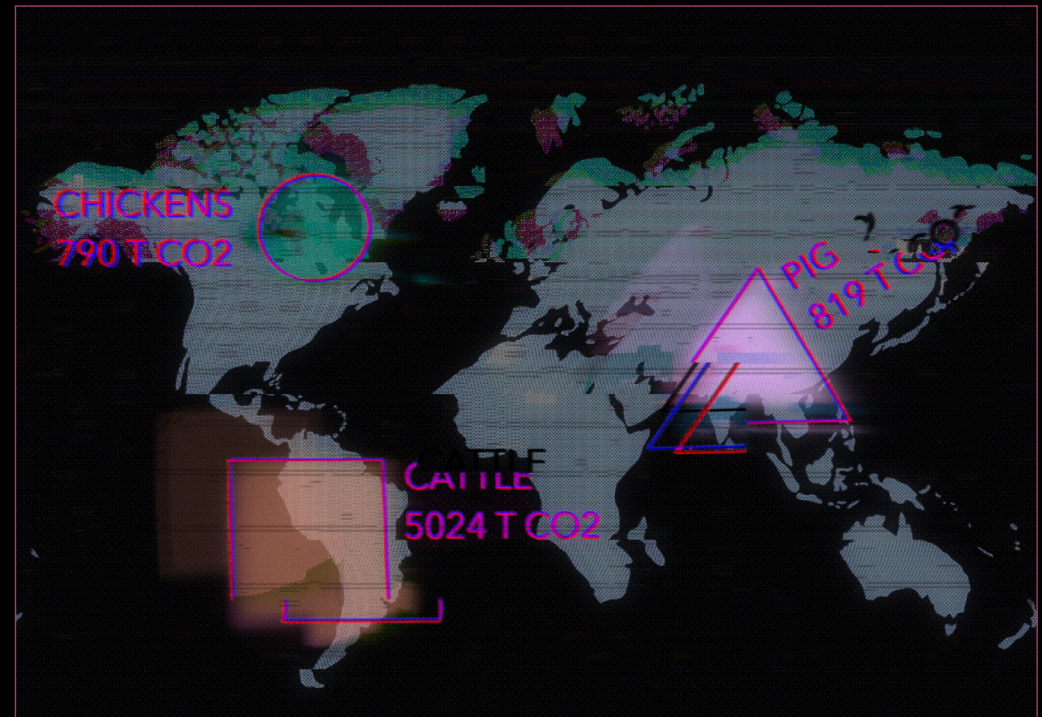
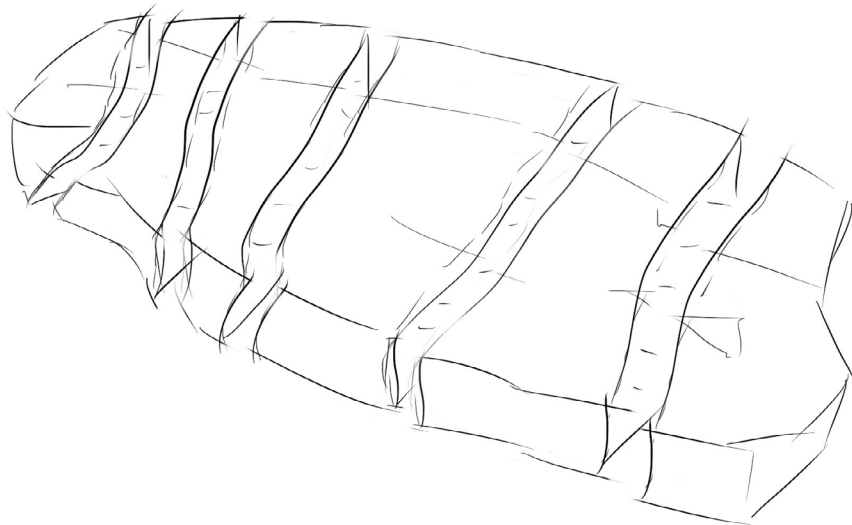
Understanding the impacts of Covid-19 on global CO2 emissions The Covid-19 pandemic and resulting economic crisis had an impact on almost every aspect of how energy is produced, supplied, and consumed around the world.

cut, make, trim - research phase

## Meat on the Bone

At this point we already started to release some of our creative musings into sketches and animations. We considered omni-directional data visualization so everyone around the table could get the information. We thought about dragging & dropping species unto maps to see their impact on the ecosystem. We even thought about complex three-dimensional clusters of connected dots, showing the codependencies between species over time.

In the end however we had to make concessions towards the available data. Even if we'd wanted to pursue a certain subject field, without the proper data sets we felt very uncomfortable combining and interpreting numbers without a proper file from a collaboration partner.





# Data Collection

The first time Paulina came to our rescue was when she helped us in finding this report by McKinsey&Company. It's actually quite hard to find any further information on the fashion industry beyond this document, that would of a similar scope and quality. We focused mainly on two sets of data: the overall co2-emissions split into categories as well as the factors of how these categories might be reduced until the year 2030.

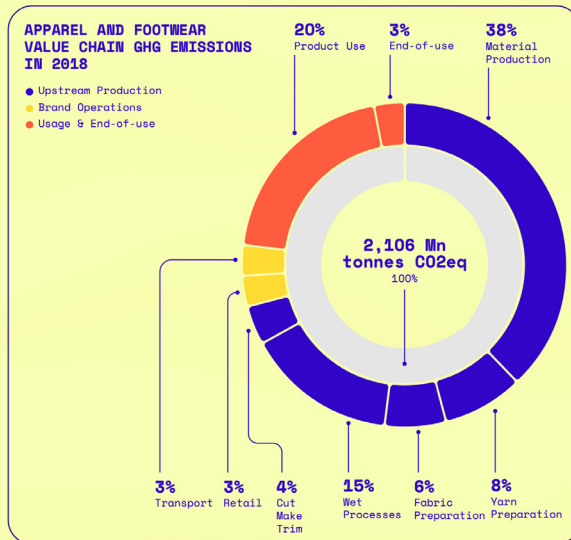
Since the category shares aren't expected to grow linearly until 2030, we were missing a piece of data showing the future pie chart. We could still make it work well enough to communicate the essence of the piece and so we soldiered on, creating our first design concepts.

## BASELINING THE FASHION INDUSTRY'S GHG EMISSIONS

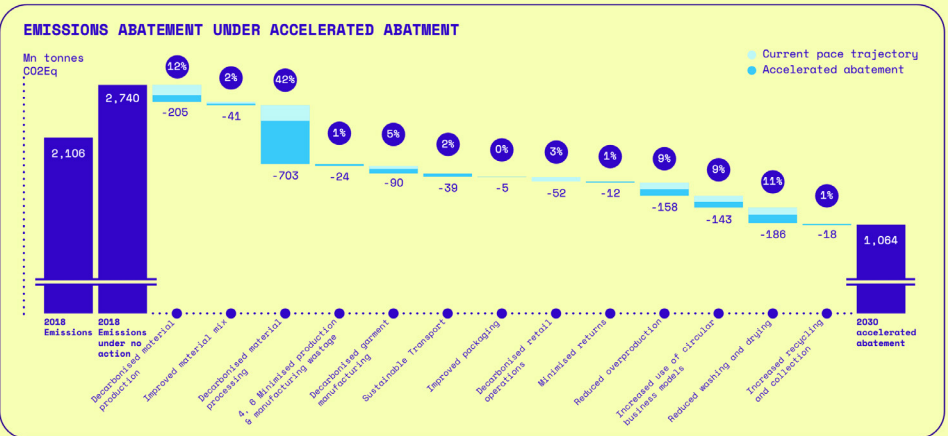
### THE STATUS QUO ON INDUSTRY EMISSIONS AND ABATEMENT EFFORTS

The fashion industry accounts for around 4% of emissions globally, equivalent to the combined annual GHG emissions of France, Germany and the United Kingdom.<sup>26, 27</sup> More than 70% of the emissions come from upstream activities, particularly energy-intensive raw material production, preparation and processing.<sup>28</sup> The remaining 30% are generated by downstream activities such as transport, packaging, retail operations, usage and end-of-use.<sup>29</sup>

