

CASE REPORT

CIRCULAR IS THE NEW BLACK

FEATURING

EverDye

iINDUO®

Iroony®

itmatters

PROLONG

Recyc'ELIT

[RE]PAIRE

THE 8 IMPACT

Weturn

How to read this report

This report is designed as a supplementary document to my thesis. It contains an in-depth review on each **circular-born start-up** (CBS) that took part in my multiple-case study. In total, 9 CBSs were included in the research, spanning a wide range of highly impactful **circular innovations** (CIs).

Please note that due to the majority of the information coming from the interviews I conducted, it was chosen to only reference the quotes or information that was taken from other primary data sources. So, **all quotes are from interview data**, unless specifically referenced otherwise.

I am very grateful for itmatters, Weturn, Recyc'ELIT, THE 8 IMPACT, [RE] PAIRE, Prolong, iINDUO, Iroony and EverDye for participating in the research. I have learned a lot, and it was a pleasure interacting with you.

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01

Closing
Slowing
Narrowing



itmatters

Information sources used to construct this case

Personal interview with CEO and founder Matthieu Challe

Itmatters' website

Itmatters' news and announcements posted on their website and LinkedIn

Website and reports from CIRPASS Consortium and WEAVEpR Horizon Call

Itmatters' Sustainability Pledge application

Itmatters has developed numerous technologies that carry the potential to transform **traceability and transparency** in the fashion and textiles industry for the better. Firstly, they have developed a **washable smart tag** that can be sewn into the hem of garments, shoes or accessoires and can withstand up to 200 washing cycles (WEAVEpR, 2024). Although not noticeable to the end user, both its RFID and bi-techno (RFID + NDF) smart tags assign a digital identity to the garment, making it traceable throughout its entire lifecycle. In the manufacturing and sales stage, it enables brands to reach operational efficiencies and improve inventory management and can overhaul current sorting processes in recycling and sorting centres. The smart tags are especially valuable in supporting luxury and premium brands, mostly within the resale stage, as the tags provide 100% product authenticity to end users with their AES encrypted tamper-proof technology. Furthermore, the tags support a strong 1-to-1 marketing strategy for brands to better engage their customers.

Their second innovation is a **patented chemical DNA tracer, Olnica by Itmatters**. It is a uniquely coded invisible, odorless and harmless molecular taggant that is applied to textiles early in the supply chain. This taggant can be detected using UVB light, optical signature recognition or lab analysis to verify the material's authenticity and geographic location of growth. It is tamperproof, and thus aids brands in securing upstream transparency and downstream traceability (itmatters, 2024).

To create a digital ecosystem that manages product or material flows, itmatters has developed the **itmatters traceability 4.0 platform**, which is tailored to match the regulations of the Digital Product Passport (DPP) (itmatters, 2024). At the moment of the interview, March 2024, itmatters was in the **early development stage**. They are an expert member within the CIRPASS Consortium, focused on DPP architecture and solutions.

Want to know more? Don't hesitate to reach out to itmatters CEO and founder Matthieu Challe at mc@itmatters.fr

2021

itmatters is founded with a mission to propel retailers in their digital transformation towards the circular economy

2023

itmatters' technology is recognised by the EU in the **CIRPASS** 'Benchmark of existing DPP-oriented reference architectures' report

2023

itmatters signs the UNECE **Sustainability Pledge** in June

2024

itmatters is selected for participation in the **EU Horizon Call**, focusing on circular solutions for textile value chains based on EPR

itmatters01

Itmatters was the first start-up that I reached out to in my quest to find suitable cases, and itmatters' CEO, Matthieu¹, was immediately enthusiastic to meet with me. Our interview took place on Friday the 29th of March. In this Chapter, I will combine interview data and additional data sources to sketch a comprehensive overview of how itmatters has approached introducing their CI to the fashion and textiles industry.

1.1. How does Itmatters Position their Circular Innovation?

With their end-to-end traceability 4.0 solution, itmatters is active in multiple sectors other than fashion, for instance in the aerospace industry. However, in my research, I mainly focus on the introduction of the washable smart tag, an innovation co-developed by itmatters in September 2021. We know that in the fashion industry, traceability and transparency are far from where they should be to reach fully traceable material flows (Fashion Revolution, 2023) - to respond to the industry's painpoints, itmatters presents its solutions with a **value proposition** that touches upon multiple benefits of their innovation:

- **A solution towards the Circular Economy (CE):** itmatters' innovations hold the potential to digitally transform how retailers manage and trace their products in favour of the CE. The European Commission confirms that "by offering detailed information about each product throughout its lifecycle, [the DPP]² can promote sustainability and circular practices" (EPRS, 2024, p. I). Itmatters' technology supports information on CO2 footprint, % of recycled versus raw material, cleaning care advice, reparability-, second hand-, anti-counterfeit- and recycling information.
- **Operational Efficiencies:** Other than digitally enabling better traceability that contributes to managing circular systems, itmatters strongly emphasises the operational efficiencies brands benefit from with their innovation. Stronger inventory management, logistic operations and enhanced data-driven decision-making are mentioned on their website (itmatters, 2021).
- **Regulatory Compliance:** In March 2022, the EU included the DPP in their draft regulation on the Sustainable Product Regulation proposal (see X for more in-depth information on DPP regulations). Itmatters has developed its innovation to be DPP compliant, hence providing brands with a **strong incentive to adopt the technology**.
- **Social and Societal Impact:** Socially, itmatters emphasise that the washable smart tags and their web application will enable stronger **customer engagement** by providing product, sustainability and authenticity information. Another strong value propositional aspect that is put forward by itmatters is that traceability and transparency can aid in **improving employees' working conditions** across the value chain. When brands' supply chains are public knowledge, they are incentivised to take responsibility to ensure fair labour practices and safe working environments. Fashion Revolution coins another point of view by stating that "knowing the names of major buyers from factories gives workers and their unions more leverage, crucial for a timely solution when resolving conflicts... it also provides the possibility to create a link from the worker back to the customer and possibly media to bring attention to their issues" (Fashion Revolution, 2023, p. 68).

When considering the above, we see that itmatters smart tags and DNA tracers truly fit into the definition of CIs in fashion. They facilitate the tracking and tracing of garments, eliminate or prolong the end of life concept by providing brands, end users, sorting centres and recyclers accurate information on authenticity, product content and origin. The technology contributes to social equity by providing more transparency into value chains, and aid in the overall closing and slowing of resource loops.

¹Matthieu has provided explicit consent for his name and contact information to be shared (see ICF 2 in the Case Protocol)

²"a DPP is the combination of an identifier, the granularity of which can vary throughout the lifecycle...and data characterising the product, processes and stakeholders, collected and used by all the stakeholders involved in the circularity process" (EPRS, 2024, p. I)

1.2. What Circular Strategy does Itmatters Use?

Since traceability is a huge criterion for recycling, reselling, or reusing garments, it is difficult to confine it to one circular strategy. However, itmatters positions its innovation as an end-to-end traceability solution, hence falling into the **closing of resource loops** approach, fulfilling this approach with an innovation that allows for the tracking & tracing of garments throughout the value chain. It must be acknowledged that the wide-scale application of this innovation would enable the slowing of resource loops too, as better traceability allows for efficient resale, repair and rental operations. A concise overview of the strategies and approaches relevant to the itmatters technology can be seen in Figure 1.1.

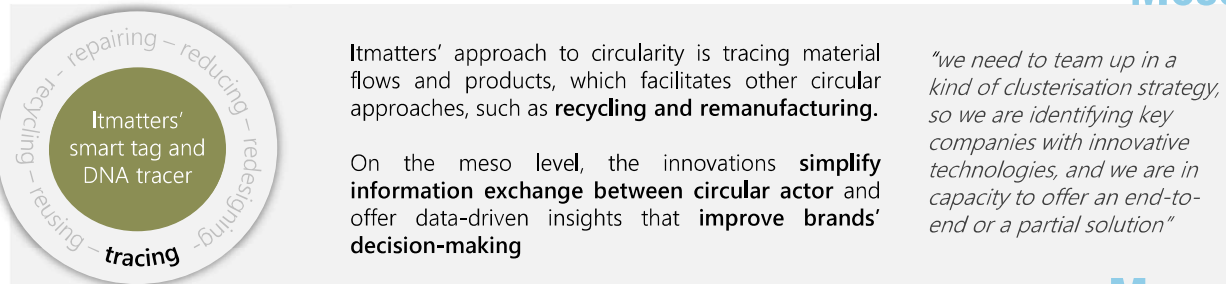
In their sustainability pledge, itmatters confirms their type of 'action', or strategy, is **traceability and transparency** (itmatters, 2022). Although mentioned in the previous Section on their value proposition, a part of their circular strategy is also to introduce their technology in such a way that it sparks positive societal change within the transition to the CE - on this, itmatters themselves say that their CI "[enhances] traceability of the social/environmental/ethical attributes of product(s)/materials along the value chain; for example, for origin, quality, sustainability performance, and compliance with health and safety requirements for consumers and workers", which can lead to "improved working conditions for workers along the value chain and, particularly, those who work for "suppliers to suppliers" in parts of the value chain that today are often hidden" (itmatters, 2022, p. 3). This proves that societal and social considerations are strongly present in their circular strategy.

Figure 1.1: The contextualization of itmatters' innovations on micro, meso and macro-level using the triple layer framework. The quotes on the righthand side are all verbatim extracts from the interview I conducted with itmatters.

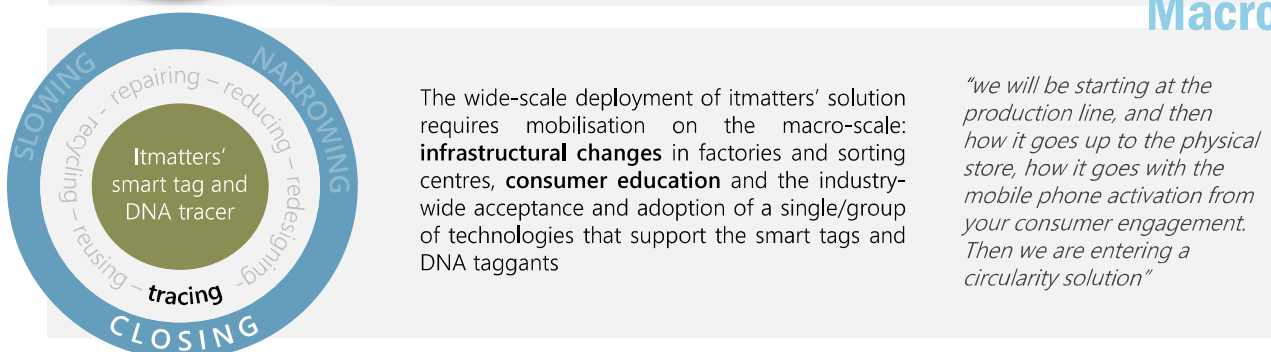
Micro



Meso



Macro



What Activities does Itmatters Engage in?

So far, I've highlighted the positioning of itmatters' solutions and analysed the circular strategies that influence how the CI is introduced into the fashion industry. To better understand what activities and processes itmatters engages in to introduce their technology into the industry, I have categorised their activities according to the 7 TIS functions. The TIS for tracking and tracing solutions in (and outside of) the fashion industry is emerging, and a **dominant technology has not yet been established**. This can be concluded from the fact that multiple institutions have developed reports that benchmark or compare existing solutions (Textile Exchange and Fashion for Good, 2022, CIRPASS Digital Product Passport, 2022), but no one methodology for DPP compliance is established. Evidence for my last statement is that an entire chapter in the EU's report on DPP in the fashion and textiles sector is called 'What could be a generic DPP for the textile sector?' (EPRS, 2024). Hence, itmatters is not only tasked with introducing their technology in the fashion industry, but also introducing their technology into an emerging TIS where harmonised standards are yet to be defined.

1.3. What Activities Does Itmatters Engage In?

Using data from their website, LinkedIn posts, news articles and my own interview, I set out to sketch an image of the processes and interactions itmatters engages in according to the seven TIS functions, detailed in the subsequent subsections.

Entrepreneurial Experimentation

Itmatters can implement their digital traceability platform within any IT ecosystem a customer might have. Although an applaudable achievement, Matthieu expressed during the interview it is a real challenge to adapt their digital platform for it to be compatible with all these different environments. Hence, a considerable part of the entrepreneurial experimentation is adapting their digital platform to ensure **customer applicability**. In order to ensure this fit, itmatters evaluates each potential customer's situation to see whether potential collaborations with other companies are needed to answer customer needs. To further enhance the customer fit and sufficient connection to the bigger innovative landscape surrounding DPP-compliant tracking technologies, Matthieu says that their innovation is "a powerful recycling solution designed to match the DPP CIRPASS Consortium". An interesting insight here is that it's extremely fruitful to research relevant **consortia, ongoing collaborations and movement in the regulatory landscape** in the technology design stage, to ensure the innovation sufficiently addresses industry needs. However, other than the direct impact of changing regulations, Matthieu highlights that down the road, repairability, second hand and repair will be the three main topics. For itmatters, this means tailoring their value proposition in such a way that it responds to consumer engagement and garment authenticity.

A large part of entrepreneurial activity is contacting potential customers to test, validate and possibly implement the innovation. Itmatters always **assesses the market** first to obtain a proper understanding of all the moving parts at play and puts them in a position to answer to each clients' specific environment and deploy their innovation accordingly. Here, it is highly helpful that Matthieu has more than 30 years of work experience in manufacturing and marketing within international firms. But although this market assessment and professional experience helps in the communication with brands, Matthieu explains a large challenge is having to **convince every department** within an organisation to consider your innovation.

For circular solutions, an important part of the value proposition is the actual environmental impact the innovation has. Performing LCAs or PEFs are therefore a vital part of the entrepreneurial process, which were challenging for itmatters. Matthieu emphasises that as a smaller company, it is extremely **difficult to dedicate the financial and human resources towards a circular assessment** - but without the assessment, it is challenging to prove you have an impactful solution. A final part of the entrepreneurial activity that is challenging for itmatters is how to build a business model that offers their solution **competitively** compared to its alternatives. Matthieu explained that 'traditional' clothing tags are 3 cents per tag, while the itmatters smart tags are 25 cents, which for many brands is a barrier towards implementing their tags. This price sensitivity is unfortunate, as *"traditional tags last up to physical stores, while the itmatters' tags remains"* during the lifetime of the garment.

Influence of Direction of Search

For itmatters, the influence of direction of search is strongly dominated by emerging regulations in favour of transparency and traceability in the fashion industry. The **EPR is combined with the DPP** to ensure all products produced by the fashion industry are traceable throughout their lifecycle. This changing regulatory landscape pushes brands to seek solutions to ensure traceability of their products. The latter has sparked change in how itmatters' presents its solution. Matthieu told me: *"we've been noticing...that now we are shifting. Itmatters is not only focusing on a turnkey apparel and footwear solution, but we are now focusing more on an end-to-end solution relative to the DPP agenda"*. On the topic of regulations, Matthieu adds that a big headache for brands is that regulations are not harmonised between the countries they operate in. He uses the example that for physical labelling of garments, the laws between countries differ. Offering a solution that is **-relatively-** easily programmable to address discrepancies in regulations could hence relieve a large part of the industry's pains. Not only does Matthieu believe that itmatters presents a solution for brand compliance to emerging regulations, but that the 'Ecodesign for Sustainable Products Regulation'-tax (ESPR) *"should be structured with an RFID data carrier, able to detect each unique DPP-ID, RFID number at the recycling stage to offset ESPR tax previously paid by brands"*.

Knowledge Development & Diffusion

During the interview, Matthieu emphasised that itmatters is not an RFID or NFC company, but they engage in **co-development** to offer their solution to their clients. Matthieu also highlighted the importance of their engagements with universities within itmatters' R&D. Itmatters is in contact with, amongst others, the Politecnico di Milano and Bocconi University in Italy, the University of Barcelona, and Auburn University in the US. According to Matthieu, these connections are highly valuable. For example, the Auburn University has an innovative lab related to RFID technology where they **assess and test** the reading distance range for the itmatters washable smart tags. Other than generating technology-related knowledge, Matthieu stresses that being in contact with academics also increases their **business intelligence**. He illustrates this with the example of Bocconi University in Italy, where *"the Italian culture between university and SME is very strong"*. Being able to observe this difference aids itmatters in adjusting its processes to gain more out of the interactions they have with universities.

Lastly, itmatters obtained invaluable knowledge on the interface of policy and technology from the Politecnico di Milano, a university that is heavily involved with the architecture behind the DPP framework: *"it's data collection, data protection. How are you going to collect data? There is a huge structural organisation which needs to be validated by a key expert, and most of them are in those universities, definitely"*. He stressed that gathering sufficient expertise on how exactly these **regulations will translate to IT systems** is crucial to make sure your innovation will actually be complementary to these changing regulations. In short, itmatters is highly engaged within knowledge development for the tracking and tracing technologies TIS, which extends beyond the fashion industry - for example, in March 2024, itmatters co-organised the 'Journée Tracabilité' for the aerospace industry, where many experts within this sector joined forces to discuss digital transformation in the aerospace sector (BoostAeroSpaceSAS, 2024).

Very recently, itmatters was selected for the WEAVEpR Horizon project call from the European Union, in which industries, research centres and policy experts are mobilised to design and test recommendations for the implementation of circular solutions in the fashion and textile industry (WEAVEpR, 2024). It is linked to the activities of the CIRPASS consortium, and itmatters in particular will work on interactive customer experiences using DPP, and an automated textile sorting system (WEAVEpR, 2024).

Market Formation

Within the process of market formation for innovative companies such as itmatters, Matthieu expresses how the **digital maturity** within current manufacturing processes blocks the implementation of innovative tracer solutions. In fashion, many brands place orders with independent factories - the problem is, as Matthieu explains, that *"the industry is 2.5, not 4.0. So we are missing the 3.0 and itmatters is somehow offering a 4.0 solution. So there is a gap that needs to be taken into consideration. There is a lack of understanding or knowledge related to this so-called digital transformation"*.

Another barrier to market formation for the itmatters solution is presented by the fact that some manufacturers of brands have recently invested in software systems, resulting in an **unwillingness to invest**

in a new system. In terms of operational efficiencies, one would imagine that implementing such a tracking technology as itmatters has developed would be highly beneficial in the textile waste sorting centres. Currently, sorting is done mostly by hand, which is resource intensive and time consuming – something I have seen first-hand during my visit to sorting centre ‘Le Relais’ in the Île-de-France region. The smart tags would allow for an automated sorting line, in which the information of the tags is read from a distance. That sorting is currently a problem is confirmed by Weturn, who state in a podcast that *“the problem with the sorting stage is that you don’t know the composition. Often, labels are missing, making manual sorting extremely complicated”* (La Seconde Vintage, 2024). Even though this painpoint currently exists, Matthieu shared with me that major sorting centres were unwilling to run a pilot with itmatters’ technology. A colossal shame, as these sorting centres provide a local, protected environment in which a start-up can test their innovation. The reason for the unwillingness to collaborate with itmatters came from the *“lack of wide-scale application of RFID tags”*. And you can imagine that brands are unwilling to cooperate, because the technology is not yet implemented at sorting centres. This example illustrates the frustrating chicken-and-egg situation in which all industry stakeholders are waiting on each other to make a move, which inhibits CBSs from bringing their technology to the market.

Legitimation

Itmatters have engaged in numerous processes and networks that have enhanced their legitimacy. In January 2023, itmatters’ innovations were recognised by the European Union, as itmatters’ solution was **featured in the CIRPASS Digital Product Passport** ‘Benchmark of existing DPP-oriented reference architectures’ report (page 55-57), with the lead beneficiary of the consortium being the Politecnico di Milano (CIRPASS Digital Product Passport, 2022). Furthermore, Fashion for Good published a report that benchmarked, and therefore recognised, tracer technologies in July 2022 (Textile Exchange and Fashion for Good, 2022). Although the itmatters’ solution is not explicitly mentioned, the report extensively explains the landscape of tracer technologies, relevant actors, and how the technologies are deployed in supply chains. This not only legitimises the technological solutions within the TIS in itself, but increases awareness and know-how amongst brands and other key stakeholders and gives them the information necessary to enter the TIS and engage with companies offering traceability innovations. A common way for start-ups to gain legitimacy is by participating in awards and challenges. Itmatters expresses that, in their experience, competitions and award shows for start-ups are not worth the **time- and financial investment** it often requires to attend them. According to them, the organisers of such events often harvest the fruits of publicity, while the opportunities for collaborations or legitimacy-enhancement are often limited for the start-ups themselves.

Resource Mobilisation

Throughout the interview, itmatters expressed the challenges of obtaining **public funding** as a start-up. The first barrier was the fact that for many government funds, the funding you can obtain must be matched with an equal investment from the start-up. *“Either you have one million and the government gives you one million, or if you have 10 euros, they give you 10”*, Matthieu explains. Itmatters circumvents this funding bottleneck by combining governmental funds with efforts to obtain **venture capital (VC)** funding. Lastly, itmatters is active in applying for EU funding, but they emphasise that *“it’s a one-shot strategy, and we need to be as smart as possible”*.

Matthieu expressed that **private investment is a challenging landscape for circular start-ups**. In his experience, investors say they want to make impact investments, but they are not willing to change drastically. *“When you consider an impact investment, you have to accept the idea that your return on investment will be different. Impact investors are expecting their circular investment to follow the same steps of a linear business model”*, Matthieu argues. Regarding human resources, Matthieu explains that it is difficult to attract young and ambitious talent. Furthermore, it is challenging to respond to economic cycles within a start-up. Matthieu explains that *“you might have a very, very nice curve of success. In which case it would be legitimate to hire many people, but six months later, you might face a downsize of revenue and then you are struggling”*.

Development of Positive Externalities

Itmatters has internally set up the **Why Foundation**, helping other parties develop their impact idea by offering advice, operational support and access to financial resources. I see this as a great example of generating positive externalities as a CBS. Such a foundation can act as an accelerator for other CBSs to join the TIS on tracking technologies, and potentially other technologies related to the CE as well. It provides Mathhieu and his partners with a platform to share their valuable knowledge on tracer technology and the DPP regulatory environment, hence lowering the barriers to entry for others.

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02

Closing
Slowing
Narrowing

WETURN

WETURN

Information sources used to construct this case

Personal interview with Weturn employee

Weturn's website and announcements posted on LinkedIn

Podcasts and 'table rondes' featuring Weturn

News segments/blog posts featuring Weturn

In January 2022, the French government announces the introduction of the **AGEC law**, which prohibits brands from destroying deadstock and holds them accountable for all the items they put on the market. For many brands, this law requires them to transform their current operations and critically assess their current ways of treating dead stock. During the same period as news of the AGEC law surfaced, Weturn founder Sophie Pignères decided to step in and create a turnkey solution to help brands take responsibility over their stock (Weturn & Premiere Vision, 2023).

