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Deterra by Tierra.
World's First 100% Bio-Based and fossil-free technical Jacket

TAGS: Bio-based materials, fossil-free, eco-conception, sustainable design strategies, social impact.

1. Project definition

Deterra Jacket by Tierra (Sweden)

The project started around a discussion with one of the Tierra Team members who had made a thesis related to bio-based synthetics years back. During that conversation the team decided to take on the challenge of making a jacket that was as high-performance as possible while being fully made from bio-based materials. The range of expertise in this multidisciplinary team made this project feasable in terms of agreements, skateholders, pricing, design, manufacturing, etc.

They are a three-person multidisciplinary group comprised of a designer, a product manager and a textile engineer. As a product development team and also as a brand they are constantly trying to evolve to learn and improve all aspects of the design process. It is also their aim to be unique and innovative. That is why they try to challenge themselves in each collection, always with the goal of designing and producing products that they want to wear themselves, coherent with their values and their taste.

In this team there are no hierarchies, the three members work side by side in each phase of the project, trying to dialogue and reach agreements with the objective of making the product as complete and well resolved as possible.

In the case of Deterra, they decided to devise a product that was as technical as possible and completely made using bio-based materials. Since at Tierra they love the outdoors, they feel it is their obligation to minimize their impact on the environment. That's one of the reasons why they decided to be strict achieving a 100% bio-based jacket, while a 98% with some small details in an standard plastic would have been much easier.

The Tierra team firmly believes that every step contributes to changing the world and that though material choice and simple manufacturing decisions they can greatly influence a product's environmental impact. In their design process, they prioritised the implementation of circular design strategies such as longevity of the life-span of the product and an accurate research and application of materials, all while considering how it will be used.

In terms of sustainability, technical outdoor clothing has the positive side that products are in general made to last, with better quality than street clothes. Despite this, sustainability is still a challenge for this kind of garments, since the requirements to which they are subjected usually make necessary a large number of combined materials and solutions, often fossil-based. These facts make recycling more complicated.

Tierra is leading a change, hoping consumers will see that bio-based resources can be transformed into premium materials, like the important sustainability awards they have won demonstrate.

This innovative and brave product has brought them new contacts in the industry that can become suppliers in the future, and also a lot of attention of the media, something that is improving the knowledge and the image of the brand.

The Deterra Jacket is an example of how the use of bio-based materials can also a good solution for high-performance technical products.

KEYWORDS: Multidisciplinary team, technical clothing industry, horizontal organization.

Timeline

Research

1. Design opportunity
A 100% bio based functional padded jacket. Definition of the functions and characteristics.

Create a network

2. Material and supplier research
Fossil free company and textile industry in Europe that fit their criterias

Analysis

3. Information analysis
Selection and orientation with specific materials such as castor oil polyamide

Design development

4. Product design and technical development
Test of the material combination and find smart solution to have only bio-based material

