Identification and improvement of indicators for the circular and social system self-assessment tool (Intermediate Version)

Deliverable 2.3

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Reviewed by:	Ángel Marcos, Joan Pau Plaza, Lucía Jordá, Adrian Hill, Fiori Zafeiropoulou, Younghyun Kim, Mariangela Lavanga
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1 Executive summary

This deliverable, **D2.3 "Identification and improvement of indicators for the circular and social system self-assessment tool,"** presents the **design, adaptation, and validation** of a self-assessment questionnaire aimed at evaluating circularity, sustainability, and social responsibility within the European textile and clothing (T&C) sector. Developed as part of the **FABRIX** project (Work Package 2, Task 2.2), the questionnaire integrates **theoretical insights** from the WP1 Conceptual Model and **practical requirements** gleaned from interviews, co-creation events, and international best practices.

Key Objectives and Approach

1. **Bridge Knowledge Gaps**
   - The T&C industry faces numerous challenges, from **fast-fashion overproduction** to **labour exploitation** and **resource-intensive production**. Existing sustainability tools and metrics often fail to capture the full complexity of on-the-ground realities—particularly in small and medium-sized enterprises (SMEs).
   - By adapting existing frameworks (AIDIMME's Circulatool, SOFFA questionnaires, TCBL audits) and **academic indicators** (e.g., circular economy metrics, social innovation measures), FABRIX creates a **comprehensive** yet **user-friendly** tool for T&C stakeholders.
2. **Ensure Practical Utility**
   - To encourage honest participation, the questionnaire uses **modular sections** (e.g., Environmental Metrics, Social Embeddedness, Institutional Alignment) and skip-logic to avoid irrelevant questions.
   - A **digital platform integration** (in WP3) allows for real-time data visualization, aggregated dashboards, and potential matchmaking among local actors in Athens and Rotterdam.
   - Stakeholders can **opt for anonymized** or **fully disclosed** data-sharing, respecting GDPR and building trust.

Methodology and Development

- **Benchmarking & Analysis**
   - Tools like **Fashion Revolution**'s Circularity Readiness, **TCBL** supply-chain checklists, **ISO 14001/14006** guidelines, and **Ellen MacArthur Foundation**'s indicators informed the design.
   - Academic literature (Galatti & Baruque-Ramos, 2022; Ibáñez-Forés et al., 2022; Samani, 2023) provided robust social, environmental, and economic metrics applicable to T&C.
- **Adaptation to T&C Specifics**
   - After a sector review of **fiber production, design, manufacturing, distribution**, and **end-of-life**, the self-assessment includes **tailored questions** about waste-free pattern cutting, reuse of clippings, hazardous dye replacements, microfibre management, and fair labour conditions.
   - Social questions highlight **inclusivity, worker well-being, local community engagement**, and **transparency**—areas often underrepresented in standard sustainability audits.

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- **Pilots and Co-Creation**
  - o Preliminary testing in Rotterdam and Athens will reveal users' needs in terms of language, sections, usability, etc.

Stakeholder Benefits

- **Businesses**
  - o Receive a **customized roadmap** for circular strategies, worker protections, and operational improvements.
  - o Potentially unlock **funding** (via FABRIX's FSTP small grants) and **in-depth mentorship** from facilitators.
- **Facilitators**
  - o Access **aggregated** or **opted-in** data to design targeted capacity-building or cross-company collaborations.
  - o Monitor the impact of interventions over time, fostering local **circular clusters**.
- **Policy Makers**
  - o Gain **macro-level insights** on T&C sector strengths and gaps—fuelling evidence-based policy, incentives, or regulatory reforms.
  - o Track city/regional progress toward **circular economy goals** (e.g., EPR awareness, local supply chains, waste minimization).

Conclusions and Next Steps

- The **FABRIX self-assessment** consolidates **academic rigor** and **practical stakeholder needs** (SME-friendly question formats, skip-logic, local nuance).
- Upcoming **co-creation** in Athens will finalize question wording, usability, and platform features.
- A **multi-phase roll-out** (WP3 and WP4) will embed the questionnaire in the FABRIX digital platform, enabling real-time data collection, supportive action research, and user-driven improvements.

Overall, this deliverable lays the foundation for **measuring and enhancing** circularity and social responsibility in T&C. By aligning academic concepts with practical stakeholder realities, the resulting self-assessment questionnaire aims to **empower businesses**, **facilitate targeted interventions**, and **inform policy**—driving systemic change toward a **regenerative** textile ecosystem.

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2 Introduction

This deliverable presents the development of a self-assessment questionnaire aimed at evaluating the circularity, sustainability, and social responsibility of companies in the textile and clothing (T&C) sector. The document outlines the theoretical, methodological, and practical steps taken to design and adapt this tool, ensuring its alignment with the overarching objectives of the project. By providing businesses with actionable insights into their sustainability performance, the questionnaire aims to support businesses and users of the results to transition toward more circular and socially responsible practices in the industry.

The work begins with a summary of the conclusions obtained after the theoretical and conceptual framework developed in T1.1, that establish the foundations for the self-assessment tool. This includes an overview of FABRIX, the project's broader conceptual framework. The initial proposal prioritised a focus on the adaptation of existing circularity and social responsibility evaluation tools for application within this project or for the textile and clothing sector. These foundational steps ensure that the tool is both relevant and effective in measuring the key sustainability and social responsibility aspects of textile companies.

The deliverable also includes a benchmarking of existing tools and methodologies, which informed the development of the self-assessment. By reviewing current tools, we identified best practices and areas for improvement, ensuring that the new questionnaire is both innovative and practical. The design output and expected value of the self-assessment tool are discussed, emphasizing its potential impact on companies seeking to improve their sustainability performance and adopt circular and socially responsible business models.

The document outlines the methodology used in developing the existing self-assessment tool, detailing the steps taken to adapt existing circularity and social evaluation tools for the textile sector. These adaptations are critical for making the tool more relevant and actionable for businesses within this industry. In addition, the development process is thoroughly discussed, including key insights and challenges encountered along the way. The final proposal for the adapted tools is provided, outlining specific recommendations for their implementation and use.

Finally, the deliverable defines the next steps for the continuous improvement of the proposal, and how it interrelates with the rest of the project. In addition, an annex includes the complete circular and social system self-assessment questionnaire, providing a comprehensive tool for businesses to evaluate their current sustainability and social responsibility practices. The self-assessment questionnaire, which will be integrated in the FABRIX platform, will serve as a valuable resource for companies, researchers, policy makers, and facilitators looking to foster the transition to a more sustainable and circular textile industry.

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3 Value and relevance of a self-assessment questionnaire.

3.1 The relevance of a self-assessment questionnaire for FABRIX

The FABRIX project aims to bridge critical knowledge gaps that are impeding for the circular economy. These include the gap between large data (including employment, resource flows, population and income data...) and detailed qualitative knowledge of how businesses operate. It includes bridging between European policy and regulation and the reality for businesses and workers on the ground. It is about connecting a desired future with a lived reality. It is about connecting strategy at various scales. The FABRIX platform is intended to be a tool where the scales, data and knowledge interface.

Considering the challenge to access realistic data on how businesses function and issues of privacy, transparency and intellectual property, the self-assessment has been considered a useful method to firstly allow businesses to build a portrait of their own activities and secondly to allow facilitators to gain realistic insights on how businesses are operating (including their struggles and challenges). Given that the T&C sector faces both environmental and social challenges, such as waste from fast fashion and exploitative labor conditions, the ability to capture on-the-ground realities is particularly relevant. While existing datasets focus on macro-level indicators (e.g., export volumes, employment statistics) or compliance metrics (e.g., EU due diligence proposals), they often overlook the role of small artisans, local cooperatives, and socially embedded entrepreneurs in driving innovation.

As sharing this data is highly sensitive, any insights are considered useful. The initial hypothesis for the self-assessment questionnaires was to invite businesses to share information on how they operate. In return, the businesses could gain insights on their performance or be supported from local business facilitators. From the outset of the project, it was clear that the collection of this data depended on trust and forging personal relationships. Likewise, businesses could not be obliged to share data that they were uncomfortable sharing and in most cases this kind of exercise would be considered a cost to businesses. Therefore, the incentives, the questions, the information provided and user-experience were considered critical to ensure businesses would voluntarily respond honestly to the questionnaires. Additionally, by enabling businesses to self-report in a controlled and potentially anonymized manner, the process mitigates concerns around intellectual property risks and internal disclosures. Trust-building remains key, particularly when businesses can clearly see the benefits of engagement, such as receiving immediate feedback on circular performance or accessing funding opportunities (via WP4's FSTP grants).

3.2 Theoretical definition of the self-questionnaire

The self-questionnaire is a structured and systematic tool designed to assess the circularity and social responsibility practices of textile and clothing sector companies. It is grounded in prior benchmarking research—detailing both the methodology and conclusions later in this document—and methodologies related to the theoretical and technical development of the "CIRCULATOOL" tool (also detailed later), a digital self-assessment tool designed by AIDIMME and currently being used in metal-mechanics and wood-furniture sectors. This enables businesses to evaluate their performance across key sustainability dimensions,

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including resource efficiency, waste management, ethical labour practices, and the adoption of innovative business models. By focusing on measurable and actionable aspects, the questionnaire provides companies with a clear snapshot of their current state while identifying areas for improvement.

The primary objective of the self-questionnaire is to guide companies in their journey toward enhanced sustainability and social responsibility. By completing the questionnaire, businesses gain insights into their operational strengths and weaknesses, enabling them to prioritize actions that align with both their strategic goals and broader sustainability standards. Furthermore, the tool fosters reflection and awareness, empowering companies to integrate circular and socially responsible principles more effectively into their practices.

This questionnaire represents an important aspect of the project, delivering significant added value to the platform under development. By evolving from a networking and community-building hub into also a management tool, the platform will provide tangible benefits to participating companies. Specifically, it will serve as a pathway for improving sustainability performance, enhancing corporate social responsibility, and exploring innovative business opportunities within the textile and clothing sector.

In summary, the self-questionnaire is not merely a diagnostic tool but a strategic enabler. It equips companies with the knowledge and resources needed to enhance their competitive edge, comply with evolving market demands, and contribute to the transition toward a more circular and socially responsible textile industry. This makes it a critical component of the project's overarching goal to drive systemic change and foster sustainable innovation.

3.3 Design output and expected value of the self-assessment

Empowering Stakeholders to "See" Their Impact

The self-assessment tool is designed to deliver both a comprehensive overview and a detailed evaluation of a company's performance in circularity, sustainability, and social responsibility. Upon completion, users will receive a structured assessment that highlights their degree of circularity and social responsibility across multiple dimensions, such as resource efficiency, ethical practices, and the adoption of innovative business models. This evaluation may be presented in an accessible and visually intuitive format, such as a dashboard or a detailed report, enabling companies to easily interpret and utilize the results.

The output will serve as both a diagnostic and a strategic planning tool. On one hand, it provides businesses with a clear understanding of their current status in circularity, sustainability, and social responsibility, pinpointing strengths and identifying specific areas for improvement. On the other hand, the assessment acts as a foundation for future action by offering companies a reference point for defining improvement strategies, setting measurable goals, and prioritizing initiatives. By leveraging the insights gained, users can build tailored action plans to enhance their performance and align with industry standards and best practices.

The expected value of the self-assessment extends beyond its immediate outputs, delivering long-term benefits to users. It empowers companies to take a proactive approach to circularity, sustainability, and social responsibility, fostering greater resilience in a rapidly changing market landscape. By using the tool, businesses can enhance their competitive positioning,

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strengthen their reputation, and unlock new opportunities tied to circular and socially responsible business models.

Ultimately, the self-assessment is more than an evaluation mechanism—it is a strategic enabler for continuous improvement and innovation. By integrating it into their management processes, companies can better respond to stakeholder expectations, contribute to the transition toward a more sustainable textile industry, and position themselves as leaders in driving systemic change within the sector.

Catalysing Collaborative Networks

Beyond its direct value to businesses engaging in the self-assessment, the tool also provides significant benefits to other key stakeholders, including facilitators, researchers, and policy makers. The aggregated data derived from the self-assessment results will offer these groups a rich source of insights into the sustainability, circularity, and social responsibility practices of the textile and clothing sector as a whole. This shared knowledge fosters collaboration, innovation, and evidence-based decision-making across the industry and beyond.

For facilitators, such as consultants or industry support organizations, the aggregated data becomes a strategic resource for guiding companies toward best practices. By analysing trends, gaps, and strengths at an industry level, facilitators will be able to develop tailored training programs, tools, and resources to help businesses transition toward circular and socially responsible models. This enables them to play a pivotal role in accelerating the adoption of sustainable practices.

For researchers, the data opens new opportunities for advancing academic and applied studies in sustainability, circularity, and corporate social responsibility. By accessing anonymized and aggregated insights, researchers will be able to identify patterns, test hypotheses, and generate actionable recommendations that contribute to the body of knowledge on sustainable transformation in the textile and clothing sector. This, in turn, can inform both innovation and education.

For policy makers, the aggregated results provide a macro-level perspective on the sector's performance, highlighting areas where policy intervention or support is needed. By identifying systemic challenges and opportunities, they will be able to design more effective regulatory frameworks and incentive structures to drive sustainability and social responsibility within the industry. Furthermore, this data helps align policy development with real-world industry trends and stakeholder needs, ensuring a more targeted and impactful approach.

Aggregated scores can also illuminate broad trends across geographies: for instance, Athens might excel at local craftsmanship yet struggle with formal waste collection, while Rotterdam could lead in logistics but need more robust artisanal networks. This knowledge can spark cross-border collaborations: a repair cooperative in Athens might team up with a Netherlands-based recycler to pilot advanced fiber recovery. Facilitators (supported under WP4) can use the aggregated results to conduct targeted capacity-building sessions. Policy makers can see where new laws or incentives might yield the highest impact.

In summary, while the self-assessment directly empowers businesses, its aggregated results will offer broader value by enabling facilitators, researchers, and policy makers to make

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informed decisions, drive systemic change, and support the textile sector's transition to a more circular and socially responsible future.

3.4 Critical analysis of the T&C sector

The textile industry consists of a production of goods that is based on the transformation of fibres, both synthetic and natural, into the production of manufactured textiles, processed products or finished products for distribution and consumption. Textile activity in Europe is mainly concentrated in five countries: Italy, Germany, the United Kingdom, France and Spain that account for 80 % of the EU textile industry (Ministerio de Medio Ambiente España, 2004).