Weturn developed a local, closed-loop process, designed to help brands **transform their dead stock** into new yarns and textiles. Together with spinners, weavers and knitters, they create an ecosystem in which these dead stocks are sorted, recycled, and turned into new beautiful fabrics. Weturn respects the waste valorisation hierarchy, meaning that they strive to tailor the most suitable recovery channel for each incoming garment or textile. This latter implying donation, reuse or recycle, respectively (Weturn & La Seconde Vintage, 2024).

Although Weturn takes on a wealth of logistic activities, including collection and distribution, numerous innovations are introduced in Weturn's circular approach – firstly, their innovative **sorting** process is unique to the market, and developed specifically to match manufacturers' specifications. It's utilises an algorithm that considers 33 variables, including material texture, colour and composition. They also developed their own recycled fabrics brand, MT®, which allows smaller brands and independent designers to benefit from Weturn's circular solution. Lastly, in 2024, Weturn launched VALO. An **innovative B2B SaaS platform** assisting brands in tracking material flows within their inventory (Weturn & La Seconde Vintage, 2024).

2020

WETURN is founded by Sophie Pignères

2021

Multiple **pilots** are conducted to fashion maisons' unsold textiles

2022

WETURN wins the **LVMH Innovation Award**, catapulting its legitimacy and visibility

2023

WETURN becomes **Bcorp certified**

2024

WETURN launches its newest innovation, **digital tool VALO** to manage material flow

Weturn02

After attending an inspiring panel discussion between LVMH's Sustainability Director, NonaSource CEO and the CEO of Weturn, I am very happy to include Weturn in my research. It turns out my apartment in Paris was located just minutes away from their office, but I only came to this conclusion during the (online) interview we had. In this Chapter, I will delve into Weturn's value proposition, circular strategy, and the processes and interactions that have shaped Weturn's market introduction.

2.1. How does Weturn Position their Circular Innovation?

As explained on the introductory page of Weturn, Weturn's value proposition consists of multiple CIs. Foremost, they have an innovative sorting process that allows them to decide on the continuation of the lifecycle of a deadstock with respect to the waste hierarchy. Second, they have developed their own brand of recycled materials, called MTr. Third, they have launched an innovative digital tool in March 2024, called VALO, which enables brands to track their stock. It is important to understand that Weturn's offering

- **Regulatory compliance:** Weturn guarantees regulatory compliance throughout their supply chain (WETURN, 2024c), hence offering brands a solution for meeting new regulations.
- **A solution towards the CE:** partnering with Weturn allows brands to not only recycle, but also direct waste streams to other channels, such as reuse, to make sure the textiles/garments stay in the loop.
- **Operational and logistical improvements:** as Weturn takes over the entire sorting, recycling, spinning and weaving process, brands do not have to make major changes to their own operations to facilitate the circularity of their deadstock.
- **Answer to consumer demand:** with Weturn's recycled material range, MTr, they enable brands or designers to include recycled materials in their collection to satisfy consumer demand for sustainable, recycled materials (WETURN, 2024c).
- For their digital tool specifically, Weturn highlights that brands can benefit from **detailed reporting** on their operations, and clients benefit from "a significant time saving on research and relationship with valorisation channels" (WETURN, 2024c), implying that the connectivity the platform **strengthens the relationship with other stakeholders** further down the supply chain.

So, Weturn offers multiple distinct services that can be combined to ensure a fully closed-loop system where Weturn takes on the logistics, storage and recycling of deadstock, traceable with the VALO tool.

2.2. What Circular Strategy does Weturn Use?

With their closed-loop recycling solution, it is clear Weturn follows a **closing strategy**. By "positioning [them]selves at the beginning, middle and end of the chain" (WETURN, 2024c), they ensure pre-consumer waste is either recycled, or redirected to another valorisation channel. Their approach to closing resource loops is hence recycling and tracking & tracing (with their VALO tool). It is important to understand that Weturn's CI is not a recycling technology in itself: *"we didn't invent it at all, we went to see our European neighbors who do it [recycling] very, very well, the Italians, the Spanish, the Portuguese...we have very precise specifications...so we didn't invent anything at the heart of the machine"* (Première Vision, 2023). For Weturn, it is interesting to see how their CIs (sorting and VALO) are leveraged by their business model: they take over inventory management and preparing garments for sorting, and although the VALO tool can be utilised by brands who do not have their deadstock recycled by Weturn, it is a great addition to brands already involved in Weturn's circular system.

Figure 2.1: The contextualization of Weturn's innovation on micro, meso and macro-level using the triple layer framework.

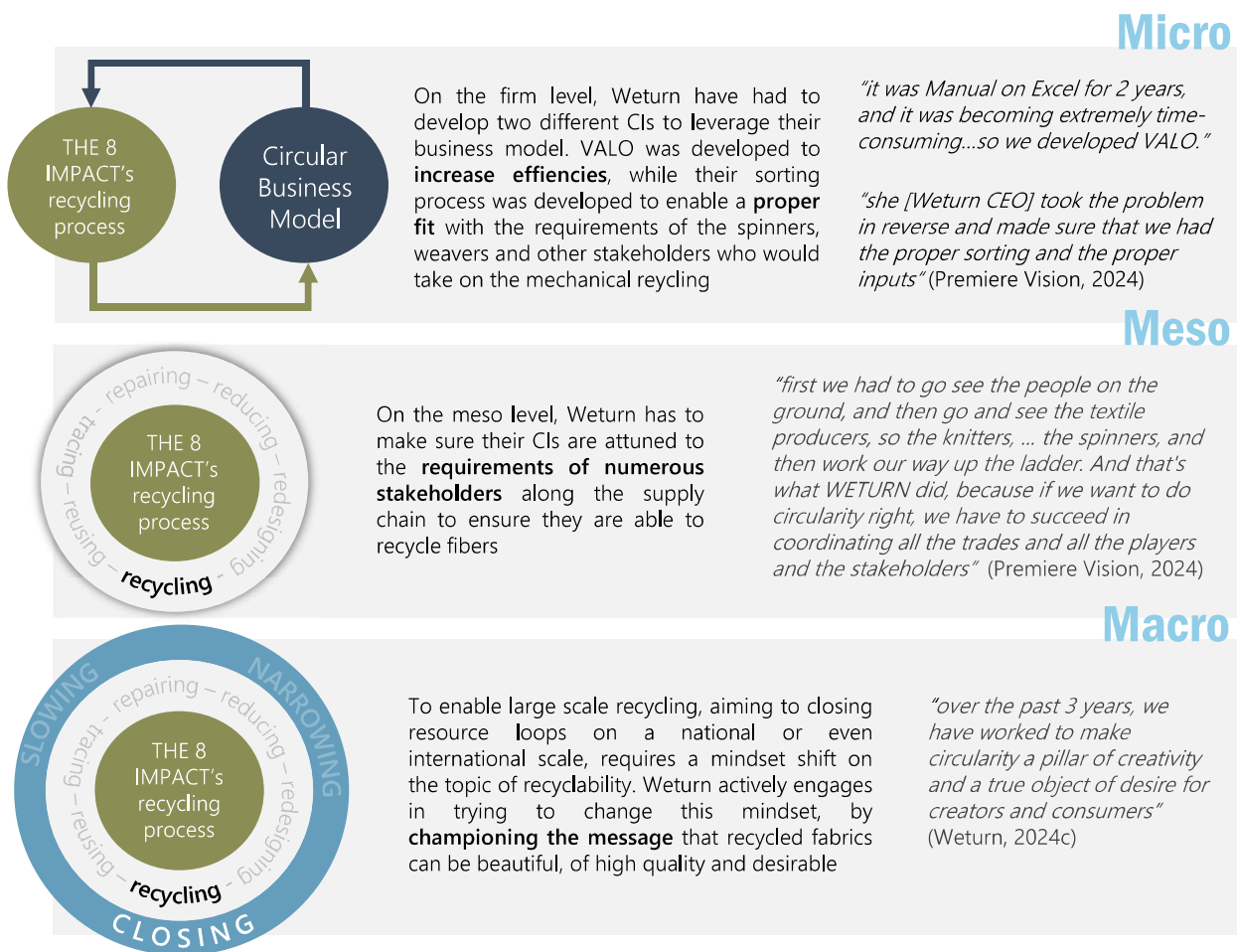


Figure 2.1 contextualises Weturn's CIs on the micro, meso and macro-level. As depicted above, at the **micro level**, Weturn's business model must encompass various logistical elements that bridge their processes with those of their partners. These logistical efficiencies also extend to the digital realm, where Weturn utilises VALO to assist brands at the **meso level** while simultaneously enhancing the efficiency of their own internal digital processes. On the **meso level**, Weturn is in contact with not only the brands they work with, but also must maintain connections with their logistic partners and spinners, weavers and knitters to effectuate the production of MTr. On the **macro level**, Weturn's ambition is to change the perception of recycled materials, and contribute to a fashion industry in which a third of the clothing in stores is recycled, a third is second hand, and a third is new (WETURN, 2023).

2.3. What Activities does Weturn Engage In?

Using data from podcasts, LinkedIn posts, recorded table rondes, news articles and my own interview, I set out to sketch an image of the processes and interactions Weturn engages in according to the seven TIS functions, detailed in the subsequent subsections.

Entrepreneurial Experimentation

Weturn was founded in 2021 - before launching Weturn, its founder *"carried out a year's worth of research, meetings and interviews to clearly define the positioning, the target and understand the needs of each of the players at each stage of the chain"* (Visconti Partners, 2023). Weturn's founder had no prior experience in the fashion and textile industry, so this **in-depth market research** was necessary to ensure a proper market fit. A real barrier the founder had to face was actually getting in contact with decision makers: she expressed that *"the tricky part of launching a business is getting appointments with the right people and decision-makers. This is all the more true in fashion, a very closed environment"* (Visconti Partners,

2023). Another 'entrepreneurial challenge' the founder had to face was *"to change the market perception of recycling, and make it more desirable"* (La Seconde Vintage, 2024).

Weturn's innovative sorting method is a result of many interactions and internal R&D: *"it's been engineered by textile engineers. It's been validated by every single person in the process and with the technical specification of the spinners, of the weavers,...many interactions were had with parties involved in the manufacturing and recycling of textiles"* (Première Vision, 2024). Especially since Weturn depends on spinners and weavers to turn their recycled fibres into fabrics, it was vital for them to attune their processes to the **standards of stakeholders** along the supply chain. Sophie tells on the same podcast that *"first we had to go see the people on the ground, and then go and see the textile producers, so the knitters, ... the spinners, and then work our way up the ladder. And that's what WETURN did, because if we want to do circularity right, we have to succeed in coordinating all the trades and all the players and the stakeholders"*. Integrating recycled fibres into collections is not decided upon solely by the brand; various parties along the supply chain must be consulted. Realising this, Weturn specifically asked various manufacturers under which circumstances they would be willing to accept and use recycled yarn, and what fibre compositions they would expect. In a podcast, a Weturn employee explains that *"spinners were not willing to use it [recycled materials] because they were saying the fibroids were too short. Then weavers were not willing to use it because...the yarns were not solid enough, and then the final brands were not willing to use it because it's not politicised. So she [Weturn CEO] took the problem in reverse and made sure that we had the proper sorting and the proper inputs"*.

A final challenge within this function concerns Weturn's **business model**. They express that *"there is a massive complexity on the business model of circularity. Despite all the commitments disclosed, this is still not well understood that this transition from linear to circular management has a cost for each department"* (WETURN, 2024b). As with almost all circular solutions in fashion, it is not easy to construct a competitive value proposition that appeals to price-sensitive customers. However, Weturn did express how, even though finding a business model is difficult, **scaling up** production is an effective way to create a more compelling cost proposition: *"we're arriving at our spinners with more interesting tonnages... we've got economy of scale...we've got a price which is much more interesting per kilo"*. What is interesting, is that Weturn emphasises how finding a competitive cost proposition should not only be sought for by the start-up, but also requires a shift in mindset from brands: *"we want to wake up managers today after Renewcell bankruptcy announcement. For companies like us, that offer sustainable outputs, fully compliant with the new regulations and climate goals, we are still facing a lot of difficulty to justify the cost of these services, even after doing a lot of effort"* (WETURN, 2024b).

Influence of Direction of Search

In a podcast, Weturn founder explains how *"an actor was needed today to accompany them [brands] from A to Z"* (Ça Bouge, 2022) as a result of the **changing regulatory landscape** in France. Weturn was founded as a reaction to the momentum created by the announcement of the AGEC law. Although the AGEC law forms a great incentive for brands to enter the CE, Weturn admits that *"it's a market that takes an extremely long time to move"* (Ça Bouge, 2022). However, Weturn also explains: *"we felt this year an acceleration. We've had a lot of incoming requests from brands...it's more of a status report, because in this first year, the law has been passed, but it's still not being followed to any great extent"*. (Ça Bouge, 2022). Weturn attracts brands to choose them for entering the CE by providing customers with a certificate of compliance with the AGEC Law (Mode in Textile by IFTH, 2021).

Knowledge Development & Diffusion

Weturn's knowledge development and diffusion has strong links with the processes described under Market Formation, as the development of knowledge involves collaborative learning with brands and other stakeholders. However, other than interactions with brands to develop their industry-specific knowledge, Weturn also interacts with ecosystem associations, students and industry experts to further increase their knowledge:

- Weturn participates in workshops, panel discussions and working groups with other startups and industry actors to stay updated on various topics. These interactions help Weturn stay involved with industry trends and challenges, and allows them to share their own **unique expertise**. Weturn told

me that they actively *“participate in workshops with other startups and actors on different updates, so the DPP... and then traceability topics and issues that fashion will face”*.

- The development of Weturn’s MTr highlights the process of **collaborative learning**: they created the fabric in partnership with the Pixelis Agency, another circular startup (Fairly Made), and students from the Institut Français de la Mode (Fashion Network, 2022).
- For the development of their own closed loop system, Weturn *“decided to invite circular experts on the donation, the reuse, the upcycling, and the recycling, and sit around the table to explain: what are the key points to reuse those goods”*. This shows that they actively sought interactions during their internal development.

Market Formation

Weturn’s market formation has been notably shaped by **strategic connections with LVMH**¹, providing a sheltered environment for them that fostered their growth, innovation, and the ability to address the unique challenges faced by luxury maisons. Weturn explains that *“the influential textile houses and players, who were not converted to recycling at the time, have the most noble, highest-quality and therefore easiest-to-recycle stocks of materials. But they can’t sell off any of their unsold stock, so they have to recycle it in other ways”* (Visconti Partners, 2023). Recognising this, Weturn decided to address the needs of luxury players before moving to middle market players. From early on, they were included in LVMH’s circular strategy. This partnership enabled Weturn to run pilots, collect feedback, learn industry specifications, and build legitimacy.

However, this process has not been without challenges. During our interview, Weturn mentioned that **involving all teams** within a brand in a collaborative project was a major challenge: *“it’s not a tiny project; it is a major circular project that should involve every step of the company. First, we were working with the logistics and productions team, but over time, we understood that it was super important to involve the financial team, the marketing team, the communications team, the CSR team, to make a collective movement to help brands take advantage of these circular projects”*. A final barrier is brands’ apprehension about **switching suppliers or manufacturers**, which can inhibit opportunities for collaboration. Weturn explained that some brands *“always do with the same supplier. Always trust the same fabric”*.

From the data that I analysed, two key parties played a role in Weturn’s market introduction. Firstly, their connection to LVMH, as described above. Secondly, Weturn is a member of the Fédération de la Mode Circulaire, which has provided both visibility and vital connections with other stakeholders: *“as a young start-up to big clients, you have the circular actors, but you also have like Isabel Marant or Kering. So far that’s nice because we participate and we get involved in many projects on recycling topics for the federation, so that’s a key point for us”*. Other than raising awareness on their circular solution as a whole, raising awareness is a key process within the market adoption of Weturn’s innovative fabrics. They aim to promote recycled fabrics through communicative brands to raise awareness and commit more actors: *“we would like to share this project with maybe communicative brands... to raise awareness on the products”*.

Legitimation

Weturn’s interactions and processes within Legitimation has been significantly influenced by their strategic alliances, particularly with LVMH, and their proactive engagement in industry initiatives:

- Weturn’s **collaboration with LVMH** has been pivotal in establishing their credibility. In 2022, Weturn won the LVHM Innovation Challenge, about which Weturn says: *“it was a nice way to get visibility and awareness, and to have real discussions with the corporate teams in LVHM. Also to convince all the LVMH brands teams as we are the awarded the startup from the 2022 Viva Tech programme, so they know us”*. This award, combined with the partnership, greatly accelerated Weturn’s credibility within the industry and solidified their reputation.
- Convincing brands of the **high quality of recycled materials** was a big challenge. Weturn noted, *“we had this real challenge to convince studios and production teams on the high quality of our recycled materials”*. At the beginning, many brands advised against going 100% recycled due to the limitations of existing industrial tools, which are not prepared for 100% recycled yarns. Weturn

¹Louis Vuitton Moët Hennessy, the largest luxury goods conglomerate in the world

responded: *"we're between around 50 percent recycled material in products. Thanks to this, we can already validate a level of quality, seduce and convince our prospects. Historically luxury, premium prospects,...we've managed to align ourselves with their quality specifications"* (La Seconde Vintage, 2024).

- To **measure the circularity** of Weturn's recycled textiles, Weturn collaborated with BCome. This analysis revealed that Weturn's garments are 63% more circular compared to market alternatives, and their materials' linear flow is 44% lower than the industry average (BCome, 2024) - having these numbers confirmed by a third party adds to Weturn's legitimacy.
- Weturn's legitimacy was further enhanced by receiving **BCorp certification** in December 2023, with an impact assessment score of 96.7. This certification, along with being featured in Wavestone's sustainable retail solutions' radar, provided additional evidence of Weturn's pioneering role in the recycling industry (BCorporation, 2023). Lastly, Weturn is also Global Recycled Standard certified on their yarns.

Although the above points mainly target Weturn's legitimacy as a company, this legitimacy greatly influences the market adoption of their CIs. Weturn's holistic circular solution encapsulates their CIs, and the credibility they have built as a start-up helps promote and integrate these innovations within the industry.

Resource Mobilisation

While detailed information on the financial resource mobilisation of Weturn is limited, there are notable insights into their operational resources and strategies. Firstly, Weturn has faced challenges due to the **lack of French quality manufacturers for recycling and spinning**. This gap in the domestic market compelled Weturn to seek interactions outside of France: *"the lack of French quality manufacturers for recycling and spinning, all materials combined, forced us 3 years ago to collaborate with our European neighbours"* (WETURN, 2024a).

As elaborated upon earlier, Weturn's **cost proposition** becomes more competitive the more they are able to scale - a recycling machine requires at least 2 to 3 tons of material from the same batch for it to run profitably (Ça Bouge, 2022). However, obtaining that much material from the same batch is a challenge. To collect sufficient input for the recycling machines, Weturn has developed a systematic approach to inventory management by storing the sorted bales until they reach the minimum quantity required for recycling (WETURN, 2024c). The latter highlights the need for storage space, which Weturn has obtained through logistic partnerships. In summary, Weturn engages in partnerships to both gain access to machineries and know-how to facilitate recycling, and to store the bales of textiles until they reach a sufficient amount.

Development of Positive Externalities

Weturn's activities generate several positive externalities that benefit the broader ecosystem of the CE in fashion. First, their **incubation at La Caserne** has resulted in a partnership with Nona Source (also incubated at La Caserne), a resale platform for deadstock luxury fabrics. This communication between the two CBSs has developed positive externalities for both of them: *"since day one, they're [NonaSource] the reuse platform for all LVMH fabrics... we validated MVPs [minimum viable products]. We did a lot of things with them. They co-created parts of the setup to ensure we were responding to the needs of the industry. Well, so it has been a real hand-in-hand collaboration"* (Première Vision, 2024).

On top of that, Weturn benefits from and contributes to the **launch of new business models**. This environment enhances the learning curve for other innovators, CBSs and industry stakeholders: *"Weturn is lucky to operate in the fashion industry, where high levels of innovation exist... enhancing the learning curve of other innovators and industry players on circular strategies and approaches"* (Première Vision, 2023). So, Weturn's participation in co-creation facilitated by a circular incubator, along with their contributions to expanding the industry's knowledge base on circular processes and business models, has generated significant positive externalities. These efforts not only support the advancement of circular practices within fashion, but also enhance Weturn's own development.

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03

Closing
Slowing


Recyc'Elit

Recyc'ELIT

Information sources used to construct this case

Personal interview with Recyc'ELIT founder

Recyc'ELIT's website and LinkedIn

Websites and reports from EURATEX, TECHTERA, and CNRS

Refashion Innovation Challenge outputs

Every second, an entire truckload of discarded clothes and textiles are either incinerated or dumped in a landfill. Currently just 1% of the garments we dispose of are recycled. This low number can be attributed to numerous reasons, such as unoptimised sorting processes and the inability to recycle **textile blends** – the latter is where Recyc'ELIT's innovation comes into play. Post-consumer textile waste consists of all sorts of blends, colours and densities. Recyc'ELIT can recycle it, as long as there is PET component present.

Recyc'ELIT has developed a **patented process** that can **chemically isolate polyester (PET)** from textile blends. More specifically, Recyc'ELIT's patented process permits polymers to be removed from PET, allowing the two original monomers to be extracted (Dimethyl Terephthalate and Monoethylene Glycol, for the chemistry enthusiasts). With the purified monomers, recycled polyester pellets can be made, which in turn can be transformed into e.g. **recycled thread**. This is a huge feat, since more than half of the global PET consumption can be attributed to the textile industry (Refashion, 2021).

What is more, Recyc'ELIT's process has very **low energy consumption**, reduced water consumption and utilises non-toxic reagents and solvents. They make use of **local textile feedstock**, from the Auvergne Rhône-Alpes region where they are based (Refashion, 2021).

At the moment of the interview, April 2024, Recyc'ELIT was in the **early industrialisation stage**. Their current endeavour? Building a demonstrator at USIN Lyon Parilly Factory, which they expect to be operable in 2025 (l'Essor, 2023).

2019

Recyc'ELIT is **founded** by two brothers - both doctors in chemistry

2021

Recyc'ELIT wins **Refashion's Innovation Challenge** in the AURAreFIL collaborative project

2023

Recyc'ELIT joins the accelerator programme at **WeDareLab, the ETAM Groupe**

2023

Recyc'ELIT raised 3.2 million in funding and moved into industrial facility **USIN in Lyon**

Recyc'ELIT 03

After reading numerous times in approximately every report on the textile industry that complex textile blends are very difficult to recycle, it was a joy to come across Recyc'ELIT and their innovative recycling process tackling complex textile blends containing PET. In this Chapter, I will delve into Recyc'ELIT's value proposition, circular strategy and the processes and interactions Recyc'ELIT has engaged in since their foundation in 2019.