**"THE FASHION INDUSTRY ACCOUNTS FOR AROUND 4% OF GLOBAL GHG EMISSIONS"**



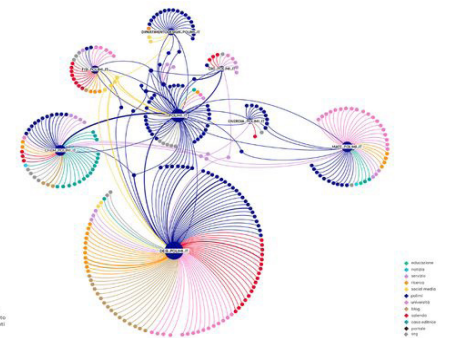
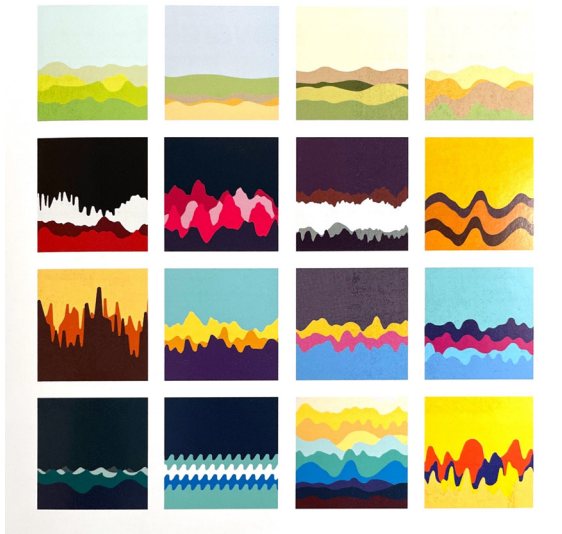
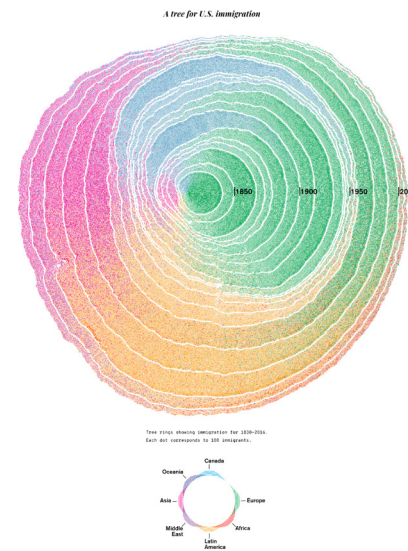
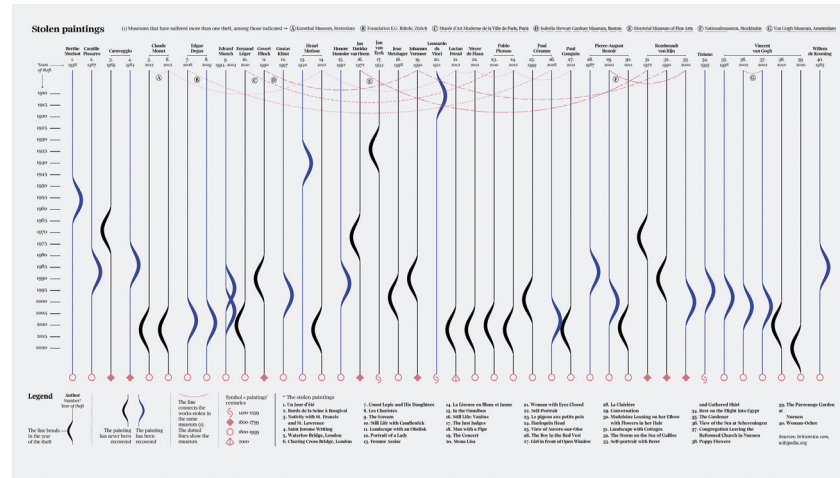
## ABATEMENT CONTRIBUTION OF ANALYSED DECARBONISATION LEVERS





cut, make, trim - research phase

# Inspiration Moodboard

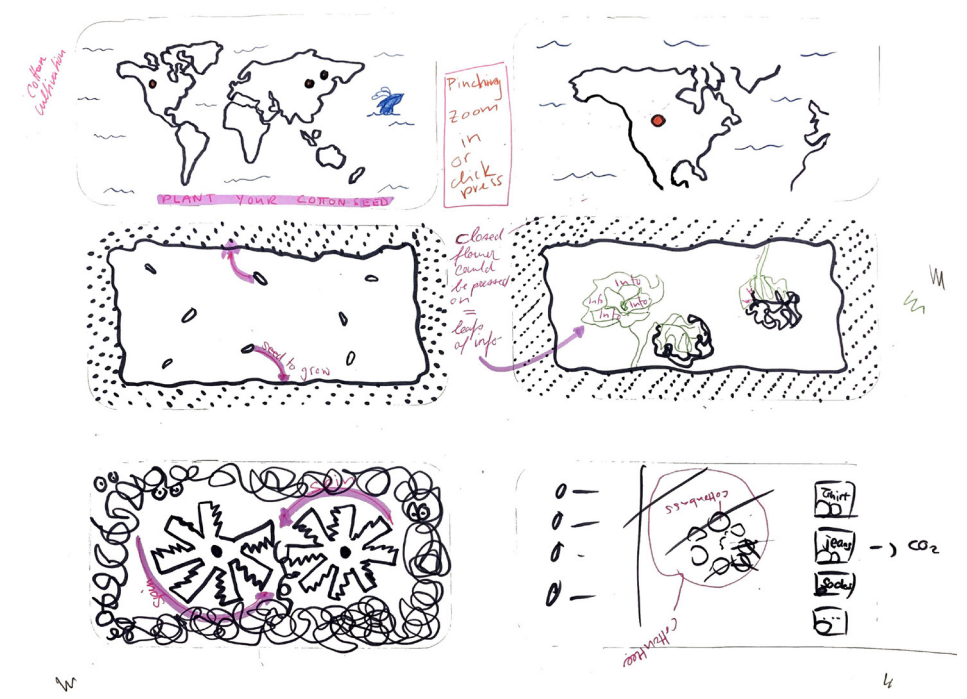
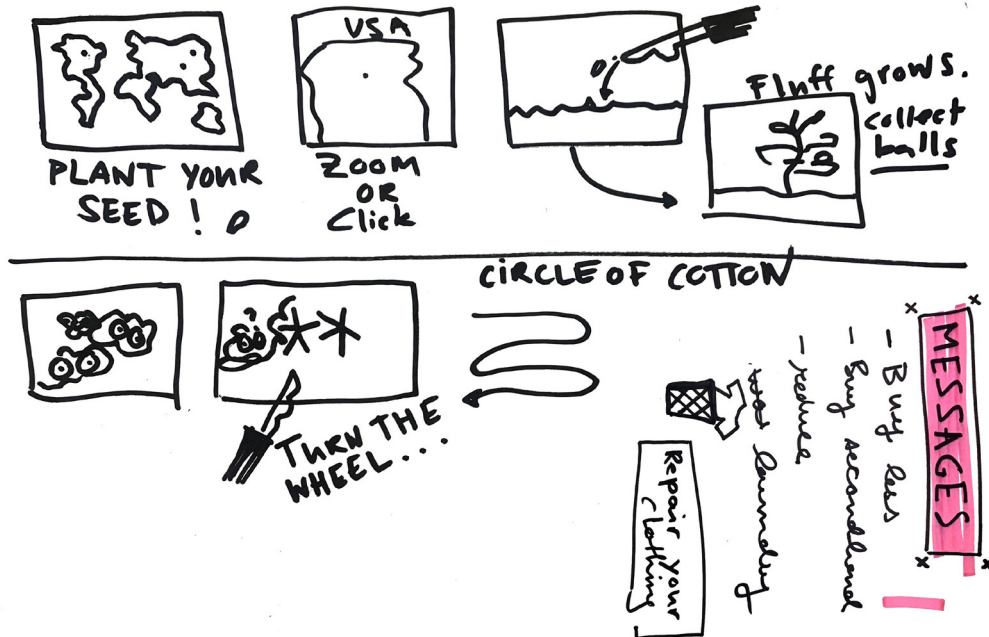


cut, make, trim - ideation phase

# Early Exploration

After spreading our research to a variety of topics on co2 emissions we went in to the fashion industry branch. Through our ideation process we navigated towards interactivity, data and an appealing visual language. We collectively prepared the ground to put our seeds to fruit and simply started sketching scenarios. We found ourself with more questions than before.

How might we display dynamic information? What makes our concept different to an informative video? Where is the silver lining in between aesthetically appealing and understandable? Can we match our knowledge of working with data visualization tools as D3.JS and our vision of a beautiful interface? How will the user end up with a sensibility to the topic?



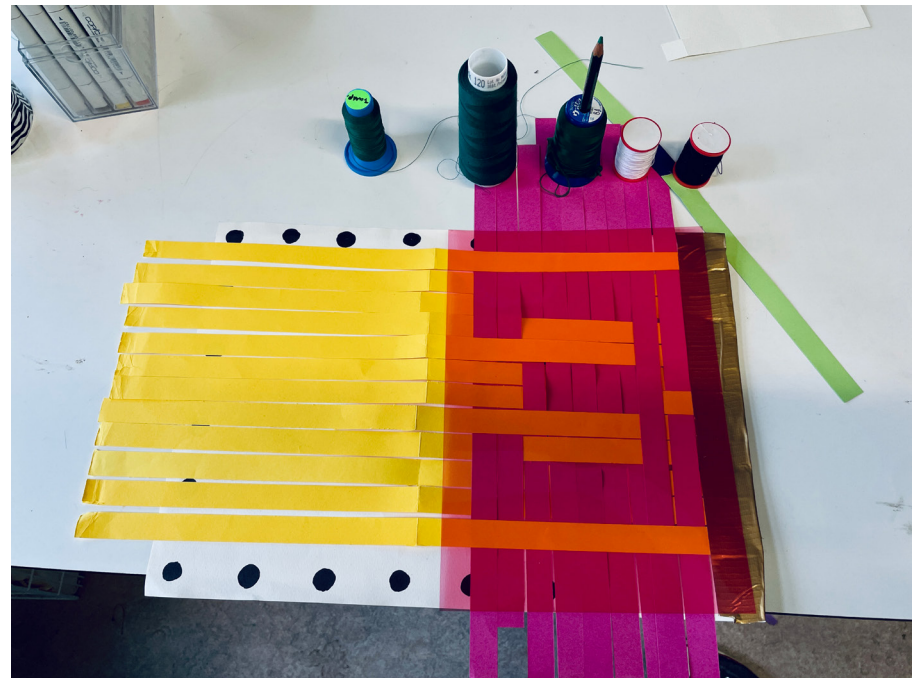
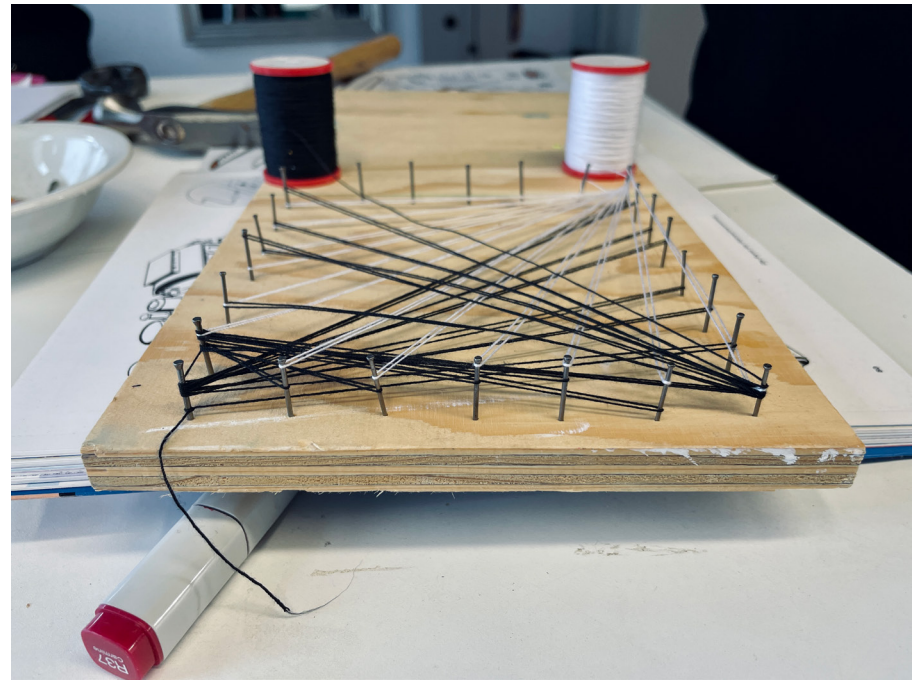


cut, make, trim - ideation phase

## Physical Prototyping

Luckily we spent a lot of our time in Svenjas atelier, surrounded by the tools of the trade in the fashion industry. This was not only very inspiring but also helpful in getting to experiment with materials and having Svenja be our guide through the world of fashion production.