The textile industry is one of the oldest and most complex of the manufacturing industries. Its complexity lies in the fact that it is a highly fragmented and heterogeneous sector, consisting mainly of small and medium-sized enterprises, some of which are highly specialised in specific processes (Ministerio de Medio Ambiente España, 2004). The textile industry is a complex business involving long and varied supply chains of production, raw materials, textile manufacturing, sales, use and final garment storage (Sánchez, Uribe, 2018).

In this sector, certain industrial sub-sectors have shifted their activities to other geographical areas in search of lower costs, as well as, in some cases, greater legislative permissiveness. The countries that have entered the market to a greater extent are China, India and Pakistan, as well as Eastern European countries (Sánchez, Uribe, 2018) (Ministerio de Medio Ambiente España, 2004).

The constant variation in demand exerted by the markets, subject to the dictates of fashion, makes the textile sector a dynamic and highly interesting sector, but also a highly complex and constantly evolving one (Generalitat de Catalunya,2002).
The main processes in the sector can be grouped as follows:

- Fibre production
  - Natural
  - Synthetic
- Spinning
- Manufacture of fabrics
  - Textile fabrics
  - Knitted fabrics
- Printing
- Finishing
- Manufacture of clothing (garments)
- Manufacture of carpets and rugs
- Manufacture of ropes, twines, nets
- Manufacture of non-woven fabrics

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In our study we have divided the sector according to the product life cycle: raw material (focusing on cotton and polyester, being two of the most frequently used materials) manufacture, manufacturing, transport, use and end of life.

Manufacture of raw materials: Cotton cultivation

Cotton is used in approximately 40% of garments. Cotton cultivation generates a great deal of environmental pressure, both in terms of land use and land transformation, as well as the number of substances needed for its growth. In particular, a cotton plant requires about 20,000 L of water for every kg of cotton harvested (William, 2007). It is also grown in dry areas where other plant species have difficulty growing (Palma et al., 2023). In addition, the agricultural machinery used in the production of natural fibres consumes fossil fuels and therefore generates greenhouse gases. Although cotton cultivation occupies only 2.4% of the world's arable land, it is a major consumer of agrochemicals, consuming 24% of the world's insecticides and 11% of the world's pesticides (Carrera, 2017), resulting in a high environmental impact. For example, among the most widely used insecticides in cotton cultivation in the USA, there are 15 that fall under the term 'possible', 'probable' or 'known' carcinogenic. Nor can we forget the problems associated with the excesses of chemical fertilisers. Especially nitrogenous fertilisers are a source of contamination of ground and surface water. Nitrogen, phosphorus and potassium contained in fertilisers contribute especially to the eutrophication of rivers and lakes, preventing the correct development of aquatic life (Carrera,2017).

Manufacture of raw materials: Polyester production

Polyester is a synthetic fibre used in the textile industry to create garments and all types of clothing. It is an affordable material and is more readily available than a natural fibre; in fact, in the first 20 years of the 21st century alone, the use of polyester has doubled (Rivas,2025). Polyester currently accounts for 52% of the clothing manufactured (Textile Exchange, 2021). Synthetic fibres are produced from fossil fuels such as oil or natural gas. The environmental problems associated with synthetic fibres are related to greenhouse gas emissions during their manufacture, mainly due to high energy consumption, the use of non-renewable resources and emissions associated with transport (Palma et al., 2023). On the other hand, additives added to fibres to enhance their properties, e.g. to make them more flexible or to extend their durability, are substances of very high concern for the European Union as they may affect human health (Palma et al., 2023). In addition, this type of fibre can release microplastics that can accumulate in the environment or in organisms.

Production

The textile industry is based on the conversion of fibres into yarn and yarn into fabric. The fabrics are subsequently dyed or printed.
The fabrics are transformed into cloth which is then converted into useful goods such as clothing, household goods, upholstery and other industrial products. In terms of environmental impacts, the textile sector is a water-intensive sector; in 2015, the global textile sector consumed 79 billion cubic metres of water (Palma et al., 2023). The amount of water needed to manufacture a textile product varies depending on the fibre and dye used. The high water consumption also results in the production of a large amount of wastewater with a high

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pollution load (Sanchez & Uribe, 2018). This water is mainly used in the dyeing and finishing processes, for example, dyeing requires about 150 L/kg of fabric, while finishing techniques, such as those that give the fabric resistance and shine, have a high consumption of water and chemical products (Palma et al., 2023; Carrera, 2017).

From the energy point of view, industrial machinery uses electrical energy for its operation: chemical fibre production, spinning, weaving, finishing and clothing), or in the generation of steam in sizing and finishing (Carrera, 2017). As far as the use of chemicals is concerned, textile finishing processes (scouring, bleaching, dyeing and finishing) also use a high amount of chemicals that are harmful to human health and the environment (Carrera,2017). It has been estimated that of the 3500 different substances used in the textile industry, some 750 substances have been classified by the European Union as hazardous to human health. These substances are toxic and persistent as water repellents or dyes, often used in the processing of textiles to improve their properties or aesthetics. Examples of these substances are chlorinated solvents, azo dyes, chlorobenzenes, phthalates, perfluorinated chemicals, formaldehyde and chlorinated paraffins (Palma et al., 2023).

As for atmospheric emissions during the manufacturing process, these occur during coating, laminating, finishing, printing, dyeing and finishing (Palma et al., 2023). Formaldehyde originates during coating, laminating, finishing and printing. Dust emissions occur during singeing, fabric production, drying, curing and heat fixation. Particulate emissions arise as a result of energy consumption during textile production and bleaching (Palma et al., 2023). These emissions not only cause air pollution, but can also cause respiratory problems in workers (Carrera, 2017).

The high noise levels produced in both spinning and weaving generate hearing problems and the monotonous and repetitive work in garment workshops increase the risk of accidents (Carrera, 2017). In terms of waste, in 2015, the textile industry was responsible for the emission of 92 million tonnes of waste both in production and at the end of life, resulting from overproduction and cutbacks during production (Palma et al., 2023).

The offshoring of textile production to take advantage of competitive wage advantages and the proximity of emerging markets leads to a marked increase in the circulation around the world of intermediate products in the long cycle of the textile chain. A large number of abuses of working conditions, trade union rights, gender discrimination (almost 70% of the sector is female), and exploitation of child labour have sometimes been documented in many mainly Asian and South American countries (Carrera,2017). This offshoring also results in a very significant increase in the carbon footprint due to endless intermediate journeys (Carrera,2017).

Use

The strategy of the textile model is based on continuous consumption and the specific case of clothing is the most paradigmatic example of so-called perceived obsolescence. We buy clothes not because they are worn out or in bad condition, but because they have gone out of fashion, generating as a consequence a perverse hyper-consumption dynamic conveniently fed by advertising (Carrera,2017). The differences in consumption between countries are abysmal. While the United States consumes around 40 kg/inhab/yr, Africa consumes barely 5

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kg/inhab/yr (Carrera,2017). Moreover, consumer products have a short life span, and textile purchases have increased by 40% in 2012 compared to 1996 (Palma et al., 2023).

In terms of environmental impacts, the use phase of textiles has major impacts. In fact, some garments consume more energy during the use phase (domestic maintenance) than during the process of raw material extraction and textile manufacturing. The highest energy consumption is used in the washing, drying and ironing of garments. Resources are also consumed by the use of water and detergents used in the cleaning processes of textile products. The washing of synthetic clothing (55% of garments) is the world's second cause of microfibre (microplastics) release into the environment (35% of all microfibres emitted) (Palma et al., 2023).

Transport/distribution

The increasing delocalisation of the sector to take advantage of competitive advantages generates an important distribution chain involving the transport of raw materials and intermediate production. The long distances between textile suppliers, factories and distribution and marketing points generate a constant and incessant movement of garments around the world, causing the carbon footprint to increase considerably. As a side effect, this transport also leads to the spread of invasive species due to the long distances involved in transporting raw materials and finished products (Palma et al., 2023).

End of life

In Europe, 3 million tonnes of textile waste are generated annually, which in the case of Spain accounts for up to 5% of municipal waste (Carrera, 2017). Fast fashion has boosted the amount of clothes being produced, but also the amount of clothes being thrown away (Parlamento Europeo, 2020). Europeans consume on average almost 26 kg and discard around 11 kg of textiles each year. In many cases, when discarded by users, these products are in good condition and therefore potentially reusable (Miteco, 2024). This waste in 85% of cases ends up mixed in the waste streams destined for landfill or incineration and less than 1% of textile waste is recycled in the system (Carrera, 2017).

Textile products are usually multi-component (either due to mixed fibres or multi-layers of different products) which makes them difficult to separate and recycle (Carrera, 2017). The fact that end-of-life textiles are considered as waste is a significant barrier to the reuse and recycling market. In addition, definitions of what is textile waste are not harmonised between different countries, which impedes the commercialisation and decreases the re-usability of certain textile streams (Palma et al., 2023).

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4 Benchmarking of current tools and methodologies

4.1 Data Collection for Questionnaire Development

To avoid "reinventing the wheel" and ensure **relevance** to the T&C sector, we performed an **analytic induction** across a wide set of existing questionnaires and frameworks (SOFFA, Circulatool, Fashion Revolution, TCBL, etc.). Alongside these practitioner-oriented tools, we also carried out a **theoretical analysis** of indicators from **published academic literature** to capture the most current thinking on circularity and sustainability metrics.

Analytic Induction on Practitioner Tools

1. **Questionnaire Benchmarking**
   a. We studied **SOFFA** questionnaires, **Fashion Revolution** forms, **TCBL** checklists, **AIDIMME's Circulatool**, and other industry-oriented tools to identify common themes (e.g., waste management, supplier audits, product end-of-life, local collaboration).
   b. These items were categorized, compared, and consolidated into a single thematic matrix in Excel.
2. **Iterative Classification and Grouping**
   a. Similar or overlapping questions were grouped under broader headings (e.g., "Circular Economy," "Community & Network Building").
   b. We paid special attention to **missing** or **underrepresented** dimensions (e.g., intangible cultural heritage, mental health at work, quantum-inspired collaboration leaps).

Theoretical Analysis from Academic Literature

- **Systematic Review of Research Indicators**: We compiled relevant studies on circular economy and sustainability metrics (Galatti & Baruque-Ramos, 2022; Rincón-Moreno et al., 2021; Eslami et al., 2023; Muñoz et al., 2024) to see which indicators might be **transferable** or **adaptable** to T&C.
- **Cross-Referencing**: We checked where academic recommendations (e.g., including mental health, measuring worker training hours, quantifying end-of-life recycling rates) aligned or diverged from existing questionnaires.
- **Integration**: Where gaps emerged—like a lack of specific social indicators—academic frameworks informed new questions for the FABRIX tool (e.g., worker mental health, anti-harassment policies).

Interviews and Workshops

- **Qualitative Interviews (D2.1)**: Project partners conducted interviews with T&C businesses, facilitators, and policymakers to understand *which questions* they found most relevant, challenging, or value-adding.

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- **Co-Creation Events (D2.4)**: Early drafts of the questionnaire were shared in workshop settings, allowing participants to **validate** clarity, **prioritize** topic areas, and suggest improvements.

4.2 Benchmarking of Other Tools

4.2.1 Overview of Existing Circularity and Sustainability Tools

Before developing the FABRIX self-assessment questionnaire, we surveyed a range of **existing tools** and **methodological frameworks** used in the textile and clothing (T&C) sector. These include:

1. **AIDIMME's Circulatool**
   a. Designed to measure circularity and sustainability performance in manufacturing.
   b. Offers quantitative indicators (e.g., resource efficiency, waste management) and qualitative aspects (organizational readiness, policy alignment).
2. **SOFFA's Original Questionnaires**
   a. SOFFA (Social Fashion Factory) developed multiple **self-assessment forms** for different stakeholder groups: tailors/trainees, suppliers, event/media partners, volunteers, and broader community members.
   b. Emphasize social responsibility (fair wages, safe working conditions, inclusion) and basic circular practices (material reuse, recycled inputs).
3. **Fashion Revolution's Tools**
   a. **Fashion Transparency Index**: Rates and ranks major brands based on publicly disclosed data on supply chain and sustainability practices.
   b. **Circularity Readiness Form**: A self-assessment tool focusing on transparency, design for circularity, and supply chain traceability.
4. **TCBL (Textile & Clothing Business Labs) Questionnaires**
   a. Focus on innovative business models, technology adoption, and collaborative networks (e.g., local synergy, supply chain integration).
   b. Include a supply-chain audit checklist (developed with Leroy Merlin) examining both social and environmental performance.
5. **Industry Standards and Certifications**
   a. **ISO 14001** (Environmental Management), **ISO 14006** (Ecodesign), **GOTS**, **OEKO-TEX**, and other established certification schemes often embedded in company self-checks.
   b. Some tools also reference the **Fashion Transparency Index** or broader due diligence approaches tied to EU policy.
6. **Other Collaborative Tools**
   a. Tools like **Up2Circ**, **HereWear**, or **regional initiatives** in the EU that measure circular strategies, new materials usage, and social innovation metrics.

Collectively, these tools address **environmental, social, and economic** dimensions, though **depth** and **focus** vary. Some emphasize **compliance** (e.g., extensive audits or certifications), others underscore **continuous improvement** (e.g., best-practice guidelines, learning resources), and still others highlight **community or network building** (e.g., facilitating local resource-sharing, knowledge exchange).

4.2.2 Multi-Level Thematic Analysis of Existing Questionnaires

1. **First-Level Classification**

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a. We captured each question or indicator theme in a simple **Excel list**, categorizing them by topic. For instance: "Resource Efficiency," "Circular Business Model," "Waste Management," "Community Service," "Gender Equality," etc.

2. **Second-Level Grouping**
   a. We then grouped these themes into **broader clusters** such as:
      i. *Organizational Readiness* (presence of environmental manager, staff training, existing certifications)
      ii. *Collaboration Interest* (openness to partnerships, knowledge exchange)
      iii. *Circular Design* (product-as-service, design for disassembly, recycled materials usage)
      iv. *Social Justice* (labour rights, fair wages, support for vulnerable groups)

3. **Third-Level Consolidation**
   a. Finally, we **consolidated** these clusters into overarching categories that map well onto **circular economy** and **social impact** frameworks. For instance:
      1. **Social Justice & Welfare** (gender equality, labour rights, well-being)
      2. **Community & Network Building** (local engagement, collaboration, referral networks)
      3. **Circular Economy** (circular design, business model, reverse logistics)
      4. **Sustainable Practices** (resource efficiency, waste management, hazard reduction)
      5. **Digital Transformation** (technology adoption, advanced manufacturing)
      6. **Governance & Policy** (compliance with formal standards, local/regional policies)

This multi-stage approach ensured that the **FABRIX self-assessment** reflects the **best practices** observed across established tools while **filling gaps** we identified (e.g., deeper attention to local community ties, intangible heritage, or emergent collaborations).