3.1. How does Recyc'ELIT Position their Circular Innovation?

Although the ability to recycle complex textile blends is a feat in itself, Recyc'ELIT does propose a variety of benefits that their CI can bring companies and other industry stakeholders:

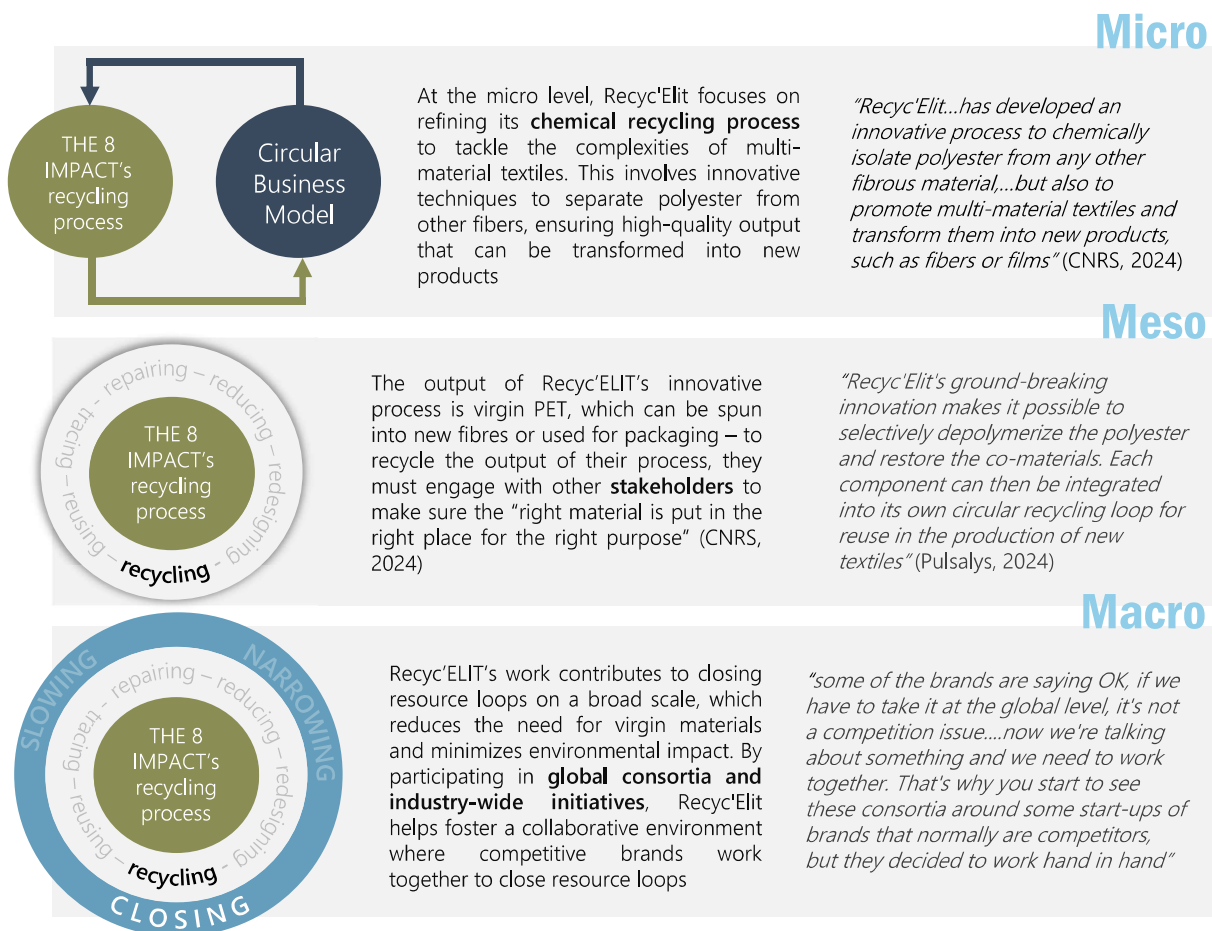
- **Comprehensive recycling capability:** on their website, we see that Recyc'ELIT emphasises how their technology enables them to recycle all types of complex textiles, especially textiles based on difficult-to-recycle polyester. This includes colored, multifiber, and mixed-origin materials (Recyc'ELIT, 2020), making their process attractive to brands who are seeking end-of-life solutions for the garments they are putting on the market.
- **Alignment with environmental goals:** Recyc'ELIT's efforts contribute to Europe's goal of incorporating 10 million tonnes of recycled plastic by 2025 (Recyc'ELIT, 2020). Brands or organisations that work with Recyc'ELIT can thus show their commitment to sustainability goals, which can help them regulatory-wise, but also benefits their reputation and marketing.
- **Valorisation of co-materials:** the selectivity of Recyc'ELIT's process enables the separation of other materials associated with PET in complex textiles, such as elastane, polyamide, cotton, and polyurethane, without degrading them. This creates opportunities for multiple closed-loop recycling systems (Recyc'ELIT, 2020, USIN Lyon Parilly, 2023), allowing brands to valorise numerous from their materials that 'exit' the recycling process.

The above shows how, even though Recyc'ELIT tackles a major painpoint within the fashion industry, multiple value propositional aspects are put forward to attract potential partners.

3.2. What Circular Strategy does REcyc'ELIT Use?

The Recyc'ELITs CI falls into the circular strategy of **closing resource loops** by recycling complex textile blends into virgin PET: *"the monomers thus obtained can give back virgin PET of food grade or any other premium quality in an infinite closed loop"* (Recyc'ELIT, 2020). When we consider Recyc'ELIT's CI within micro, meso and maso levels (shown in Figure 3.1), we see that at **micro level**, their business model is attuned to the chemical recycling process. However, to make their CI as attractive (and circular) as possible, the output of the process (other than the recycled PET) must deliver valuable co-materials. On the **meso level**, Recyc'ELIT's effectiveness relies on collaboration with various industry stakeholders. This includes partnerships with textile manufacturers, other recycling companies, and research institutions. These collaborations are essential to ensure that the outputs of Recyc'ELIT's process are integrated back into the production of new textiles and products. At the **macro level**, Recyc'ELIT emphasises the importance of global collaboration to close resource loops: they advocate for a collaborative approach where brands (often competitors) work together to address textile waste. This collective effort is necessary to scale their recycling innovations and ensure widespread adoption, ultimately achieving a more sustainable and circular textile industry.

Figure 3.1: The contextualization of Recyc'ELIT's innovation on micro, meso and macro-level using the triple layer framework. The quotes without references are verbatim extracts from the interview I conducted with Recyc'ELIT.



3.3. What Activities does Recyc'ELIT Engage In?

Using data from their website, LinkedIn posts, news articles and my own interview, I set out to sketch an image of the processes and interactions Recyc'ELIT engages in according to the seven TIS functions, detailed in the subsequent subsections.

Entrepreneurial Experimentation

A good starting point to understand the processes and interactions within Recyc'ELIT's entrepreneurial experimentation is that Recyc'ELIT is founded by two doctors in chemistry. In our interview, Recyc'ELIT explained how the decision to apply their recycling technology to the fashion and textile industry was a **strategic choice**: *"manufacturers, brands need to find a solution now and they believe that the solution from them, at least for the polyester part, would be relying on chemical recycling process. So...the pivot was very strategic for us"*. With this pivot, Recyc'ELIT committed to apply their solution to the textile industry. However, more research was necessary to pinpoint the exact painpoints of the industry. Recyc'ELIT told me how they *"started to develop and then you start to test the market and then see what are the needs of the market... so I started to dig and see the needs, and I figured out that the need was to address these complex textile based on polyester, because nobody else was able to [do that]"*. A challenge Recyc'ELIT highlighted was how the market can change fast, and that it can be difficult *"putting yourself in this position to say yeah, I should be able to switch very quickly, on demand, because you have to see to monitor what are the market needs"*.

An important interaction in Entrepreneurial Experimentation, is that they have been incubated by PULSALYS, a **deep-tech incubator** in Lyon, who provided a supportive environment for their innovative technology (Recyc'ELIT, 2023c). Furthermore, Recyc'ELIT joined the ETAM group. An interaction in which

Recyc'ELIT learns about the wants, needs and requirements of the market: *"what we are looking for by joining the ETAM group is to better understand the materials they are using, to help them to recycle and study their recyclability, but also benefit from their experience, their network and know-how, so as to support them in the eco-conception and to support us to market our solution"* (WeDareLab by Etam Groupe, 2023).

While developing their technology, they had frequent **interactions with brands**. When they were able to convince a brand, Recyc'ELIT explains that *"they [brands] would need fast, bigger. But on the spec. So this is also very challenging. So they ask you spec of industry where you're a start-up. And you're learning"*. The spec refers to the volumes brands wish to produce, and these can often be more than the capabilities of a start-up. However, this pushed Recyc'ELIT to create a roadmap, and become *"industry ready"*, accelerating their development and allowing them to tune their innovation to fit the market.

Influence of Direction of Search

A first influence within the Influence on Direction of Search, is a **growing demand** from customers for sustainable textile solutions that are anchored in France or Europe (Millénaire 3, 2023), which forms a driver for (French) brands to collaborate with Recyc'ELIT to recycle their products domestically. Furthermore, Recyc'ELIT's innovation help meet new **regulatory obligations** and eco-organisation approvals, that aim to increase waste collection rates and the incorporation of recycled materials in new products (Pulsalys, 2024).

Other than consumer demand and regulatory pressure, Recyc'ELIT also highlights how brand collaborations can **spark interest from other brands**, causing them to contact Recyc'ELIT: *"you have this follow-up effect, when they [brands] see that you are working with this...you gain interest, this must be interesting"*. Furthermore, Recyc'ELIT explained how they believe that social pressure also forms an incentive for brands to enter in the TIS for recycling complex textile blends: *"consumers would need more circular materials. So the pressure is on the brands...they have this pain point to try to find a solution for what they are putting on the market...switching from material, it's not that easy...I think the easiest way for them is to try to scout technologies that would help them to address the end of life of what they are putting on the market"*.

Knowledge Development & Diffusion

Recyc'ELIT's processes and interactions within Knowledge Development & Diffusion is characterised by strategic partnerships, collaborative projects, and active engagement with various stakeholders in the textile recycling ecosystem:

- Recyc'ELIT **collaborates with partners** to drive innovation in textile recycling. One notable project is their collaboration with Fairbrics and citepo to prototype a low-carbon tray made from (CBS) Fairbrics' MEG monomer (derived from CO₂) and Recyc'ELIT's DMT monomer (derived from plastic waste) (Recyc'ELIT, 2023a).
- Recyc'ELIT benefits from support and collaboration with **industry organisations** such as Regio-TexAid and EURATEX, which help in upcycling difficult and complex textiles (Recyc'ELIT, 2023d,b). Additionally, Recyc'ELIT told me how: *"We have been a lot helped by TECHTERA"*, an innovation cluster for the French fashion industry.
- Recyc'ELIT participates in **interdisciplinary projects** like the PEPR initiative, which involves collaboration across laboratories in France. This initiative aims to develop a global vision of the life cycle of materials, enhancing the technical solutions and recommendations provided by researchers: *"We no longer work in our own corner. PEPR projects are interdisciplinary and carried out between laboratories across the country"* (CNRS, 2024).
- Recyc'ELIT is involved in the **AURAreFIL project**, in partnership with the Techtera competitiveness hub and the Grenoble Alpes Metropolis. This project focuses on developing a local outlet for high-quality recycled polyester yarn. The project involves sorting and preparing used polyester textiles, followed by laboratory and pre-pilot testing. If successful, a mini-demonstrator will be launched, with the goal of scaling the model nationally and internationally: *"Techtera will coordinate the project, so as to develop a local outlet around the production of a high quality recycled polyester yarn, whilst Grenoble Alpes Metropolis will provide used polyester textiles which are sorted and prepared according to specifications jointly compiled with Recyc'ELIT"* (Refashion, 2021).

The importance of the collaborative research efforts between Recyc'ELIT and other recycling/textile experts are vital for obtaining a global vision of the life cycle of materials (CNRS, 2024).

Market Formation

Establishing initial relationships with brands is crucial within Market Formation. Recyc'ELIT leveraged early partnerships with **frontrunner brands**, which were willing to test their technology, sometimes for free initially. These brands later became sponsors, providing necessary financial support and credibility. Such collaborations helped build trust and demonstrate the value of Recyc'ELIT's solutions, eventually leading to paid engagements. This approach also involved working with various stakeholders in the value chain, including manufacturers of polyester and nylon. By showing that key brands are interested, Recyc'ELIT could influence the entire value chain to collaborate: *"So you have your final prescriptor your brand, which is the final client of these stakeholders. And when you show that these prescriptor is interested, it makes these agglomerations... it is aggregation around your startup with all these brands because at a certain point you solve a problem for them"*.

In Entrepreneurial Experimentation, I explained how Recyc'ELIT's collaboration and interactions with brands accelerated their development. However, Recyc'ELIT highlighted that one of the main challenges when contacting and convincing brands was *"first to bring them around the table to have their interest, and then once it's done, to convince them to progress more and then...stick to your proposal and then make them pay"*. This process involved not only demonstrating the technical feasibility and benefits of their recycling technology, but also ensuring that brands see its value and are willing to invest in it. I learned that the market demand for Recyc'ELIT's solution also depended on the **readiness of brands** to work with a developing startup. Some brands were supportive, understanding the startup's capacities and willing to accommodate initial imperfections in the product: *"they understand, they are here to accompany you... But then the idea also at a certain time they need also from you a clear road map saying, do I have to engage myself with you? When would you be able to deliver this amount?"*. Others, on the other hand, were less understanding. Recyc'ELIT shared how *"some brands don't talk to you under 2 tons"*. Hence, the process of assessing and contacting brands involved pinpointing visionary brands that were willing to collaborate with Recyc'ELIT. One of them being Decathlon, a collaboration announced by Recyc'ELIT in May 2024 (Recyc'ELIT, 2024).

Networking and visibility were other factors that proved essential within Market Formation from Recyc'ELIT's perspective. Recyc'ELIT engaged in extensive business development, attending fairs and conferences to increase visibility. They also explained how they hired a consultant to identify and qualify strategic partners, in order to structure their market approach. Additionally, support from clusters like TECHTERA and other regional initiatives provided crucial connections and resources, leveraging Lyon's historical significance in the textile industry. Especially the latter, the region, has been pivotal for creating a sheltered environment. Recyc'ELIT recalls how the region actively *"created visibility for us"*, and helped them secure a location for their demonstrator, further elaborated under 'Resource Mobilisation'.

Legitimation

Recyc'ELIT has made significant strides in gaining legitimacy within the textile recycling TIS - firstly, their technology's legitimacy was significantly boosted when they won the **Refashion Innovation Award**. This award not only highlighted the company's innovative approach to recycling, but also showed how their solution was recognised and endorsed from a very respected industry body (Refashion, 2021). Secondly, in 2022, Recyc'ELIT built a **pilot plant** to validate the technical feasibility of their recycling process. The development of their demonstrator have been supported by some prestigious organisations, including the Auvergne-Rhône-Alpes region and Refashion (Pulsalys, 2024) - the support in itself showcasing the legitimacy of Recyc'ELITs CI to other industry stakeholders.

Resource Mobilisation

Recyc'ELIT has effectively mobilised resources to scale its innovative recycling technology through strategic funding and partnerships, leveraging regional and European support mechanisms:

- **Regional support for financial resources:** In 2022, Recyc'ELIT built a prototype to validate the technical feasibility of their recycling process. Aiming to scale up, they conducted a fundraising round that secured €3.2 million. For this, Recyc'ELIT benefitted from the FIAM: a strategic initiative by the Metropole de Lyon and Saint-Étienne Metropole, aimed at reindustrialising the region with a focus on green startups established the the Fund for Industrial and Metropolitan Startups (FIAM),

an €80 million fund designed to support impactful startups. This fund, managed by Demeter, has been instrumental for Recyc'ELIT, as it provided them with capital and support (l'ESSOR, 2023).

- **Regional support for operational resources:** with support from the region, Recyc'ELIT has positioned itself in the Vallée de la Chimie within the Lyon metropolitan area, known for its vibrant industrial ecosystem. More specifically, Recyc'ELIT is located within USIN, a site with proximity to other recycling players. This location facilitates them with easy access to necessary resources and industry players (USIN Lyon Parilly, 2023).
- **European support:** Recyc'ELIT is also part of broader European initiatives like RegioGreenTex, which aims to support the green and digital transition of the textile industry. This project is supported by a €9 million grant from the European Commission, and involves 25 SMEs and 11 textile regions across Europe (Recyc'ELIT, 2023d).

On obtaining financial resources in general, Recyc'ELIT argues that: *"it must be recognized that investing in textile recycling is today less attractive in the eyes of certain decision-makers than other sectors"* (Millénaire 3, 2023). However, Recyc'ELIT's resource mobilisation so far proves that their strong network of partners position them well to overcome these challenges.

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04

Closing
Slowing
Narrowing

 **THE 8**
— IMPACT

THE 8 IMPACT

Information sources used to construct this case

Personal interview THE 8 IMPACT co-founder

THE 8 IMPACT's website and LinkedIn posts

News segments, reports or interviews on THE 8 IMPACT

Refashion, Polymeris, Pôle Competitive websites and reports

In France, 415 million pairs of shoes are produced, of which only 36% of used shoes is correctly deposited and sorted. From the shoes sorted by sorting centres, more than **90% is incinerated or exported** to the Global South. Less than 9% is recycled, as shoes are notoriously difficult to recycle: it is a highly technical challenge to separate all the materials that make them up (Éco 121, 2021). When shoes are mechanically recycled, rubber, foam and fibre granules can be recovered from which flooring surfaces can be made. However, recovering the **raw materials** requires a more complicated process. The latter is something THE 8 IMPACT has been developing for the last 3 years: THE 8 IMPACT is a **deeptech** that transforms used consumer goods into rare and competitive recycled raw materials (Team2, 2023).

THE 8 IMPACT, formerly REVIVAL by impact.capital, was founded on the notion that although non-reusable, used footwear loses its economic worth, it represents a **valuable resource** in terms of materials. After assessing the market, they found that there were only partial solutions to the recycling of shoes (Batirama, 2022). So, they set up their own intensive R&D activities and developed an **innovative sorting and recycling process**. Incoming used sneakers, rain boots or hiking shoes are evaluated with the help of **predictive software**. This is necessary, as shoe uppers can consist of more than 70 different materials (Bsmart, 2022). THE 8 IMPACT is tasked with evaluating the rubber composition in the batches they receive, and with extensive R&D, determine the most fitting course of action for the batch – whether that be via a **high added-value transformation** or a **lower value-added outlet** (Refashion, 2021).

Currently, THE 8 IMPACT has an operational industrial chain with a **Technology Readiness Level of 7**, which implies a system prototype demonstration in an operational environment. They aim to raise €30 million this year to accelerate their growth (Team2, 2023; THE 8 IMPACT, 2023d).

2021

THE 8 IMPACT, then **REVIVAL by impact.capital**, is founded by its three founders in Haute-de-France

2021

Collaborative project REVIVAL wins the 2021 **Refashion Innovation Challenge**

2023

THE 8 IMPACT's demonstrator project, a 272-metre long **cycling path** made of volcanic rock and ground-up shoe soles, is opened in Pont-à-Marc

2024

REVIVAL by impact.capital becomes THE 8 IMPACT, and receives label by **POLYMERIS**

THE 8 IMPACT 04

Based in Saint-Rémy, THE 8 IMPACT, formerly Revival by impacte.capital, forms a valuable asset to my case studies since I not only have a CBS involved in the repair and care of shoes [RE]PAIRE, but also their recycling - completing the circle. The data used to construct the case includes the (online) interview I conducted with THE 8 IMPACT, information on their website and LinkedIn, and news articles/news fragments.

4.1. How does THE 8 IMPACT Position their Circular Innovation?

THE 8 IMPACT offers a value proposition that addresses both key challenges in the recycling and sustainability, and regulatory compliance and environmental transparency:

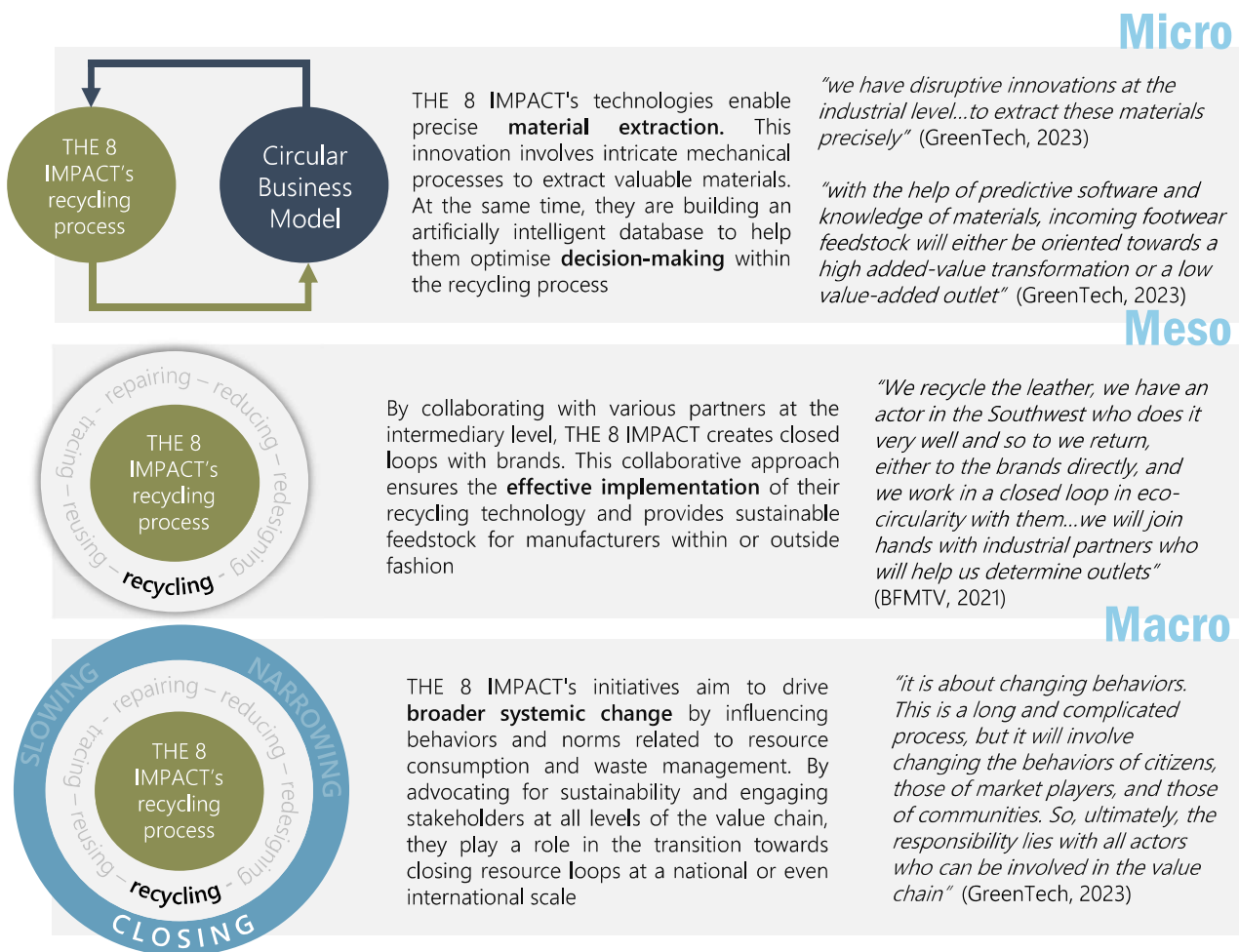
- **Waste valorisation:** by recycling waste streams that were not valorised before, THE 8 IMPACT creates economic value for brands where it did not formerly exist.
- **Regulatory compliance:** by recovering high-quality materials, THE 8 IMPACT enables brands and manufacturers to incorporate these recycled materials in their shoes, allowing them to reach upcoming regulatory requirements (the integration of 20% recycled content) (THE 8 IMPACT, 2022).
- **Enhanced transparency:** THE 8 IMPACT is committed to making a positive environmental impact. For this, they strive for complete transparency and traceability of the deposits. This enables them to perform accurate impact measurements that prove the impact of their solution (THE 8 IMPACT, 2022).
- **Enhanced CSR:** THE 8 IMPACT propose that adoption of their innovative recycling process can help brands improve their CSR, therefore committing to a positive environmental impact and enhancing their reputation.