Growth

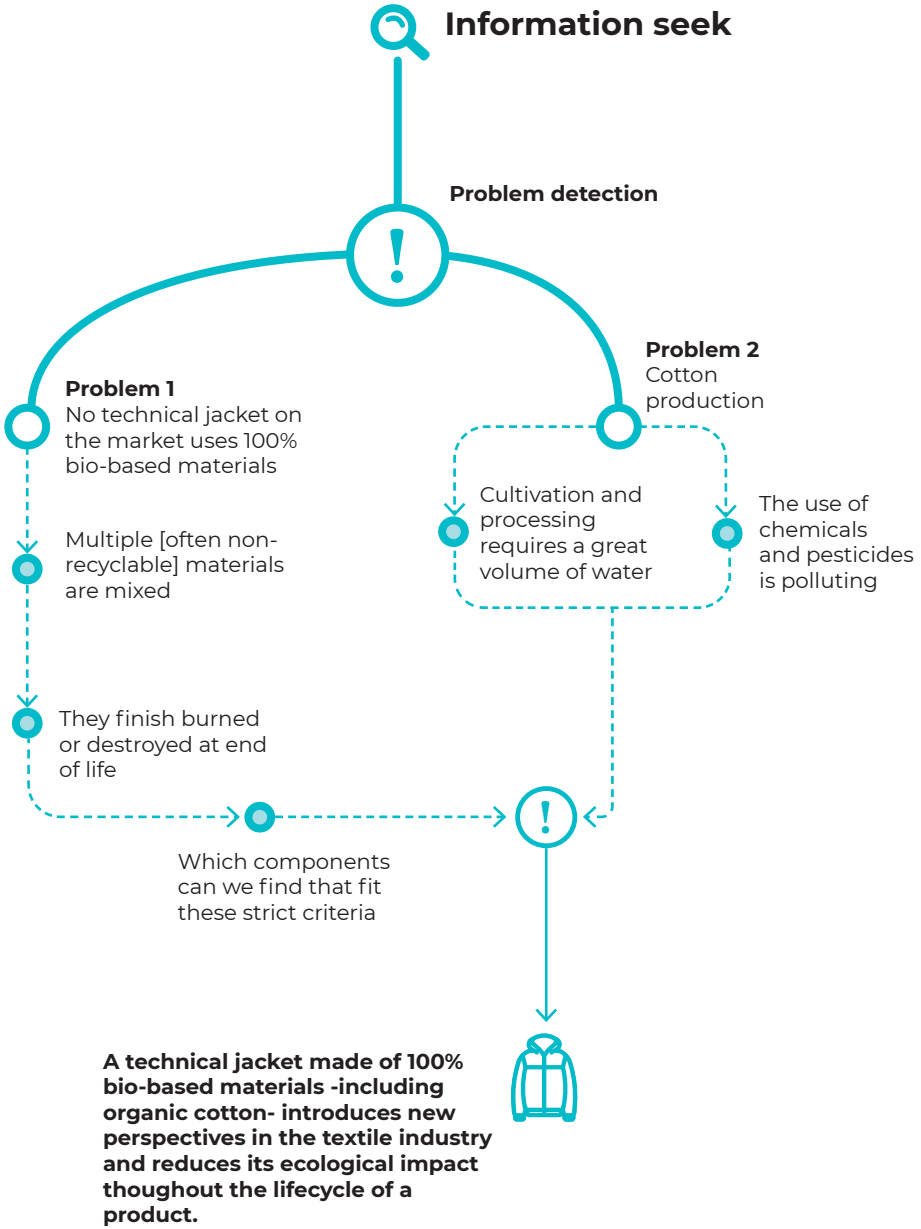
5. Awards : More visibility
ISPO Recognition and OutDoor Industry Awards. Media impact: congress, lectures, press contact, smaller producers interest

Next steps

6. New design for new markets
Develop the style of their bio based technical jacket for more urban customers and to reach new markets

7. Introduce bio-based materials
Extend bio-based synthetics (30 %) in their most commonly used linings looking for more sustainability, using this jacket as a platform to introduce new solutions to the rest of the range

(1 year in total)



2. Research

To begin with, they looked for existent bio-based materials from around the globe that met their technical criteria. Subsequently, they focused on achieving the desired finishes for each part. Tierra needed to process the raw materials so they had to be ready to use to be assembled into a competitive product.

The technical jacket industry mostly uses materials sourced from fossil fuels which has a great environmental impact. Therefore Tierra decided to create the a high-performance technical jacket without using any fossil based materials. This created an opportunity for consumers to cut their oil usage through marking a conscious choice.

Every step throughout a product's lifecycle results in an environmental impact, from production, through its use, and finally its disposal. Manufacturing and material obtaining often account for the biggest one during a product's lifecycle, so to give up materials based on fossil fuels or others that involve huge water consumption, such as normal cotton, could greatly improve the performance of the jacket in relation with sustainability.

In terms of components, most of the research was focused into what they could and couldn't use to remain 100% bio-based. They couldn't introduce common solutions in the sector like zippers or velcro because of this reason, so they pointed their attention in others like buttons produced with nuts in order to offer a simillar functionality.

KEYWORDS: Interviews with stakeholders, research of qualified partners, assembly test

The technical jacket industry is a really popular sector that has traditionally used mostly fossil based materials. The challenge of Tierra was to rethink the product and the process from a more conscious perspective to minimize its impact.

3. Analysis

One of the most important tasks in every project is to accurately define and identify the actors needed to complete the team, and in this case this was done brilliantly.

It was a critical issue to generate a network of suppliers that could solve such a specific need, and that's why a big part of the initial effort was put in the market research to find valid solutions for the project.

They didn't create a briefing at the beginning like they or most of the companies do. They decided to wait until the material and components research was done to know the exact characteristics that the jacket was about to have.