4.3 Insights from Academic Literature on Circularity and Sustainability Indicators

In parallel, we conducted a **theoretical review** of academic papers that propose or analyze circularity and sustainability indicators—particularly in manufacturing and textiles. Key references and their contributions include:

- **Galatti & Baruque-Ramos (2022)**
  o Identifies **37 social indicators** in the Brazilian T&F industry, focusing on worker well-being, labor rights, diversity, and fair distribution of income.
  o Highlights the importance of mental health care, anti-harassment policies, and inclusive hiring—dimensions often overlooked in standard sustainability indexes.
- **Samani (2023)**
  o Explores **gaps** between **Life Cycle Assessment (LCA)** and **circularity assessment**, noting that many circularity tools miss critical elements like scarcity or toxicity of materials.
  o Reinforces the need for a **holistic** approach that integrates resource flow metrics (waste, recyclability) with toxicity or hazard indicators.
- **Ibáñez-Forés et al. (2022)**

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- Proposes **34 indicators** grouped into 10 categories (Design, Suppliers, Inputs, Production, Business, Outputs, Environmental, Social, R&D, and Communication) to measure organizations' progress toward circular economy.
- Stresses the role of **corporate sustainability reports** in disclosing data that can be used to compute these indicators.
- **Rincón-Moreno et al. (2021)**
  - Provides a **micro-level** view of CE performance indicators (e.g., percentage of green energy, waste generation, CE investment).
  - Emphasizes **productivity** metrics (energy usage per revenue, water usage per revenue) and alignment with local policy (green procurement).
- **Eslami et al. (2023)**
  - Introduces a **life-cycle-based** sustainability assessment framework, bridging product, process, and system levels.
  - Identifies the importance of **hierarchical** and **multi-dimensional** indicator sets that merge environmental, economic, and social metrics.
- **Muñoz et al. (2024)**
  - Proposes the **9R circularity index** using a material-mass perspective, combined with an Analytic Hierarchy Process (AHP).
  - Suggests weighting different CE strategies (e.g., reuse, remanufacture) to get a single composite index.

From these academic studies, we gleaned several **lessons**:

1. **Holistic Coverage**: Indicators should address social, environmental, and economic factors in tandem—particularly important for T&C's labour-intensive context.
2. **Flexibility and Context**: Industry specifics (e.g., small artisan shops vs. large factories) require adaptable scales and sub-questions.
3. **Integration of Formal and Informal Metrics**: Many academic frameworks encourage mixing **quantitative data** (e.g., resource usage, cost savings) with **qualitative** aspects (e.g., workforce well-being, intangible cultural heritage).
4. **Life Cycle Perspective**: Where feasible, frameworks assess impacts from **pre-manufacturing** to **end-of-life**, highlighting the need for cross-stage data in T&C.

These findings reinforce the **breadth** of metrics needed—covering topics like mental health, supply-chain compliance, advanced resource-efficiency computations, and intangible social-embeddedness factors.

4.4 Lessons Learned for the T&C Sector

From combining practitioner toolkits with academic literature, we distilled several **key insights**:

1. **Need for Both Depth and Usability**
   a. Many questionnaires are either too **technical** (e.g., extensive audits) or too **generic**. For FABRIX, a balance is required: enough detail to inform improvements and produce robust data, yet **concise enough** that busy SMEs or artisans are willing to complete it.
2. **Social Criteria Often Underrepresented**
   a. While environmental metrics (energy use, water, materials) are common, **social indicators** (fair wages, cultural heritage, labour rights, mental health

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policies) are sometimes minimal or vague. Academic studies like Galatti & Baruque-Ramos (2022) reveal a deeper range of potential social criteria. FABRIX addresses this gap with dedicated sections on social embeddedness, inclusivity, and worker well-being.

3. **Emphasis on Certification May Overlook Emerging Practices**
   a. Tools focusing heavily on ISO or GOTS certification might fail to capture **grassroots innovations** or partial compliance with evolving standards. FABRIX aims to capture **incremental** or **creative** circular solutions, not just "tick-box" certifications.

4. **Multi-Actor Complexity**
   a. The T&C sector is highly fragmented (designers, farmers, mills, NGOs, policymakers). Existing questionnaires rarely differentiate the **different roles**. In FABRIX, we incorporate user-specific paths (e.g., brand vs. artisan vs. facilitator) to ensure relevance.

5. **Quantitative–Qualitative Mix**
   a. Academic frameworks highlight the need for **hybrid** approaches (Ibáñez-Forés et al. 2022, Rincón-Moreno et al. 2021) that blend **objective metrics** (e.g., % recycled content, energy use per unit of revenue) with **subjective measures** (e.g., worker satisfaction, local trust). FABRIX adopts this dual approach.

6. **Digital Platforms Enhance Engagement**
   a. Some of the more successful tools are integrated into platforms offering **instant feedback** (dashboards, comparisons) or **matchmaking**. FABRIX leverages this approach by embedding the self-assessment in a digital platform that reveals local synergy, grants, or next steps.

4.5 Validation Approach and Iterative Feedback Loops

4.5.1 Justification for Selection and Adaptation

Based on the above benchmarking—encompassing both practitioner tools and **peer-reviewed academic** guidelines—our **design choices** for the FABRIX questionnaire include:

- **Modular Structure**: Inspired by TCBL's mini-questionnaire approach and the multi-section structure of Circulatool. Users can **pick** relevant sections or skip those that do not apply.
- **Stakeholder-Specific Pathways**: Borrowing from SOFFA's multiple forms for tailors, volunteers, and suppliers, FABRIX also offers distinct question sets for brand owners, manufacturers, artisans, facilitators, etc.
- **Emphasis on Social & Community Dimensions**: Drawing on the insights that social issues are underrepresented—yet crucial in academic research (Galatti & Baruque-Ramos 2022)—we integrated **community-building**, **social justice**, and **mental health** indicators.
- **Practical, Action-Focused Indicators**: Combining the "checklist" style of supply chain audits with an eye toward **open-ended** reflection (e.g., "Have you discovered any new collaboration or 'tunnelling' solutions recently?").

Thus, the FABRIX questionnaire synthesizes the **most relevant features** from established tools and academic literature, bridging environmental, social, and institutional factors while adding **innovative** elements specifically tailored for the T&C ecosystem.

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4.5.2 Future Iterative Studies

Pilot Studies

The newly drafted questionnaire will undergo **pilot testing** under **WP3 (Task 3.3)**:

1. **User Testing Sessions**: Selected T&C businesses and facilitators in Athens and Rotterdam will be invited to complete the self-assessment online.
2. **Feedback Surveys**: Immediately after completion, participants will answer a short survey on clarity, relevance, and length.
3. **Focus Groups/Interviews**: Follow-up discussions help refine question wording, skip logic, and user experience design.

Based on user feedback, we will **streamline** or **reorganize** any sections that prove confusing, redundant, or overly time-consuming.

Integration with FABRIX Platform

- **Modular Implementation**: The self-assessment will be integrated into the **FABRIX digital platform** developed in WP3, allowing users to **select** relevant sections based on their role (brand, producer, artisan, facilitator, etc.).
- **User Pathways**
  - **Viewers** (Policy Makers, Researchers, General Audience): Can register simply to see aggregated outputs, map visualizations, or sector-wide trends.
  - **Community Members** (Businesses, Facilitators): Provide basic info upon signup (organization size, location, interest)
  - *Optional:* Delve into **in-depth** self-assessment modules, each aligned with the user's specific profile (e.g., brand focusing on design, manufacturer focusing on waste management, NGO focusing on social empowerment).
- **Capturing User Interactions**
  - **Onboarding Survey**: A short initial survey (~5 minutes) captures essential data (role, area of interest) to personalize the user experience.
  - **Mini-Questionnaires**: Once onboarded, the user accesses discrete modules—mirroring the main thematic sections (e.g., "Environmental & Circular Metrics," "Social & Community Embeddedness," "Institutional Alignment," "Adaptive & Quantum Strategies," plus optional advanced topics in "Technology & Dynamic Capabilities").
  - **Feedback Loop**: Completion of a module generates immediate insights (e.g., a radar chart or short textual recommendations). This **gamifies** the process, encouraging participants to complete further modules.
- **Ongoing Revisions**: Because the platform is dynamic, we can implement iterative improvements—adding new questions as the project evolves or removing those that prove less relevant.

Iterative Data Analysis

As more stakeholders complete the self-assessment, the FABRIX platform aggregates data for:

- **Comparative Dashboards**: Summaries at city or region levels (e.g., typical circular design adoption rates in Athens vs. Rotterdam).
- **Research Hypothesis Testing**: QENF predictions discussed in Annex II (e.g., whether measuring resource flows leads to more rapid adoption of recycling or new partnerships).

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- **Policy Feedback**: Municipal agencies can see where local T&C ecosystems need targeted support (e.g., training, grants, bridging policy gaps).

Data Handling and Privacy

All responses will be **stored securely**, with user consent and GDPR compliance. Participants can opt for **anonymous** data aggregation, ensuring sensitive business information remains confidential while still contributing to the project's overarching insights.

5 Adaptation of the circularity level self-assessment questionnaire

5.1 Description of the reference tool (*CIRCULATOOL*)

As indicated above, the development of a circularity self-assessment tool is based on a previous technical development led by AIDIMME within the framework of two regional innovation projects, named CIRCULARIZA and CIRCULATOOL. The result of those projects is CIRCULATOOL; a self-assessment and self-improvement tool regarding circular economy intended for companies from the metal and furniture sectors, which can be consulted and be used at the following link: economiacircular.aidimme.es

Figure 1: CIRCULATOOL Certification System logo (source: AIDIMME, 2025)

As these were two large sectors that could be subdivided into several subsectors that were very different from each other, the first thing that was done was to classify the subsectors, in order to be able to ask specific questions that apply to certain subsectors (for example, if they have cyanide baths in the metal surface treatments, or if they use wood with a certificate of legal origin for the wood sector).

For the development of CIRCULATOOL it was decided that it was convenient to adapt the variables to the sector and business reality, adjusting the variables to the actions that each company carries out through filter questions.

The development of the original questionnaire demanded bibliographical research of both the legal requirements and the state-of-the-art regarding circularity assessment. In January 2018, the European Commission published a working document aimed at establishing a

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comprehensive set of indicators to serve as a framework for assessing the progress of the transition towards a circular economy model (European Commission, 2018). This document was thoroughly reviewed and constructively critiqued by the European Economic and Social Committee (EESC) in a report released during the same year (European Commission, 2018b).

No single indicator was identified that could comprehensively and coherently measure the circular economy. However, it was pointed out that a system of multiple indicators could help assess performance across various areas that directly or indirectly contribute to the development of a circular economy. The European Commission proposed a framework consisting of 10 key indicators (with several sub-indicators) categorized into the following areas:

- Sustainable Resource Management: Evaluates the reduction in resource consumption, thereby enhancing supply security and reducing environmental pressures.

- Social Behaviour: Reflects public awareness, engagement, and participation in the circular economy. This includes new consumption patterns (e.g., sharing models, product-service systems, and willingness to pay more for durability), reuse (which requires a shift in mindset toward repair and restoration), and waste disposal (waste stream separation and end-of-life management focused on remanufacturing and/or recycling).

- Business Operations: Describes eco-innovation initiatives aimed at transforming and adapting business models in alignment with circular economy principles.

The proposed indicators are listed below (European Commission, 2018b):

Table 1: Indicators proposal (European Commission, 2018b)

Category	Indicator	Sub-indicators
Production and Consumption	1. Self-sufficiency level for raw materials	-
	2. Green public procurement	-
	3. Waste generation	3a. Municipal waste generation per capita
		3b. Waste generation (excluding major mineral waste) per unit of GDP
		3c. Waste generation (excluding major mineral waste) per unit of domestic material consumption
	4. Food waste	-
Waste Management	5. Recycling rates	5a. Municipal waste recycling rate
		5b. Recycling rate of all waste excluding major mineral waste

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	6. Recycling rates for specific waste streams	6a. Overall packaging recycling rate
		6b. Plastic packaging recycling rate
		6c. Wood packaging recycling rate
		6d. Waste Electrical and Electronic Equipment (WEEE) recycling rate
		6e. Bio-waste recycling rate
		6f. Construction and demolition waste recycling rate
Secondary Raw Materials	7. Contribution of recycled materials to raw material demand	7a. End-of-life recycling input rate
		7b. Circular material use rate
	8. Trade of recyclable raw materials	-
Competitiveness and Innovation	9. Private investments, employment, and gross value added in the repair and reuse sector	9a. Gross investment in assets related to end-of-life recycling
	10. Patents	-

Additionally, the Ellen MacArthur Foundation developed and published the Material Circularity Indicator (MCI), a metric designed to assess the circularity of a product. This indicator also has an adapted version applicable at the corporate level. To facilitate its calculation, an Excel-based application was developed, allowing businesses and organizations to measure and analyze their circularity performance effectively (Material Circularity Indicator, 2021).
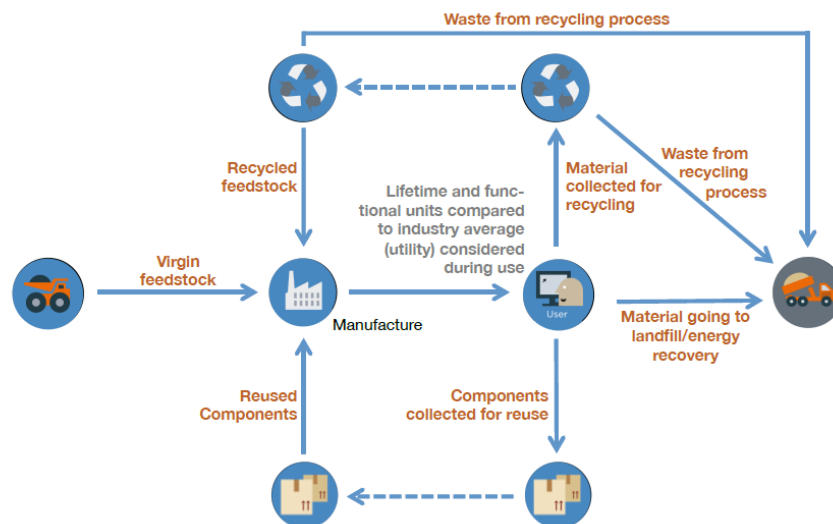

Figure 2: Product's Material Circularity Indicator (MCI) (source: Ellen McArthur, 2021)

The input data considered in the Material Circularity Indicator (MCI) calculation include:

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- The material inputs (%) originating from reuse and recycling, as well as the efficiency of the recycling process. From these values, the mass of virgin materials (V) is derived.
- The end-of-life destinations and the calculation of non-recoverable waste, expressed as percentages of reuse and recycling, along with the efficiency of the recycling process.