In summary, THE 8 IMPACT's value proposition extends beyond waste valorisation, but also provides significant economic and regulatory benefits.

4.2. What Circular Strategy does THE 8 IMPACT Use?

By recovering materials from waste that subsequently can be used by other actors in the fashion and textile industry, THE 8 IMPACT follows a circular strategy of **closing resource loops**, with a recycling approach.

Figure 4.1 shows the contextualisation of THE 8 IMPACT's CI, contextualised on the micro, meso and macro level. On the **micro level**, THE 8 IMPACT's business model is tailored to the intricacies of performing recycling. Their innovation is not a single breakthrough but a series of innovations that collectively enable the recycling of shoes (sneakers). This process is supported by activities that facilitate the application of their technology. For example, an extensive sorting and identification stage precedes the actual recycling, as it is essential for THE 8 IMPACT to identify the exact content of each batch of shoes. To optimise this process, they developed a database for product contents that is designed to speed up and optimise this stage. On the **meso level**, THE 8 IMPACT is dedicated to creating closed loops between brands, material workshops, and industrial partners. This collaboration ensures that the outputs of THE 8 IMPACT's recycling process are redirected towards actors who can use these recycled materials, facilitating full recycling. On the **macro level**, THE 8 IMPACT emphasises that fully closing resource loops requires more than collaboration between brands and industrial partners; it requires behavioural change and the commitment of all actors in the value chain to take responsibility and drive systemic change.

Figure 4.1: The contextualization of THE 8 IMPACT's innovation on micro, meso and macro-level using the triple layer framework.

4.3. What Activities does THE 8 IMPACT Engage In?

Using data from their website, LinkedIn posts, news articles and my own interview, I set out to sketch an image of the processes and interactions THE 8 IMPACT engages in according to the seven TIS functions, detailed in the subsequent subsections.

Entrepreneurial Experimentation

THE 8 IMPACT has engaged in significant entrepreneurial experimentation to develop and scale their innovative shoe rubber recycling process. To adapt their CI to the market specificities of shoes within the fashion and textile industry, THE 8 IMPACT was tasked to learn about the content and construction of shoes. A major challenge in this process was the high heterogeneity of materials in shoes, which can "... Brands themselves often lacked detailed knowledge of what their suppliers used in their products. This complexity required THE 8 IMPACT to continuously innovate and adapt their processes to handle the diverse inputs effectively. They provided brands with greater control over their products and supported them in moving towards eco-design (Interpreneurs, 2022).

"take back is something actually that you don't want to deal with at the moment because it's too expensive. You don't find your business model" "this is where we had to sort of adapt our business models, in the sense of, OK, you have to find enough money to close the gap and wait for the time of the R&D, which is taking longer". An interesting aspect within THE 8 IMPACT's entrepreneurial experimentation is that they recognised that achieving high-purity regenerated materials would take time, so they developed interim solutions. They needed immediate applications for the materials they processed and ways to handle materials of lower purity: "it was going to take time to get to that stage of regenerating the material,...we

said, *OK, in the meantime,...we need to do something with the materials that come in. We need to get some kind of immediate applications to offer to the brands. And...then when the purity of quality is not good enough, you need to keep it at the grand stage, then we need to do something with it*". One innovative approach involved collaborating with a PhD candidate in material science. This collaboration led to the development of a cycling coating path using ground rubber from shoes. This solution describes how THE 8 IMPACT's entrepreneurial experimentation extends beyond applications for the fashion and textiles industry, but also created new opportunities for material use in applications like sporting surfaces.

THE 8 IMPACT's entrepreneurial process was not just about technological innovation, but also about building a capable team. They invested heavily in training their staff, equipping them with the skills needed to manage the entire recycling process, from sorting to maintenance. THE 8 IMPACT did face significant challenges in this area, as training and retaining employees is difficult: *"it's very challenging to have someone come in and instantly operate things"* (Green Tech, 2023), explains one of the co-founders in a table ronde. This approach was crucial for the company's operations, given the need for versatile employees who could handle various tasks: *"in our expenses, we consider training as part of innovation, and it's absolutely essential"* (Green Tech, 2023).

Influence of Direction of Search

Considering the Influence on Direction of Search, THE 8 IMPACT notes how *"retailers and brands are increasingly integrating environmental costs into their operational and financial decisions"*, and that *"legislative pressures and consumer demand for transparency are pushing waste valorisation to go beyond mere landfilling and incineration"* (THE 8 IMPACT, 2023b).

For recycling, legislative requirements will soon mandate the incorporation of recycled materials into production. In our interview, THE 8 IMPACT explained how brands will simultaneously seek to incorporate post-consumer recycled materials, not just to comply with legislation but also to enhance their marketing narratives. The latter forms an important influence on direction of search for brands, because *"they will all need to have a marketing story at the same time"*. THE 8 IMPACT anticipates many parties to enter the recycling TIS in the foreseeable future, and are performing ongoing R&D to ensure they are ready when the market moves. THE 8 IMPACT explains *"the fact that we're doing R&D is not just because it's not for the sake of that because we want to be ready actually once they [brands] press the button"*. So, in summary, THE 8 IMPACT mentions that regulatory pressure, consumer demand and the pressure amongst brands to stay ahead of each other form major drivers within this TIS function.

Market Formation

THE 8 IMPACT is significantly contributing to market formation for sustainable practices in the footwear industry. To date, they have garnered around twenty clients, including major brands like Decathlon and GoSport (Perreau, 2023). This highlights that there is interest among brands to collaborate with visionary CBSs on recycling, and suggests a growing market demand for sustainable waste management solutions. However, despite the growing demand, THE 8 IMPACT acknowledges that they *"do not start any project without knowing how to create a consortium with the stakeholders in the value chain"* (Team2, 2023), which highlights that partnerships and the support of multiple stakeholders along the supply chain is necessary to foster an environment in which THE 8 IMPACT is able to facilitate their solution.

Despite the enthusiasm from big brands, THE 8 IMPACT observes that there is a gap between initial interest and actual orders. THE 8 IMPACT finds it challenging to secure substantial commitments from brands, which are necessary to justify the high costs of setting up industrial-scale recycling operations. However, the lack of orders creates a chicken-and-egg scenario for THE 8 IMPACT. They explain that *"you need to basically prove everything that you can do at industrial scale even though you don't really have the orders yet"*, but at the same time, when brands want to place an order, brands negotiate with them as if they were flooded with orders: *"you're negotiating with me as if I was going to produce like 200 tonnes and you could buy 3 tonnes out of that...so that's the chicken-and-egg"*.

In line with the entrepreneurial experimentation of finding intermediate solutions, THE 8 IMPACT offers both open loop and closed loop valorisation solutions, processing all polymers and rubbers used in the footwear industry. This flexibility allows them to answer to various kinds of needs within the industry, and

enhances their chances of collaboration. However, THE 8 IMPACT does stress the importance of producing recycled materials at a price comparable to virgin materials to ensure market competitiveness, suggesting high price sensitivity amongst consumers and brands (Éco 121, 2021).

Collaboration with EPR schemes and local authorities guarantees a steady feedstock for THE 8 IMPACT, enabling them to choose the most suitable materials for recycling. This partnership not only ensures a continuous supply of raw materials but also facilitates the creation of high-quality recycled products. However, the startup continues to face challenges in convincing brands to integrate these recycled materials into their supply chains, as many manufacturers are hesitant to disclose the exact composition of their products, complicating the recycling process.

Knowledge Development & Diffusion

THE 8 IMPACT is very active within the knowledge development and diffusion for the rubber recycling TIS. They have conducted over 50 R&D programs, from sorting deposits of sporting and leisure articles to developing three eco-materials in partnership with manufacturers (THE 8 IMPACT, 2024). THE 8 IMPACT emphasises how important R&D is for them: *"we always have the same R&D protocol. So we were always very strict about it. So we make sure that everything that we say is proved scientifically"*.

A vital interaction in THE 8 IMPACT's development is with the academic community. More specifically, they have integrated post-doctoral researchers trained at the Institut des Mines et Telecom Nord Europe into their teams, and a partnership with university laboratory GEMTEX, who provide them with access to machinery and the scientific community (Interpreneurs, 2022). THE 8 IMPACT explained how this interaction is facilitated: *"it's completely private in the sense that the deal is we are hosted by them [materials lab]. So we have access, it's very American in terms of partnership...we have access to the machines, we have access to the scientific community. But then it means that all the R&D we're doing remains proprietary, so we are completely autonomous on that"*.

As highlighted under 'Entrepreneurial Experimentation', one of the core challenges THE 8 IMPACT faces is the time-consuming nature of R&D. The founder noted, *"what we have to adapt is the fact actually, that there is a time for R&D and it's taking up much more time than what we expected"*. Another challenge within their knowledge development is the need to effectively balance theoretical and applied R&D: the former to stay 'ahead of the curve', technologically wise, and the latter allowing them to apply their technologies to create concrete solutions for industry stakeholders. *"So that's the first thing then we've always believed that if you call yourself a deep tech, it's because you have some you juggle between the fundamental research and the application research"*, THE 8 IMPACT noted during our interview. Another factor that poses a barrier within R&D is the heterogeneity of the shoes they receive, which is made more challenging to address due to a lack of transparency: *"the manufacturers, they do what they want. They have their own formulas. They don't tell what's in a shoe, even if you're talking about the big ones"*.

To address this, THE 8 IMPACT have developed their own predictive database to allow them to aptly respond to incoming batches, recognising rubber contents, and decide on the valorisation method. Although their predictive software is used by themselves, the tool in itself could become a highly valuable tool within the rubber recycling TIS in the foreseeable future.

THE 8 IMPACT focuses on developing and diffusing knowledge regarding multiple aspects along the rubber value chain: for example, THE 8 IMPACT plays a role in educating sorting centres on the importance of proper shoe recycling through Refashion. This collaboration is crucial for ensuring that not only they receive suitable feedstock, but that shoes in general can be sorted more effectively.

Legitimation

THE 8 IMPACT has multiple approaches to establish legitimacy. Although not all are equally impactful, the combination of the below has proven useful for THE 8 IMPACT:

- THE 8 IMPACT have received multiple recognitions, including the state label Ecolab - Greentech Innovation and the POLYMERIS certification within the European plastics industry ecosystem (Green Tech, 2023). While awards and certifications help, *"they are not enough"*. THE 8 IMPACT acknowledges that true legitimacy comes from demonstrating a viable business model and tangible results.

They note, *"there are so many examples of startups who got all these labels or awards and etcetera and still they don't manage to succeed because they didn't find their business model"*.

- Building client confidence involved demonstrating their production capabilities: *"I think the big difference is when we started to being the clients at the IMT at the lab"* and gradually building legitimacy by partnerships with respected brands: *"we're working with an agency who is very recognised actually within especially the outdoor market"*.
- THE 8 IMPACT's strategy to build legitimacy includes partnering with municipalities for demonstration projects that showcase their capabilities and generates visibility (Green Tech, 2023).
- Regarding the impact they make, THE 8 IMPACT have strictly integrated principles like transparency, traceability, impact measurements, and LCAs to ensure their environmental benefits were measurable and aligned with regulations (THE 8 IMPACT, 2023a).

Resource Mobilisation

THE 8 IMPACT has successfully mobilised various resources to support their recycling initiatives. Initially, they financed R&D programs through their *"own funds and committed partners"* (Perreau, 2023). In 2023, they raised €500,000 from business angels, supplemented by debt and grants, totalling €1.7 million. By 2025, THE 8 IMPACT hopes to raise €30 million (Perreau, 2023). They are also supported by BPI and ADEME, the latter backed up by the France 2030 investment plan (Éco 121, 2021). THE 8 IMPACT emphasise the importance of these public funds for R&D: *"They have the industrial challenge where they basically have some R&D, like the grants that you can have from ADAME, BPI, or you can have from the European Community and et cetera. There will have some budgets actually that they can allocate to support R&D for some start-ups or even finance actually some of the CAPEX investment into materials. So this is really important"*.

Whoever the financial partner, THE 8 IMPACT emphasise how the need for a long-term perspective is crucial (Green Tech, 2023), and that regional funds have integrated this well into their investment plans. *"Regional anchoring is a priority that will call for national and European anchoring - with France 2030 as a catalyst"*, THE 8 IMPACT posts on LinkedIn (THE 8 IMPACT, 2023c).

Regarding operational resources, an initial challenge was finding a proper location for their factory: *"we were forced to leave the Hauts-de-France because we didn't find the right location, so we ended up in another region"*, explains one of the founders in a table ronde (Green Tech, 2023). Although securing a plant might have been challenging, they do have a guaranteed feedstock supply thanks to collaborations with Refashion and other EPR schemes. This is crucial for their operations, as their first industrial unit, set to be operational by the end of 2023, will valorize around 20,000 tonnes of end-of-life products annually. They already have visibility over 75% of the feedstock needed for this unit, and are in discussions with various market players and financial institutions to secure further support (Green Tech, 2023).

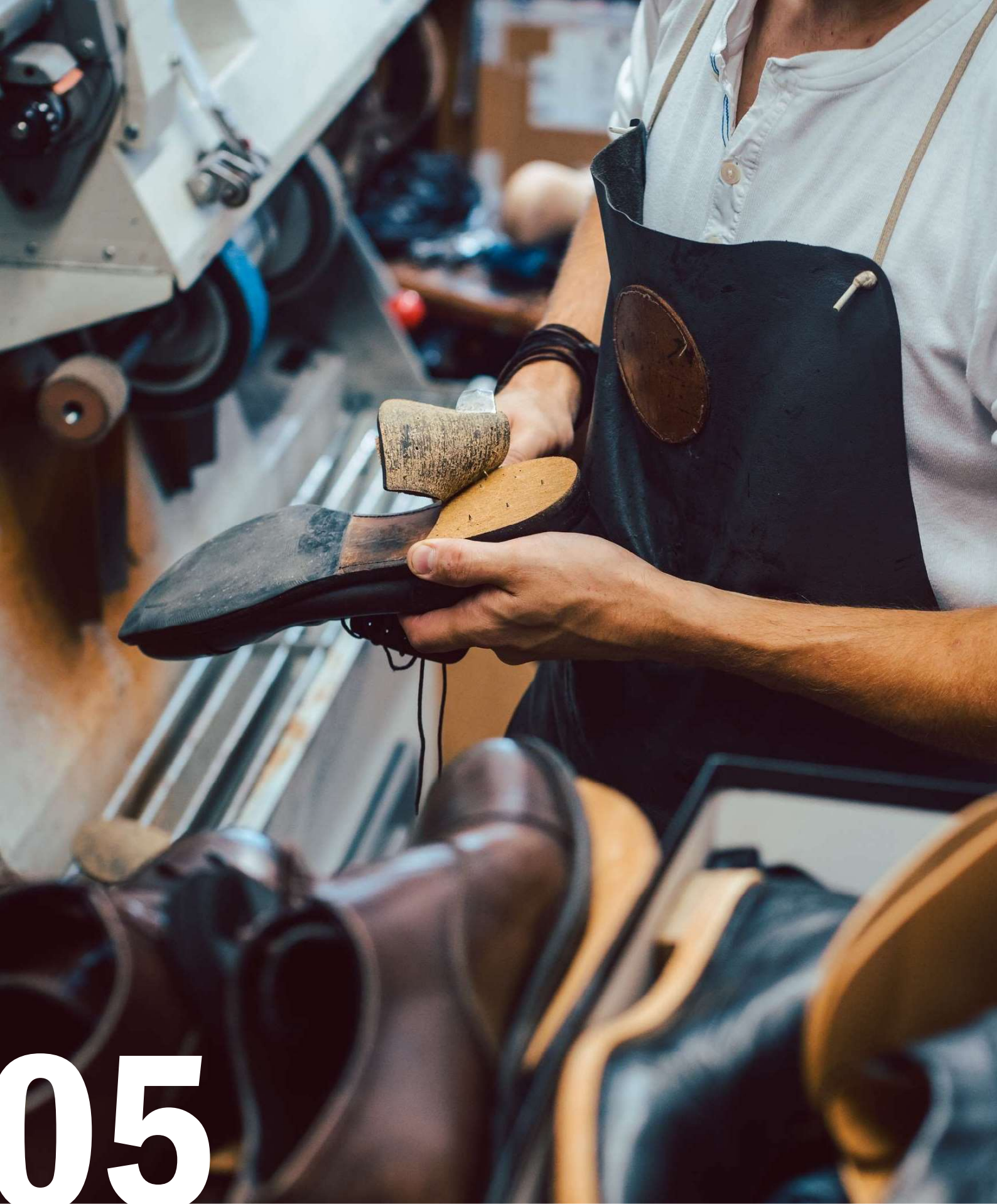
Development of Positive Externalities

THE 8 IMPACT actively engages in creating positive externalities by collaborating with policymakers and industry partners. They recently communicated with a Member of Parliament responsible for CE at the European Commission, providing input on draft legislation regarding the harmonisation of Extended Product Responsibility schemes within Europe. This involvement is important, as the voice of smaller innovative parties, such as THE 8 IMPACT, have to be heard by officials to ensure legislation and policy also considers their needs (Team2, 2023). Lastly, THE 8 IMPACT drives transparency and traceability along the value chain, as they require their *"industrial partners to supply all necessary data for LCA calculations"* (Team2, 2023). Through these efforts, THE 8 IMPACT not only advances its mission in rubber recycling, but also contributes to broader systemic improvements in sustainability and CE practices.

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05

Closing
Slowing
Narrowing

**(RE)
PAIRE**

[RE] PAIRE

Information sources used to construct this case

Personal interview with
[RE] PAIRE founder

[RE] PAIRE's website

[RE] PAIRE's news and
announcements posted
on their website and
LinkedIn

Interviews and news
articles published about
[RE] PAIRE

Industry report from
Fédération de la Mode
Circulaire and Accenture

Each year more than 400 million pairs of shoes are discarded in France alone. Shoe and leather goods reparations account for about **60% of the care and repair market** in France (Accenture & Fédération de la Mode Circulaire, 2024). About a quarter of French consumers are interested in repairing their clothes and shoes, rather than buying more expensive items. However, the majority of purchases in the market are focused on entry-level products, which could limit the demand for repair services. While there is a desire to repair and prolong the lifespan of items, the **dominance of cheaper products** in the market could hinder the adoption of repair services (Kantar, 2022). In 2024, Refashion launched its Repair Bonus, allowing consumers to benefit from a financial incentive to get their garments and shoes repaired.

[RE] PAIRE has developed an innovative solution to capture traction from the Repair Bonus, and allow brands to include shoe repair in their value proposition. Their business model consists of a **digital tool** to register and manage repair requests, and the **logistic- and repair services** themselves. More specifically, [RE] digital white brand solution, designed for it to be part of each brands' own communication. It includes a strong back office dedicated to each brand - this way, [RE] PAIRE brilliantly links the brand with highly skilled cobblers who are guaranteed to meet the brands' quality requirements. Last year, in 2023, they launched their repair services with Bessec Chaussures in Saint-Malo (Ouest-France, 2023).

At the time of the interview, April 2024, [RE] PAIRE was **seeking investments** to support their expansion and prepare for market acceleration (The Good Goods, 2023). Currently, their solution is designed for shoes, but [RE] PAIRE is looking into the possibilities of including other items, such as clothes, within their service: in fact, the service will soon be opened towards textile brands.

Want to know more? Don't hesitate to reach out to [RE] PAIRE on info@re-paire.fr

2022

[RE] PAIRE is founded in September with the objective of offering brands a turnkey repair solution for shoes

2023

[RE] PAIRE launches their repair service with their first customer, Saint Malo-based **BESSEC Chaussures**

2023

Refashion's **Repair Bonus** is launched, providing potential customers incentive to partner with [RE] PAIRE

2024

[RE] PAIRE actively seeks **investment** to expand their operations

[RE] PAIRE 05

I am delighted to include Paris-based start-up [RE] PAIRE in my research: not only do I admire their mission to prolong the lifetime of shoes within the CE, but it has been very interesting learning about the role and treatment of shoes within the fashion industry in itself. I had assumed shoes and garments would follow a similar path and encounter the same 'problems', but have since learned otherwise. And you will too, after reading this case. The interview with [RE] PAIRE was in person, in their office space in Paris. The interview lasted over two hours, of which I will include the qualitative interview data with information I found on LinkedIn, [RE] PAIRE's website and news announcements on the start-up.

5.1. How does [RE] PAIRE Position their Circular Innovation?

[RE] PAIRE has developed a digital tool, which is a white brand solution, design for each brand to be part of its communication. It includes a strong Back Office dedicated to each Brand. Today, the digital tool is suitable for shoes and we might now open possibilities for clothes or other items. With its digital tool combined with their cobbler service, [RE] PAIRE falls into the circular strategy of **slowing resource loops**. They do this with the circular approach of repair, which, given their name, comes as no surprise. Next to their mission of helping shoe brands enter the CE, their proposal their solution offers value in various other aspects:

- **Taking care of the logistics of repair:** [RE] PAIRE takes care of the logistics of the shoe repair service. They have their own workshop and cobblers, so they can take over the entire care and repair service for (shoe) brands, making it a true turnkey solution.
- **Enhanced customer engagement:** The care and repair service is, as presented by [RE] PAIRE on their website, a way to enhance customer engagement. The repair service is said to build customer loyalty, as well as to attract new customers. The care and repair service [RE] PAIRE offers creates either digital or physical touchpoints with the customer. [RE] PAIRE's digital tool is plugged into the brand's website, meaning the customer visits the website when requesting the repair service. These touchpoints thus increase the interaction customers have with the brand, and the repair service in itself connects the customer to the brand as long as the customer owns the shoes.
- **Enhancing brands' value propositions:** [RE] PAIRE's service allows brands to "create value with a new offer" ([RE]PAIRE, 2024). Brands create an extra source of income off the repair of their shoes, and are able to increase their own value proposition towards their customers.
- **Offering brands a first-mover advantage for repair in the CE:** Lastly, although it is not listed on their website's "4 reasons to commit", it does mention on their website how partnering with [RE] PAIRE enables brands to be the first to offer their customers with a profitable repair solution. I believe this is an important part of [RE] PAIRE's value proposition, since being one of the first brand to offer such a solution forms a competitive advantage for them. They can use it for marketing, to boost their reputation, and thus gain traction with a sustainability-oriented clientele.