Because of the high specialization required in the bio-based material sector, it was necessary to be associated with a company with high expertise in the subject. The aim was to achieve a fossil-free polyamide with the necessary aesthetic appeal and material properties, without compromising its quality.

Finally, the swedish weaver FOV met all the necessary requirements. They made the facefabric according to Tierra's specifications with the material Evo yarn by Fulgar, consisting of polyamide fibers extruded from castor beans, a renewable resource that does not require high amounts of water nor subtracts arable land for food uses.

The wool padding used for the jacket is made by Baur-Vliesstoffe and is sourced from german sheeps. This padding also included a 10% of PLA bioplastic which keeps the structure of wool during washing.

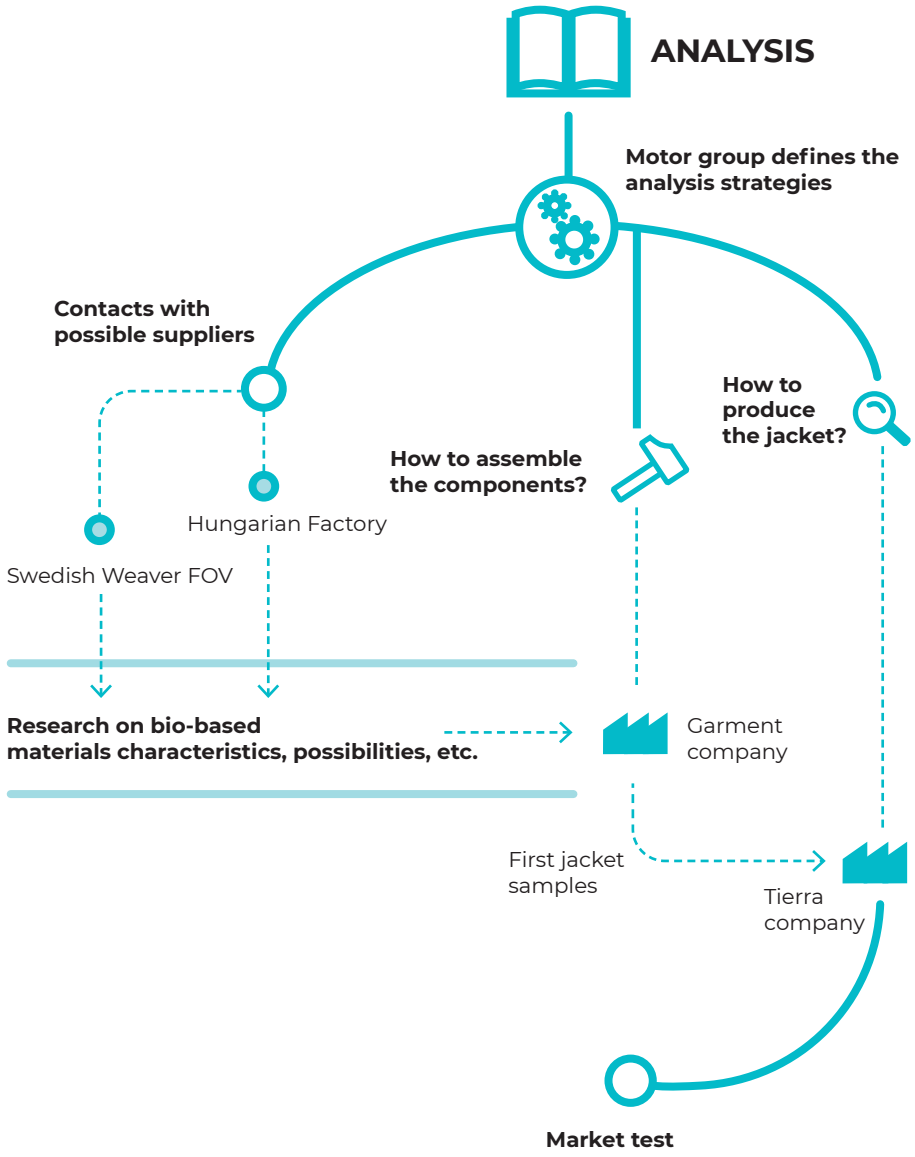
They also benefited from their close relationship with their garment manufacturer, with whom they have collaborated for many years now. This Hungarian factory understands Tierra's desire to push the possibilities of the design further than other brands. Thus, they were up for the challenge that this project posed.