Despite its usefulness, the Ellen MacArthur Foundation's approach presents certain limitations:
- It does not account for reject fractions in remanufacturing processes.
- It does not consider waste generated during production, from raw material extraction to final product manufacturing.
- It does not track what happens to industrial waste—whether it is recovered or sent for final disposal.

In summary, the total waste generated includes the fraction of the product that is directly lost and sent to landfill and the waste generated during production and material recovery operations, whether through recycling or remanufacturing. This results in a partial assessment of actual material consumption and waste generation, as certain key aspects of the circular economy are not fully accounted for.

From the literature review and benchmarking of alternative circularity measurement methods, it was concluded that while identifying the key aspects of circularity relevant to the development of an index is crucial, an even more fundamental challenge lies in simplifying the way businesses can conduct self-assessments.

As a result, efforts were focused on defining both an evaluation methodology and a questionnaire designed to provide businesses with an accessible and easy-to-understand approach for conducting an initial circularity assessment. This structured approach aims to facilitate adoption by organizations of varying sizes and sectors, ensuring that circularity measurement is practical, scalable, and actionable.

The original questionnaire consisted of six axes, providing partial values for each. This structure allows for the identification of areas with the best and worst performance.

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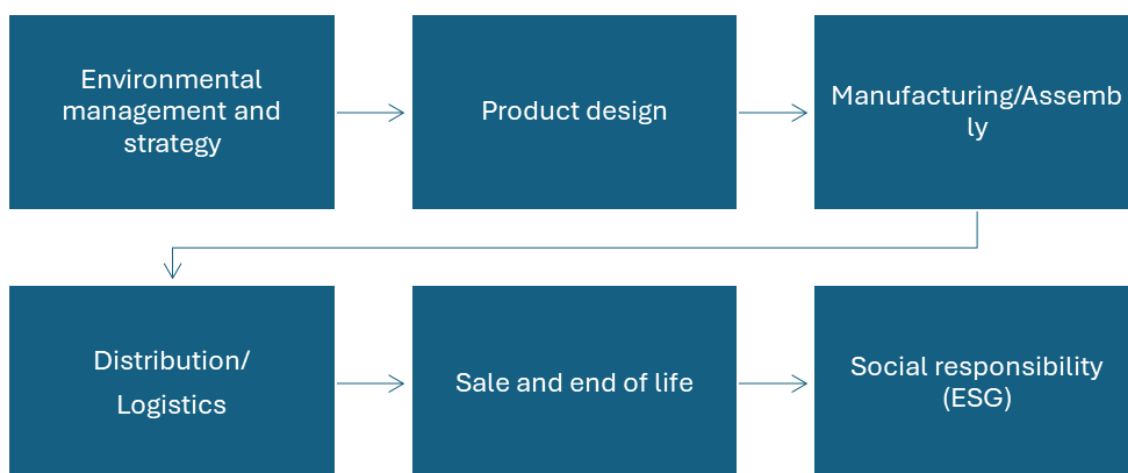
Figure 3: CIRCULATOOL axis (source: AIDMME, 2018)

Additionally, the questionnaire was organized into five circular economy concepts, referred to as "dimensions."

Figure 4: CIRCULATOOL dimensions (source: AIDIMME, 2018)

These *dimensions* of the circular economy were structured into *areas*, each further divided into *key concepts*. This approach allowed for the development of a simple-response questionnaire that provided both a global circularity score and a detailed breakdown. It can be seen in Table 2.

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By offering a granular assessment, the questionnaire enabled businesses to identify specific areas for improvement and receive tailored recommendations for enhancing their circular practices. This method ensured that the evaluation was not only comprehensive but also actionable, facilitating the implementation of targeted strategies to advance circularity.

Table 2: Indicators proposal (AIDIMME, 2018)

DIMENSIONS	Areas	Key concepts
ECODESIGN	E.1 Ecodesign management and environmental communication	E1.1. Ecodesign (R&D)
		E1.2. Environmental assessment
		E1.3. Eco-labeling
		E1.4. Green purchasing
	E2. Design aimed at reducing resource use/consumption	E2.1 Secondary MMPP
		E2.2 Renewable MMPP/ Critical MMPP
		E2.3 Minimization
		E2.4 Harmful substances
	E3. Functional optimization of the product	E3.1 Efficiency in use
		E3.2 User orientation
	E4. Extend the useful life	E4.1 Design for durability (adapted to intensity of use)
		E4.2 Design for maintenance
		E4.3 Design for upgrade and repair
	E5. End-of-life valorisation-oriented design	E5.1 Design for separability
		E5.2 Recyclable materials/components
EFFICIENT PRODUCTION	PE1. Environmental management systems	PE1. Environmental management
	PE2. Process optimization: Lean Manufacturing + Industry 4.0	PE2.1. Zero defects
		PE2.2. Stock management/Internal control of MMPP flows/Product traceability
		PE2.3. Process sensorization
		PE2.4. Equipment: Preventive maintenance/technological update
		PE2.5. Co- working in the value system
	PE3. Industrial symbiosis	PE3.1. Use of secondary raw materials
		PE3.2. Effluent management
	PE4. Efficient technologies	Utilization of raw materials
		Energy consumption
	PE5. Efficient logistics (supply and distribution)	Trusted Provisioning
		Local sourcing

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		Efficient distribution: (routes and loading efficiency)
		Distribution: type of vehicles
	PE6. Remanufacturing	Unused products (occasional activity)
		Products collected after their useful life (main activity)
SERVITIZATION	S1. User orientation / product customization	Personalization
		Production on demand
		Additional services to improve user experience/efficiency
	S2. Extend the useful life	Guarantee +
		Services: after-sales advice / maintenance / upgrade
		Repair
	S.3 Pay per use (Product servitization)	Payment for time of use of the product (leasing, renting , etc.)
		Replacing the product with a service (pay-per-success, result-oriented services)
	S4. Data and information management and processing (Industry 4.0)	Virtual communication with the user
		IoT in the product
		Product/component traceability
		Sharing platforms
TAKE-BACK	TB1. Selective collection	User incentives
		Logistics management of collection
		Collection: at home, private collection points or public SIG.
	TB2. Reuse (Second Hand)	Sale of second-hand products
		Facilitate reconditioning operations
	TB3.Waste recovery: recycling + energy	Instructions for final management
		Preparing for component reuse/recovery
		Traceability of waste
		Material flow analysis
		By-product platforms/industrial symbiosis
		Control of waste management processes
		Cascade recycling
		Energy recovery
SOCIAL RESPONSIBILITY	RS1. Primary corporate CSR, within the company	Working conditions: health and safety, training
		Code of ethical conduct, non-discrimination (equality plan, hiring of

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		people at risk of social exclusion) and internal communication
		Retributive balance
		Job stability and career plan
		Social benefits for workers: conciliation, flexibility…
		Alternative financing: responsible banking, microfinancing , crowdfunding , etc.
	RS2. Secondary CSR, area of influence	Social mission
		Safety and health of the products/services offered
		Access facilities (financing, sales/use format) for groups of users with special needs.
		Communication of CSR policy: sustainability report, etc.
		Selection of suppliers and collaborators based on their CSR/environmental practices.
		Strengthening the local economy (support for local suppliers and distributors)
	RS3. Tertiary CSR, with the world	Institutional alignment: Human Rights, etc.
		Donations and support for specific social or environmental actions (global reach outside of your value system). Independent or associated with sales
		Awareness campaigns

A series of questions were developed, each linked to key concepts of the circular economy. However, as it has already been pointed out, it was crucial to strike a balance between depth and usability to ensure the tool remained practical. As a result, a selection of the most representative questions was made, along with the addition of filter questions. This structure was designed to simplify the process for the person completing the questionnaire. Additionally, quantitative questions were incorporated, but always with ranges, recognizing that many small and medium-sized enterprises (SMEs) may not have precise data for all parameters.

The inclusion of filter questions allows the questionnaire to be tailored to each company's specific context. Questions that do not apply to the company are automatically hidden, ensuring that the respondent only answers relevant queries and avoids unnecessary complexity. Furthermore, it was decided that weighting the questions would enhance the accuracy of the circularity level assessment. The proposed system assigns varying importance to each question, with more weight given to those that are critical to the specific characteristics of each sector.

To facilitate the assessment, five distinct levels of circularity were defined, offering a clear framework to measure a company's progress in circularity. This structured approach allows

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SMEs to easily assess their current standing and swiftly identify areas for improvement. The five levels represent a progressive transition from a fully linear business model to a fully circular one, ensuring companies can understand and navigate their journey towards greater circularity.

- **Linear company**
  - The environment poses a threat to the economic interests of the company
  - It is not associated with your activity or is not aligned with any of the key concepts of the circular economy
  - High lack of knowledge about the bases of the circular economy.
  - The first thing that these types of companies should do is start a learning and awareness process to carry out the analysis of their main areas of environmental and social improvement.

- **Conscious company**
  - The environment is not integrated into the company's business management.
  - Begins to connect certain areas of its activity with the environmental and social impacts that may arise from them and carries out partial initiatives to try to improve them.
  - However, it has not assimilated and integrated the various concepts of circular economy into its business strategy to be able to act from a more global perspective, not only in its area of direct influence, but also seeking synergies with possible collaborators.

- **Committed company**
  - The company knows that it must comply with environmental obligations.
  - Understanding of the main concepts of the circular economy
  - It works to improve its environmental and social impacts from various areas, but mainly acts in its area of direct influence.
  - Stands out in a very specific area or at a medium level of overall commitment.

- **Active company**
  - The environment is integrated into business management
  - Has carried out an analysis of its business model and integrated the circular economy into its business strategy
  - Has a clear action plan and dedicates significant resources to achieving its objectives.
  - Stands out in alignment with key concepts from various areas

- **Circular company**
  - The environment is a strategic factor for the company
  - High awareness and sense of socio-environmental responsibility.
  - Has a broad perception of its activity and its consequences on the environment and people, trying to provide real value to society while

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optimizing the use of resources and putting the well-being of people before mere values. economical.

- o It is dynamic and aligned and is very proactive in all possible strategic areas that can contribute to a circular economy, considering and intervening (directly or indirectly through strategic alliances) in all phases of the life cycle of the product/service that offers, from the conception itself through its efficient and satisfactory production and use, to ensuring the maximum return on resources at the end of their life.

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An example of the results is illustrated below.:
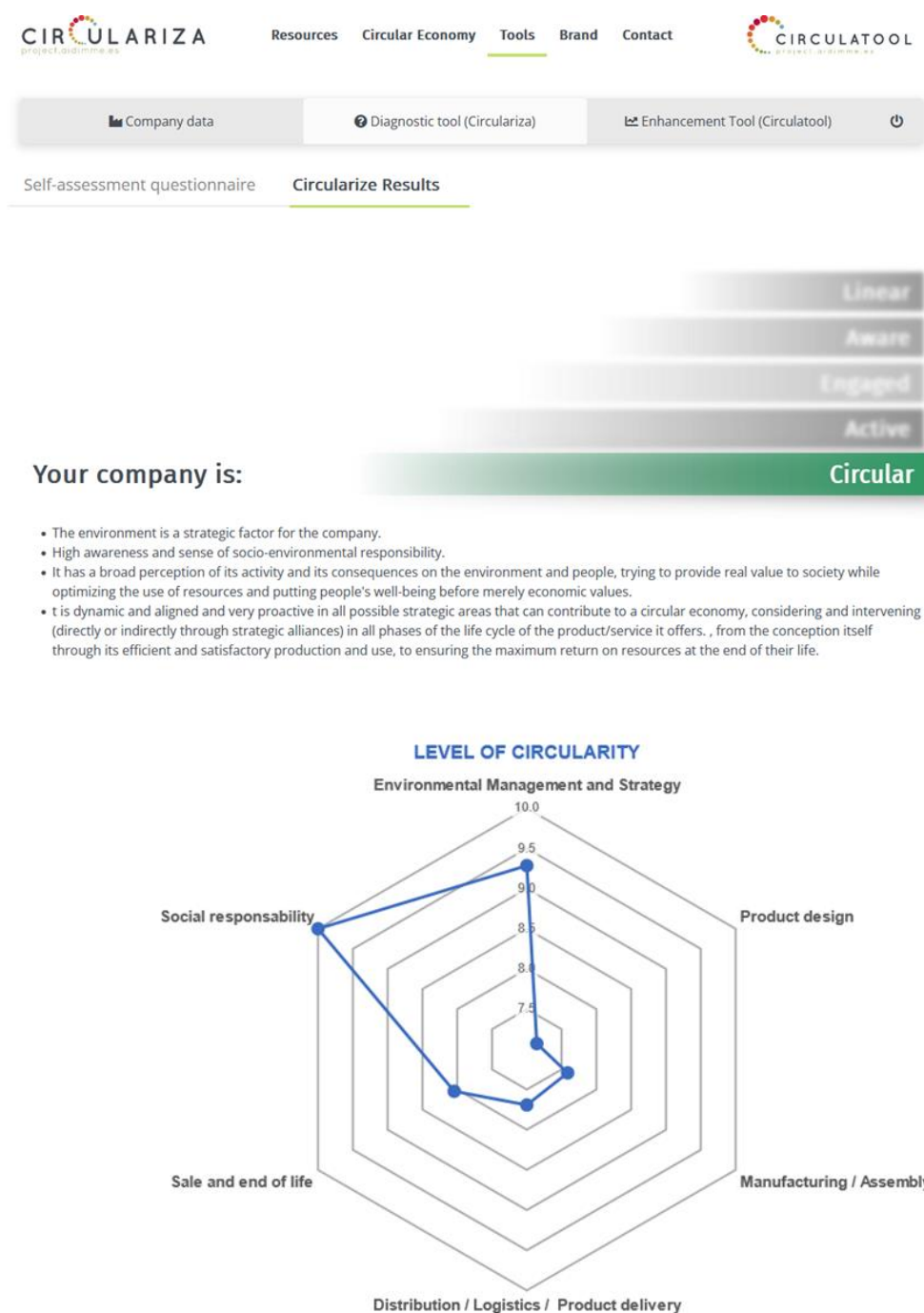
Figure 5: CIRCULATOOL results example (source: AIDIMME)

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Finally, an automatic results report is generated, offering a visual summary of the company's circularity status. The report uses traffic light colours (green, yellow, and red) to indicate the performance of each area, making it easy to identify which actions are progressing well and which require further attention:

- Green: Represents areas where the company is performing well and has implemented positive circular practices. These actions are aligned with circular economy principles and require no immediate changes.
- Yellow: Indicates areas that are somewhat effective but still need improvement. These actions are in progress but require more attention or optimization to meet circularity goals.
- Red: Highlights areas that are underperforming or need significant improvement. These actions are critical for enhancing circularity and should be prioritized for immediate action.