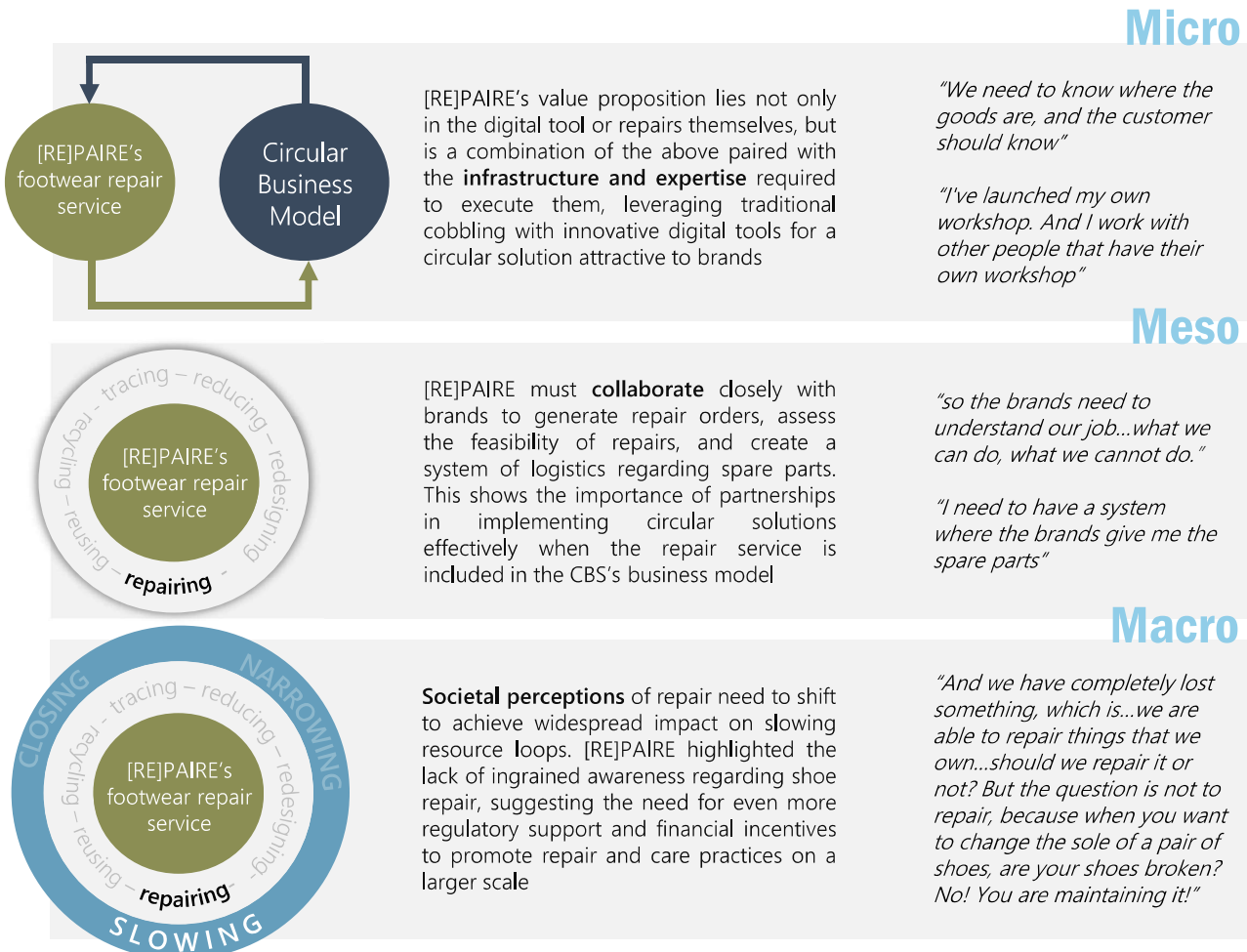
5.2. What Circular Strategy does [RE] PAIRE Use?

With its digital tool combined with their cobbler service, [RE] PAIRE falls into the circular strategy of **slowing resource loops**. They do this with the circular approach of repair, which, given their name, should come as no surprise. To fully understand the context surrounding [RE] PAIRE's innovative tool combined with the cobbling service, I use the Triple Layer Framework, which is shown in Figure 5.1.

On the micro-level, [RE] PAIRE's innovation of their turnkey digital solution is accompanied by the cobbling service, as well as the responsibility of taking on all the logistics of the repairs. This clearly illustrates the interplay between a CI and a CBM: the CI enables their CBM to be effective, traceable and reliable. A vital aspect of the value proposition of [RE] PAIRE are the repairs in itself. They have to have a

workshop, tools, and the skilled human capital to handle the repairs. And while the craft of cobbling has been around for centuries, and in itself is not an innovation, the combination of [RE] PAIRE's CI and CBM enables them to offer a new, circular solution which is attractive to brands.

Figure 5.1: The contextualization of [RE] PAIRE's innovation on micro, meso and macro-level using the triple layer framework. The quotes on the righthand side are all verbatim extracts from the interview I conducted with [RE] PAIRE.



So, on the micro level we see strong dependencies of the CI on the CBM, and vice-versa. On the meso level, [RE] PAIRE must work closely together with brands to a) get an influx of repair orders, and b) learn about the brands' shoes and decide, in collaboration with the brand, which repairs are possible. I will go into the latter in more detail later in this case. On the macro level, if we want to slow down resource loops on a big scale, we as society must change how we view repairs. During the interview, [RE] PAIRE explained how people don't have it engrained in their system that shoes can be repaired, of which a quote is shown in Figure 5.1. What is more, is that to fully embrace repair and care of shoes on the macro level, regulatory support could help, in offering financial incentives to repair shoes.

5.3. What Activities Does [RE] PAIRE Engage In?

To better understand how [RE] PAIRE has gone about introducing their innovation to the market, I will synthesise the qualitative data for this case according to the seven TIS functions.

Entrepreneurial Experimentation

[RE] PAIRE began its journey with a thorough **study of the market**. [RE] PAIRE's founder told me how he had done an intensive study of the market, in which he explained "I have done many interviews with people in the field, brands, cobblers etcetera. For the study of the market, I have made a questionnaire

for brands and for consumers. What do they expect from cobblers? What do they want? What do they want to give their customers?”. On top of that, [RE] PAIRE relied on industry reports and studies, such as from ADEME and Refashion. For [RE] PAIRE’s solution to have a proper market fit, it was vital for them to find out what brands expect, how they work, and especially, how they currently deal with repairs of their shoes.

After the market research, developing their digital tool and creating a workshop, [RE] PAIRE continued their entrepreneurial experimentation within their very first brand collaboration with Saint-Malo based ‘Bessec Chaussures.’ During this collaboration, both parties learned from each other and [RE] PAIRE was able to tailor their innovative solution to the brands wishes. [RE] PAIRE explained how it is vital for them to know where the goods are at all times, and that this information is available online to both the client and the brand.

Influence of Direction of Search

Similarly to each circular start-up I have spoken, [RE] PAIRE also explains how the **changing regulatory landscape** in France is driving more brands and organisations to seek circular and sustainable solutions. [RE] PAIRE tells me that within the last three years, they have noticed a large shift in the shoe sector - whereas back then care and repair was not considered an option, they emphasised that *“it’s becoming slowly but surely a nice to have, not a must have. Maybe in two years it will become a must have”*. So, the regulatory landscape is definitely shifting shoe brands’ priorities and a driving force for incentivising brands to enter into the realm of care and repair. On top of that, Refashion has launched the **Repair Bonus**, which forms a financial incentive for customers to get their shoes repaired, and pushes brands to enter into the repair economy.

However, [RE] PAIRE did elaborate on a factor that keeps brands away from seeking repair solutions. They explain that some brands are currently facing a decline in sales and revenue, and that in such a situation, brands will not venture into the unknown and adopt a new solution. *“When we are in danger, we are doing more of the same thing... You are not trying to invent something new”*. Some brands, however, do realise that repair and second hand form an opportunity to attract more consumers to their (online) stores. [RE] PAIRE explains that *“there is a decrease of frequency of the customers going to the shops. Customer are not going to the shops because they prefer to go on Internet to find their shoes, and [the brands] want the customer to come back to their shops. To do that, they have to create new services. So second hand and repair are both good services for that...so the motivation of the brand is, we might use the use phase as something to make the people come back to the shops for new products”*. The latter illustrates how [RE] PAIRE plays into customer behaviour by taking their preference for digital services into account during the development of their innovative cobbling service.

Knowledge Development & Diffusion

To be able to properly grasp the knowledge development and diffusion around the cobbling of shoes, you must realise that repairing shoes and garments are a completely different ballgame. Tailors are often equip with the right equipment, parts, thread, zips and buttons to repair virtually any garment that a customer brings in. However, with the service [RE] PAIRE offers, this is not the case - close collaboration and knowledge exchange is needed between the shoe brand and [RE] PAIRE to ensure the shoes are repaired to meet the wishes of the brands and to collaboratively decide on which repairs are possible, and which are not. [RE] PAIRE sits around the table with potential customers, and educates them on which repairs they can do, what they need for the repairs (this refers to spare parts, which I will talk about later), and what the cost of the repairs will be. This is necessary, because [RE] PAIRE takes on repairs in the name of the brand, and thus must meet the quality expectations of the brand. [RE] PAIRE explains: *“we are trying to educate the brand on what can be done, what cannot be done, yeah. Otherwise we will ask, we will have a new question every day.”*

In [RE] PAIRE’s experience, many brands have **little to no knowledge on the implications and costs** of including repair in their value proposition. Hence, it is up to them to educate brands on the costs of the service, how long the repairs will take, and what specific repairs can be done. [RE] PAIRE told me an anecdote of one brand they were in discussions with: *“we said OK, it would be interesting to work together. But there is a question of price. Upon which the brand said: “no, we said that we want to offer it.” But yeah,*

someone has to pay for it. So I told them the price, and they said they cannot give that to their customers, it's just too expensive. So this is quite interesting because they want to enter in this system, but they have no information on how to enter it". Another interesting knowledge exchange that happens is, due to the close communication between [RE] PAIRE and the brand, [RE] PAIRE is in the position to make requests regarding the manufacturing of the shoes to increase the reparability of the shoes - *"if the glue is too hard, I will ask them to put less glue on the sole, in order for me to be able to make something easier"*, they explain.

That [RE] PAIRE has accumulated **unique knowledge** on the topic of shoe repair is adamant. They are frequently contacted by consulting firms, brands and organisations to provide them advice, give their insights into the repair market, and participate in panel discussions. Educating brands, consumers and industry stakeholders is necessary to mature and normalise the costs and operational implications (e.g. spare part management) for the repair of shoes. When people learn more on the skill, knowledge, equipment and logistic operations necessary to perform repairs, the associated costs will hopefully become more normalised and slowly decrease as a barrier to entry for firms.

Market Formation

The market formation for [RE] PAIRE's service has been, and is still, not an easy journey. [RE] PAIRE reflects that shoes are *"one of the only goods in our life that we buy, and there is absolutely nothing made from the brand to repair and to manage the life of the product. First problem, is the brands are only here to sell products, their priority is absolutely not to repair"*. Paired with the limited knowledge on the costs and implications of including repair in a brand's offering, as described in the subsection above, the barriers to entry for firms are still quite high. As the business model and inclusion of repair is not mature in the fashion industry, brands have not developed a sense for the costs, and are hence very price sensitive. [RE] PAIRE explains how *"brands need to integrate Care & Repair into their P&L, otherwise it is a side project. And the costs, training and development of these projects should not be borne by the start-up"*. [RE] PAIRE emphasises that due to the cost of repairs, luxury brands are more inclined to offer these services as they are able to achieve better margins on the repairs, and hence form a more attractive target group for [RE] PAIRE.

Another barrier to enter the market for [RE] PAIRE is the closedness of the fashion industry. In their experience, it took up to one year (!) to secure a meeting with certain brands. Response times are slow, and getting to the right person within an organisation is difficult. [RE] PAIRE elaborates further on the barrier of time: as a start-up, runway is limited and revenue must be generated at some point to keep the business running. However, I was told the *"the time of implementing is different, definitely not the same. For a big company, big shoes or company, the time from the idea to the realisation could be 10 years. For startup, it's a question of yeah, it could be one week, sometimes."* [RE] PAIRE highlights that **ecosystem associations**, such as the Fédération de la Mode Circulaire, played an important role in building their network and meeting people who were interested in their service.

When brands are interested in a cooperation, [RE] PAIRE told me that *"[our] first position is to say, OK, tell me if I can have the spare parts"*. As I already explained, if you need a dress or a shirt repaired, it is highly likely you can bring it to any tailor in town - similar buttons, zips or thread are easily found. However, [RE] PAIRE explained how the **availability and management of spare parts** plays a large role in the repair of shoes, but currently forms a logistic, technical barrier. You can imagine that a sole replacement for a pair of leather platform boot from Dr. Martens requires different spare parts than a pair of fancy Oxfords. [RE] PAIRE emphasises that *"to have a competitive cost, we need to industrialise. And to industrialise, we need to have spare parts, spare parts is an absolutely unnegotiable"*. The problem is, in [RE] PAIRE's experience, that brands do not have a system in place to manage these spare parts, if they even have them in stock at all. *"I don't have the resources to buy all the spare parts. Most of the spare parts are made in specific materials and after five years, materials start to get rigid, so they just have to throw them away. They have no idea where to find the correct sole. But they have it in stock, so it costs them a lot of money to have it in stock...but they do not manage it"*.

"There is one problem is to find a [brand] and to educate the [brand]. The second problem is to find the people to work. And the third problem is to arrive at the correct price, and to arrive at this correct price, we need to have volume and industrialise, and spare parts" - [RE] PAIRE

Legitimation

In terms of legitimation, [RE] PAIRE explains that the best way for them to obtain legitimation is to show their skill and way of working in brand collaborations. They add that once you **show a brand that it can be done**, it sends a message to other brands that repair is feasible and that money can be earned on the reparation. Their first collaboration with Bessec Chaussures gained visibility in the media, which is a good way to show both brands and customers that the repair is shifting to a musthave for shoe brands.

Resource Mobilisation

The first part of resource mobilisation I want to touch upon is that of **human resources**: [RE] PAIRE expressed that finding skilled, technical cobblers is an extreme challenge: *"we used to have 3400 or 3600 workshop before the Covid crisis, and now there are 3200 workshops, so there is a big decrease"*. There is a technical school in the centre of France that trains cobblers, but the number of students in the programme has decreased immensely over the last few years. *"It's super, super difficult. It's impossible to find someone who knows the market"*. Especially for the luxury brands, [RE] PAIRE emphasises that they need cobblers with a lot of experience, which are both difficult to find, and whose services come at a cost.

When we look at financial resource mobilisation, [RE] PAIRE is currently **raising funds** to support its expansion, and prepare for market acceleration. They wish to upgrade their operations to a scalable, industrial demonstrator, and upgrade their existing digital tool (The Good Goods, 2023). [RE] PAIRE highlights that finding investors is not easy. In their experience, investors seek a business that currently has a higher profitability. This is difficult, as [RE] PAIRE needs to scale up to drive the costs down and become more profitable, and to scale up, they need investments. Secondly, they explain that the shoe repair market is driven by firms, and if they don't move, nothing happens. Due to this insecurity surrounding how the repair market will move, investors are hesitant to invest. [RE] PAIRE has benefitted from financing from BPI, a large French bank. However, when seeking a second round of financing, BPI emphasised that [RE] PAIRE would need to obtain private investments before being able to apply for second-time financing.

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06

Closing
Slowing
Narrowing

PROLONG

PROLONG

Information sources used to construct this case

Personal interview with Prolong co-founder

Prolong's website

Prolong's news and announcements posted on their website and LinkedIn

Interviews and news articles published about Prolong

Podcast with Prolong co-founder

Expanding the use phase of a garment by 75% results in a reduction in environmental footprint of approximately 30% (Accenture and Fédération de la Mode Circulaire, 2024). However, Kantan (2022) finds that on entry-level items, consumers are more inclined to purchase new products or repair their garments themselves, instead of having it repaired by a professional. To incentivise repair, the French government has launched a repair fund (the Repair Bonus) – more than 150 million will be invested between 2023 and 2028 with the objective to boost repairs by 35% (Refashion, 2023).

One of the innovative parties to help reach the 35% objective is Prolong: they aim to provide brands with a solution to simplify access to repair service providers (Fashion Network, 2024). While incubated at the Imagination Machine, Prolong has developed a **SaaS management platform** to streamline Care & Repair operations for brands. It integrates directly into brands' IT ecosystems (Journal du Net, 2024). They do not carry out the repairs themselves, but allow brands to access their network of certified tailors or cobblers. Customers can request a repair via the brand, and Prolong's omnichannel platform will connect the customer with a suitable tailor in the customer's proximity.

Other than streamlining Care & Repair services for brands, Prolong's platform provides brands insights on after sale and enables brands to increase their value proposition. By including repair in their offering, brands can attract more customers, resulting in increased turnover (Prolong, 2024).

Currently, Prolong has 3 clients, one amongst them being Fusalp, a high-end ski brands. They aim to expand their clientele by reducing the **onboarding time**, and enter new markets such as jewelry or leather goods (Journal du Net, 2024).

2023

With Imagination Machine, CEO Tanguy Frécon conducts **6 months of market research** to construct value proposition

2023

Prolong is founded in November 2023, making it the youngest start-up featured in this research

2024

Prolong raises **€1 million in their seed funding** round from Imagination Machine and AFI Ventures (Journal du Net, 2024)

2024

Fusalp becomes Prolong's first customer, and their collaborative project commences

Prolong06

Prolong is the youngest CBS included in my research, and I had the pleasure of meeting one of the founders of Prolong at the ChangeNOW summit in Paris. Throughout this chapter, I will present how Prolong has gone about positioning its CI on the market, which circular strategy they follow, and what activities and processes they engage(d) in during market introduction.

6.1. How does Prolong Position their Circular Innovation?

Prolong's allows brands to straightforwardly enter the repair market with their CI - however, next to the ability to enter the CE, Prolong puts other benefits forward as well:

- **Generating additional revenue:** on their website, Prolong notes how maintenance services *"add up to 15% to the average purchase value"* (PROLONG, 2024b). Other than the one-off purchase price, brands are able to make money on repairs throughout the lifetime of their products. It allows for upselling, as brands can allow customers to pre-pay for repair services. Lastly, Prolong's solution allows brands to benefit from the French Repair Bonus (PROLONG, 2024b). In a news article, Prolong explains that Care & Repair *"increase[s] their [brands'] turnover because they can attract consumers by offering repair and maintenance services once the product is sold"* (Journal du Net, 2024).
- **Increasing product lifetime:** offering repair and maintenance services can increase product lifetime (PROLONG, 2024b), bringing more value to brands' products.
- **Enhancing customer engagement:** Prolong explains how the offering of repair services can increase customer loyalty towards a brand and even attract new customers. The omnichannel platform allows for transparent and real-time information on any issues a product might have, facilitating better customer service on the brands' end, increasing customer satisfaction (PROLONG, 2024b).
- **Becoming a sustainability leader:** including repair and care in a brand's value proposition doesn't only allow them to become increasingly circular, but also boosts CSR results (PROLONG, 2024b). This might add to a brand's reputation and competitive edge.
- **Access to analytics & insights:** digitally managing repair and care services via a central platform allows brands to track what happens during their products' lives, hence obtaining valuable insights into their habits and behaviours.

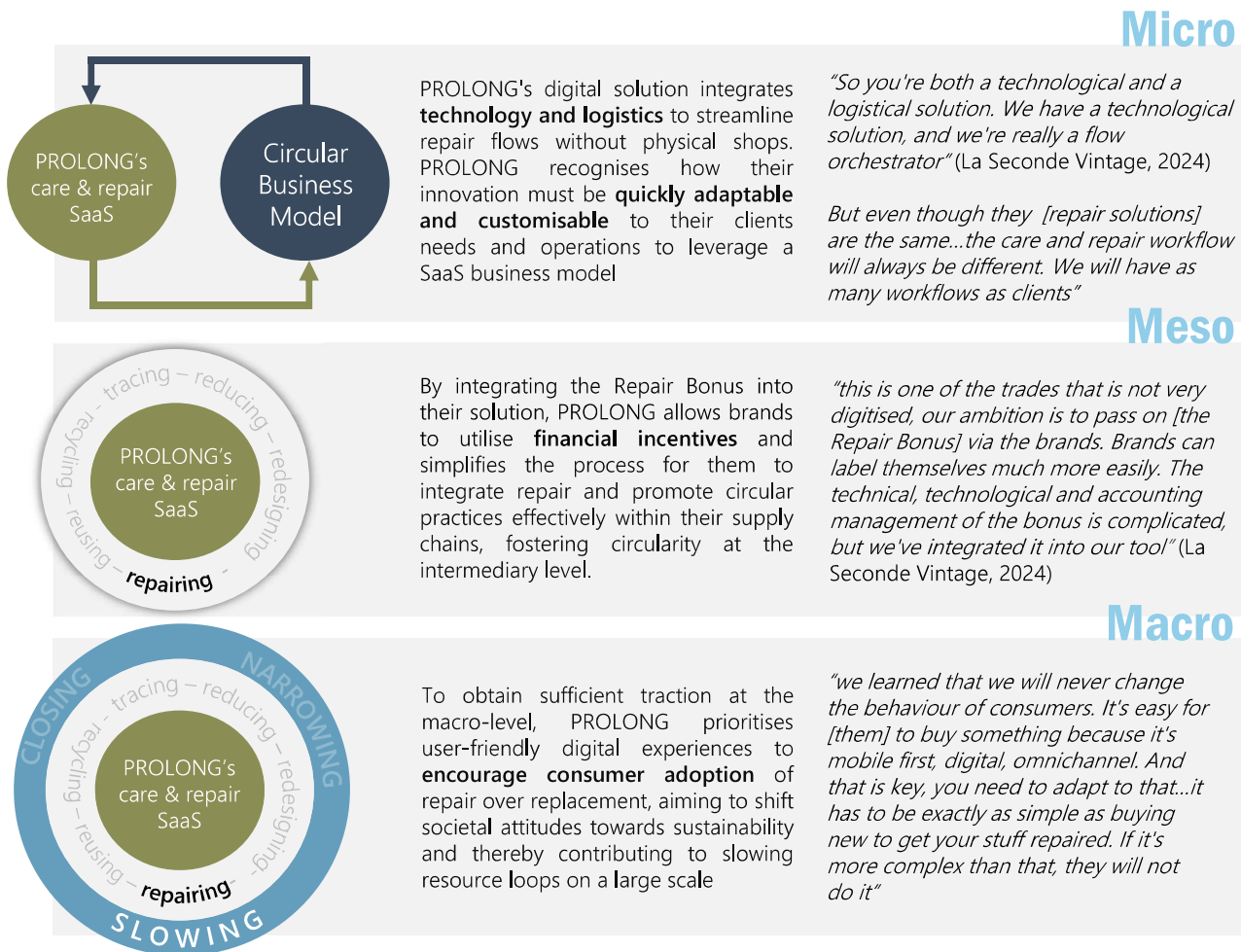
Prolong's value proposition is evidence that brands can truly benefit from circular solutions, and that these benefits extend merely the notion of becoming a circular actor, or reputational improvement.