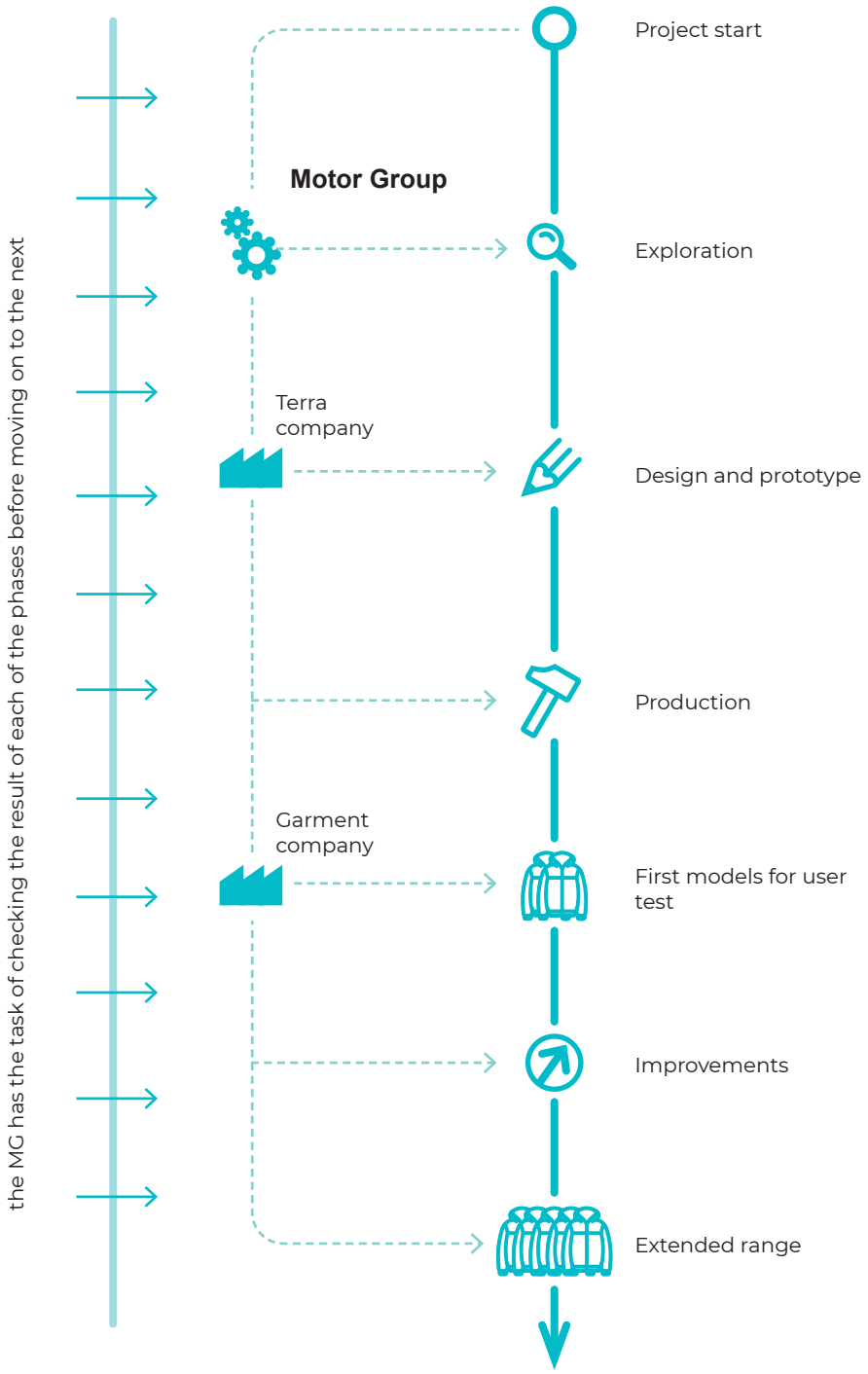
Another essential step was to find a company with expertise in jacket production, because this industry is highly competitive and completely influenced by trends.

Thus, the Swedish weaver FOV; Fulgar, the yarn creator and the garment company became the necessary team to make the Deterra Jacket a reality in the market.

Once the team was put together, they performed assembly tests to produce the first units. These were the units that they used to assess the viability of the material acoice, the assembly and the project itself.