This colour-coded approach ensures that companies can quickly interpret their performance and prioritize next steps. The visual report makes the results accessible and actionable, allowing for better decision-making and focused efforts to drive circularity improvements.

Figure 6: CIRCULATOOL report example (source: AIDIMME)

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5.2 Proposal description for adaptation of the tool

Considering the critycal review of the textile sector, developed in section 3.4, a review of the questions has been carried out, and a series of questions specific to the textile sector have been added. It should be noted that this is a first proposal, which is expected to evolve throughout the FABRIX project.

In Table 3, the modified questions with respect to the initial questionnaire or that have been proposed because they deal with issues that affect companies in the textile sector can be checked. These questions were integrated into the proposal (see Annex I), adapting them to the needs of the questionnaire and to the pre-existing questions.

Table 3: Updated circular economy self-assessment (source: FABRIX)

Name	Circular economy area (Dimension)	Type	Axis	Quantitative/ Qualitative	Nº Options	Brief justification of the question
When quantifying your company's carbon footprint, do you take into account both direct and indirect aspects?	PE.1. Environmental Management Systems	Unique selection	Environmental Management and Strategy	Qualitative		Carbon footprint quantification must include both direct (scope 1) and indirect (scope 2 and 3) emissions, as defined in the GHG Protocol and ISO 14064. This comprehensive approach is essential to comply with the reporting obligations established in European Directive 2014/95/EU on non-financial information disclosure.
What methodology do you use to measure your carbon footprint? (GHG Protocol, ISO 14064, etc.)	PE.1. Environmental Management Systems	Unique selection	Environmental Management and Strategy	Qualitative		This question aims to identify the specific methodology the company uses to measure its carbon footprint, helping to evaluate the robustness of its measurement practices and its alignment with recognized standards for carbon management.
… has implemented a sustainable mobility plan for employees?	PE.1. Environmental Management Systems	Unique selection	Environmental Management and Strategy	Qualitative		sustainable mobility plan reduces CO2 emissions associated with employee transport by improving energy efficiency. This approach

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						is aligned with the European Green Deal and the European Directive 2010/31/EU, which promotes sustainable urban mobility to reduce the environmental impact in cities.
Does your company carry out product design activities internally (or do you have influence over them)?	E1. Ecodesign management and environmental communication	Unique selection	Product design	Qualitative	2	This question aims to assess whether the company is involved in product design or has influence over it, highlighting its role in integrating eco-design principles and environmental considerations into the product development process.
… design your products to minimize the use of resources?	E.2. Reduction in resource use/consumption	Unique selection	Product design	Qualitative	2	This question seeks to understand whether the company actively designs products with a focus on minimizing resource use, supporting sustainability and circular economy goals.
… design your clothing to use non-toxic dyes?	E.2. Reduction in resource use/consumption		Product design	Qualitative		This question focuses on whether the company ensures the use of non-toxic dyes in its clothing design, promoting sustainability by reducing harmful chemicals in the product lifecycle.
… design your clothing with a timeless design to ensure the longevity of the product?	E.5. End-of-life valorisation-oriented design		Product design	Qualitative		This question evaluates whether the company designs clothing with a timeless approach, which contributes to product durability and reduces the need for frequent replacement, promoting sustainability and circular economy principles.
… design your products so that it is easy to separate components or materials for reuse or recycling?	E.5. End-of-life valorisation-oriented design	Unique selection	Product design	Qualitative	3	This question assesses whether the company designs products with end-of-life considerations in mind, specifically focusing on the ease of disassembly

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					for reuse or recycling, which supports circular economy goals.
Is modular design used for the manufacture of textile parts?	E.2. Reduction in resource use/consumption		Product design	Qualitative	This question determines whether the company employs modular design in textile manufacturing, which allows for easier repair, upgrade, or replacement of components, fostering longer product life cycles and supporting circularity.
Is recycling designed with recycling in mind? For example, is the complexity of materials reduced in the design of textile products?	E.2. Reduction in resource use/consumption		Product design	Qualitative	This question explores whether the company incorporates recycling principles into its design process, particularly by reducing material complexity, which makes recycling more efficient and aligns with sustainable design practices.
Have materials from renewable and biodegradable sources been chosen?	E.2. Reduction in resource use/consumption		Product design	Qualitative	Organic farming allows for reduced consumption of water, fertilizers, pesticides, etc., thereby reducing its environmental footprint.
Is a waste-free cutting pattern used?	E.2. Reduction in resource use/consumption		Product design	Qualitative	This question examines whether the company uses cutting patterns that minimize fabric waste, promoting resource efficiency and supporting circular economy principles by reducing material consumption.
Is it designed with disassembly in mind?	E.5. End-of-life valorisation-oriented design		Product design	Qualitative	This question evaluates whether the product is designed with disassembly in mind, which facilitates easier repair, recycling, and material recovery at the end of the product's life cycle.
Are joining systems used that are easy to separate?	E.5. End-of-life valorisation-oriented design		Product design	Qualitative	This question assesses whether the product is designed for disassembly and if the joining systems used allow for easy separation

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						of components, enhancing the product's recyclability and supporting circular economy practices.
Computer programs are used to reduce the number of cuttings in the pattern? Making the most of the surface area of the fabric	E.2. Reduction in resource use/consumption		Product design	Qualitative		This question seeks to determine whether the company uses computer software to optimize fabric cutting patterns, reducing waste and making the most of the material, thus contributing to resource efficiency and sustainability.
Have eco-labels been obtained for the product or for the raw materials?	E1. Ecodesign management and environmental communication		Product design	Qualitative		This question checks if the company has obtained eco-labels for its products or raw materials, indicating a commitment to environmental sustainability and providing consumers with trusted certifications.
…design your packaging so that it is easy to separate components or materials for reuse or recycling?	E.5. End-of-life valorisation-oriented design	Unique selection	Product design	Qualitative	3	This question evaluates whether the company designs packaging with disassembly in mind, ensuring that materials can be easily separated for reuse or recycling, promoting a circular approach to packaging.
…designs its products to be easy to clean and maintain?	E.4. Extend the useful life	Unique selection	Product design	Qualitative	2	This question assesses whether the company designs products for easy cleaning and maintenance, which contributes to extending the product's useful life and reducing the need for replacement, supporting circular economy principles.
Does your company carry out manufacturing/assembly activities internally?	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Not applicable	2	This question aims to determine whether the company performs manufacturing or assembly activities internally, providing insight into the control over production processes and the

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						potential for integrating circular economy practices in-house.
If you use forest fibers, do you buy raw materials or products certified by PEFC, FSC or equivalent?	E1. Ecodesign management and environmental communication	Unique selection	Product design	Qualitative	2	This question evaluates whether the company uses certified sustainable forest fibers (PEFC, FSC) in its products, ensuring responsible sourcing and alignment with eco-design principles in line with circular economy standards.
Have you replaced more polluting chemical compounds with less dangerous ones?	E.2. Reduction in resource use/consumption	Unique selection	Product design	Qualitative	2	This question assesses whether the company has taken steps to reduce the environmental impact of its products by replacing harmful chemicals with safer alternatives, promoting a reduction in resource consumption and a lower environmental footprint.
What compounds?	E.2. Reduction in resource use/consumption	Free text	Product design	Qualitative	0	This question seeks specific information about which harmful chemical compounds have been replaced by safer alternatives, providing details on the company's efforts to reduce pollution and promote more sustainable materials.
Are microfibres (polyesters, polyamides, etc.) used in manufacturing?	E.2. Reduction in resource use/consumption		Manufacturing/Assembly	Qualitative		Microfibre emissions occur both during the textile production process and during the useful life of finished products, through the washing and drying processes. Industrial and domestic wastewater treatment systems retain a large part of these microplastics, but another part escapes, reaching rivers and finally the seas, depositing in natural ecosystems.

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… reuse containers and/or packaging of the raw materials you purchase (such as pallets, cardboard, etc.)?	PE.3. Industrial Symbiosis	Unique selection	Manufacturing/Assembly	Qualitative	2	This question assesses whether the company reuses packaging and containers used for raw materials, fostering circular economy practices by reducing waste and promoting resource efficiency in the supply chain.
Indicate the percentage	PE.3. Industrial Symbiosis	Unique selection	Manufacturing/Assembly	Quantitative	4	This question asks for the percentage of raw material packaging and containers that are reused, providing a metric to measure the company's commitment to industrial symbiosis and circularity in its operations.
Reuse the scraps produced in the production process	PE.3. Industrial Symbiosis	Unique selection	Manufacturing/Assembly	Qualitative	2	This question evaluates whether the company reuses scraps generated during production, promoting resource recovery and reducing waste in alignment with circular economy principles.
Estimated % of reuse of scraps	PE.3. Industrial Symbiosis	Unique selection	Manufacturing/Assembly	Quantitative	4	This question asks for the estimated percentage of production scraps that are reused, offering a quantitative measure of the company's efforts to minimize waste and optimize resource usage.
Optimize your processes to generate the minimum amount of scraps	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Qualitative	2	This question examines whether the company optimizes its processes to minimize scrap generation, which contributes to reducing waste and enhancing the sustainability of its manufacturing practices.
Wood waste, do you reuse it for other products?	PE.3. Industrial Symbiosis	Unique selection	Manufacturing/Assembly	Qualitative	3	This question assesses whether the company reuses wood waste for other products, supporting circular economy practices by diverting waste from landfills and creating

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						new value from by-products.
Do you reuse the scraps/cuts for other products?	PE.3. Industrial Symbiosis		Manufacturing/Assembly	Qualitative		This question assesses whether the company reuses scraps or cuts generated during production, promoting resource efficiency and reducing waste through the reuse of by-products.
Is recycled raw material used in the manufacturing process?	PE.3. Industrial Symbiosis		Manufacturing/Assembly	Qualitative		By asking this, we aim to determine if the company incorporates recycled materials into its manufacturing process, which supports circularity by reducing the need for virgin raw materials.
… minimizes water consumption in its production process? Especially in the dyeing and finishing stages of textiles	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Qualitative	2	Equipment that uses water efficiently should be used, long washing cycles should be avoided and water should be reused in more than one process.
Estimated % reduction in discharges	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Quantitative	4	This question quantifies the reduction in discharges, providing insights into the company's efforts to reduce environmental pollution from its production processes.
energy consumption per unit of production (YES/NO/data)	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Quantitative		This question seeks to understand the company's energy consumption per production unit, a key metric for evaluating energy efficiency and sustainability in manufacturing processes.
water consumption per production unit (YES/NO/data)	PE.4. Efficient technologies	Unique selection	Manufacturing/Assembly	Quantitative		This question explores the company's water consumption per production unit, helping to assess its approach to water usage efficiency and its impact on water resources.
Have you taken steps to reduce returns, such as accurate sizing	E.3. Functional optimization of the product			Qualitative		Accurate sizing and standardized production processes help minimize returns, reducing waste

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guides and standardizing production?						and enhancing the product lifecycle's efficiency.
In my company we carry out upcycling tasks, so that we creatively transform used clothing items into new designs or accessories.	S.1. User orientation/product customization	Unique selection	Sale and end of life	Qualitative		Upcycling adds value to used products, offering a creative way to extend their lifecycle while reducing waste and promoting sustainable consumption.
We carry out periodic tests to ensure minimum product durability under normal conditions of use, as well as resistance to shrinkage and weathering.	E.3. Functional optimization of the product	Unique selection	Sale and end of life	Qualitative		Ensuring product durability under normal use conditions helps extend its life, reducing the need for replacements and contributing to a more sustainable product lifecycle.
Are end users informed on the label of the characteristics of the products: composition, cleaning and maintenance tips?	S.2. Extend the useful life					Informing consumers about product care promotes better maintenance, increasing the product's useful life and reducing its environmental impact through fewer replacements
… earns income from recovering/recycling components/materials from used products? (reconditioning or remanufacturing) Do you reuse or resell used clothing?	PE.6 Remanufacturing	Unique selection	Sale and end of life	Qualitative	2	Reusing and reselling clothing reduces the use of water, fertilizers and pesticides during the cultivation of linen and cotton, as well as the use of water, dyes, wetting agents, surfactants and all kinds of products related to dyeing and manufacturing.
In our products we use standard components for those parts that are prone to breakage.	S.2. Extend the useful life	Unique selection	Sale and end of life	Qualitative		Using standard components for vulnerable parts enhances the ease of repair, contributing to longer product lifespans and reducing waste.
Please indicate the percentage of easily separable materials in your product.	TB.3. Waste recovery: recycling and energy	Unique selection	Sale and end of life	Quantitative	4	The separability of materials is essential for efficient recycling, ensuring that products are easier to disassemble and thus more sustainable in the end-of-life phase.

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Please indicate the percentage of materials in your product that are expected to end up in landfill (taking into account current techniques, separability, etc.)	TB.3. Waste recovery: recycling and energy	Unique selection	Sale and end of life	Quantitative	4	Understanding the proportion of materials likely to end up in landfills is crucial for evaluating a product's environmental impact and the opportunities for improving waste recovery.

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6 Adaptation for Businesses, Facilitators, and Policy Makers

6.1 Segmented Approach and Stakeholder Value

A core objective of the FABRIX self-assessment is to **tailor** questions, guidance, and outputs to the specific needs of **three key stakeholder groups** in the textile and clothing (T&C) ecosystem:

1. **Businesses** (e.g., designers, manufacturers, retailers, artisans, raw material producers)
2. **Facilitators** (e.g., NGOs, cluster managers, industry associations, training providers)
3. **Policy Makers** (e.g., municipal governments, regional authorities, EU-level agencies)

a) Businesses

Practical Benefits

- **Performance Insights**: By completing tailored modules (e.g., environmental metrics, social/community engagement, circular design), businesses gain a clear baseline of where they stand in sustainability and circularity.
- **Potential Funding**: Those seeking grants (like FABRIX FSTP opportunities) can showcase readiness, identify relevant areas for improvement, and demonstrate strong engagement.
- **Tailored Recommendations**: The questionnaire data feeds into a **dashboard** (or PDF report) suggesting possible next steps—like investigating local recycling partners, exploring new certifications, or adopting advanced design-for-disassembly methods.