6.2. What Circular Strategy does Prolong Use?

As Prolong's name suggests, they fall under the circular strategy of **slowing resource loops** by offering a Care & Repair solution. Although Prolong's solution is implemented within the (digital) walls of a brand, it requires mobilisation on multiple levels to significantly impact the adoption of **Care & Repair** services in and outside of France. A three-level analysis of the context of Prolong's CI is shown in Figure 6.1. On the **micro-level**, Prolong must develop and construct its innovation in such a way that it integrates with both the operational workflows and the IT ecosystems of their customers - the latter affects the internal processes of Prolong. Prolong explained to me how they work in sprints, which allows them to quickly develop and adapt their product to their client's needs. On the **meso level**, beyond mobilising a network of repair professionals to facilitate their CI, Prolong is aware of financial incentives, such as the Repair Bonus, and assists brands in taking advantage of these incentives. This not only enhances the appeal of their services but also supports brands in promoting sustainable practices. On the **macro level**, we see that consumers' behaviour is an essential part of the puzzle: Prolong accounts for consumer habits by developing their CI in such a way that consumers encounter as few barriers to adoption as

possible, primarily by making the solution digital. This approach ensures ease of access and convenience, encouraging wider adoption of Care & Repair services, and ultimately slowing resource loops.

Figure 6.1: The contextualization of Prolong's innovation on micro, meso and macro-level using the triple layer framework. The quotes on the righthand side that contain no reference are all verbatim extracts from the interview I conducted with Prolong.



6.3. What Activities does Prolong Engage In?

To better understand how Prolong has gone about introducing their innovation to the market, I will synthesise the qualitative data for this case according to the seven TIS functions.

Entrepreneurial Experimentation

Prolong's journey began with its current CEO, who had the idea to create a tool for brands to streamline their Care & Repair operations. He quickly started presenting a PowerPoint with his idea to VCs, retail friends, and consultants to gather feedback and refine the value proposition. After having approached **incubator Imagination Machine**, who *"had a playbook on customer research"*, a period of extensive market research began. Processes during this market research included mystery shopping in stores to understand the existing repair options offered by brands and to prove painpoints within these activities. Together with Imagination Machine, they conducted more than 300 interviews with retail stakeholders, from C-level executives to aftercare and marketing personnel, to identify pain points across different personas. This research phase lasted about nine months, from September 2022 to March 2023, and involved presenting and iterating on the value proposition with retail executives (La Seconde Vintage, 2024).

After **validating their value proposition** with two brands, Fusalp and Eram, Prolong was able to secure pilot programs to co-develop and demonstrate their solution. These pilots were very important

processes within Prolong's Entrepreneurial Experimentation, as they provided them with traction and validation - the latter allowing Prolong to attract further interest and investment. With no initial product yet, the founder recognised the need for technical expertise, leading to the recruitment of a CTO and product team to develop the digital tool.

During the process of developing their platform, Prolong faced the challenge of adapting to the diverse IT ecosystems of brands. Furthermore, each brand has unique workflows for managing repair requests, requiring Prolong to develop adaptable solutions tailored to different operational needs. During the interview, Prolong noted that *"integration is a big topic and the workflow, also the care and repair workflow, will always be different"*. Other than understanding **brands' workflows and processes**, an aspect that required attention during development of Prolong's solution was properly understanding **consumer behaviour**: even though multiple studies reveal a high willingness amongst consumers to get their goods repaired, there is an action-intention gap due to perceived complexity and cost. Prolong responded to this by making the process surrounding repair *"as simple and accessible as buying new"*.

Influence of Direction of Search

Prolong has played a significant role in shaping the direction of search within Repair & Care in fashion. Their efforts are influenced by evolving **regulatory frameworks** and market dynamics. Regulatory developments on product end-of-life are expected to further boost this market, with both entrepreneurs and investors anticipating significant growth (Accenture and Fédération de la Mode Circulaire, 2023, Fashion Network, 2024). Prolong notes that *"there's a legal and regulatory framework that's being tightened up, with constraints that will soon oblige brands to offer compulsory repair options"* (La Seconde Vintage, 2024). Furthermore, the introduction of the repair bonus by Refashion has created an incentive for industry stakeholders to enter the repair market. During our interview, Prolong observes that *"the repair bonus is making the topic [Repair & Care] pretty hot, obviously"*.

Other than a changing regulatory landscape, Prolong's CEO explains in a podcast how the **repair market is projected to grow** from over €10 billion in 2024 to €32 billion by 2030 (La Seconde Vintage, 2024). Although this projected growth might spark interest from brands and other stakeholders, it is still difficult for them to enter the Repair & Care market: the market is still highly fragmented, with many small local independents and web platforms offering repair services. The latter might be one of the reasons few brands have ventured into Care & Repair, and Prolong aims to help them benefit from this growing market with their solution.

Knowledge Development & Diffusion

Early in their development, Prolong partnered with Refashion to present their developing solution and obtain feedback. This interaction evolved into a deeper partnership, as Prolong helped Refashion with their tech - Prolong explained to me how they *"were super early in touch with Refashion. Just first of all, to present what we were building to get their feedback, but at some point to also help them building the API their tool their tech solution because it's not a tech company"*. This partnership was not only valuable in obtaining feedback and insights from Refashion, but also ensured that Prolong's solutions aligned with industry standards and needs.

As outlined in 'Entrepreneurial Experimentation', Prolong forged **'product co-build'** interactions. These interactive processes allowed Prolong to increase their knowledge on how brands work, ensuring their CI was better adapted to their clients' needs. This collaborative approach not only enhanced the product's relevance but also built strong relationships with early adopters (PROLONG, 2024a). So, we see that through strategic partnerships and active engagement with industry stakeholders, Prolong has effectively developed and diffused knowledge on Care & Repair and their digital tool.

Market Formation

Prolong's early client engagements have been instrumental in validating their market potential and creating an environment for Prolong to iteratively develop their solution while receiving targeted feedback. This early adoption phase is crucial for refining their service and demonstrating its value to potential new clients. The launch of the **Repair Bonus** in France and the increasing emphasis on sustainability by both

consumers and corporations have significantly contributed to the maturation of the maintenance and repair market, benefiting Prolong's market positioning (Les Echos, 2024, PROLONG, 2023). The latter formed a key component of Prolong's strategy to appeal to the current market by integrating the Repair Bonus into their tool. This feature allows brands to offer competitive repair prices, encouraging consumers to opt for repairs over replacements and supporting sustainability efforts (La Seconde Vintage, 2024).

As was mentioned earlier, the Care & Repair market is still highly fragmented - in an effort to mobilise repair professionals, Prolong has built a robust **network**: *"we have a big network of repairmen. So, today we have 200 repairers in 8 countries that we make available to the brands"* (La Seconde Vintage, 2024). This extensive network supports not only repairs but also personalisation and recycling efforts (La Seconde Vintage, 2024). Although the Care & Repair market is maturing, price-sensitivity amongst consumers remains: *"our first client are launching the repair business next month. So I don't have data before...I believe that today, a lot of clients drop the request due to the price. So it will be interesting to see according to that"*. Another cost-related effect Prolong faces, is that their solution is too expensive for smaller companies, who might be thought leaders on Care & Repair: *"we have many opportunities to work with very small businesses that make between 1,000,000 to €10 million. However, the price point of our solution today is too expensive for them...But we have on the radar for 2025 to build a very light version of our application for the SMEs that also have these needs"*.

An interesting finding, is that the brands that have expressed interest in working with Prolong were ones that were **already offering Repair & Care** in one way or another: *"when we first created Prolong, I thought that 90% of my pipeline would be from brands who don't do anything and can benefit from a technology like ours to actually become pioneers. Turns out that most of our pipeline is actually filled with brands that are doing it [Repair & Care] already, that are struggling with it"*. This ability to streamline and enhance existing services has been a significant selling point for Prolong and has accelerated their market introduction. So, Prolong is currently most attractive to brands that already offer some kind of repair to their customers. However, Prolong provides the additional insights about their added value: *"the bigger the companies are the more stores they have, the more channels they have...The more complex it is, the more value we create"*. The above shows how Prolong has succeeded in identifying exactly whose needs they must tackle, and how they optimise their value to these parties - a vital process within both Market Formation and Entrepreneurial Experimentation.

Legitimation

In retrospect, Prolong's legitimacy was enforced step by step. First, Prolong benefitted from great legitimacy due to the **track** records of the founding team. Prolong's CEO also founded Lizee, a successful start-up that enables brands to resell and rent their goods - this instilled trust within interactions with industry stakeholders: *"I think they believed in the product, and what made them trust us, is the fact that I had already built a start-up before Prolong for rental and resale, and they believed in the fact that if I did once, I probably can do it even better second time"*.

Secondly, the support from **incubator Imagination Machine** added to Prolong's legitimacy. Lastly, their legitimacy is reinforced by successful partnerships with notable brands such as Fusalp and the ERAM group: *"they are doing a lot of refurbishing today...so I guess we were lucky to have those two brands that are thought leaders in their field, even though it's small"*.

Resource Mobilisation

Although the youngest CBS within my sample, Prolong has been very successful in mobilising resources. In their seed round, Prolong was able to secure a significant amount of **capital** to launch and develop their platform. At the end of 2023, they raised €1.5 million: €1 million from Imagination Machine and AFI Ventures, and an additional €500,000 loan (Journal du Net, 2024). The fundraising process was *"quite simple"* due to the early involvement of their lead investor, Imagination Machine. Despite receiving larger investment propositions, Prolong opted to raise €1 million to maintain a reasonable valuation. This strategic decision ensured a healthy equity distribution and supported sustainable growth for them.

Development of Positive Externalities

Prolong briefly reflected on the fact that the emergence of more circular actors in fashion, even though they might be direct competitors, are beneficial to everyone: *"it's really to educate, to **accelerate the***

market education around circular business models. *And to do it, also with the power of...a group of companies, who could be also competitors,...because we are...trying to achieve the same goal, which is making the retail industry more sustainable".* Hence, increasing competitors and actors (reflected in e.g. the growth of circular fashion ecosystem associations) create positive externalities for educating the market, maturing business models and creating momentum within the fashion industry.

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07

Closing
Slowing
Narrowing

iNDUO®  **Refact**

iINDUO®

Information sources used to construct this case

Personal interview with iINDUO co-founder

iINDUO and Refact's website

iINDUO's news and announcements posted on their website and LinkedIn

Interviews and news articles published about iINDUO and Refact

Podcast with iINDUO co-founder

At the beginning of their endeavour, the iINDUO® founders wanted to create a clothing brand that tackled the three most common issues related to shirts: (sweat) stains and wrinkles. However, after scouring the market, they came to the conclusion that the innovative fabric they were looking for was non-existent. So they set out to develop it themselves (iINDUO®, 2024).

iINDUO® holds 5 patents on their **innovative fabrics** that guarantee anti-wrinkle, sweat and stain qualities. iINDUO® works with **OKEO-TEX certified** cotton, making their shirts biodegradable and fully recyclable. More than half of a garment's total ecological impact is determined by how it is maintained. iINDUO® fabrics resist perspiration and bacteria, resulting in less frequent washing, which **conserves water and energy**. According to a study by McKinsey & Company, reduced washing and drying can account for an 11% abatement in emissions during the use phase of garments (McKinsey & Company, 2020).

iINDUO®'s innovative activity does not stop at their shirt fabrics. Due to the decrease in retail activity during COVID, iINDUO® found that they had "time on their hands", and dedicated their R&D team to recycling. In 2020, **Refact** is born under iINDUO®. Since, they have 4 recycling-related patents, and were one of the winners of Refashion's Innovation Challenge. The Refact technology allows common textile blends to be recycled with no addition of virgin materials, and the Refact fibres are 100% recyclable themselves (Refact, 2023).

At the moment of the interview, April 2024, iINDUO®'s fabrics are sold in 25 countries, and Refact is in a scale-up phase with the objective to construct a textile recycling factory in Europe (Refact, 2023).

2016

2 years after incubation at INNOTEX, iINDUO®'s 100% stain-resistant cotton shirt is created, and their first **patent** is applied

2020

iINDUO® is awarded three new patents for their anti-stain, wrinkle and perspiration technology. In the same year, iINDUO® ventures into recycling R&D, and **Refact** is born

2021

iINDUO® wins **Refashion's Innovation Challenge** for their cellulose recycling technology

2023

iINDUO® is selected for the **Amazon Sustainability Accelerator**, and wins the **RRR call** for projects by ADEME



Totalling 9 patents, iINDUO® is a highly innovative force that I am happy to include in my research. Not only are they selling their innovative anti wrinkle, -stain and -sweat fabrics in over 25 countries, but have also developed groundbreaking recycling technologies over the last few years. As highlighted on the introduction page for iINDUO®, they have their iINDUO® fabrics on the one hand, and their recycling technologies under the brand 'Refact'. The focus of the case study is mainly on iINDUO®'s innovative fabrics, but insights regarding the market introduction of Refact were also identified - they will be shared when relevant, and will be explicitly mentioned.

7.1. How Does iINDUO® Position their Circular Innovations?

Other than looking sleek and sharp, iINDUO®'s textiles provide a range of benefits to consumers, that they communicate to potential users and partners on their website:

- **Sustainable alternative:** iINDUO® fabrics are made with OKEO-TEX® certified cotton, implying the fabrics are better for the environment than non-certified alternatives.
- **Unique textile characteristics:** iINDUO® fabrics are stain-, sweat- and wrinkle-proof, resulting in a more pleasant and stress-free wearing experience for consumers.
- **Reduced care and maintenance:** due to the stain and sweat resistance, the fabrics can be worn for an extended period of time, resulting in reduced washing and maintenance for the consumer (iINDUO®, 2024b).
- **Increased product lifetime:** the stain- and bacteria- repellent material not only results in a more enjoyable user experience and reduced washing and drying, but also implies that iINDUO® fabrics last longer. They don't have to endure as many wash cycles as regular clothing and don't require tumble drying, extending the lifetime of the garment (iINDUO®, 2024b).

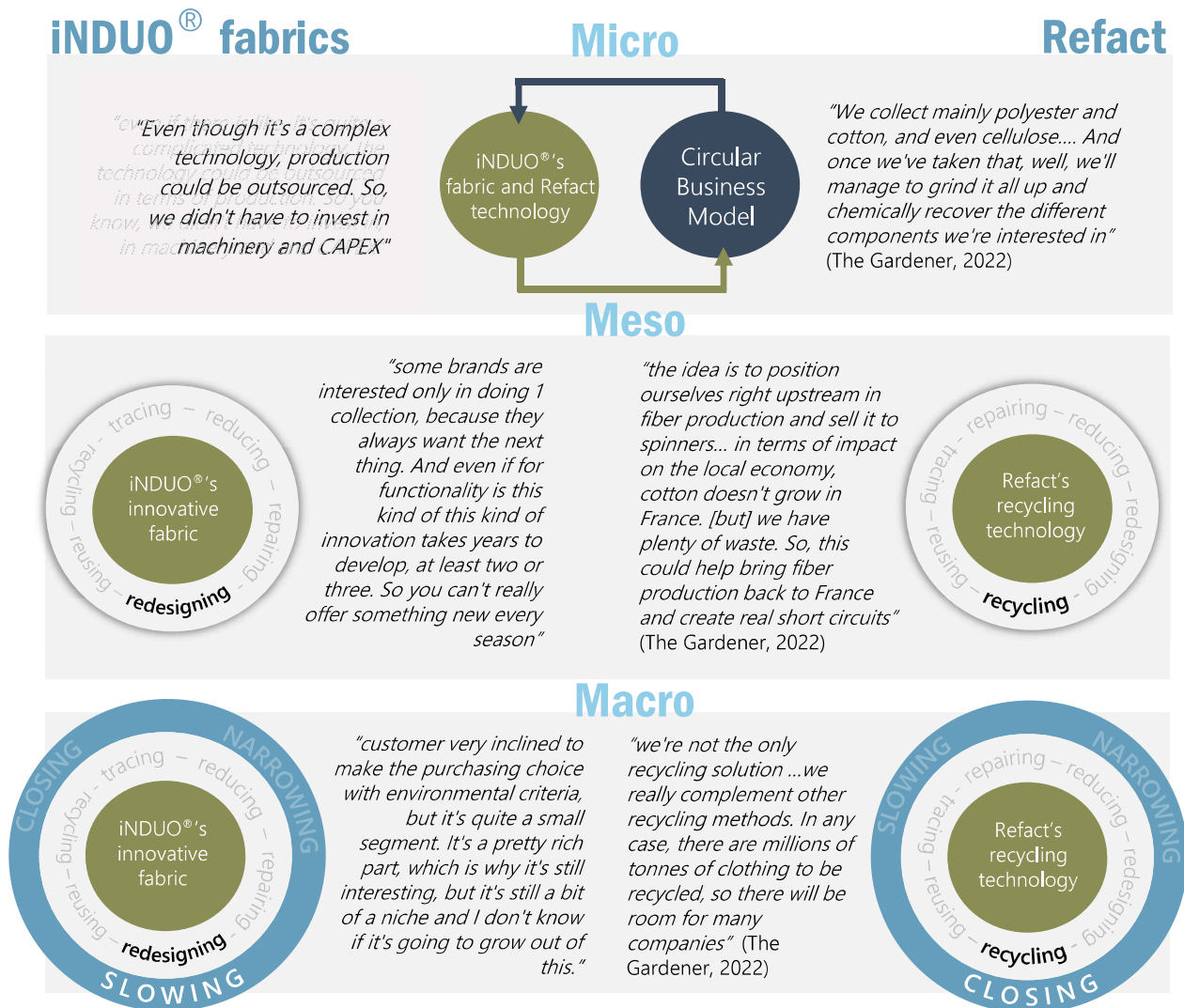
There is an overlap in the value propositions from iINDUO® and Refact: both note how the fibres obtained from the distinct technological processes are **fully recyclable**. However, there are some unique value propositional aspects that Refact communicates:

- **Comprehensive recycling capability:** on Refact's website, we learn how textile recycling is currently very complex due to heterogeneity of textile blends and the presence of hardware and colours. Refact's innovative recycling process is able to tackle these challenges, hence providing industry stakeholders with a unique solution to recycle textile blends and obtain recycled viscose (Refact, 2023).
- **Alignment with environmental goals:** another key message on Refact's website is the detrimental impact of the fashion and textile industry on our environment - they position their recycling solution as one of the pathways to avoid textile waste being incinerated or sent to a landfill (Refact, 2023).

7.2. What Circular Strategy does iINDUO® Use?

iINDUO®'s innovative fabrics provide a wide range of benefits, and are hence difficult to place under one circular strategy: the fabric's characteristics enable the extension of garments' lifetime, hence **slowing resource loops**. However, the stain and sweat resistant quality also enables the reduction of washing and ironing garments, hence enabling a reducing approach under the 'narrowing' strategy. Identifying the circular strategy for Refact is more straightforward: its recycling focus clearly follows a strategy of **closing resource loops**.

Figure 7.1: The contextualization of iNDUO®'s innovations on micro, meso and macro-level using the triple layer framework. The quotes that contain no reference are all verbatim extracts from the interview I conducted with iNDUO®.



At the **micro level**, iNDUO®'s innovations impact internal processes and business models differently. iNDUO® outsources the production of its fabrics, eliminating the need for large upfront investments and avoiding the necessity to design internal processes for industrial production. In contrast, Refact internalises its research and aims to recycle in-house, necessitating internal processes tailored to support industrial-scale technology. At the **meso level**, another distinction arises between iNDUO®'s fabrics and Refact's technology. iNDUO® must ensure that external parties can work with their technology and meet their quality standards, maintaining strong connections with brands. Conversely, Refact aims to position itself within supply chains, becoming a crucial link in garment manufacturing. At the **macro level**, there is a significant difference in the impacts of iNDUO®'s fabrics and Refact's recycling technology. The wide scale adoption of iNDUO®'s fabrics depends largely on consumer behaviour and is less reliant on the mobilisation of industry stakeholders. In contrast, the success of Refact's recycling technology requires a coordinated effort among numerous recyclers, textile sorters and other industry stakeholders who complement and collaborate with each other to close resource loops on a large scale.

7.3. What Activities does iNDUO® Engage In?

To better understand how iNDUO® has gone about introducing their innovations to the market, I will synthesise the qualitative data for this case according to the seven TIS functions. Note that the focus during the interview was on their innovative textiles, so the functions will be described primarily from that perspective. Any specific insights regarding Refact will be explicitly mentioned.

Entrepreneurial Experimentation

iNDUO® began with the ambitious goal of creating a fabric resistant to stains, sweat, and wrinkles. Despite initial challenges in achieving all three functionalities, the company focused on identifying and addressing key pain points in fabric performance, which, according to iNDUO®, were not difficult to pinpoint: *"What are dress shirt fabric pain points? Everyone's going to tell you the same thing, like not wanting to iron them. Or in summer, you don't want to see sweat stains, and if they get stained, it's just unsightly"*. I was told that pinpointing the customer pain points was easy, but finding a suitable technology was the challenge. This involved extensive technical experimentation, testing various chemicals and treatments to enhance fabric properties. **Collaborating with suppliers and leveraging the resources of GEM-TEX**, a university partner, allowed iNDUO® to advance their research and refine their technology despite not having an in-house lab in the early stages. To validate their product, iNDUO® conducted practical use case tests: *"For me, it's always about trying and get yourself to do a use case"*. Their first acceptable fabric led to an order of 1,500 meters of fabric, which was the supplier's minimum. This **'hands-on' testing** was then followed by a successful crowdfunding campaign, generating €23,000. This approach provided valuable market feedback and demonstrated consumer interest and willingness to pay for the innovative fabric.

iNDUO®'s entrepreneurial learning process required the founder to immerse himself in both the technical aspects of fabric development and business development and start-up management: reading research articles, conducting experiments, and managing the iterative improvement process. In our interview, he explained: *"you have to do it yourself, because at least personally, I've never found someone I could hire to do this kind of job"*. This hands-on involvement was crucial in bridging the gap between **theoretical research and practical application**, which ensured that the fabric met both technical specifications and market needs. iNDUO® also explained that *"[at the beginning] we didn't have a lab per se, so at the beginning we were mostly doing a test at suppliers"*.