We experimented with weaving patterns from threads and jacquard patterns to display information through the weaving of threads alone. We were very intrigued by the idea of letting the user weave a personalized fabric entirely unique to his interaction with the data visualization.

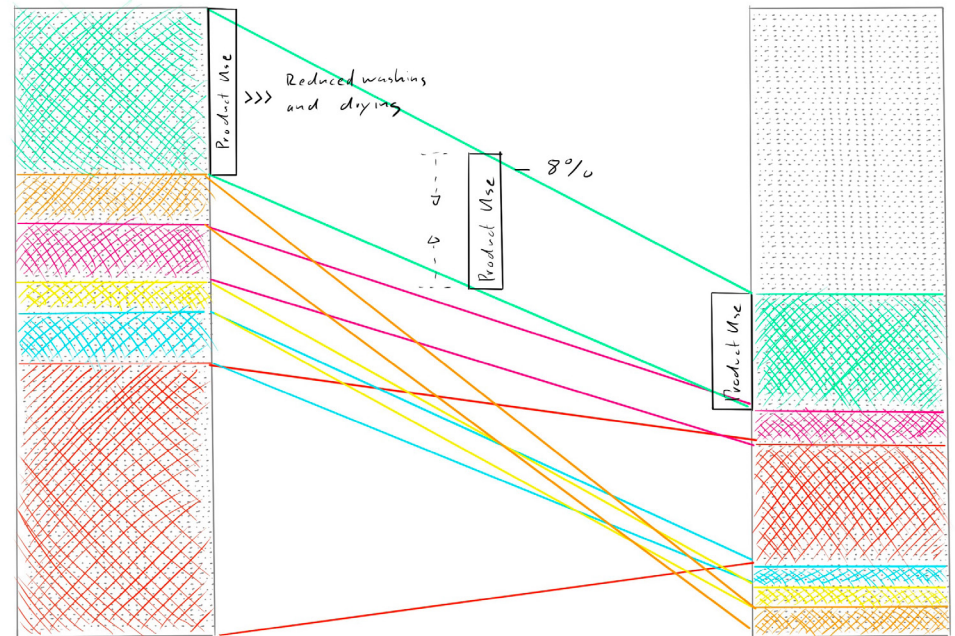
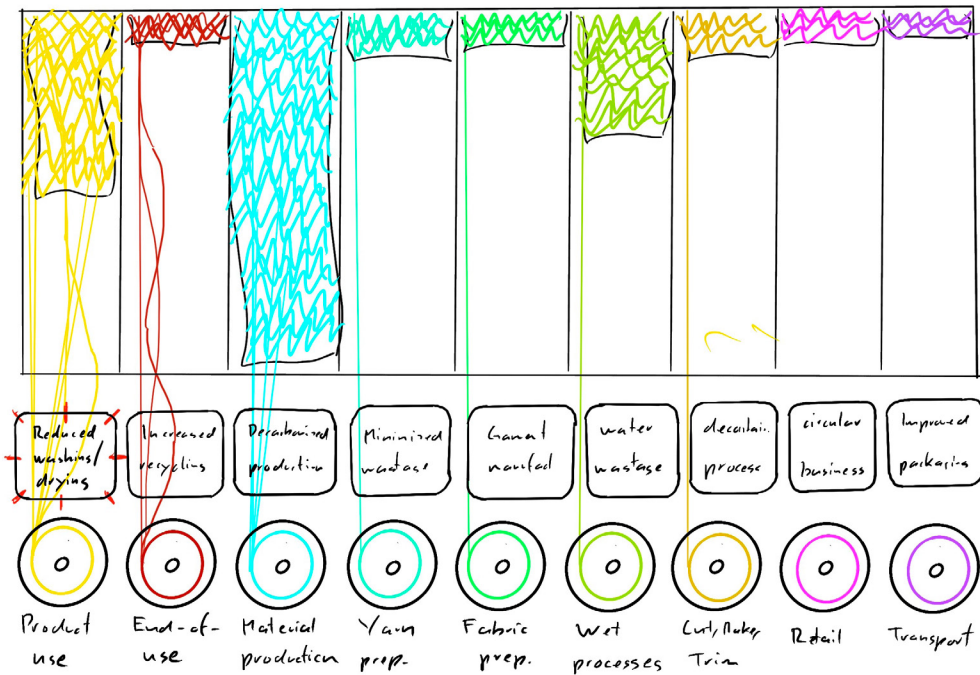




# Webbing & Embroiding

One concept we pursued for a while was a quite complicated way of having spindles of thread represent emission categories in diameter and thread length. Furthermore these threads could then be unspooled, creating a bar chart made of fabric. By cutting these fabrics in size correlating to the projected saving potential we hoped the user would learn about possible measures for carbon reduction.

Many of these ideas can be found in an adapted form in the final prototype, but the spindles we were courageous enough to leave behind, after a more simple and understandable concept didn't seem to materialize. We then started looking into methods of visualizing reductions again, which is where an idea for an embroiding board emerged, as well as the final patchwork concept.





cut, make, trim - ideation phase

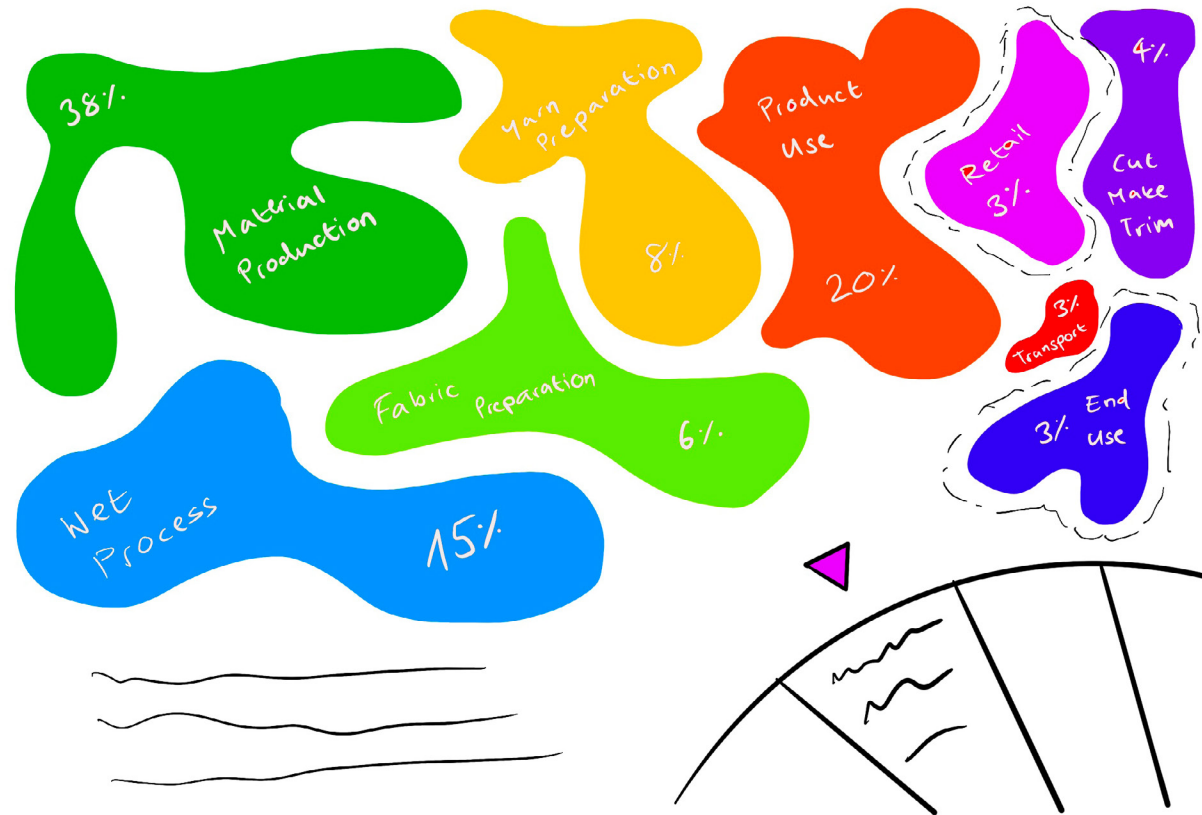
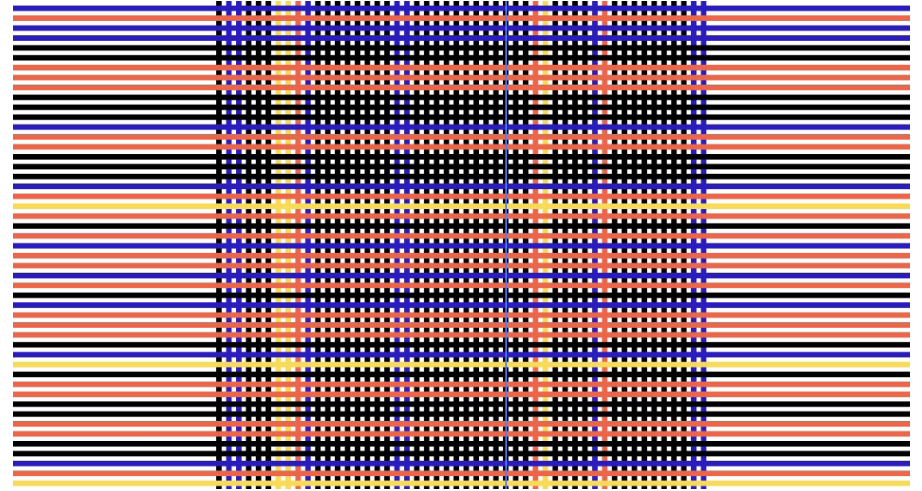
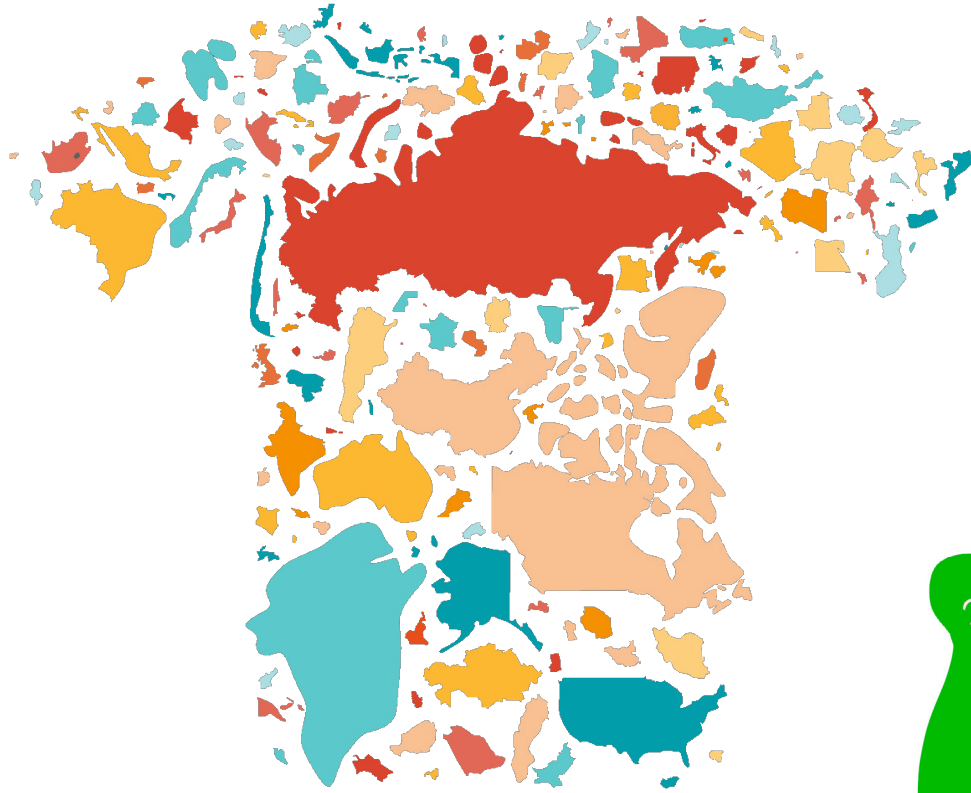
## Patchwork Sketches