Usage Scenarios

- **Voluntary or Incentivized**: While the tool is not strictly compulsory, businesses often participate to access project resources (e.g., small grants, matchmaking with local facilitators).
- **Onboarding and Mini-Questionnaires**: During registration, they decide which "mini-questionnaires" (e.g., Product Design, Social Embeddedness, Technology Readiness) are relevant to their operation. This approach keeps the process manageable in terms of time investment.

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b) Facilitators

Practical Benefits

- **Aggregated Data**: Facilitators see **anonymized** or **opted-in** data, allowing them to spot common challenges (e.g., minimal recycled content, lack of repair services) and direct capacity-building programs accordingly.
- **Guidance & Benchmarking**: The tool highlights who is already advanced in circular design vs. who needs fundamentals. Facilitators can form targeted training cohorts and run thematic workshops.
- **Networking**: By identifying synergy potentials (like multiple brands interested in local supply chains), facilitators can organize co-creation events or collaborative projects.

Usage Scenarios

- **Optional Follow-Up**: Businesses can opt for direct contact from facilitators. If they do, facilitators can craft interventions or pilot projects (e.g., a city-level campaign on waste minimization or a collaborative upcycling initiative).
- **Platform Integration**: Facilitators access the platform's aggregated "heatmaps" or distribution curves (e.g., average energy reduction across local SMEs), shaping better interventions.

c) Policy Makers

Practical Benefits

- **Macro-Level Insights**: The self-assessment's aggregated results highlight sector-wide trends—like the percentage of T&C actors using renewable energy, employing local artisans, or adopting advanced digital tools.
- **Evidence-Based Regulation**: Identifying gaps (e.g., low awareness of EPR) can spur new incentives, policy refinements, or training programs.
- **Incentive Structures**: Data can guide the design of grants or tax breaks targeting, for instance, advanced eco-design or local supplier networks.

Usage Scenarios

- **Voluntary Data-Sharing**: Businesses opting to share non-anonymized data can be approached with policy pilots or recognized as "exemplars."
- **Community-Focused**: Where friction between policy mandates and local community norms emerges (Section 4 of the questionnaire), policy makers can adjust frameworks to reduce conflict and enhance uptake.

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6.1.1 Value Proposition for Each Stakeholder

Why Businesses Should Invest Time

- **Operational Efficiency**: Identifying quick wins in energy reduction, material reuse, or collaborative distribution can directly impact profit margins.
- **Brand Differentiation**: Demonstrating social and environmental commitment resonates with consumers increasingly demanding transparency and responsibility.
- **Access to Funding & Partnerships**: Many project-based or public grants (including FABRIX's small grants) require baseline sustainability data. The self-assessment provides this in a structured format.

Why Facilitators Should Engage

- **Targeted Program Design**: Instead of generic training, facilitators use questionnaire data to **pinpoint** real issues (like minimal knowledge of eco-design or institutional misalignment).
- **Community Building**: Facilitators can nurture networks of companies with complementary strengths—accelerating circular transitions at the local level.
- **Monitoring Impact**: By revisiting self-assessments over time, facilitators can measure how their interventions shift the needle on specific metrics (e.g., adoption of new tech or local supply-chain collaborations).

Why Policy Makers Gain Value

- **Data-Driven Policy**: Policymaking often grapples with insufficient ground-level data. This tool illuminates exactly where T&C actors struggle or excel.
- **Benchmarking Progress**: City governments (like Athens or Rotterdam) can track improvements in circular metrics year over year, informing future urban development strategies.
- **Strategic Resource Allocation**: If analysis reveals major energy inefficiencies, local authorities could channel green bonds or subsidies toward renewable adoption in T&C manufacturing hubs.

6.1.2 Usage Scenarios and Incentives

1. **Compulsory vs. Voluntary**:
   a. **Voluntary but Incentive-Linked**: Participants who complete at least some core sections can access certain features or funding opportunities.
2. **First-Time Login**:
   a. The platform's sign-up process distinguishes between *Viewers* (minimal data input) and *Community Members* (deeper self-assessment), ensuring we **respect privacy** while offering advanced networking and funding for those who opt in.
3. **Follow-Up**:
   a. Over time, businesses can re-take sections to measure improvements. Facilitators and policy makers track aggregated shifts, validating QENF's "observer effect" (H4).
4. **Cross-Country and Cross-Sector Comparisons**:
   a. Summaries reveal differences between, say, Athens-based artisan clusters and Rotterdam's high-tech producers, guiding city-specific approaches or facilitating cross-regional knowledge exchange.

By catering explicitly to each stakeholder group—businesses, facilitators, and policy makers—the FABRIX self-assessment becomes more than a data-gathering exercise. It sets up

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pathways to capacity-building, innovation, and policy engagement across the T&C ecosystem.

6.2 Development

6.2.1 Questionnaire Structure Overview

Below is a **high-level** outline (refer to Annex I for complete questions):

1. **Basic Profile**: Role, location, team size—essential for tailoring.
2. **Environmental & Circular Metrics**: From carbon footprint and ISO certifications to design for disassembly and manufacturing waste minimization.
3. **Social & Community Embeddedness**: Worker well-being, local collaboration, inclusive hiring.
4. **Institutional Alignment**: Awareness of regulations (EPR), synergy or friction with community norms.
5. **Adaptive & Quantum Strategies**: Observing if measuring metrics led to emergent changes, crisis pivots, or unconventional alliances.
6. **Additional Context & Feedback**: Free-form commentary and an option to connect with facilitators or remain anonymous.
7. **Optional Advanced Section** (Organizational & Strategic Dimensions): Technology adoption, dynamic capabilities, social capital, and business model innovation for those seeking deeper insights.

Alignment With QENF

- **H1 (Quantum Dynamics)**: Questions about multiple concurrent strategies, unexpected collaborations ("tunnelling"), or partial adoption of green energy ("superposition") appear under Environmental & Circular Metrics and Adaptive Strategies.
- **H2 (Social Embeddedness)**: Focuses on local community ties, trust in supply chain partners, and workforce inclusivity.
- **H3 (Institutional Integration)**: Captured by formal certifications, policy awareness, and potential friction with local norms.
- **H4 (Adaptive Strategies)**: Prominent in the sections on measuring impacts and changing behaviour, major pivots, and crisis responses.

6.2.2 Iteration and Refinement

During the next few months, in order to review and improve the developed self-assessments and how it suits both the platform and the potential users, some iteration and refinement actions will be carried out.

The following actions can be highlighted:

- **Co-creation events, involving local T&C stakeholders**

- **Continuous Improvement Cycle**, ensuring a living tool that evolves based on real-world feedback: 1. Pilot Feedback → 2. Revised Questionnaire → 3. Platform Updates

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6.2.3 Connection to Other WPs and Future Deliverables

WP2 and the Self-Assessment Deliverables

- **D2.1 (Interviews)** and **D2.2 (GIS)** feed into this deliverable (D2.3) by providing context-specific questions on resource flows, trust levels, spatial distribution, and local governance.
- **D2.4 (Co-Creation Event)** will further refine the questionnaire by testing it with real users—checking for clarity, relevance, and user-friendliness.

WP3: Digital Platform Development

- Once the questionnaire is finalized, it becomes a **core feature** of the digital platform. This platform will:
- **Host** the self-assessment, enabling T&C actors to answer tailored questions.
- **Visualize** results (e.g., dashboards, PDF reports) to guide next steps or best practices.
- **Incorporate** iterative feedback loops, ensuring the tool remains adaptive as new challenges and policies arise.

WP4: Action Research, Capacity Building, and FSTP

- The outcomes from the questionnaire—particularly aggregated insights—will be critical in:
- **Action Research & Capacity Building**: As more businesses complete the self-assessment, facilitators and policy makers can:
    - Identify prospective recipients of **FSTP grants** (20 businesses in Athens/Rotterdam, 4 facilitators).
    - Design **tailored capacity-building** sessions—knowing exactly which topics (waste management, supply chain tracking, etc.) are most needed.
- Monitor changes over time

6.3 Results & Conclusions

6.3.1 Current Status and Preliminary Insights

While **full-scale data collection** has not begun, the project consortium has:

- **A fully drafted Self-Assessment Questionnaire**: Organized into segments (Basic Profile, Environmental Metrics, Social Embeddedness, Institutional Alignment, Adaptive Strategies, Additional Feedback, and an optional Advanced section).
- **Initial Pilot**: A small-scale test in a Rotterdam co-creation event, revealing user interest but also the need for a short, modular approach.
- **Forthcoming Pilot**: The next test in Athens (with SOFFA, Fashion Revolution Greece, and TCBL communities) will refine clarity, confirm the approach for micro-enterprises, and gather insights on technology-specific questions (3D design, advanced manufacturing).

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6.3.2 Key Takeaways So Far

1. **Modularity is Essential**: T&C stakeholders vary widely in size, tech adoption, and supply-chain complexity. Splitting the self-assessment into "mini-questionnaires" prevents drop-off and data overload.
2. **Social Dimensions Matter**: Feedback strongly supports incorporating deeper metrics on worker well-being, inclusivity, and local community ties—an area often overlooked by purely environmental checklists.
3. **Policy & Grassroots Alignment**: Respondents want clarity on how local/regional policies can support circular transitions. EPR is widely unknown or partially understood, suggesting a need for deeper awareness campaigns.
4. **Quantum-Inspired Concepts Resonate**: Although not framed as "quantum," many users grasp the idea that **measuring** leads to improvements (observer effect, H4), that new alliances sometimes bypass standard barriers (tunnelling), and that multiple strategies can coexist until one "collapses" (superposition).

6.3.3 Next Steps

- **Further Testing**:
    - **Athens Co-Creation**: Gather user feedback from local businesses and NGOs to refine language and scope.
    - **European TCBL Engagement**: Leverage TCBL's broader network to test the tool in different national contexts, ensuring relevance for diverse cultural and regulatory environments.

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- **Refinements and Finalization**:
  - **Question Simplification**: Potentially reduce jargon or merge overlapping items.
  - **Waste & Technology Sections**: Expand detail for advanced waste inventory questions (off-cuts, unsold garments) and technology specifics (digital prototyping, AI-based optimization).
  - **Certifications**: Add user-friendly checklists for common T&C standards (GOTS, OEKO-TEX, BCI, etc.) to measure motivations and compliance levels.
- **Full Roll-Out** (WP3 and WP4 Collaboration):
  - **Official Launch**: Integrate the final self-assessment into the FABRIX platform with a user-friendly interface, set up aggregated dashboards for facilitators and policy makers.
  - **Action Research**: Use real data from SMEs applying for FSTP grants, track changes over time to validate QENF's observer effect, and refine theoretical constructs.
- **Deliverable 2.4:** Self-assessment questionnaire described in this document (D2.3) will be updated thanks to the information that will be gathered thanks to the iteration and refinement actions, and the different inputs that will be received during the next steps to be taken in future WP. The questionnaire final version will be included in D2.4, together with a description of the technical work carried out through the analysis of inputs and their transformation into improvements and modifications.

6.3.4 Contribution to FABRIX Objectives

1. **Bridging Knowledge Gaps**: The self-assessment collects granular data—social, environmental, institutional—never before aggregated in such a user-friendly platform for T&C.
2. **Fostering Trust**: By allowing partial anonymization and giving businesses control over data-sharing, the questionnaire encourages **honest** participation, building trust among SMEs who might otherwise be wary of disclosure.
3. **Supporting Systemic Change**: Combined with co-creation events, capacity building, and policy engagement, the tool actively drives *action*, not just *analysis*. Businesses see immediate benefits in resource savings and brand differentiation; facilitators gain well-targeted programs; policy makers obtain the evidence base to refine circular economy initiatives.
4. **Testing QENF Hypotheses (in Annex II)**: Through iterative measurement, we observe if (and how) measurement changes behaviour (H4), whether local trust fosters more circular collaborations (H2), and the extent to which formal policy (H3) interacts with bottom-up norms. Over time, these insights will sharpen QENF's theoretical constructs while delivering real, measurable improvements in T&C.

The FABRIX self-assessment questionnaire stands at the **intersection** of rigorous theoretical grounding (QENF) and practical stakeholder needs. Through pilot testing and iterative refinement, we aim to **unlock** circular, socially responsible transformations across Europe's T&C networks. The next co-creation steps in Athens and subsequent roll-outs will confirm the tool's usability, enrich its indicators, and pave the way for broader **systemic change**—meeting the FABRIX project's core ambition to build a truly **circular**, **innovative**, and **people-centred** textile future.

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8 ANNEX I: CIRCULAR AND SOCIAL SYSTEM SELF-ASSESSMENT QUESTIONNAIRE

Formatting & Guidance

- **Answer Formats**:
  - Where "Yes/No" is indicated, you might allow a short text field for additional details.
  - For percentages or sub-questions (1–25%, 26–50%, etc.), consider radio buttons.
  - For frequency (Annually, Occasionally, etc.), use a dropdown or radio button.

- **Skip Logic**:
  - If "No" for certain key questions (e.g., "We do not do in-house manufacturing"), the platform can skip advanced details on manufacturing.
  - If "Yes" for environment manager or specific certifications, you can ask deeper sub-questions.
- **Tailored Paths**: If the user is a small designer, the platform can dynamically skip advanced supply-chain efficiency questions. Large producers might see more specific EPR or labor compliance prompts.
- **Knowledge Base** : "Why?" Buttons: Each question has a short explanation (pop-up or link) clarifying how it benefits the user and how data is used.
- **Non-Judgmental Wording**: The questionnaire frames best practices as opportunities, not moral judgments.
- **Optional Depth**: Users can delve deeper (extended sub-questions) or stay at a top-level assessment.
- **Documents attached:** After each question, the user can provide additional documentation to justify the answer. This can also be useful for companies to have all the information on the same platform.
- By merging robust circular and social metrics with institutional and quantum dynamics, this self-assessment can effectively gather data to validate QENF (H1–H4), while empowering stakeholders to see tangible next steps and connections in the broader FABRIX ecosystem.