Although not discussed in detail in the interview, I was told how the process of **entrepreneurial experimentation for Refact was very different** from that for iNDUO®'s fabrics. First of all, iNDUO® had already gathered a team of skilled researchers, established internal processes, and built a network within the fashion industry that they could leverage for Refact's development. Even though they internalized most of the R&D for Refact, they did still engage in collaborative projects, which I will further elaborate on under 'Knowledge Development & Diffusion'. They are currently planning to conduct a first industrial pilot in 2026, which is supported by the French government. The ambitions surrounding the Refact project are large: by 2030, they want to construct a 300 million euro plant in France, capable of producing 80,000 tons of recycled viscose yearly (20 Minutes, 2023).

Influence of Direction of Search

iNDUO® were incentivised to enter the TIS for innovative textiles once their own demand for sourcing fabrics that were wrinkle-, sweat- and stain-resistant were not available on the market. In a podcast, one of the iNDUO® founders states that an incentive for them to enter the recycling TIS was prompted by their customers: *"We had a lot of people who were interested in these ecological issues saying, 'Do you have a solution for taking back the fabric we buy from you, the shirts we buy from you, to manage the end of life?'...So it was at this point that we turned to this question and tried to find solutions"* (The Gardener, 2022). On top of that, the realisation of the disastrous effects of the fashion industry on our environment prompted iNDUO® to venture in recycling (The Arch, 2023).

Other than consumer demand, iNDUO® notes that **the regulatory landscape** also forms incentives for industry stakeholders to adopt circular solutions. The effects of the latter, however, differ for iNDUO®'s fabrics and Refact: for Refact, iNDUO® tells me how *"obviously, recycling is promoted"*, while iNDUO® is at the *"the opposite end of the spectrum because chemical treatment for functionalities are currently being scrutinised for a potential ban."* Either way, it does underpin the importance of regulatory support for

the adoption of technologies. iINDUO® confirms the latter, by stating *"I think for the ecological transition, a regulator is the main stakeholder"*.

A final insight from iINDUO®, from the perspective of the Refact project, is that even though recycling is pushed, iINDUO® expects the transition to take long: *"everybody knows that the challenge for the textile industry...of the coming decades, is recycling. So clearly the opportunity is there...there is a big question of timing...are people ready to move now? It's going to take many years. But I still think that at the end of the day, there is no question asked that you're gonna have to move and it's gonna move"*.

Knowledge Development & Diffusion

Within Knowledge Development & Diffusion, partnerships with universities have been very important to iINDUO®'s learning process. iINDUO® leveraged university resources by taking on interns and conducting research projects directly within academic spaces. iINDUO® emphasises that for a collaboration with a university to work, it is essential *"to have a clear view of what you want technically"*, as it is easy to get 'sucked in' the academic research. iINDUO® told me: *"We've worked extensively with universities, which is both useful and somewhat tricky. Useful because it's relatively easy to set up and not overly expensive. Tricky because if you forget that any product not brought to market holds no value, you risk wasting time and energy"*. So, a challenge for iINDUO® was to balance the theoretical and applied R&D and to keep connecting the research they were doing to **tangible outputs**.

Other than their interactions with GEMTEX, iINDUO® has fostered a strong relationship with **ADEME**, who, according to iINDUO®, have *"have quite good technical knowledge. And they really try to understand what is possible, what is not possible and they are quite engaged"*. Other than ADEME, iINDUO® also interacted with **ecosystem organisations** such as Refashion. However, although Refashion was great for networking, iINDUO® emphasises how learning from stakeholders directly involved in the supply chain is essential: *"Refashion introduced us to some people, but true knowledge isn't just about being part of an organisation. It's about meeting people and visiting places first-hand through these connections."*. An industry insight regarding the latter is that, in iINDUO®'s experience, *"many in the industry take pride in their factories and appreciate your onsite presence, which is crucial for understanding the intricacies."*

Within this TIS function, **managing IP** has been crucial for iINDUO®. iINDUO® collaborated with one of the biggest IP advisory firms and participated in training with a French IP agency, which provided a low-risk environment for learning about IP. What is interesting is that even though it is vital to have proper protection of proprietary technology, the informal nature of the (French) textile industry often complicates formal agreements, resting more on **trust and personal relationships** to manage IP effectively. iINDUO® recalls: *"we wanted all of our clients to sign contracts about this intellectual property, right? We eventually gave up on that because people were just like, no, I'm never going to do that"*.

Market Formation

Market Formation for iINDUO® has been a complex process, involving significant challenges and strategic networking to gain entry into the textile industry. Initially, iINDUO® created their own brand - however, the founder explained that selling to other brands was difficult, particularly because of the idiosyncratic characteristic of **strong seasonality** within the fashion industry: *"It's a bit of a niche market ... Some brands are only interested in doing one collection because they always want the next thing. And even if the functionality of this kind of innovation takes years to develop, at least two or three, you can't really offer something new every season"*. On the customers' side, iINDUO® explains how customer segments that value sustainable options are small, which inhibits market adoption: *"Customers interested in functionalities and environmental impact are quite a small segment. This segment is affluent, making it profitable, but it's still a niche market. I'm not sure if it will expand beyond this"*.

The textile industry's **traditional structure** posed another challenge. Being a largely family-run industry in France, it was difficult for someone without a textile background (i.e., the iINDUO® founders) to gain entry. Despite joining an accelerator, the founder faced significant hurdles in managing relationships with suppliers. This situation led them to work more with suppliers abroad, particularly in Asia, where they found suppliers more willing to accommodate their requests. *"I'm not very experienced in other industries, but I usually think that textile is a rather complicated industry to enter. Because, at least in France, it's a*

lot of family business. And if you're not from a textile family or a textile university, they don't really want to talk to you", iINDUO® explained to me.

To strengthen their embeddedness within the fashion industry, networking and industry collaborations were essential for iINDUO®'s within Market Formation. Being part of industry organisations and competitive clusters (France pôle compétitive) provided important introductions to suppliers and other industry players. iINDUO® explains that *"You need a network of people who understand your needs. Often, they won't introduce you to someone out of the blue, but if you're top-of-mind for them, they'll connect you when the opportunity arises. That's been incredibly helpful".*

Legitimation

iINDUO® has made significant efforts to establish legitimacy for their innovative fabric technologies. However, it was not always easy, especially in the beginning: in the early days, the founders relied on personal credentials and networks for initial support. *"when you start you're alone, you have nothing...until we had a product in our hand".* Hence, demonstrating their CIs effectiveness, such as literally pouring coffee on their stain-resistant shirts, helped **build trust** with potential clients. For Refact specifically, LCAs were necessary to demonstrate the positive environmental impact of their recycling technology. *"For recycling...any kind of recycling technology like ours, we have to do LCAs and shows that the impact is positive".*

Since their creation, both the innovative fabrics and the Refact project have received **numerous awards, recognitions and acknowledgements**. In 2021, Refact was one of the winners of the Refashion Innovation Challenge (Refashion, 2021), and iINDUO® recently received the "DeepTech" label from Bpifrance and the Région Hauts-de-France was a recognition that underpinned the technological capabilities of the CBS (iINDUO®, 2024a). Although iINDUO® has won a good handful of awards, they did note how they are currently more selective when applying: *"so I usually don't apply if there is no money to be made, for the visibility, we don't do it any more. Or we sometimes do it when we are just close to a fundraiser or kind of timing where we may need it".*

Resource Mobilisation

Resource mobilisation has involved a combination of personal investment, public funding, and strategic partnerships for iINDUO®. Initially, iINDUO®'s founder financed the start-up with **personal savings and a grant** from the regional government: *"I started the company with my own money...I got a little bit of grants from the region...and a bank loan of 50K from BPI".* In addition to this public funding, iINDUO® benefited from its partnership with GEMTEX, the laboratory of ENSAIT (National School of Arts and Textile Industries). This collaboration provided them access to **high-cost machinery and a talent pool**, significantly enhancing iINDUO®'s research capabilities. *"Thanks to our partnership with GEMTEX...we have access to extremely expensive machines that complement the arsenal of our own laboratory" (iINDUO®, 2024b).*

Initially, iINDUO® operated without an in-house lab, which resulted in them relying on external suppliers for testing, which iINDUO® emphasises was a significant limitation. *"For the first six years of the company, we didn't have a lab, which was a real challenge. But having a lab requires a significant amount of funding".* The high cost of lab equipment and the need for appropriate facilities were challenges for iINDUO®: *"Every time you want to test something you need a machine. And it's always the equipment you don't have".*

REFACT project, on the other hand, has been **strongly supported by ADEME, BPI, and the European Union**. *"We got very huge support from...ADEME...2.8 million funding in grants".* iINDUO® has also been supported by various accelerators and incubators, receiving both financial support, access to operational resources and strategic guidance. A more recent accelerator programme iINDUO® participated in with Refact was the Amazon Sustainability Accelerator. This program supports companies developing new recycling technologies and provided iINDUO® with €12,000 in equity grants and numerous other financial benefits (Amazon, 2023).

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08

Closing
Slowing
Narrowing

 Iroony[®]

RBX
CREATIONS

Iroony®

an innovation by RBX Créations

Information sources used to construct this case

Personal interview with RBX Créations founder

Iroony®'s website

RBX Créations' joint publication "Next-Generation Cellulosic Filaments from Hemp Pulp via Dry-Jet Wet Spinning Using HighPerCell® Technology"

Iroony®'s news and announcements posted on their website and LinkedIn

Interviews and news articles published about RBX Créations or Iroony®

Reports and newsletters from the projects and accelerator programmes Iroony engaged in

Historically, hemp was utilised for a wide array of applications such as medicine, textiles and paper. Since the early 20th century, its use cases have strongly decreased. Plant-based materials are still widely used in the textile industry, but hemp has been replaced by cotton and viscose, the most dominant plant-based materials today. Environmentally, this is unfortunate – cotton cultivation requires tons of water, pesticides and its monocultivation results in soil degregation. Hemp, on the other hand, is a fast-growing plant that requires little to no fertilizers, pesticides, and increases soil quality and biodiversity.

After having established their ecological clothing and accessories brand Gorfoo®, RBX Créations founders became increasingly engaged in researching use cases that utilise the robustness and environmental benefits of hemp. Iroony® was born, and through extensive R&D, the founders managed to create an **innovative process in which crushed hemp stalks from food crops are transformed into cellulosic pulp** that can be transformed into cellulosic (plant-based) fibres. RBX Créations have a technological partner, the German Institutes of Textile and Fiber Research Denkendorf (DITF), who through their **HighPerCell®** technology can create a fibre, which then can be spun into a textile.

Iroony® materials can be used for a wide range of applications: not only are they suitable for weaving and knitting, but can also be deployed in packaging and as a replacement for bioplastics. The **environmental benefit** of using Iroony materials to produce a T-shirt, in comparison to cotton, are astonishing: Iroony materials can account for a 99% reduction of water consumption, and a 25-26% reduction of the use of fossil fuels, minerals or other renewable resources.

At the moment of the interview, in April 2024, RBX Créations was in the **industrialisation phase** of their Iroony® brand.

2016

RBX Créations is **founded** by a brother-sister duo in the Nouvelle Aquitaine region in France

2018

Development for new materials becomes RBX Créations' main activity, and **Iroony® is born**

2022

Iroony® participates in **GALACTICA Project** under the EU's Horizon 2020 programme and receives TechTextil 2022's 'New Material' **Innovation Award**

2023

RBX Créations and the DITF **co-publish paper** on joint research project

After seeing one of the founders of RBX Créations pitch their Iroony® innovation during the ChangeNow summit 2024 in Paris, I knew I would love to include them in my research – and I am happy that I was able to do so! In this Chapter, I elaborate on how RBX Créations have gone about positioning their CI on the market, which circular strategy they pursue, and the processes and interactions they engage in. For clarity and consistency, I will refer to both the Iroony® project and RBX Créations as Iroony® within this report.

8.1. How Does Iroony® Position their Circular Innovation?

Other than creating an alternative, sustainable fibre for the textile industry, Iroony®'s value proposition considers wider aspects than solely an improved environmental footprint for brands:

- **Alignment with environmental goals:** on their website, Iroony® highlight the numerous ways their hemp cellulose fabrics help brands align their output better with environmental goals. Compared to common alternatives, the production of Iroony® materials requires less water, decrease carbon emissions and increase biodiversity and soil quality (Iroony®, 2022).
- **Create additional valorisation opportunities:** hemp farming optimises agricultural land use, both environmentally and financially. By utilising the hemp stalks, a by-product from hemp cultivation, Iroony® create an additional revenue stream for farmers. Not only do the hemp stalks themselves prove valuable for material production, but the seeds are a healthy food source (Iroony®, 2022)
- **Strengthen local supply chain:** other than fostering a strong relationship with local farmers themselves, Iroony® propose that hemp farming creates local jobs, can strengthen territories resiliency and shortens transport chains (Iroony®, 2022).
- **Social Impact:** Iroony® don't only strengthen local supply chains, but benefit surrounding communities in several other ways. The championing of hemp cultivation leads to the creation of jobs, the improvement of the soil, increased biodiversity, and overall healthier communities (Iroony®, 2022).

From the above, we can conclude that Iroony® provides benefits on both local and national/international scales. They not only promote sustainable materials but also support hemp farming, which offers numerous benefits beyond applications in the fashion and textile industry.

8.2. What Circular Strategy does Iroony® Use?

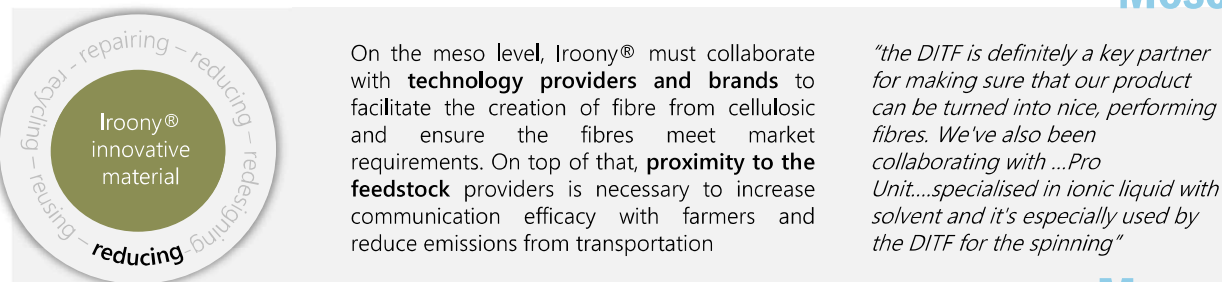
With their innovative Iroony® materials, RBX Créations fall under the CE approach of **narrowing resource loops** – according to their website, Iroony® materials reduce irrigation and pesticide use, providing a sustainable alternative to, for example, cotton. However, their circular strategy goes further than narrowing resource loops needed to produce fibres suitable for the textile- and packaging industry. On top of the environmental part, there is a clear **social and societal angle** to how they position and introduce their innovation. As there is increasing hemp cultivation currently in France, the Iroony® innovation creates local jobs, provides the hemp farmers with an additional revenue stream for their crop and increases the territories resiliency (Iroony®, 2022). Furthermore, Iroony® have signed the 'Ancient Forest Friendly and Next Generation Solution Policy', in which they commit to the protection of global ecosystems, including ancient and endangered forests.

Figure 8.1: The contextualization of the Iroony® CI on micro, meso and macro-level using the triple layer framework. The quotes that contain no reference are verbatim extracts from the interview I conducted with Iroony®.

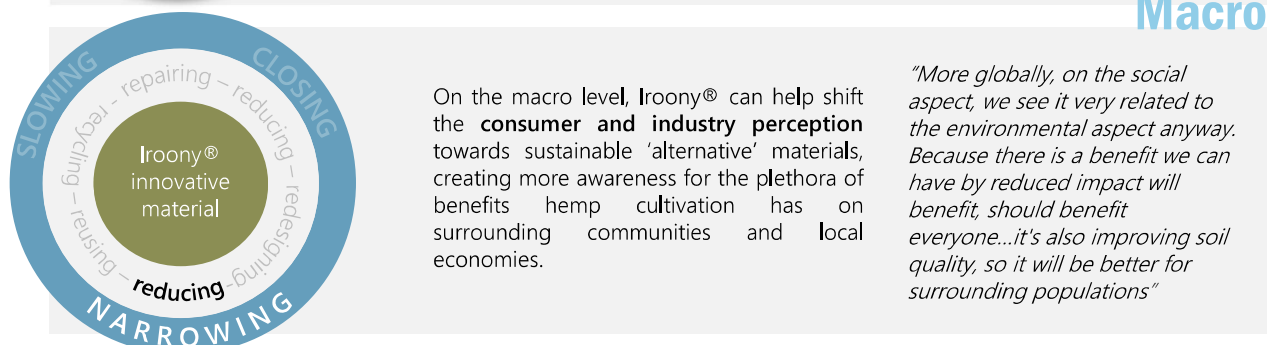
Micro



Meso



Macro



At the **micro level**, the Iroony® project requires a delicate balance between technological development and market perception to ensure a strong market fit for the end product. At the **meso level**, Iroony® collaborates closely with farmers and technology providers. This partnership with farmers is crucial, as they supply Iroony®'s feedstock and benefit from the CI by generating additional income. Effective communication is essential regarding how, in what form, and when the farmers deliver the hemp stalks. By utilising these hemp stalks, a by-product, Iroony® not only reduces waste but also minimises water consumption and pesticide/fertiliser use compared to crops like cotton. At the **macro level**, Iroony® is acutely aware of its potential to reduce emissions, narrow resource loops, and enhance the natural and economic resilience of ecosystems.

8.3. What Activities does Iroony® Engage In?

To better understand the diverse activities and processes Iroony® engages in, the following Sub-sections explore Iroony®'s activities based on the seven TIS functions.

Entrepreneurial Experimentation

The founders of Iroony® and the Iroony® project wanted to produce materials that had a clear **market application**. The latter guided their R&D activities from the beginning, as fibre properties can be defined in the very early stages of the fibre production, as early as the pulp and filament production stage. Not only have they performed extensive tests to make the fibres as suitable as possible for knitting and weaving, but they also wanted the Iroony® fabric to work well with dyes and digital printing, which are commonly deployed in the production of clothing (DITF, 2021). To make sure their end product met the actual expect-

tations of end users and clients within the market, Iroony® made sure to iteratively collect feedback, which was then shared with their partner DITF (Deutschen Institut für Textil und Fasern) to **iteratively develop** the Iroony® material further (European Commission, 2020). Iroony® explains how *“we want to adapt to be as close as possible to the expectation of potential users of the material”*.

More specifically, Iroony® invested time and effort into finding the best technical approach to be able to supply end users or brands to directly test the material. They created **prototypes** in collaboration with a designer, to reach a full end product made from Iroony® material (Le Boudoir Numérique, 2020). As highlighted in every case, the life cycle assessment of the innovation is a vital part of a circular or sustainable start-up's value proposition. For Iroony®, it was *“almost a prerequisite”*, and the founders carried out life cycle analyses by subcontracting the LCA, but supplying data in order to facilitate the process: *“when we did it [the LCA], it was because we were in an R&D project with some support of the French Environment Agency and they were asking for it, which we thought was good. So through a network of like, a regional environmental [organisations],...they [certified centres] were like a subcontractor for the LCA. But we had to bring the data and we had to sync up the data for each step”*.

What I find highly interesting, is the **research-focused entrepreneurial angle** Iroony® has taken to valorising the use of hemp in the fashion industry. Within their clothing and accessories brand 'Gorfoo', they already included Vietnamese hemp materials in some of their products. Although hemp fabrics are, as illustrated, 'readily available' from other parts of the world, Iroony® set out to *“expand and facilitate the textile valorisation of hemp through research”* (Réseau National Agricultures et Ruralité, 2021). In another news article, Iroony® confirms that R&D is their main activity, as their goal is to promote hemp innovatively and *“to broaden its field of commercial application”* (Le Boudoir Numérique, 2020).

Influence of Direction of Search

Let's start with the reason Iroony® was born: during the design studies of one of the Iroony® founders, the future founder became more and more aware of the damage the fashion industry poses to the environment. Together with their sibling, they set out to find for more sustainable alternatives to widely used materials in the industry. This is when they found hemp, and the rest is Iroony® history. When asked about if they have noticed any changes in demand for their Iroony® materials since its conception, I learned that they have noticed significant differences between now (April 2024) and when they started with Iroony® in 2018: *“It's gonna be different from one brand to another....but the common thing is that, especially now compared to when we started, brands are really looking for alternative solutions considering the new regulations”*. So, the **new regulations in France** form an influence on direction of search for brands looking for sustainable alternatives. On top of that, they Iroony® highlights that *“there is a better fit with the market now than when we started, because there is more awareness”*.

Another interesting angle on the influence of direction of search is that Iroony® believes that in the coming years, more farmers will **adopt hemp cultivation**, as they will become increasingly aware of the multiple outlets it can offer them (Le Boudoir Numérique, 2020).

Knowledge Development & Diffusion

Since the Iroony® brand was established in 2018, the project has been involved in strong knowledge development and diffusion activities. In 2020, Iroony® and DITF entered a collaborative project that focused on the development of an advanced manufacturing process for the production of Iroony® materials. An interesting addition here is, without getting too technical, that an innovative solvent was used, provided by Proionic, that provides a sustainable alternative to the solvents currently used in the fashion industry (Iroony®, 2020). The collaboration between DITF and Iroony® was a **win-win situation** (DITF, 2021). Iroony® are able to benefit from the extensive know-how of DITF regarding the processing of cellulosic materials into textiles. DITF, on the other hand, benefit from Iroony®'s network and proximity to feedstock producers, the latter giving DITF the opportunity to process fibres that are ecologically sourced.

An important part of the knowledge diffusion of the Iroony® innovation are its 'official' knowledge outputs in the form of an **academic publication and a patent**. In February 2023, Iroony® and the DITF published a paper on their joint innovative process, named *“Next-Generation Cellulosic Filaments from Hemp Pulp via Dry-Jet Wet Spinning Using HighPerCell® Technology”* (Ota et al., 2023). This academic

paper highlights the legitimacy and maturity of the innovative process, and also increases its visibility amongst a wider academic audience. I can well imagine that the latter could potentially cause more researchers or industry players to enter in the TIS for innovative cellulosic materials. To protect their IP, Iroony® have an **IP strategy** in place which they developed with **personalised support from INPI**, a national bureau for IP in France: *we've been very early in contact with INPI, so the national INPI institute...so this is very great because for instance, in the past six months we did training with them, a master class on IP with really personalised training sessions*", explains Iroony®. Although they did not envision an IP strategy at the beginning of the Iroony® project, Iroony® quickly kickstarted the process of formulating one once they had come into contact with their regional IP entity. The latter was a good move from Iroony®'s side, since ELIIT emphasises that *"understanding of business strategy and common goals regarding intellectual property assets"* is an essential aspect of successful technology transfer between SMEs and technology providers (ELIIT Project, 2023). Lastly, Iroony® added the interesting angle of how patents enhance the communication between partners: *"for partnership, it's also usually something asked to mention the know-how of each partner so when you have a patent makes things a bit easier"*.