cut, make, trim - ideation phase

# Patchwork Illustrations





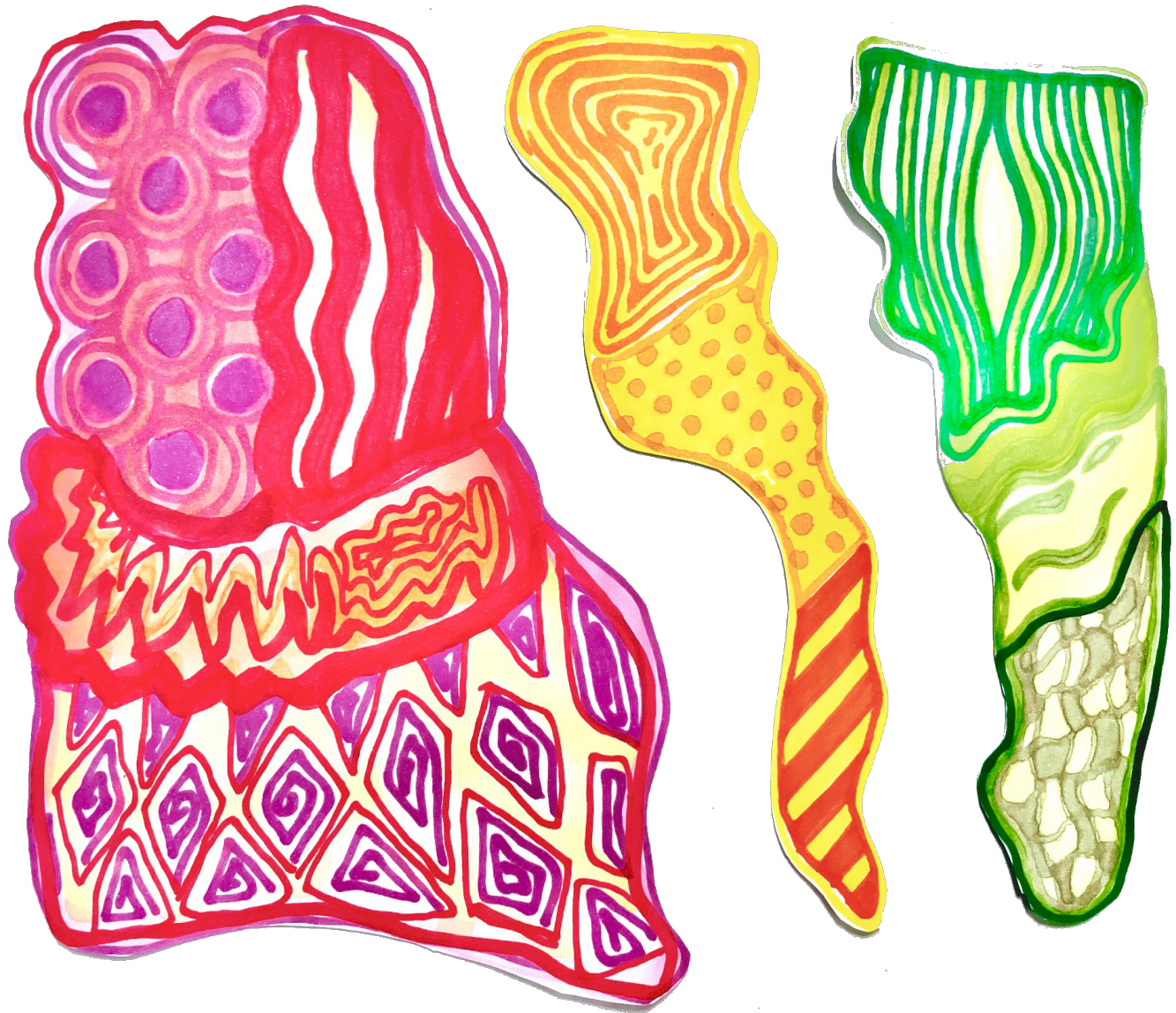
cut, make, trim - ideation phase

## Patchwork Concept

After we had presented our spindle concept for a second time and still couldn't really simplify the idea to a level where it was easy to communicate, we started exploring alternatives again. What we liked about the spindles was that the subject matter was tied to the visualization on a tactile and visceral level. We also enjoyed the idea of displaying colorful fabric instead of dreary black on white data points. It was then when the idea of visualizing the data using a treemap made out of differently colored fabrics emerged. After further development and mentoring the concept took on a more concrete shape:

The fashion industry alone accounts for at least 4% of all global CO<sub>2</sub> emissions. In our interactive data visualization created for a large touch table, the user can learn more about how these emissions can be reduced. When stepping up to the table, the user sees a patchwork made of colorful fabrics. The patches represent the different factors contributing to these large CO<sub>2</sub> emissions. The size of the patches correlate directly with the portion the category contributes to the total carbon footprint of the industry.

By touching one of the fabrics, the corresponding label reveals information on what measures should be taken to reduce the selected categories CO<sub>2</sub> emissions. By tapping the "Check Reduction" button now visible on the label, the patch of fabric shrinks in size and the potential in CO<sub>2</sub> savings gets added to a white "carbon saved" pattern. After a patch has been reduced, it takes on a slightly washed out appearance, indicating that it can not be interacted with further. After having gone through all nine fabric patterns, the user has reached the final screen of the journey, showing that 2/3 of all emissions could be saved by the year 2030.



cut, make, trim – production phase

## Coding the Real Deal

After the treemap concept had solidified itself, we decided to pursue a two track approach to our production. We would develop a high fidelity illustration of our idea inside an interactive prototyping tool (figma in this case). At the same time we would try to code a working sketch of the concept using d3.js.

We suspected that our programming skills as well as the time given, wouldn't be sufficient to create anything usable in the final presentation, but we still wanted to see how far we could get. After a while and some very generous help from Paulina we had a working prototype based on a template we found online.