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FABRIX SELF-ASSESSMENT QUESTIONNAIRE PROPOSAL

Introduction

Welcome to the FABRIX Self-Assessment Questionnaire!
- **Purpose**:
  - Help you reflect on your circular, social, and institutional practices in the T&C sector.
  - Provide *personalized feedback* on improving sustainability, social impact, and resilience.
  - Supply anonymized data for the FABRIX project, thereby enhancing the MANTEL platform and guiding local facilitators.
- **Data Usage & Confidentiality**:
  - Your responses remain private; you can choose what level of detail is shared with facilitators or policymakers.
  - Each question is accompanied by an optional "*Why this question?*" link or text for further explanation.
- **Instructions**:
  - Complete only sections or questions that apply to your organization (skip those irrelevant).
  - Upon completion, you receive a *summary* plus optional suggestions.
  - Look for "Practical FABRIX Gains" after each question to see how it may assist your *self-learning* and *self-development*.

Section 1. Basic profile

Purpose: Provide a contextual understanding of your organization's size, location, and role.
- Practical FABRIX Gains: Helps tailor future recommendations and allows city-based analytics (e.g., Athens vs. Rotterdam).

Questions
1. **Organization Name (optional)**
   - *Response Format*: Free text

2. Role
Please select the category that best describes your primary activity in the textile and clothing (T&C) sector.

A. Brand / Fashion Designer
(e.g., designing and marketing fashion under your own brand, creating collections)
B. Retailer (Multi-brand or Independent)
(e.g., physical or online store, selling garments, footwear, or accessories from multiple brands)
C. Manufacturer / Production (Garments, Footwear, Accessories)
(e.g., sewing, assembly, large-scale production lines; may include mending, sorting, or upcycling as part of the manufacturing process)

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D. Artisan / Craftsmanship
 (e.g., embroidery, weaving, loom work, traditional artisan crafts)
E. Farmer & Raw Material Producer
 (e.g., plant-based fibers, animal-based fibers, man-made or recycled raw materials)
F. Mill / Spinner / Weaving / Trim / Dyeing / Processing
 (e.g., spinning yarn, ginning, weaving fabrics, producing trims/supplies, dyeing and finishing textiles)
G. Circular Fashion Platform (B2B or B2C)
 (e.g., rental, swap, resell, collection/take-back services, secondhand marketplace)
H. Digital / Tech / R&D / Services
 (e.g., AI, IoT, data solutions, product design software, marketing/consulting, accounting, environmental or social advisory, R&D labs, investment services, policy-making, advocacy, training)
I. Facilitator / NGO / Advocacy / Public Body
 (e.g., local or international NGO, public institution, policy or awareness-raising entity, capacity-building organization)
J. Other (please specify):
 (if you do not see your activity adequately reflected in the above categories)
Other (specify)

2. **Location**
Response Format: Free text + city/region dropdown
- ο (If Athens/Rotterdam, specify)

3. **Team Size**
- ο *Response Format*: Numeric
- ο Why this question? Basic context.
- ο Relevant Hypothesis: None directly, though big or small companies may differ in *Adaptive* strategies (H4).

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Section 2. Environmental & Circular Metrics

Purpose & Rationale
- Practical FABRIX Gains:
  - Identifies where you stand regarding eco-design, waste minimization, or renewable energy usage.
  - Helps reflect on areas for cost savings, resource efficiency, or potential collaborations with local actors.
  - It allows to self-evaluate your performance in relation to issues related to the circular economy, and can guide you so that you can identify the areas that can be improved.

Questions

2.1 Environmental Management & Strategy
1. Environmental Manager/Department
   a. Question: "Does your company have dedicated personnel or a department for environmental management?"
   b. *Response Format*:
      i. Yes → (Select one)
         1. We have an Environmental Department
         2. We have an Environmental Manager (but no department)
         3. We have one person covering environment/quality/prevention
      ii. No
   c. Why this question?
      i. *Practical FABRIX Gains*: Recognize how structured your environmental approach is; consider adding an eco-manager if lacking.
2. Carbon Footprint Measurement
   a. Question: "Do you measure your company's carbon footprint?"
   b. *Response Format*: (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains*: Knowing carbon data can reveal cost-cutting or synergy opportunities (e.g., energy savings).
3. If 2 affirmative:
   a. When quantifying your company's carbon footprint, do you take into account both direct and indirect aspects?
   b. *Response Format*: (Yes →Methodology used / No)
   c. Why this question?
      i. *Practical FABRIX Gains*: determining the scope of carbon footprint calculations.

4. ISO 14001 Certification
   a. Question: "Are you certified to ISO 14001 (Environmental Management)?"
   b. *Response Format*: (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains*: It enables compliance with legal environmental requirements. It reduces environmental risks. It improves efficiency and corporate image. It facilitates access to new markets.

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5. Worker Training on Environmental Issues
    a. Question: "Do you train workers on environmental issues?"
    b. *Response Format*:
        i. Yes → *How often?* (Annually / Every 2 years / Occasionally)
        ii. No
    c. Why this question?
        i. *Practical FABRIX Gains*: *Updated environmental education is key to making responsible decisions and tackling ecological challenges with effective and sustainable solutions.*
6. Use of Renewable Energy
    a. Question: "Does your company use renewable energy sources?"
    b. *Response Format*:
        i. Yes → Approx. %? (1–25%, 26–50%, 51–75%, >75%)
        ii. No
    c. Why this question?
        i. *Practical FABRIX Gains*: Potential cost savings, brand enhancement.
7. On-Site Renewable Generation
    a. Question: "Do you have on-site renewable installations (e.g., solar panels)?"
    b. *Response Format*: (Yes / No)
    c. Why this question?
        i. *Practical FABRIX Gains*: *Having internal renewable energy facilities makes the company more self-sufficient and lowers its carbon footprint, supporting EU climate goals.*

8. Environmental Criteria for Supplier Selection
    a. Question: "Do you consider environmental requirements when selecting suppliers?"
    b. *Response Format*: (Yes / No)
    c. Why this question?
        i. *Practical FABRIX Gains*: *Environmental assessment of clients is key to ensuring sustainable practices, reducing risks, and promoting responsible business operations*
9. Local/Close Suppliers
    a. Question: "Do you work with geographically close suppliers?"
    b. *Response Format*:
        i. Yes
        ii. No → If No, why? (No local suppliers / Cost-quality ratio / Other)
    c. Why this question?
        i. *Practical FABRIX Gains*: *Local suppliers reduce transport emissions, save time, and ensure faster deliveries.*

2.2 Product Design & Eco-Design
1. In-House Product Design
    a. Question: "Is your product design done in-house?"
    b. *Response Format*: (Yes / No)

    If the answer is NO, the entire Product Design and Ecodesign block is skipped.

2. Environmental Evaluation of Products

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a. Question: "Do you assess your products' environmental impact?"
b. *Response Format*:
    i. Yes → *How many?* (All / >Half / <Half / Occasional)
    ii. No
c. Why this question?
    i. *Practical FABRIX Gains*: *Evaluating products environmentally ensures sustainability, reduces impact, and promotes responsible choices.*

3. ISO 14006 (Ecodesign)
    a. Question: "Are you certified to ISO 14006 for Ecodesign?"
    b. *Response Format*: (Yes / No)
    c. Why this question?
        i. *Practical FABRIX Gains: ISO Eco-design certification enhances sustainability, reduces environmental impact, boosts efficiency, and improves brand reputation*
4. Use of Recycled Raw Materials
    a. Question: "Do you design with recycled materials?"
    b. *Response Format*:
        i. Yes → Approx. %? (1–25%, 26–50%, 51–75%, >75%)
        ii. No
    c. Why this question?
        i. *Practical FABRIX Gains: promotes resource efficiency and reduces the environmental impact of raw material extraction.*
5. Forest fibres certified
    a. Question: "If you use forest fibres, do you buy raw materials or products certified by PEFC, FSC or equivalent??"
    b. *Response Format*:
        i. Yes → Approx. %? (1–25%, 26–50%, 51–75%, >75%)
        ii. No
        iii. Not applicable
    c. Why this question?
        i. *Practical FABRIX Gains: reduces the environmental impact of raw material extraction.*

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6. *Ecolabels*
   a. Question: "Have eco-labels been obtained for the product or for the raw materials?"
   b. *Response Format:*
      i. Yes → Approx. %? (1–25%, 26–50%, 51–75%, >75%)
      ii. No
   c. Why this question?
      i. *Practical FABRIX Gains: promotes resource efficiency and reduces the environmental impact of raw material extraction.*

7. Resource Minimization in Design
   a. Question: "Do you design products to minimize resource use (lightweighting, fewer components)?"
   b. *Response Format:* (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

8. *Easy to recycle*
   a. Question: "Are your products designed with recycling in mind? For example, is the complexity of materials reduced in design ?"
   b. *Response Format:* (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

9. Material Recyclability
   a. . Question: "Approx. % of materials that are easily recyclable?"
   b. *Response Format:* (0, 1–25%, 26–50%, 51–75%, >75%)
   c. Why this question?
      i. *Practical FABRIX Gains: promotes resource efficiency and reduces the environmental impact of raw material extraction.*

10. *Design for cleaning/maintenance*
    a. Question: "Do you design your products to be easy to clean and maintain?"
    b. *Response Format:* (Yes / No)
    c. Why this question?
       i. *Practical FABRIX Gains: product life extension*

11. Design for Disassembly/Repair
    a. Question: "Are your products designed to be easily disassembled/repaired for reuse?"
    b. *Response Format:* (Yes / No / Not applicable)
    c. Why this question?
       i. *Practical FABRIX Gains: enables efficient recycling, reduces waste*

12. Eliminating Hazardous Substances
    a. Question: "Do you replace harmful chemicals with safer alternatives?"
    b. *Response Format:* (Yes / No/Not applicable)
    c. Why this question?
       i. *Practical FABRIX Gains: less contaminant products*

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13. Specific Chemicals *(Skip if not applicable)*
   a. E.g., Chrome VI, solvent-based paint usage, dyes etc.

14. Are microfibres (polyesters, polyamides, etc.) used in manufacturing?
   a. Question: "Are microfibres (polyesters, polyamides, etc.) used in manufacturing?
   b. *Response Format*: (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains: Reduced environmental pollution, improved biodegradability, and safer textiles for consumers*

15. Timeless design
   a. Question: "Do you design your clothing with a timeless design to ensure the longevity of the product?"
   b. *Response Format*: (Yes / No/Not applicable)
   c. Why this question?
      i. *Practical FABRIX Gains: Extended product lifespan, and lower environmental impact*

2.3 Manufacturing & Assembly

1. In-House Manufacturing
   a. Question: "Is manufacturing/assembly done internally?"
   b. *Response Format*: (Yes / No)

If the answer is NO, the entire Manufacturing & Assembly block is skipped.

2. Material Consumption Reduction
   a. Question: "Do you minimize material use in production?"
   b. *Response Format*:
      i. *Yes → % reduction in last 3 years?* (1–25%, 26–50%, etc.)
      ii. No
   c. Why this question?
      i. *Practical FABRIX Gains: reduces costs, decreases waste*

3. Materials from renewable and biodegradable sources
   a. Question: "Have materials from renewable and biodegradable sources been chosen?"
   b. *Response Format*: (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains: Organic farming allows for reduced consumption of water, fertilizers, pesticides,...*

4. Reusing Raw Material Packaging
   a. Question: "Do you reuse inbound packaging, such as pallets, boxes...?"
   b. *Response Format*:
      i. *Yes → Approx. %?*
      ii. No
   c. Why this question?
      i. *Practical FABRIX Gains: reduces waste, lowers costs*

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5. Processes optimization
    d. Question: "Do you optimize your processes to generate the minimum amount of scraps? (e.g.: use of cutting optimization software?"
    e. *Response Format: (Yes / No/Not applicable)*
    f. Why this question?
        i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

6. *Scraps reuse*
    a. Question: "Do you reuse the scraps produced in the production process...?"
    b. *Response Format*:
        i. Yes → *Approx. %?*
        ii. No
        iii. Not applicable
    c. Why this question?
        i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

7. Energy Consumption
    a. Question: "Do you take actions to reduce energy consumption?"
    b. *Response Format*:
        i. Yes → *% reduction estimated over the last 3 years?*
        ii. No
    c. Why this question?
        i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

8. Water Consumption
    a. Question: "Do you take actions to reduce water consumption?"
    b. *Response Format*:
        i. Yes → *% reduction?*
        ii. No
    c. Why this question?
        i. *Practical FABRIX Gains: reduces costs, lowers environmental impact, enhances efficiency, and improves sustainability*

9. Industrial Symbiosis
    a. Question: "Do you use by-products or energy from other companies?"
    b. *Response Format*: (Yes → specify / No)
    c. Why this question?
        i. *Practical FABRIX Gains: cost savings, waste reduction, resource efficiency*

10. Water reuse
    a. Question: "Do you reuse part of the water consumed in the production process?"
    b. *Response Format*: (Yes → *% reused* / No)
    c. Why this question?
        i. *Practical FABRIX Gains: cost savings, waste reduction, resource efficiency*

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11. Waste Minimization
   a. Question: "Do you actively reduce production waste?"
   b. *Response Format*:
      i. Yes → *Approx. % reduction in the last 3 years?*
      ii. No
   c. Why this question?
      i. *Practical FABRIX Gains: cost savings, waste reduction, resource efficiency*

12. Energy consumption per unit of production
   a. Indicator: Energy consumption per unit of production
   b. *Response Format*:
      i. Data
      ii. No Data Available
   c. Why this question?
      i. *Practical FABRIX Gains: having indicator relating energy used per unit of production*

13. Water consumption per unit of production
   a. Indicator: Water consumption per unit of production
   b. *Response Format*:
      i. Data
      ii. No Data Available
      iii. Not applicable
   c. Why this question?
      i. *Practical FABRIX Gains: having indicator relating water used per unit of production*

14. Product tests
   a. Question: We carry out periodic tests to ensure minimum product durability under normal conditions of use, as well as resistance to shrinkage and weathering.
   b. *Response Format*:
      i. Yes
      ii. No
      iii. Not applicable
   c. Why this question?
      i. *Practical FABRIX Gains: Improved product quality, enhanced durability, customer satisfaction, and reduced returns*

15. Lean Manufacturing/Industry 4.0
   a. Question: "Have you introduced lean or Industry 4.0 solutions (automation, sensors, etc.)?"
   b. *Response Format*: (Yes → specify / No)
   c. Why this question?
      i. *Practical FABRIX Gains: Increases efficiency, reduces waste, cost savings.*

2.4 Distribution & Logistics

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1. Influence Over Distribution
    a. (Yes / No)

If the answer is NO, the entire Distribution & Logistics block is skipped.