KEYWORDS: Interviews with stakeholders, research of qualified partners, assembly test





4. Concept

The product design was done by the team at Tierra, whose designers were familiar with the needs regarding ergonomics, dimensions, technical needs, joints, etc. However, for this innovative design, they had to reivent their design process by using and thinking about new materials.

As for design we can say that a normal process was followed, with different iterations. They started some some open first ideas, they worked them with more detail, they developed a pattern that allowed them to build the first rough prototypes, and these patterns were sent to Hungary to produce the first full prototypes.

The difference here was above all the large amount of extra limitations that were faced with the design. The fact of not wanting to have very common resources in the sector, from zippers, glues, lamination, to velcro, had a big impact on the design process and also of course on the final result.

This is why part of the design process has been not only to determine the shape and pattern of the jacket as it would have happened with a normal product, but also to design the technical solution that was to be implemented. It is the case of the typical plastic closures with springs that we see in the laces to adjust the hood of most of the similar products, replaced in this case by a knot developed to suit the needs of the jacket, or the replacement of the usual zipper by buttons made with another material of organic origin.

KEYWORDS: Briefing limitations, smart design solution, common design process

5. Prototyping

Once the actors were identified and the first version of the jacket was designed, the prototype session started. They developed a first preseries with the initial material choices. The combination of those materials set the design apart from others in the market. The prototypes also reassured them that they could make a product with the desired quality while working with bio-based materials.

Subsequently, as mentioned previously, came the testing stage. They performed a longterm test with five mountain guides during for three months while doing different activities, which is equivalent to 10 years of normal use. In Tierra they work always with the same group of testers, located in the Alps and in the swedish and norwegian mountains.

The fact of having a long collaboration with the testers allows to obtain feedback under constant criteria, and this is really helpful to improve the brand's products. We can say that with the Deterra jacket this has been especially important, since it has allowed it to be compared with jackets with a more normal selection of materials, but demanding the same from it.

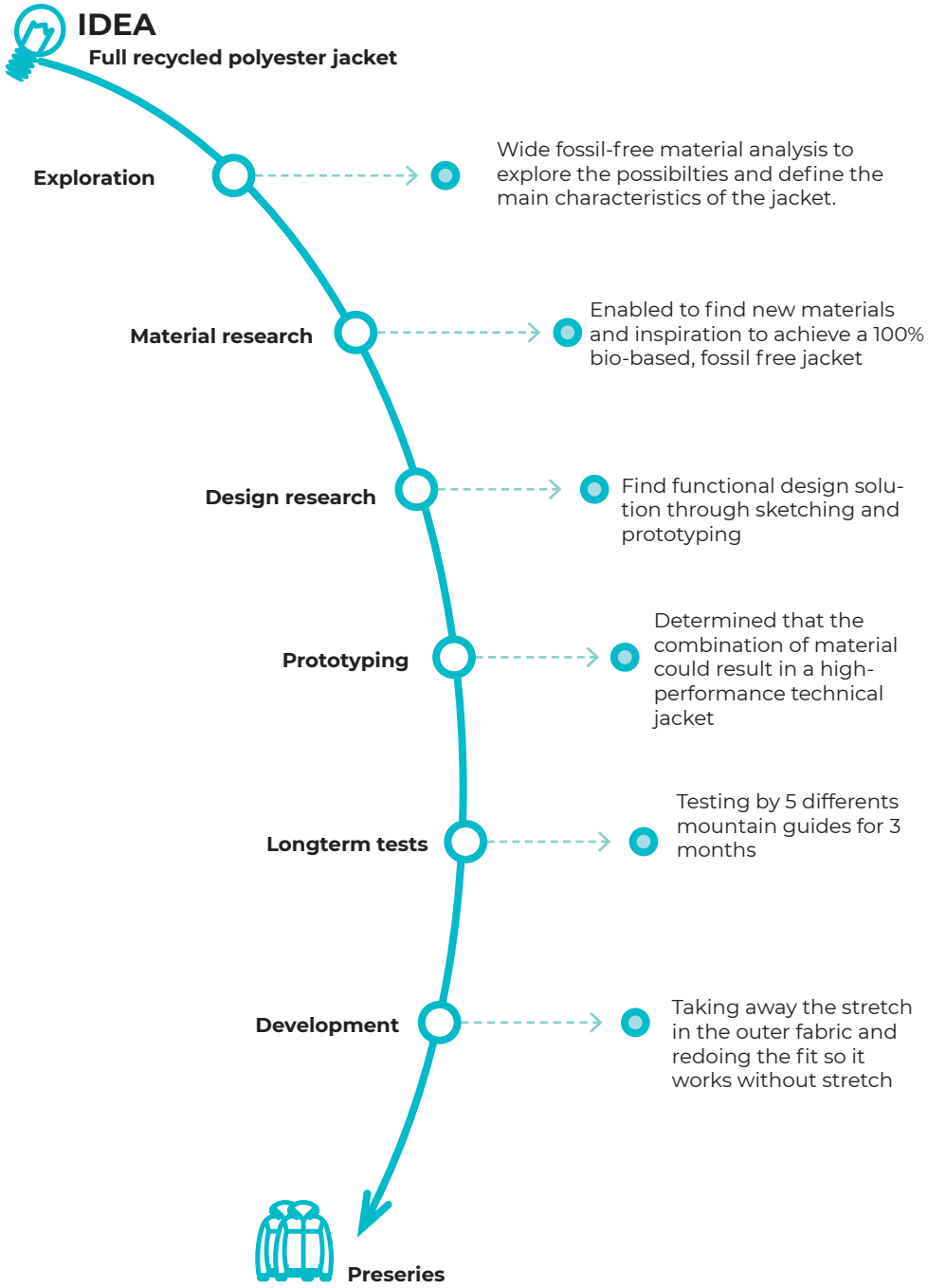
A great amount of feedback resulted from this testing that helped to continue improving the product.