The sketch while not being very aesthetically pleasing, allowed us to showcase the interaction of reducing the individual categories in size, while simultaneously adding the saved amount to a correspondingly growing rectangle on the treemap.



cut, make, trim - production phase

# d3.js Treemap Code

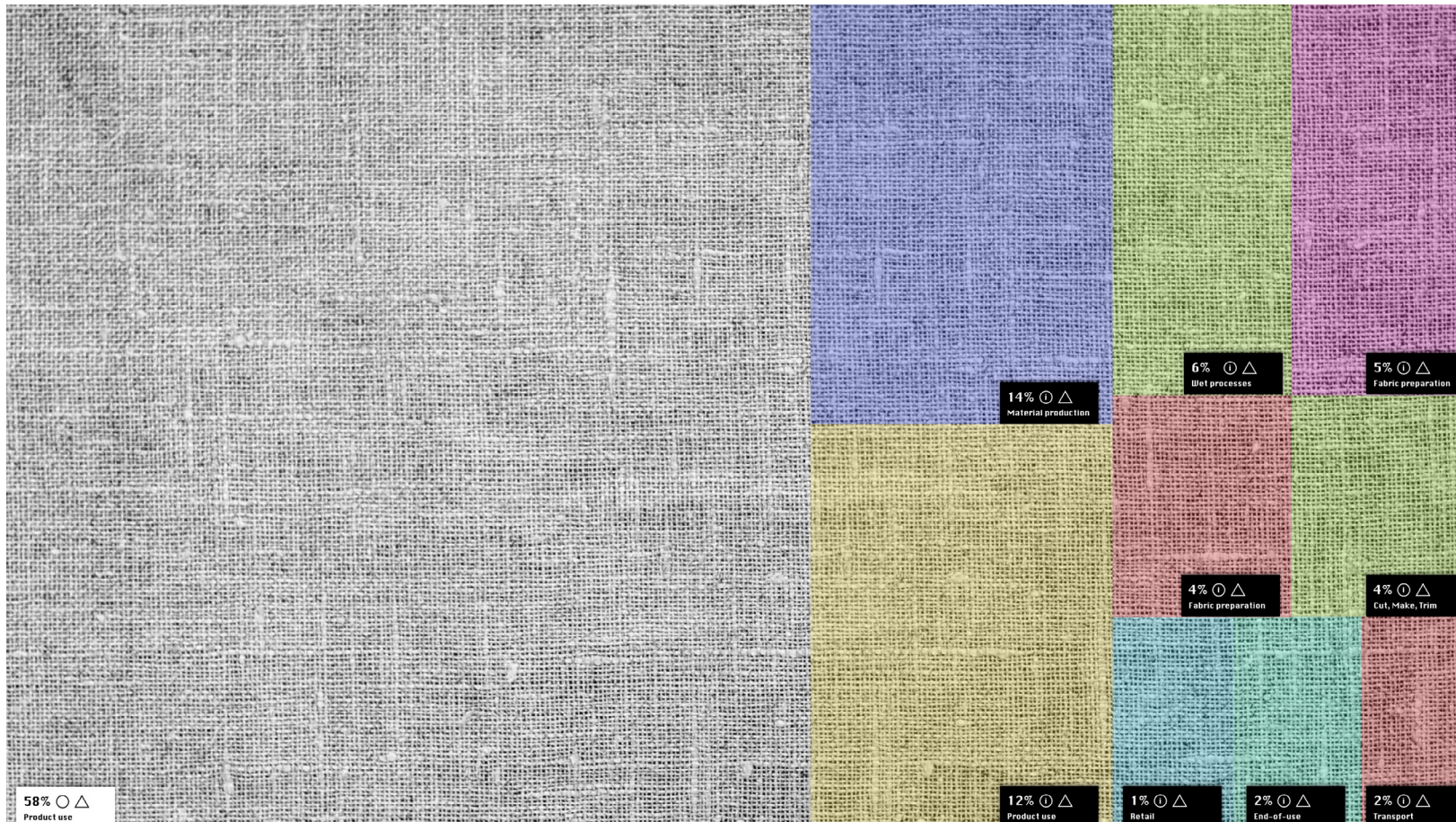
```
1 let testcol = "";
2 var co2 = 0;
3 var total = 0;
4 var easing = 0.02;
5 var val1 = 0.03;
6 var val2 = 0.03;
7 var val3 = 0.2;
8 var val4 = 0.03;
9 var val5 = 0.38;
10 var val6 = 0.08;
11 var val7 = 0.06;
12 var val8 = 0.15;
13 var val9 = 0.04;
14 var val10 = 0.20;
15 var clicked1 = false;
16 var clicked2 = false;
17 var clicked3 = false;
18 var clicked4 = false;
19 var clicked5 = false;
20 var clicked6 = false;
21 var clicked7 = false;
22 var clicked8 = false;
23 var clicked9 = false;
24 var clicked10 = false;
25
26 var tree = {
27   name: "tree",
28   children: [
29     {name: "1, Transport", size: innerWidth * val1},
30     {name: "2, Retail", size: innerWidth * val2},
31     {name: "3, Product Use", size: innerWidth * val3},
32     {name: "4, End-of-use", size: innerWidth * val4},
33     {name: "5, Material Production", size: innerWidth * val5},
34     {name: "6, Yarn Preparation", size: innerWidth * val6},
35     {name: "7, Fabric Preparation", size: innerWidth * val7},
36     {name: "8, Wet Processes", size: innerWidth * val8},
37     {name: "9, Cut, Make, Trim", size: innerWidth * val9},
38     {name: "10, GHG saved", size: innerWidth * val10},
39   ],
40 };
41
42 var color = d3.scale.category20c();
43 const b = d3.color("pink");
44 const w = d3.color("steelblue");
45
46 function update_dic(a,b){
47   for(key in b){
48     a[key] += b[key];
49   }
50   return a;
51 }
52
53 function buildTreemap(){
54   tree = {
55     name: "tree",
56     children: [
57       {name: "1, Transport", size: innerWidth * val1},
58       {name: "2, Retail", size: innerWidth * val2},
59       {name: "3, Product Use", size: innerWidth * val3},
60       {name: "4, End-of-use", size: innerWidth * val4},
61       {name: "5, Material Production", size: innerWidth * val5},
62       {name: "6, Yarn Preparation", size: innerWidth * val6},
63       {name: "7, Fabric Preparation", size: innerWidth * val7},
64       {name: "8, Wet Processes", size: innerWidth * val8},
65       {name: "9, Cut, Make, Trim", size: innerWidth * val9},
66       {name: "10, GHG saved", size: innerWidth * val10},
67     ],
68   };
69 }
70
71 update_dic();
72
73 var margin = {top: 0, right: 0, bottom: 0, left: 0};
74 width = 1000 - margin.left - margin.right;
75 height = 1000 - margin.top - margin.bottom;
76
77