2. Shared Transportation
    a. Question: "Does your company share the transport of raw materials or finished products with other nearby companies?"
    b. *Response Format:* (Yes → specify / No)
    c. Why this question?
        i. *Practical FABRIX Gains: Reduces costs, lower emissions, increases efficiency, and optimizes logistics.*

3. Logistics Optimization
    a. Question: "Do you optimize routes, loading, or use multimodal transport?"
    b. *Response Format:* (Yes → *continuously/sporadically* & *methods used* / No)
    c. Why this question?
        i. *Practical FABRIX Gains: , reduces emissions, improves efficiency, and enhances logistics flexibility*
4. Returns reduction
    a. Question: "Have you taken steps to reduce returns, such as accurate sizing guides and standardizing production?"
    b. *Response Format:* (Yes → specify / No/Not applicable)
    c. Why this question?
        i. *Practical FABRIX Gains: lower costs, increased customer satisfaction, improved efficiency*

2.5 Sale & End-of-Life

2. Does your company sell products?

    d. Question: ¿Does your company sell products?
    e. *Response Format:*
        i. Yes
        ii. No

    If the answer is NO, the entire Sale & End of life block is skipped.

3. Services associated with the product
    d. Question: "Does your company earns additional income through services associated with the product (customization, updating, additional functionalities, etc.?"
    e. *Response Format:* (Yes → specify / No/Not applicable)
    f. Why this question?
        i. *Practical FABRIX Gains: Enhanced customer satisfaction, increased value, stronger loyalty, and new revenue opportunities.*

4. Product-as-a-Service

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a. Question: "Could your products be rented or leased (the user can be charged based on the use made of the product, without having to buy it)?"
b. *Response Format*: (Yes / No/Not applicable)
c. Why this question?
   i. *Practical FABRIX Gains: Lower upfront costs, continuous updates, increased flexibility, and improved sustainability*

5. Repair Services & Second Life
   a. Question: "Do you offer product repair or refurbishment?"
   b. *Response Format*: (Yes → cheaper than new? / No)
   c. Why this question?
      i. *Practical FABRIX Gains: Extended product lifespan, cost savings, enhanced customer loyalty*

6. Recovering/Recycling Income
   a. Question: "Does the company promote/incentivize giving a product a second life? For example, by accepting the product in exchange for discounts on the purchase of new products, providing a free product collection service?"
   b. *Response Format*: (Yes / No)
   c. Why this question?
      i. *Practical FABRIX Gains: Extended product lifespan and enhanced customer loyalty*

7. Upcycling
   a. Question: "In my company we carry out upcycling tasks, so that we creatively transform used clothing items into new designs or accessories"
   b. *Response Format*: (Yes / No/ Not applicable)
   c. Why this question?
      i. *Practical FABRIX Gains: unique designs, reduced waste, sustainable resource use, and lower environmental impac*t

8. Product information
   a. Question: "Are end users informed on the label of the characteristics of the products: composition, cleaning and maintenance tips?"
   b. *Response Format*: (Yes / No/ Not applicable)
   c. Why this question?
      i. *Practical FABRIX Gains: increases the product's useful life and reduces its environmental impact*

9. "Approx. % of materials that end in landfill
   a. Question: "Please indicate the percentage of materials in your product that are expected to end up in landfill (taking into account current techniques, separability, etc.)
   b. *Response Format*: "% that may end up in landfill?" (0, 1–25%, 26-50%, 51-75, 76-100 %)
   c. Why this question?
      i. *Practical FABRIX Gains: enhanced sustainability strategies*

Section 3. Social & Community Embeddedness

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Purpose: Assess your local engagement, community initiatives, inclusivity, and transparency.

- Practical FABRIX Gains: Identify scope for social innovation (e.g., employing vulnerable groups, building stronger local ties).

3.1 Community & Local Engagement

1. Local Community Initiatives
   a. *Response Format*: 5-point Likert (Never → Always)
   b. *Question text*: "Does your organization support local communities (social programs, development, cohesion)?"
2. Support for Local Suppliers
   a. *Response Format*: 5-point Likert (Never → Always)
3. Collaboration with Local Stakeholders
   a. *Response Format*: 5-point Likert (Never → Always)
   b. *Question text*: "Do you partner with local actors (e.g., design clusters, city councils) for sustainable or circular projects?"

3.2 Human Rights & Worker Well-Being

1. Human Rights Policy & Working Conditions
   a. *Response Format*: 5-point Likert (Never → Always)
   b. E.g., living wage, safety, no forced/child labor
2. Inclusive Hiring *(vulnerable groups)*
   a. *Response Format*: 5-point Likert (Never → Always)
3. Cultural Heritage & Local Traditions
   a. *Response Format*: 5-point Likert (Never → Always)
   b. E.g., artisanal weaving or local craft preservation

3.3 Transparency & Public Sharing

1. Supply Chain Traceability
   a. *Response Format*: 5-point Likert (Never → Always)
   b. E.g., publicly share supplier info, factory locations

- 3.4 Proximity to Suppliers
- If not covered in Section 2: "Do you prioritize local suppliers?" (Yes / No → reason)

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Section 4. Institutional Alignment

Purpose: Explore synergy or friction with policies or grassroots norms.

- Practical FABRIX Gains: Reveals if you can tap local subsidies, or if you face policy constraints.

1. Regulatory Awareness & Compliance
   a. E.g., "Familiar with EPR?" (Yes, applying / Aware / Not aware)
2. Local/Regional Incentives
   a. E.g., "Any known municipal grants for circular solutions?" (Yes / No)
3. Influence of Grassroots
   a. "Do you collaborate with local repair cafes or activism groups?" (Yes / Some awareness / None)
4. Policy–Community Tensions
   a. "Have you experienced friction between policy mandates and local community norms?" (Frequent / Occasional / None)

Section 5. Adaptive & Quantum-Inspired Strategies

Purpose: Identify emergent innovations, major pivots, or "quantum-like" leaps.

- Practical FABRIX Gains: Facilitators see if measuring data prompts big changes; who's open to scenario modelling.

1. Metric Visibility & Behaviour
   a. "Do you measure circular/social metrics?" (Systematic / Informal / Not at all)
   b. "Has it changed your practices?" (Major / Minor / None)
2. Major Pivot or Crisis Response
   a. "Have you reshaped your business model after a disruption?" (Yes → short example / No)

Unconventional Collaborations (Tunnelling)
   b. "Have you overcome major barriers through unique alliances?" (Yes → short text / No)

Section 6. Additional Context & Feedback

Purpose: Let users share open-ended insights or request follow-up.

- Practical FABRIX Gains: Could highlight emergent themes not captured in earlier questions.

1. Open-Ended Reflection
   a. Free text: "Any success stories, obstacles, or next steps?"
2. Future Collaboration
   a. "Would you like a local facilitator to contact you for partnerships, training, or funding?" (Yes/No)
3. Privacy & Data-Sharing
   a. "Select data-sharing preference:
      i. Anonymized only
      ii. Full contact details
      iii. No sharing beyond internal analytics"

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Section 7. Organizational & Strategic Dimensions (Optional Advanced)

Purpose: Delve into technology use, dynamic capabilities, social capital, and business model.

- Practical FABRIX Gains: See if you're prepared for advanced manufacturing, cross-company collaboration, or new business model innovation.

1. Technology Adoption *(Likert: 1–5)*
   a. "Using technology-based manufacturing is advantageous for our firm."
   b. "Our company favours advanced tech in product design/manufacturing."
   c. "Overall, advanced tech enhances our productivity."
2. Dynamic Capabilities
   a. (a) Absorptive
      i. "We have the skills to implement newly acquired knowledge."
      ii. "We can transform that knowledge."
      iii. "We can use that knowledge effectively."
   b. (b) Transformative
      i. "Employees are encouraged to challenge outmoded practices."
      ii. "We evolve rapidly with shifting priorities."
      iii. "We are creative in operations."
      iv. "We seek out new ways of doing things."
      v. "Employees get managerial support to try new ideas."
      vi. "We introduce improvements/innovations frequently."
3. Collaboration (Social Capital)
   a. (a) Internal
      i. "Overall, employees' intentions in my department are good."
      ii. "They are honest/trustworthy."
      iii. "They exhibit integrity."
      iv. "I fully trust them."
   b. (b) External
      i. "We have a climate of cooperation/trust in agreements with other companies."
      ii. "Partners assume high commitment."
      iii. "Partners share common goals/interests."
      iv. "Partners share a common vision re: environment, success factors."
4. Business Model Themes
   a. (a) Novelty
      i. "Our model offers new combos of products/services/information."
      ii. "We bring new types of customers together."
      iii. "We have new ways of linking with customers."
   b. (b) Efficiency
      i. "We enable fast transactions."
      ii. "We have few errors in execution."
      iii. "Overall, our model is cost-effective."

Thank you for completing the FABRIX Questionnaire—your insights will help refine circular, social, and innovative solutions across our textile and clothing ecosystem. We look forward to supporting you on your journey toward a more sustainable, inclusive future!

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9 ANNEX II: Position of the Self-Assessment in the QENF Research

The **FABRIX** project aims to enable a systemic transition toward circularity and social responsibility in the textile and clothing (T&C) sector. It is structured around multiple Work Packages (WPs), which align closely with the **Quantum Embedded Network Framework (QENF)** developed in the related research study:

- **WP1** corresponds to the QENF study (i.e., the "theory development"), establishing foundational concepts such as *quantum-inspired principles, social embeddedness, institutional theory, and humanistic management*.
- **WP2** (empirical design, data collection, and analysis) maps onto the empirical study design and operationalisation of the QENF study. Within WP2:
    - o **D2.1** involves qualitative interviews, which reflect the in-depth interviews described in QENF.
    - o **D2.2** features GIS mapping of the T&C ecosystem, aligning with the spatial analyses and network visualization.
    - o **D2.3** (this deliverable) focuses on developing the self-assessment questionnaire for circular and social performance, which draws directly from the QENF text on the Fabrix/MANTEL platform (i.e., "Self-Assessment via MANTEL Platform") and the broader quantum-inspired approach.
    - o **D2.4** includes the co-creation events, mirroring the *Focus Group / Co-Creation* methods in the QENF study.
- **WP3** designs and develops the FABRIX digital platform, where this self-assessment tool will be integrated, connecting real-time user inputs, GIS overlays, and iterative feedback loops.
- **WP4** operationalizes the action research, capacity-building, and implementation phase (see QENF on *Action Research and Capacity Building*). Notably, WP4 includes:
    - o A **Financial Support to Third Parties (FSTP)** mechanism, offering small grants to **4 selected facilitators** (each receiving 25k€) and **20 businesses** (each receiving 5k€) in Athens and Rotterdam. This practical support fosters real-world experimentation with circular strategies, aligning with the QENF emphasis on *observer effect*, *adaptive strategies*, and *emergent innovations*.

In essence, the self-assessment questionnaire sits at the heart of this multi-layered project design: It captures nuanced data on **how businesses function**, **how trust is built**, **where circular opportunities arise**, and **how policy or institutional frameworks can accelerate (or hinder) adoption**. By facilitating bottom-up data collection and top-down policy alignment, the self-assessment acts as a bridge between the theoretical pillars of QENF and the practical goals of FABRIX.

Quantum Principles and the Observer Effect

In **QENF**, one core proposition is that "measuring" stakeholder practices can itself spur change, akin to the observer effect in quantum physics. By prompting T&C actors to reflect on circularity, social embeddedness, and institutional alignment, the very act of self-assessment can **nudge** them toward improved strategies—whether in waste reduction, labor practices, or supply-chain partnerships. This notion is reinforced in the QENF study (the Fabrix/MANTEL

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platform), which details how performance metrics—circular, social, institutional—can set in motion an adaptive process.

Multi-Method Empirical Study Feeding Into the Self-Assessment

The **QENF research design** employs a **mixed-methods** approach, combining:

- **Interviews (D2.1)** with diverse stakeholders to capture qualitative nuances (trust, cultural norms, real or perceived barriers).
- **Focus groups / co-creation events (D2.4)** to explore how T&C actors jointly develop circular solutions and validate or challenge QENF hypotheses (H1–H4).
- **GIS mapping (D2.2)** to visualize spatial and institutional overlaps—critical for revealing opportunities or bottlenecks in T&C ecosystems.
- **Action research (WP4)**, facilitating iterative cycles where stakeholders translate new insights into tangible pilot projects, continuously monitored and refined.

Information gleaned from these complementary methods drives the **development and refinement** of the self-assessment questions, ensuring the questionnaire remains context-aware, stakeholder-friendly, and *actionable*.

Bridging Formal and Informal Institutions

The **QENF** underscores how **institutional integration** (H3) and **social embeddedness** (H2) shape a firm's capacity to innovate. In T&C, *formal policies* like Extended Producer Responsibility (EPR) coexist (sometimes uneasily) with *informal norms*—community repair events, heritage craft traditions, or grassroots advocacy. The self-assessment serves as a **diagnostic** and **reflection** tool, illuminating where formal–informal synergies or conflicts arise. Policymakers can use aggregated data to **re-align regulatory levers** with ground-level practices. Facilitators can spot "friction points" (e.g., policy gaps, missed networking opportunities) and design targeted interventions.

Testing QENF in Real Contexts

By embedding QENF hypotheses (H1–H4) into the self-assessment, FABRIX effectively **tests** whether quantum-inspired constructs (e.g., entanglement, superposition) and social embeddedness frameworks translate into **improved** business behavior and **systemic** circular transitions. This experimentation, spanning *Athens* and *Rotterdam*, provides comparative insights into how local culture, policy structures, and community practices affect the observer effect.

The **Quantum Embedded Network Framework (QENF)** guides the conceptual basis for our self-assessment. QENF posits four main hypotheses (H1–H4) that focus on:

- **Quantum Dynamics** (H1): How uncertainty, entanglement, and superposition shape circular strategies.
- **Social Embeddedness** (H2): The role of trust, relational ties, and cultural norms in enabling (or impeding) collaboration.
- **Institutional Integration** (H3): Formal vs. informal policy alignment, bridging top-down regulations and grassroots practices.
- **Adaptive Strategies** (H4): How awareness of metrics (observer effect) can spark emergent, non-linear changes.

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In practice, this means our self-assessment is not merely **descriptive** (i.e., capturing a company's sustainability status). Instead, it is structured to **probe** each of these dimensions—often with direct or indirect questions—and to **test** whether measuring certain practices nudges T&C stakeholders toward more circular and socially responsible behaviours over time.

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