The facefabric was in the beginning a castor bean nylon with stretch, but the biobased stretch yarn was discontinued in the production in the middle of the process, so they decided to take away the stretch in the outer fabric and redo the fit to make it work without stretch.

Since then every new model has been tested in terms of material, dimensions, feel, aesthetics, etc. This reduced the risks before moving into mass production.

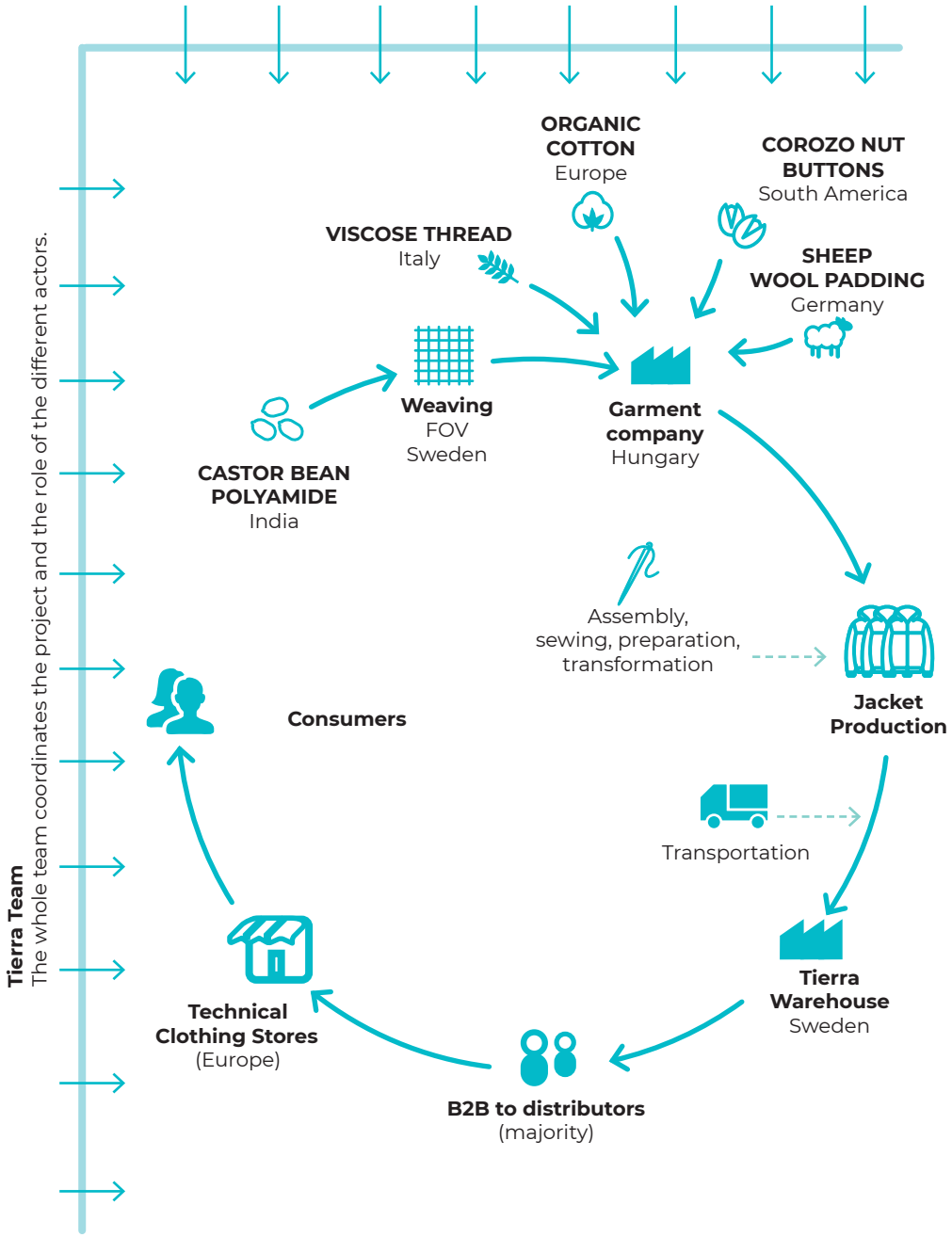
The prototyping phase and subsequent redesign were key in determining if they could get a product of the highest quality while using 100% bio-based materials and while also maintaining a competitive price.