Market Formation

Entering the vast fashion industry is challenging as a small company. In the interview, the founders emphasised how important it was for them to be a part of the **Organic Hemp and Flax association**. Iroony® told me how: *"we've been part, since 2017, of the Organic Hemp and Flax Association...this is a way to communicate more easily with the producer and this ecosystem, so this has been very, very key"*. Complementary to the latter is the **Interreg 'Hemp4Circularity'** project, which aims to incorporate sustainable and biobased long hemp fiber into the textile supply chain throughout North-West Europe. The project connects and synchronises all participants in the value chain, while also raising awareness among designers and consumers about hemp textiles (Libeco Belgian Linen, 2024). Iroony® explains how the Organic Hemp and Flax Association and the Interreg have helped them advance technically, and advanced their network, thereby assisting in market formation.

Another valuable connection for the Iroony® project is the European light industries innovation and technology (ELIIT). Iroony® explained how they identified the opportunity of the ELIIT project during our interview: *"we learned about the ELIIT call through Avantex fashion fair. So yeah, it was a crossing of different sort of networking opportunities more or less"*. Their role in the Market Formation surrounding Iroony® materials was persuading partner companies to try out prototypes, which, in turn, allowed Iroony® to gain **user feedback**. ELIIT's support was fruitful in more ways than one, since Iroony® managed to forge a partnership with a key textile player (European Commission, 2020) - since then, multiple other brands have expressed an interest in working with Iroony® materials. So, it goes to show that one partnership with an industry player can spark interest amongst other brands, a real driver for market formation for smaller companies and start-ups in fashion.

One interesting insight I gained during the interview, was that the founders notice **communication with brands** about their materials is easier compared to when they started, due to the **increased material know-how amongst industry players**. In my eyes, this increased know-how helps foster a nurturing and understanding environment surrounding innovative parties that work with materials, as brands are increasingly aware of the challenges and limits of creating and working with innovative textiles. A difficult part in Market Formation for Iroony® materials, is the fact that hemp, as a material, is **not widely recognised** in the fashion industry - even though France is the leading producer of hemp in Europe. In an interview for Boudoir Numerique, Iroony® explains that this is due to historical and technical reasons: since the large scale development of cotton during the industrial revolution, combined with the difficult properties of the thick hemp fibres, it has lost its significance as a textile application (Le Boudoir Numérique, 2020).

One of the key challenges Iroony® faces is **setting up an industrial facility** in proximity to agricultural areas to enable the scaling up of parts¹ of their technology (European Commission, 2020). Another challenge to consider regarding upscaling is the **long-term partnership** necessary to actually create the Iroony® materials, since the process is a joint effort between Iroony® and the DITF. A clear roadmap must

¹The 'parts' reflects how Iroony® does not scale up the entire technological process themselves, as the DITF provides the High-PerCell® technology necessary to create the fibres.

be in place to ensure that increasing quantities of textile can be manufactured using DITF's HighPerCell technology (European Commission, 2020).

In a video interview for the Enterprise Europe Network (EEN) (Enterprise Europe Network, 2022), the founders explain that they first connected with the network in 2019, when they were looking how to better position themselves on the market and creating a roadmap for development. The EEN has since helped them with market introduction in numerous ways: they have provided Iroony® with access to the European market by offering (free) advice on IP management, EU funding and forging connections with key stakeholders in the European textile sector. In the same video, Iroony® expresses how since their association with the EEN, their commercial partnerships have more than doubled and their production have tripled². Other than support to forge connections for market creation internationally, the **Nouvelle-Aquitaine region** has been a key stakeholder in creating a market environment for Iroony® on a more local level.

Legitimation

In a news article, Iroony® highlighted that **being identified as a key player in hemp cellulose** enabled them to make a strategic leap as a company (ADI Nouvelle-Aquitaine, 2022). This recognition was a result of the R&D programme they did via the LEADER programme, where they worked closely together with the region, local farmers and laboratories. Another highly valuable move Iroony® has made to improve their materials' legitimacy, is creating **prototypes** to demonstrate that it is possible to produce wearable garments: *"prototypes, it's very key"*, Iroony® emphasises in our interview.

And last but not least, Iroony® materials have been awarded multiple **prizes and recognition**. During the TechTextil salon in 2022, they received the Innovation Price in the 'New Material' category, and received an honorable mention during the International Conference of Natural Fibres the year before. Iroony® also highlights that it is especially useful when you are new to the industry: *"when you're a small company, and we were not working in textile before, we didn't come from the sector and so on. It's important to have some recognition. It's also more visibility, it's a way to communicate"*.

Resource Mobilisation

Up until now, the Iroony® project has relied on **public funding and EU funds**. These funds are often rewarded to clearly defined projects: an example of this is the Galactica funding, which Iroony® received as a part of the EU's Horizon 2020 research and innovation programme (Iroony®, 2020). The joint research project with DITF and Proionic, focusing on the development of advanced manufacturing process for Iroony® materials, received a grant of €70.000 from ELIIT (European Commission, 2020).

Other funds were granted by **ADEME** and the **Adour-Garonne Water Agency** for an R&D project between Iroony® and agricultural group 'Chanvre Mellois de Melleran', focusing on feedstock supplied by the agricultural group. For this, they received a financial support of €48.000 to research how to extract cellulose from hemp stalks before transforming it to fibres (AquitaineOnline, 2021). A Research and Innovation manager at ADEME said: *"To help those in research and the economic world to initiate research, development and innovation projects, ADEME has been deploying for several years a range of technical and financial support systems, from thesis to commercialization. It is in this context that we supported the RBX Créations project which illustrates both the inventive potential of our regional entrepreneurs and the business opportunities opened up by the ecological transition"* (AquitaineOnline, 2021).

Development of Positive Externalities

A positive externality I observed within the processes described above is how collaborative R&D processes can lead to **long-term relationships**. For example, since the Galactica project, the partnership with the DITF is still going strong, an important enabler for the production of Iroony® materials. These long-term partnerships encourage more joining knowledge development and diffusion, and being associated with research institutes can provide Iroony® with additional legitimacy. Furthermore, the success of the ELIIT project provides proof that stimulating (and financing) joint R&D projects within the innovative textiles is worthwhile, potentially stimulating future public and private investments.

²Note that the video was published in 2021.

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09

Closing
Slowing
Narrowing

 ever dye

EverDye

Information sources used to construct this case

Two personal interviews with EverDye founders

EverDye's website

EverDye news and announcements posted on their website and LinkedIn

Interviews and news articles published about EverDye

Podcasts and panel discussions featuring EverDye

As outlined multiple times in this research, the fashion and textile industry is extremely polluting. Half of the industry's carbon emissions can be attributed to **inefficient dyeing processes**. On top of that, textile dyeing accounts for 20% of worldwide waste water. Current dyeing processes utilise synthetic dyes and chemicals, where vats of dyes and textiles must be heated at high temperatures for a long period of time to be effective (European Parliament, 2020; Pallaci, I. 2023).

EverDye's innovative approach to textile dyeing poses the potential to revolutionise the status-quo of polluting and energy-intensive textile dyeing. They have developed an **innovative, petrochemical-free dyeing process** that can be performed at room temperature. Their process reduces emissions by a factor 10, and is approximately 5 times faster than traditional methods. Lastly, it requires no infrastructural changes to current industrial facilities (EverDye, 2024a; Pallaci, I., 2023).

EverDye explains that their process, based on **5 years of academic research**, involves a pretreatment and pigment that act like magnets. The negatively charged pretreatment acts on the surface of the fibres to be dyed, and creates anchoring sites for the positively charged pigments – the latter being made of vegetal waste and minerals (EverDye, 2024a).

During our interview held in April 2024, EverDye had just recently validated their process at lab scale. Their next step is to **scale up their production capacity** that will allow them to industrialise their process. To visualise their current abilities: EverDye's current scale is a 250 litre vat, while their target goal is one of 2000 litres. They are not only working on the technical part of the process, but also engaged in the application of their dyes - they are currently conducting pilots, and aim to launch a capsule collection at the end of the year (EverDye, 2024b).

2021

The founding duo meet at a Entrepreneur First networking initiative, and **EverDye is founded**

2022

EverDye receives the **ANDAM Innovation Award** and participates in the **Fashion for Good programme**

2023

EverDye raises **€3.4 million in seed funding** from Maki.vc, Asterion Ventures and Entrepreneur First

2023

EverDye is announced as one of 12 winners of the **European Innovation Council Accelerator programme**

EverDye09

Upon learning that a significant part of the textile industry's emissions stem from dyeing processes, I am delighted to include EverDye in my research. Unfortunately I was a year late with meeting them at the ChangeNOW summit, but I did get to speak to the founders on two separate occasions. In this chapter, I will synthesise my case data findings and analyse how EverDye has positioned its CI, which circular strategy they pursue, and what processes and interactions they engage in.

9.1. How does EverDye Position their Circular Innovation?

The impact EverDye is able to achieve is very tangible and impressive: their technology enables energy savings of up to a factor 15 compared to the status quo (BFMBusiness, 2023). On their website, EverDye proposes the following aspects under their value proposition:

- **Alignment with environmental goals:** one of the first messages on the website of EverDye is how their CI contributes to lowering the energy from fossil fuels by 90% and use of toxic chemicals during textile dyeing (EverDye, 2024).
- **Compatibility with existing infrastructures:** EverDye's technology is developed to fit existing processes at suppliers, ensuring a seamless switch between previous dyeing methods and the implementation of EverDye's solution, also implying no upfront investment is necessary (EverDye, 2024).
- **Creative competence:** by bridging the gap between technological advancements and creative applications, EverDye strengthens their value proposition for both technologists and designers - they show how CIs can be integrated within fashion without having to compromise design (EverDye, 2024).
- **Increased efficiencies and cost-savings:** EverDye's solution reduces energy costs by the ability to perform their dyeing process at room temperature, and reduces the dyeing time by 5-fold (EverDye, 2024).

The above shows how EverDye have accounted for the idiosyncrasies of the fashion industry within their value proposition: other than allowing brands to decarbonise within their supply chain, but their consideration of existing infrastructure and the need for design make it better tailored to the industry.

9.2. What Circular Strategy does EverDye Use?

With such a strong impact on decreasing the energy usage and toxic chemicals required during textile dying, it is evident that EverDye follows a circular approach of **reducing**, while falling under the larger circular strategy of **narrowing resource loops**. Figure 9.1 shows a contextualisation for EverDye's CI, based on quotes from the interview or other primary data sources.

At the **micro level**, EverDye focuses on ensuring that their operations meet stringent quality standards while stabilising their pigment technology. This is crucial because the scalability of EverDye's innovation directly influences their business model. As they transition from a research-driven startup to an industrial-scale producer, they need to adapt their internal processes to maintain quality and ramp up production, highlighting the vital link between their innovative capabilities and business strategy. At the **meso level**, EverDye's collaboration with research and industrial partners is essential for scaling their technology and reducing environmental impact. These partnerships enable the integration of EverDye's dyeing solutions into existing industrial setups, thereby cutting down on emissions and resource use.

Figure 9.1: The contextualization of EverDye's innovations on micro, meso and macro-level using the triple layer framework. The quotes that contain no reference are verbatim extracts from the interview I conducted with EverDye.



At the **macro level**, the adoption of EverDye's technology is influenced by regulatory changes and consumer demand for sustainability. New regulations are driving the shift towards more eco-friendly manufacturing processes, making it imperative for companies to adopt technologies that narrow resource loops. EverDye's role in this broader industry transformation is pivotal, as their innovations help brands meet regulatory requirements and align with consumer expectations for sustainable products, as emphasised by (Callum Cyrus, 2023): *"Our group is committed to a major decarbonization plan, and the future of textile production includes new resource-saving solutions like the one developed by Ever Dye."*

9.3. What Activities does EverDye Engage In?

To better understand the diverse activities and processes EverDye engages in, the following Sub-sections explore Iroony's activities based on the seven TIS functions.

Entrepreneurial Experimentation

Within Entrepreneurial Experimentation, it is vital for EverDye to fit the requirements of the fashion industry. EverDye explained to me in our interview how *"in any market, and the fashion market is one of them, you have the criteria of the market and the criteria of your product. It's a lot of criteria segments: you have quality, you have duration, you have the environment."* Developing a product that meets these **diverse criteria** is a complex process that requires lengthy R&D and interactions. Within these processes, EverDye interacts with brands to get access to the industry-specific criteria, as it is vital for them to have this during the development of their technology.

However, these interactions extend beyond brands and includes research and industrial partners. Within Entrepreneurial Experimentation, these interactions are vital. EverDye describes their significance as: *“they’ll help you, and you have access to all of those machineries. It will help you understand how your business reacts in different machinery, so it really helps you get a deeper understanding of your own technology.”* These interactions are vital for refining EverDye’s technology and understanding its performance under various conditions, making it more industry ready.

When asked about the challenges within the entrepreneurial process, EverDye emphasised how nothing comes easy when you are developing a technology: *“you are gonna meet a lot of roadblocks. You need to understand them and change your processes. We need to make sure we are reaching our own quality requirements and producing enough,”*. This involves continuously **adapting and refining internal processes** to meet production demands and quality standards. When hiring skilled employees to help develop EverDye’s technology, EverDye had to broaden their search beyond France to find the talent and skill they needed. The latter resulted in EverDye having a highly international team, with people from Honduras and Tunisia (Bouge, 2024).

An important challenge within Entrepreneurial Experimentation is scaling up to ensure competitive cost propositions. During our interview, EverDye noted how *“once you go to Southeast Asia, you need to be super competitive in unit economics. People do not want to pay more, so a 1% increase in price is already unacceptable.”* This shows how price-sensitivity within manufacturers dictates how EverDye shapes their **business model**, as the costs must be competitive with the status quo for the technology to be widely adopted.

Influence of Direction of Search

EverDye’s market introduction and the collaborations they take on are strongly influenced by the evolving landscape of regulations and market demands, which play an important role in shaping the direction of not only their search, but also the search of brands for innovative solutions. EverDye highlights the impact of **regulations** on the fashion industry, stating, *“Most of the regulations that are happening are strengthening what brands need to do. Better end-of-life management, less emissions—these all impact how brands need to change how they work.”*

However, due to EverDye’s place in the supply chain, they do emphasise how regulatory changes are particularly crucial in **production countries**. EverDye explained that *“if China doesn’t change the laws, nothing will change. They have their plan every five years. The current plan from 2021-2026 states that it is mandatory for brands in textiles to reduce energy usage by 13%. This will be a driver of our technology”*. This shows that even though regulations in France are important, the real change must happen in production countries, where the majority of garment manufacturing occurs. *“All of the production laws in France or the US don’t matter as much because most brands don’t produce there. We know the companies in China, Bangladesh, but we’re not developed enough yet; we do not have a deployment plan. We will deploy in 2027,”* EverDye explains.

Despite the lack of harmonised regulations between the country of sale and the countries of production, there is a clear influence on direction of search happening regarding innovations within garment manufacturing processes that do affect brands in France: *“We can see an acceleration in this transformation because of new regulations that are making it mandatory to change how garments are being manufactured and recycled”*. On top of that, consumers push brands to adopt new technologies in the manufacturing stage: *consumers are demanding more sustainable clothes, brands must invest in these new materials and processes to remain desired by consumers”*, EverDye states in an article (Fibre2Fashion, 2022). By being so aware of the interplay of global regulations and consumer demand, I find that EverDye positions itself at the forefront of innovation in the fashion industry, hence being in a position to swiftly respond to changing regulations or consumer/industry demands.

Knowledge Development & Diffusion

As EverDye’s CI is technologically-intensive, Knowledge Development & Diffusion is critical for EverDye’s market introduction. As explained under ‘Entrepreneurial Experimentation’, understanding **industry specifications** and ensuring their innovation meets these standards is a dynamic process. For EverDye, Knowledge Development & Diffusion and Entrepreneurial Experimentation are critically linked, especially since

they have not entered the market yet with their product, but are still in the industrial testing phase.

When asked about how they obtain the industry-specific information necessary for the development of their technology, EverDye explained to me that: *“we ask our clients, so our clients could be the brands. Because we are doing projects, we can also ask the houses to give us the criteria they are looking for in their product.”* This client-driven approach within Knowledge Development & Diffusion allows EverDye to tailor their developments to meet specific market demands, ensuring their technology aligns with industry expectations, which is vital for its adoption. Within the process of developing their technology, EverDye explains how challenging the R&D has been: *“Everything was really difficult. Difficult to develop colour and make them stable. You get good results quickly, and then for eight months you struggle to stabilise it”*. Other than the R&D being lengthy, it is also **unpredictable**: *“You think you’re 90% done, but the last 10% will take you six months. R&D is not easy, very long, and costs a lot of money,”* EverDye recalls.

Scaling from lab-scale to industrial production is, other than a challenge cost proposition-wise, a significant technological challenge. EverDye explained that *“we validated the process at lab scale a few months ago. To produce big quantities and move to the industrial path, we need big facilities”*. For this, interactions with industrial partners are needed. Furthermore, collaborations with **academic institutions** are important interactions in EverDye’s knowledge development. EverDye emphasises the importance of these partnerships, stating, *“we work with academia for certain points. If we have an issue in one product and don’t have the resources or expertise, we choose research partners to gain time.”* This approach allows EverDye to focus on their primary targets while outsourcing specific research tasks, hence speeding up their development. These partnerships can take various forms: when EverDye fully funds the research endeavours, they remain in ownership of their IP, but when the research is a more collaborative effort, the IP is shared. Within Knowledge Development & Diffusion, this **IP management** is crucial. EverDye works closely with IP attorneys to ensure their CI is well-protected: *“we have IP attorneys that work with us on patents and to discuss the IP strategy. It’s very important to have a specialist because it’s a very vague and large domain,”* EverDye described. A proper IP strategy is especially important when outsourcing production, as it involves sharing EverDye’s proprietary knowledge with partners.

Lastly, in addition to industrial and brand partnerships, EverDye benefits from interactions with ecosystem associations to help them develop their knowledge. EverDye notes how *“eco-system companies like Fashion for Good are great places to be. Many collaborators, many brands, many specialists. They create networks.”* These networks provide support in many ways, but knowledge-wise, EverDye benefits from technical problem-solving to getting strategic advice. For instance, when EverDye encountered technical challenges, their network connected them with specialists who provided crucial insights and solutions.

Market Formation

Although EverDye’s CI is not yet commercially available, Market Formation processes and interactions have been developing since EverDye was founded. Some brands are aware of their pain points regarding dyeing processes, and will reach out to EverDye themselves: *“something that really brands are looking for, like they have a pain that they’re looking to solve, they’ll be contacting you to try to work, to know more about the technology,”* EverDye told me. This initial contact is crucial, as it could lead to potential partnerships which would speed up development and resource mobilisation for EverDye. Of course, EverDye also contacts brands themselves to seek out **partnership opportunities**: *“We contact brands to present our product, especially its advantages. If they see tangible value, they will be encouraged to move to the industrial phase.”* When reaching out to brands in search of a partnership or collaboration, EverDye explain how it helps to show them tangible results of the CI: *“It was contacting brands and giving them tangible value that they can see, then sending some samples. And then we started to build that partnership”*.

EverDye’s ability to integrate their technology into **existing infrastructures** is a significant advantage within Market Formation. During a podcast, EverDye explains: *“we are developing pigments that fit into existing infrastructures. This makes our solution highly sustainable and cost-effective because the dyeing process is one of the most impactful parts of the textile industry, representing half of the carbon emissions”* (BFMBusiness, 2023). This compatibility with existing systems **reduces the barriers to adoption** and enhances their appeal to potential clients (BFMBusiness, 2023).

From the above, it is evident that the connections forged during knowledge development and entrepreneurial experimentation lay the groundwork for strong partnerships when EverDye launches its pigments on the market. These relationships with industrial partners ensure that EverDye's internal processes are optimised for efficient collaboration. Additionally, brands will be familiar with EverDye's capabilities, allowing them to place orders that align with EverDye's production capacities at the time of market entry.

Legitimation

Legitimation is a critical process for EverDye as they seek to establish credibility and acceptance for their CI within the fashion industry. The latter involves a series of validation phases and strategic engagements to build trust and demonstrate the viability of their technology:

- First, it was essential for EverDye to validate their CI at the **lab-scale**. *"There are a few phases you need to validate your formula in the lab scale, then you need to validate the quality of the product on the lab scale. Then you need to find a partner that can produce at a large scale"*, EverDye explains.
- The second stage is to validate the technology at an **industrial scale**, to show potential clients and investors that the technology is economically and realistically scalable. *"To produce at an industrial scale right now, we are on a 250-metre scale. Our target is a 2000-litre vat"*, EverDye notes.
- Lastly, **pilot projects and capsule collections** with brands not only create visibility for EverDye, but validate that their CI works and can contribute to sustainable collections - these processes are currently in the works!
- **Awards** have contributed to EverDye's legitimacy. They have received recognition from ANDAM, where they won the 2022 ANDAM Innovation Award, which was paired with a grant of 70.000 euros (Fashion United, 2022). Such awards not only validate their technology, but also attract further investment and interest from the industry.

EverDye's CI has significant environmental impact. In the fashion industry, parties must often prove their impact with impact assessments such as LCAs. When asked about this, EverDye explained how they initially used data from industry reports to validate their impact: *"The first numbers we found were from a Fashion for Good report, those were trusted. It is not about what is exactly true. And I was like, that can be trusted"*. A crucial aspect of EverDye's legitimation involves showcasing their CI's compatibility with existing industrial processes. This helps them gain acceptance from industry players who need to see that adopting EverDye's technology will not require substantial changes to their current operations, which will in turn enhance Market Formation. Lastly, securing significant private investments from reputable investors and public institutions has significantly contributed to EverDye's legitimacy. Their ability to attract significant funding from both private and public sources shows the confidence that investors have in their technology and business model (see 'Resource Mobilisation for more on the latter).

Resource Mobilisation

For EverDye, Resource Mobilisation involves securing **private and public funding**, building partnerships, and leveraging expertise to meet industry needs effectively. EverDye has been very successful in raising funding so far. EverDye told me: *"We have raised about 7 million euros with funding from private actors, which we call dilutive funding, and public grants, including a lot from BPI, the French Public Investment Bank"*. Recently, they secured €3.4 million in seed funds from investors like Maki.vc and Asterion Ventures, which will enable them to launch their first industrial-scale production line and triple the size of their team over the next two years (Callum Cyrus, 2023). These funds are crucial for EverDye to advance their R&D projects, which are risky but necessary for transitioning from development to commercialisation. The breakdown of their funding is approximately 60% from subsidies or loans from European and French sources and 40% from private investments (Bouge, 2024). When asked what investors value about EverDye's CI and EverDye as a company, EverDye reflects that investors want *"to see a technology that replies to the pains of the industry. It's not about how sophisticated the technology is, but about the need it addresses."* On top of that, proper IP protection is crucial when looking for private investments: *"You need to show that you can protect your IP in a world where everything is open and copying is very easy"*, EverDye told me.

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