78 var width = innerWidth - 40;
79 height = innerHeight - 40;
80
81 var svg = d3
82   .select("body")
83   .append("svg")
84   .attr("width", width)
85   .attr("height", height)
86   .style("position", "absolute");
87
88 var treemap = d3.layout
89   .treemap()
90   .size([width, height])
91   .sort(function (a, b) {
92     //uncomment if you want the 10th node to be static
93     //return a.name === "10, GHG saved";
94     //return a.name === "10, GHG saved" ? null : a.value - b.value;
95     return a.value - b.value;
96   })
97   .value(function (d) {
98     return d.size;
99   });
100
101 var node = svg.datum(tree)
102   .selectAll(".node")
103   .data(treemap.nodes)
104   .enter()
105   .append("g")
106   .attr("class", "node")
107   .attr("data-clicked", function(d){
108     return d.clicked;
109   });
110
111 //our new hover effects
112 //onmouseover, function (d) {
113 //  d3.select(this).transition()
114 //    .duration(50)
115 //    .attr("opacity", ".85")
116 //    .attr("style", "outline: 3px solid white;")
117 //  }
118 //onmouseout, function (d, i) {
119 //  d3.select(this).transition()
120 //    .duration(50)
121 //    .attr("opacity", "1")
122 //    .attr("style", "outline:none")
123 //  }
124
125 node.append("rect")
126   .attr("x", function (d) {
127     return d.x;
128   })
129   .attr("y", function (d) {
130     return d.y;
131   })
132   .attr("width", function (d) {
133     return d.dx;
134   })
135   .attr("height", function (d) {
136     return d.dy;
137   })
138   .attr("fill", function (d) {
139     return d.name === "10, GHG saved" ? d.color(d.name)
140     : null;
141   })
142   .style("fill", function (d) {
143     return d.name === "1, Transport" ? "url(#1)";
144     : d.name === "2, Retail" ? "url(#2)";
145     : d.name === "3, Product Use" ? "url(#3)";
146     : d.name === "4, End-of-use" ? "url(#4)";
147     : d.name === "5, Material Production" ? "url(#5)";
148     : d.name === "6, Yarn Preparation" ? "url(#6)";
149     : d.name === "7, Fabric Preparation" ? "url(#7)";
150     : d.name === "8, Wet Processes" ? "url(#8)";
151     : d.name === "9, Cut, Make, Trim" ? "url(#9)";
152     : null;
153   });
154
155 //rename all your images to 1.svg, 2.svg, etc.
156
157 //return d.children ? null : d.size != 0 ? d.name : null;
158
159 //renames all your images to 1.svg, 2.svg, etc.
160
161 //return d.x;
162
163 //return d.y;
164
165 //return d.x;
166
167 //return d.x;
168
169 //return d.y;
170
171 //return d.y;
172
173 //return d.x;
174
175 //return d.y;
176
177 //return d.y;
178
179
180
181 node.append("defs")
182   .append("pattern")
183   .attr("id", "3")
184   .attr("width", "1")