KEYWORDS: Material tests, prototypes, longterm test, fossil-free, minimize



Their biggest innovation has been the creation and the detection of these complex network materials which involve very different actors and organizations. They have demonstrated that bio-based materials are able to meet the most demanding requirements

Tierra suppliers of bio-based materials
Thanks to the network that they have created they could introduce materials created from castor beans, viscose, corozo nuts, sheep wool and organic cotton.



6. Project

The system that they have created to make a 100% bio-based and fossil free technical jacket involved differents suppliers from all around Europe. The collaboration of those manufacturers made the product innovative and unique. That is why a large part of this project was to find the right material and supplier that fit the set criteria. The material selection also involved their ethical criteria, such as their choice to keep their supply away from the food industry. The raw material is sourced from around the world and is transformed in Europe before it is delivered to the garment company in Hungary.

Their most relevant collaboration is with the Swedish Weaver FOV that allowed them to not have to compromise on the material choice. The biopolymer they use is made of castor beans and allowed the replacement of the fossil based polyamide.

These components are all transported to Hungary, one of their more trusted and oldest garment collaborators, where they're assembled, sewn and prepared to ensure the highest quality possible. Finally, the finished jackets are transported to the Tierra warehouse in Sweden to be stocked and sold.

Thanks to this project Tierra is becoming well known in the fossil-free industry abroad, and this is making possible that small manufacturers contact them to offer their bio-based materials. This fact is making possible to expand the company's network of contacts, and it will surely help them to develop even more ambitious products in the future. It's the case of producers of zippers made of bioplastics, a product that was impossible to find when they were developing the Deterra jacket. Through the analysis of Tierra's production system as well as their product, we can conclude that Deterra Jacket is a superior product regarding sustainability, without implying a change in its performance as technical clothing. It critically improves access to bio-based materials and has the capacity to become a real model for a conscious fashion industry in the future.

This sector mostly follows a B2C model, where it is not final consumers but stores that are the real clients. A product like the Deterra jacket can potentially help the company to leave the high mountain sector, since with its aesthetics it can be perfectly integrated into more urban environments.

Tierra's team believes that a product like theirs can be a challenge for bigger brands to develop similar products. Instead of facing this fact as a danger to their company and the great work they have done, they consider that it can help to create a greater demand for this type of materials, and that this can facilitate their access to them thanks to more competitive prices and to increase the number of providers that offer them. Of course, the success they have achieved in such an ambitious challenge demonstrates to others that things can be done differently.

Deterra Jacket has won two important awards, the ISPO prize for Eco Achievement Apparel 2017/2018 and the Sustainable Innovation in the Outdoors Industry Prize 2017.

KEYWORDS: Bio-based materials, lifecycle, sustainable materials, biopolymers