185   .attr("height", "1")
186   .attr("patternUnits", "ObjectBoundingBox")
187   .append("image")
188   .attr("xlink:href", function (d) {
189     //return d.x;
190     //return d.x;
191     //return "3.svg"
192     //return "3.svg"
193   })
194   .attr("x", function (d) {
195     return d.x;
196   })
197   .attr("y", function (d) {
198     return d.y;
199   })
200   .attr("width", function (d) {
201     return d.dx;
202   })
203   .attr("height", function (d) {
204     return d.dy;
205   })
206   .attr("x", "0")
207   .attr("y", "0")
208   .attr("width", "600")
209   .attr("height", "600");
210
211 //return d.name.substring(0, d.name.indexOf(","));
212
213 //return d.name === "tree" ? null : d.name + ".svg";
214
215 //return d.name.substring(0, d.name.indexOf(","));
216
217 //return Math.max(10, 0.1 * Math.sqrt(d.area)) + "px";
218
219 //return d.name === "10, GHG saved" ? "ffff" : w;
220
221
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226
227
228
229
230
231
232
233
234
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# Interactive Prototype

For our high-fidelity prototype we created a linear user journey, allowing us to showcase and test interactions and animations beyond our d3.js sketch. The user could explore the treemap along a predetermined path, reading and morphing the design through the interaction. Testing within our group, we could already implement some improvements.

We allowed the user to touch the entire square of fabric and not just the label. This way the person touching the table was guaranteed to stumble upon an interaction point. The dynamic layout also brought some challenges with it, as components had to be sized just right to fit all possible design states while still being legible. For the purposes of demonstration we also shortened the steps required to reach the end state of the design.



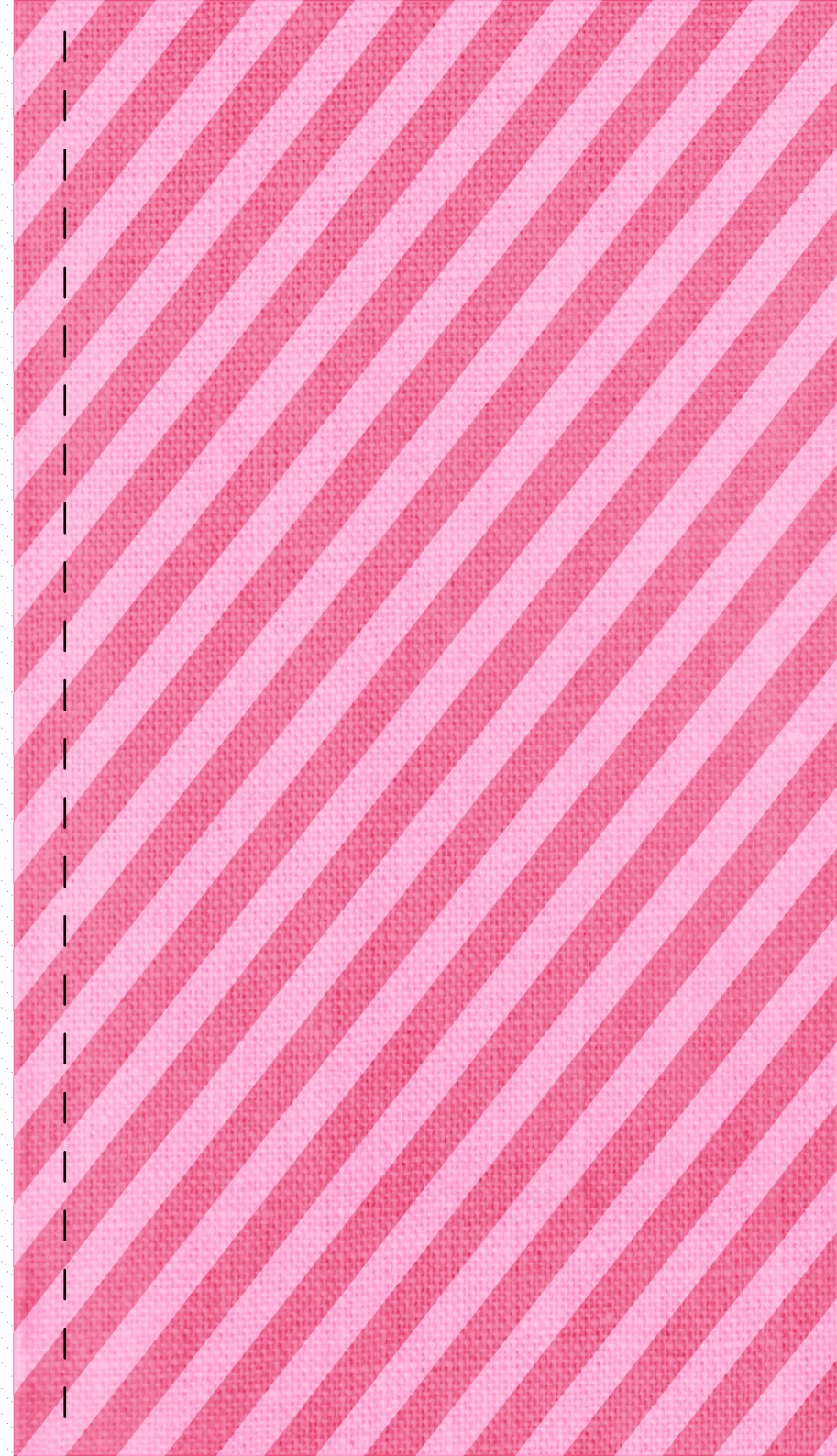


cut, make, trim - production phase

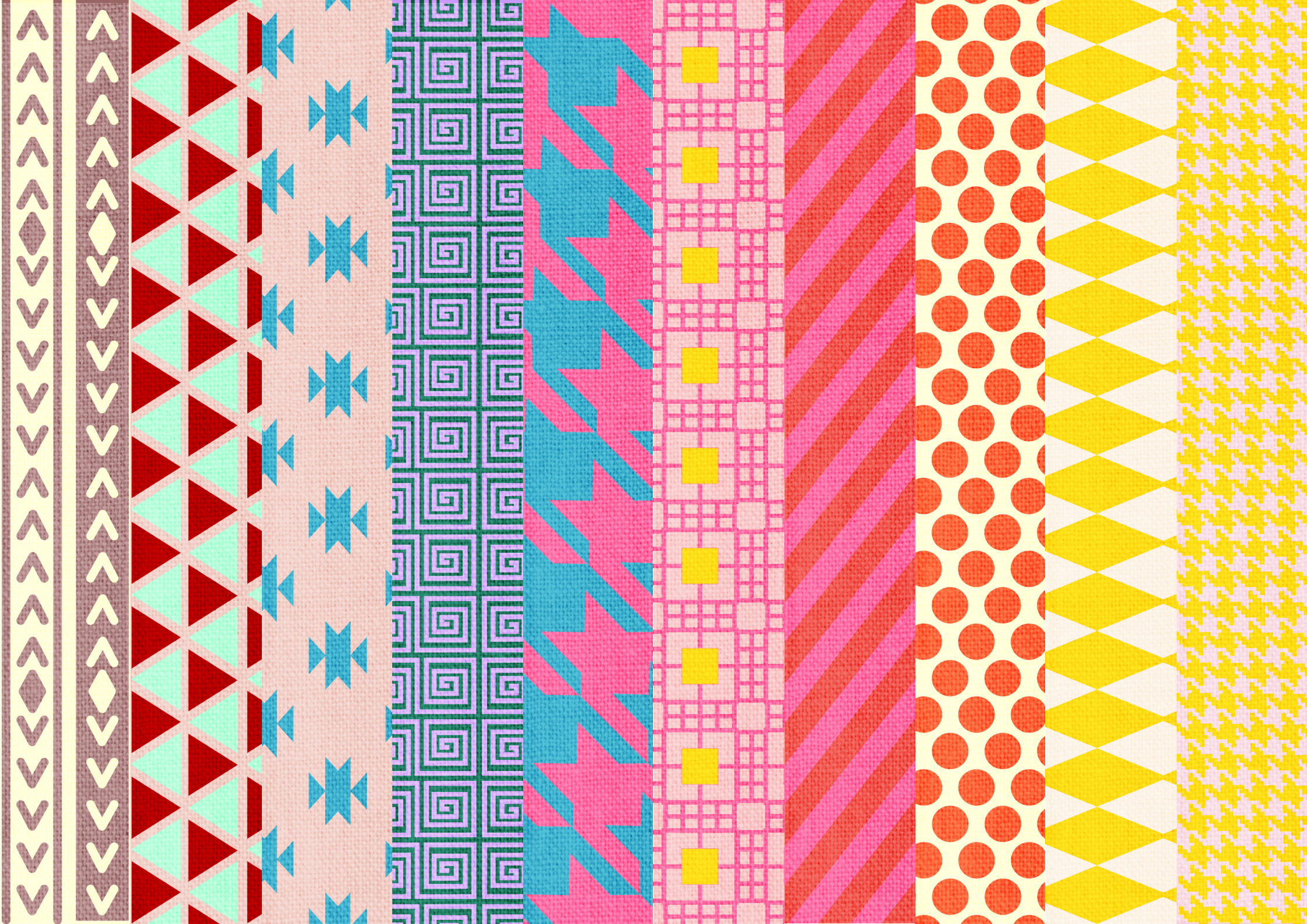
## Fabric Preparation

Our concept called for the creation of many different patterns of fabric. The biggest challenge in creating these patterns, lay in there assembly into a larger patchwork. This was because the fabrics would have to form a harmonious whole when displayed next to one another other.

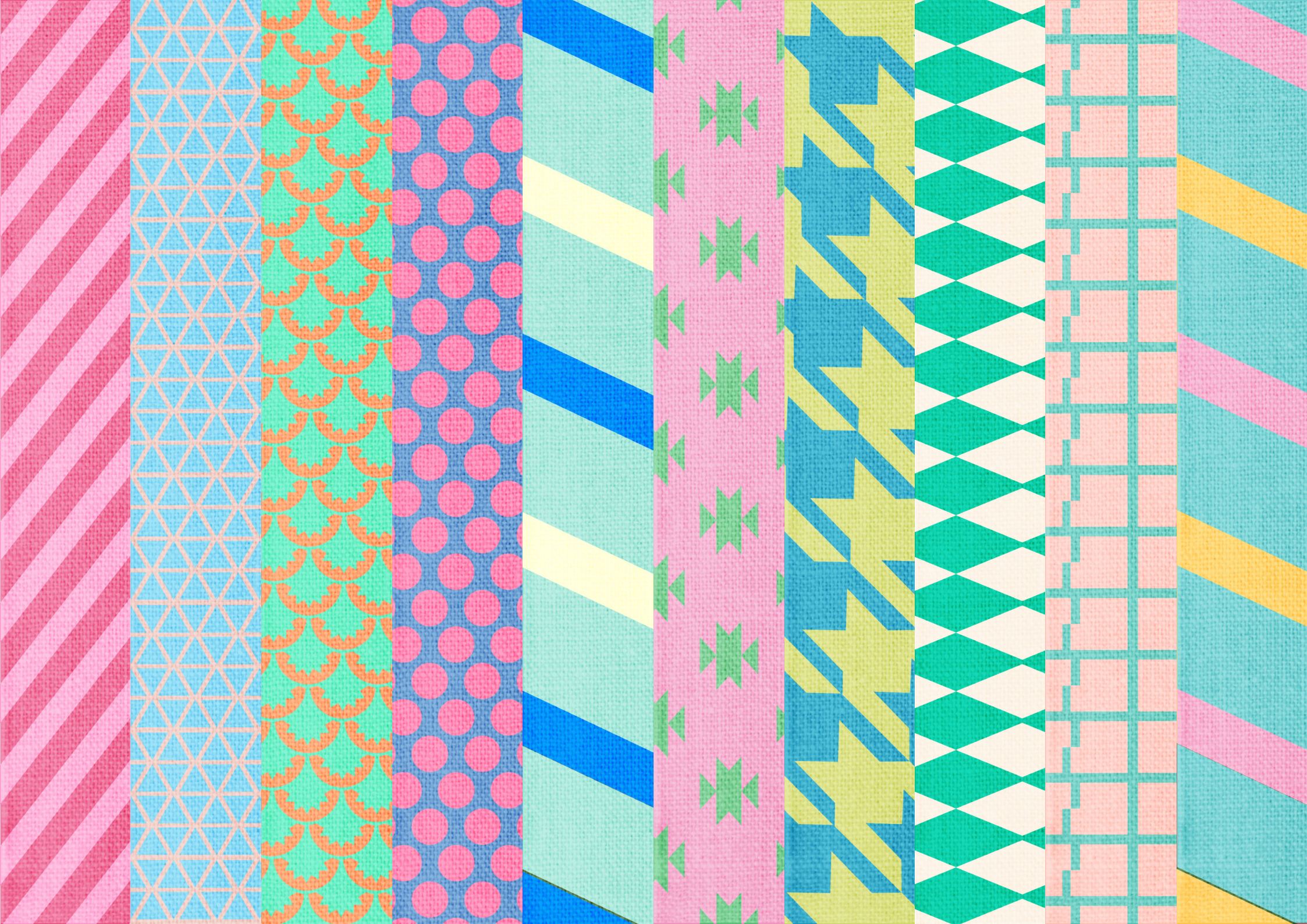
We had to decide early on what look we wanted to achieve in terms of realism and playfulness, so that we had time enough to iterate in different pattern styles, colors and assemblages. In the end we created many beautiful patterns, not all of which managed to find representation in the finished product.





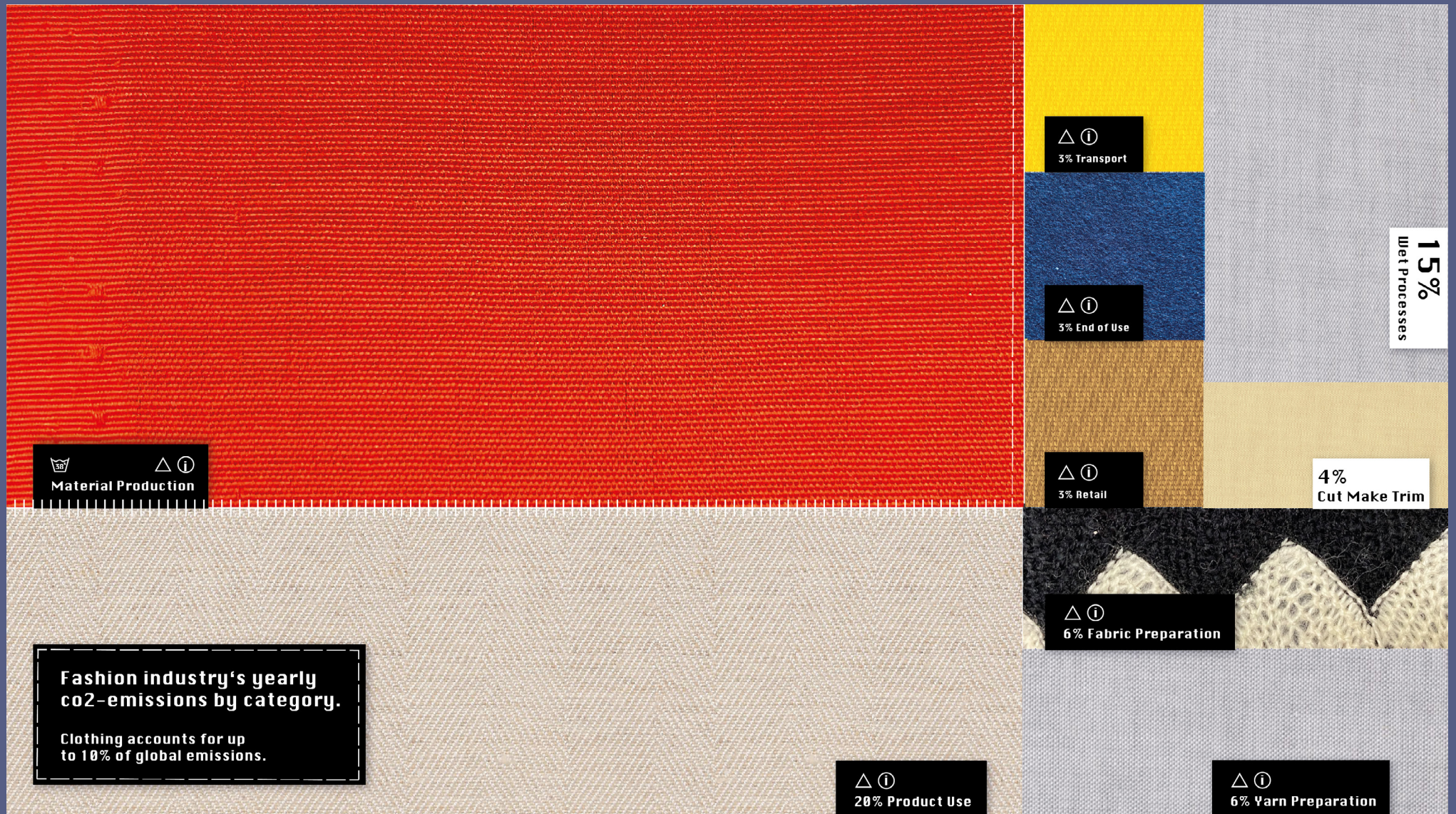








# Patchwork A





# Patchwork B

**XX%  
GHG  
saved**

**▼ ⓘ**  
**38% Material Production**

Potential reduction of greenhouse gas emission (of global total / until 2030):

- 4% material production  
Improvements across the - production & cultivation of key materials e.g. Cotton, Polyester & Viscose
- 2% improved material mix  
Decarbonization through improved mix of alternatives for existing materials and introduction of new materials

**down to: 32 %**

**check reduction**

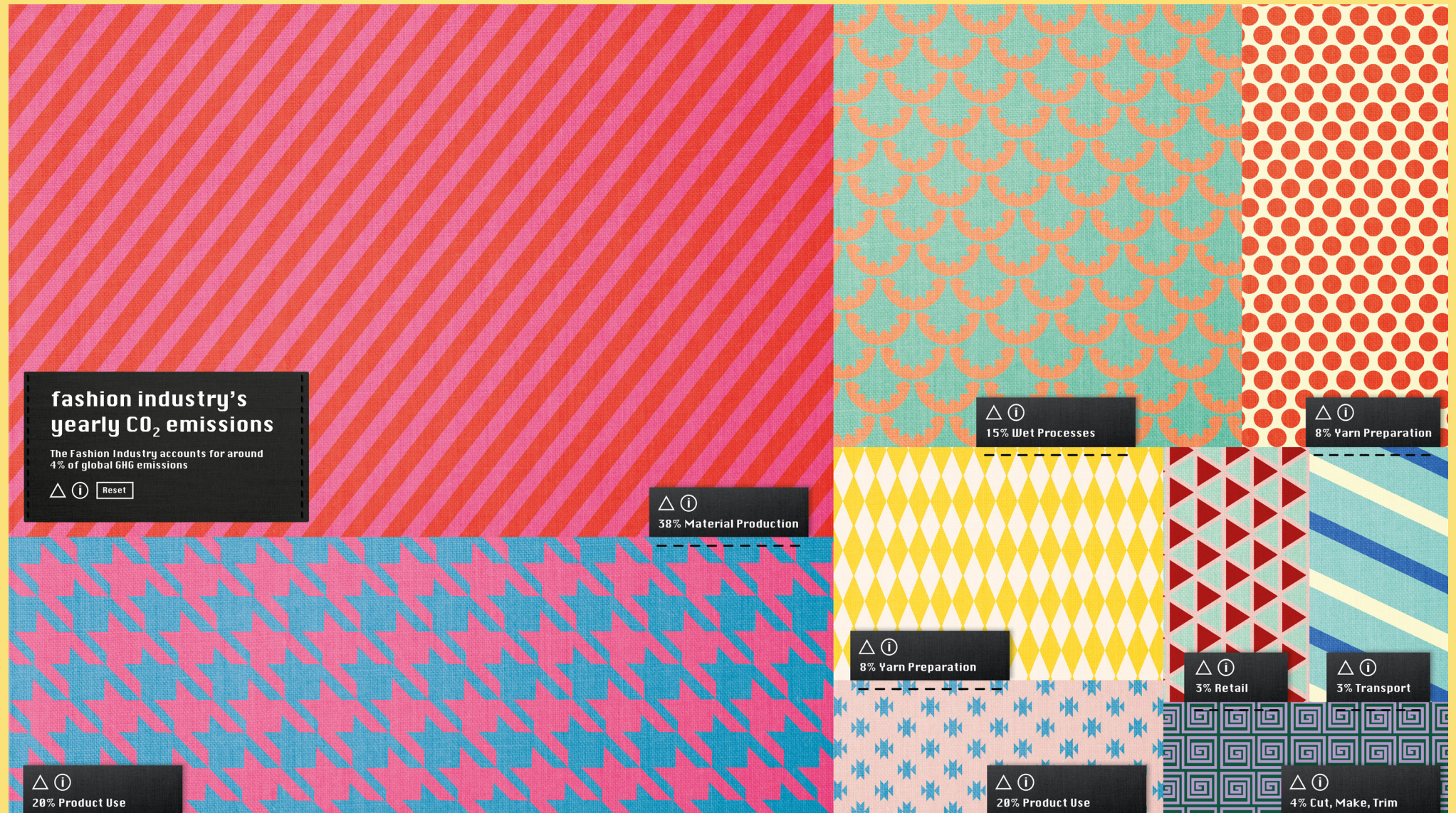
**Fashion industry's yearly co2-emissions by category.**

**Clothing accounts for up to 10% of global emissions.**





# Patchwork C



## fashion industry's yearly CO<sub>2</sub> emissions

The Fashion Industry accounts for around 4% of global GHG emissions

△ ⓘ [Reset](#)

△ ⓘ  
38% Material Production

△ ⓘ  
15% Wet Processes

△ ⓘ  
8% Yarn Preparation

△ ⓘ  
8% Yarn Preparation

△ ⓘ  
3% Retail

△ ⓘ  
3% Transport

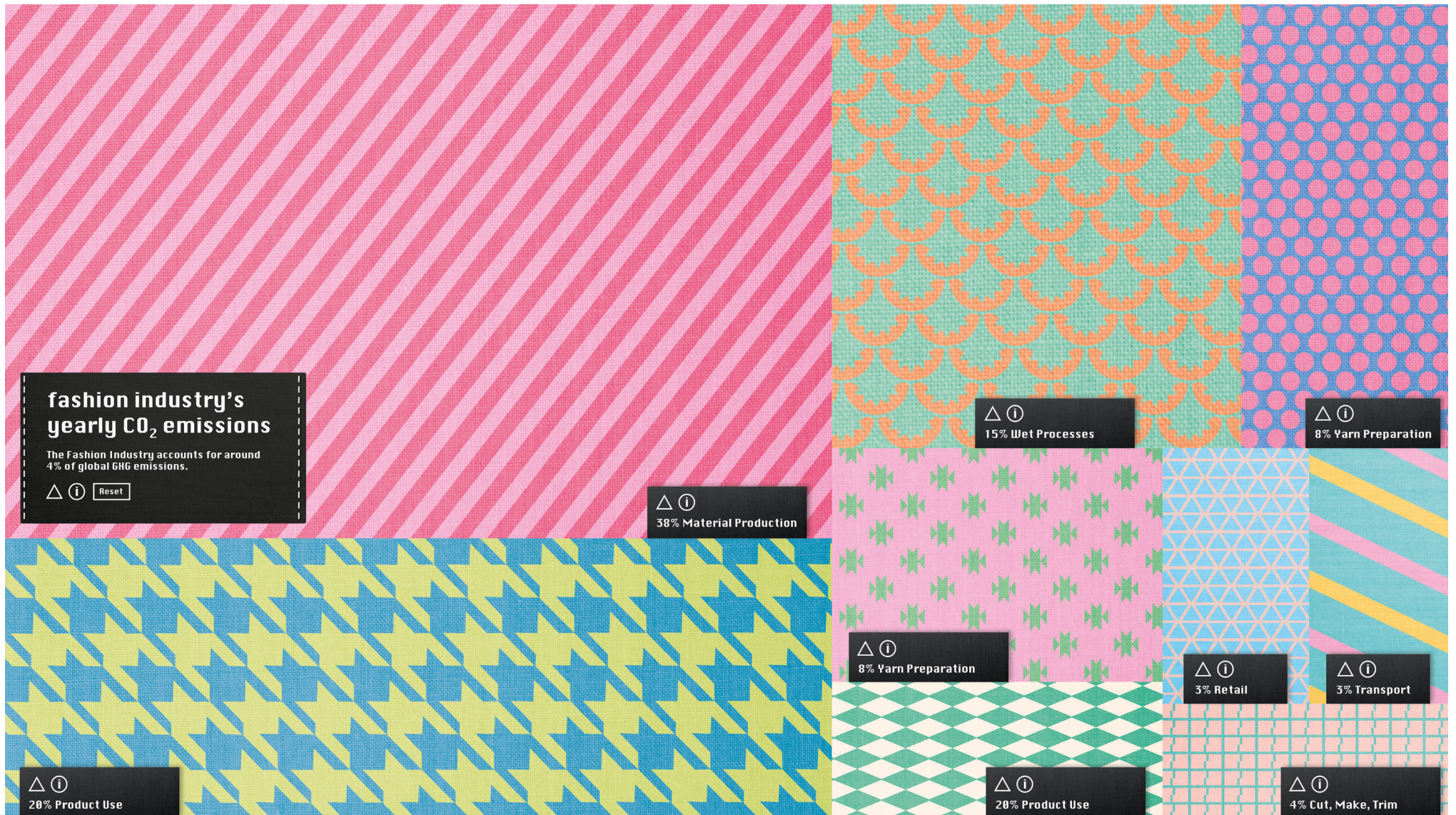
△ ⓘ  
20% Product Use

△ ⓘ  
20% Product Use

△ ⓘ  
4% Cut, Make, Trim



# Patchwork D



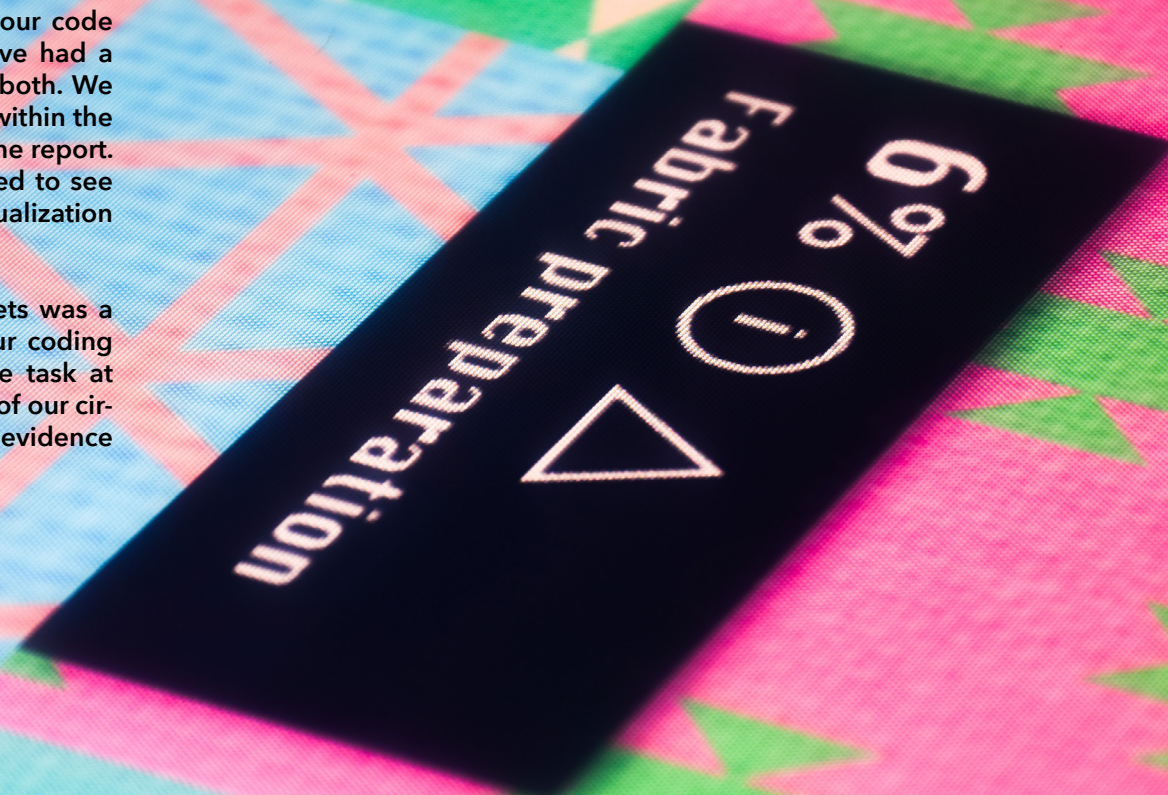


## Conclusion & Reflection

Looking back at this project, we are quite satisfied with what we have achieved, the methods that brought us here and the fun that we allowed our-selves to have along the way. As always though we had to make concessions to time and skill. Especially irksome is that the final prototype's data and treemap don't precisely correspond to one another.

Of course we would have liked to improve our code even further, to a point where we could have had a high-fidelity and fully functioning prototype both. We would have also liked to create subdivisions within the treemap and we were missing some data in the report. Most importantly though we would have liked to see many more people experience our data visualization on the touch table.

Having to find and interpret our own datasets was a challenge to the point of irresponsibility. Our coding skills too, were insufficient for achieving the task at hand. In the end however, we made the most of our circumstance and we believe the final product is evidence of our great teamwork.





# The Fashion Industry's CO<sub>2</sub> Emissions

The fashion industry accounts for around 4% of emissions globally.

○ △ **reset**

14% ⓘ △  
Material production

6% ⓘ △  
Wet processes

8% ⓘ △  
Yarn preparation

6% ⓘ △  
Fabric preparation

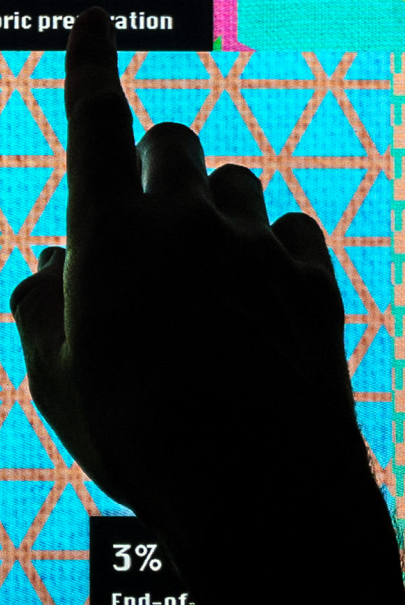
4% ⓘ △  
Cut, Make, Trim

12% ⓘ △  
Product use

3% ⓘ △  
Retail

3% ⓘ △  
End-of-

3% ⓘ △  
Transport













cut, make, trim - project documentation

**end**