

Manifesto draft

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Executive Summary

The green and digital transformation of the textile sector has been made a priority by the European Commission publishing the EU Strategy for Sustainable Textiles in March 2022. However, to stay competitive in the global market, the textile industry's efforts regarding innovative circular technologies need to be supported by massive investments, as pointed out by the ERA industrial technology roadmap for textiles, construction and energy-intensive industries. Estimated investment requirements for achieving circularity in the textile sector by 2030 and expanding the textile recycling industry range from EUR 5 to 7 billion, a challenge that the SME-driven sector can't overcome alone.

STEP2030 – Sustainable Textiles European Partnership is a proposal for a public-private partnership under the European research and innovation framework programme HORIZON EUROPE that aims to promote innovations for more circularity and sustainability in the textile ecosystem, as well as to advance textile recycling throughout the value chain. The Partnership will operate from 2025 to 2030 with a budget of 1 bln.€ with a 50/50 contribution from the European Commission and the industry as well as member states to achieve 6 strategic objectives:

- securing sustainable and diversified raw materials,
- increasing textile-to-textile recycling capacity,
- improving the aesthetic and functionality of textiles,
- supporting design as a driver for sustainable innovation in the fashion/textile industry,
- enabling the digital transformation of the textiles ecosystem,
- and stimulating skills development to meet the needs for technological advancement and new digital and smart specialisation approaches.

The Partnership should drive scientific breakthroughs, new processing technologies, smarter purchasing decisions, and stakeholder collaboration to optimise the sector's resource footprints and, address the lack of transparency, traceability and enable a secured collection and processing of data in the global textile supply chain. The Partnership will cover the whole textile ecosystem, including the leather and footwear sectors. It will promote creativity, efficiency, versatility and customer value creation as well as enable the industry to meet the evolving needs of its high-added-value end uses to secure Europe's position as global leader.

Leading European fashion and design brands, waste management industry representatives, environmental NGOs, research and innovation institutes as well as representatives for VET and higher education will work together under the umbrella of STEP2030 to support the transition towards a more sustainable and resilient future for the sector.

STEP2030 is an approach to help the sector overcome current challenges, such as its fragmented innovation and research landscape, by creating a dedicated innovation framework under Horizon Europe for more collaborative research projects, creating more textile-specific calls that cover all future-oriented topics of the sector leading to better success rates and more SME engagement as they are the backbone of the sector, create synergies with other initiatives such as the Pact for Skills to tackle the social dimension of the twin transition and raise awareness of the importance of the sector for Europe as well as helping change consumer behaviour until "fast fashion is out of fashion".

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Introduction

Over the coming years, the European Union is confronted with a dual challenge, encompassing environmental and climate change concerns and the need to recover from the economic and societal repercussions of the war in Ukraine, the energy crisis, and the COVID-19 pandemic. Significant transformations to current production and consumption systems are necessary to address these challenges and achieve a competitive, carbon-neutral, healthy, and resource-efficient economy.

The textile sector has been recognised as a strategic sector in the EU's new industrial strategy, but at the same time is challenged to become more sustainable and digital, while remaining globally competitive. The EU Textile Strategy, adopted a bit over one year ago by the European Commission, is setting an ambitious roadmap to realise that vision.

The strategy indicates that innovation is essential to successfully making that transition: "*enhancing research and innovation and promoting investments in the sector are essential to tap into its potential to create sustainable growth and jobs*"¹. This was also confirmed in the ERA industrial technology roadmap for circular technologies and business models in the textile, construction and energy-intensive industries, highlighting the sector's investment needs to become more green and digital.

A European Partnership for Textiles under Horizon Europe aims to facilitate the emergence and deployment of innovative and circular solutions, particularly in developing efficient raw and secondary raw materials and fostering talent generation. Moreover, it should bring all stakeholders in the textile ecosystem together to collaborate in achieving the goals set by the twin transition.

The Partnership's strategic objectives include securing sustainable and diversified raw materials, increasing textile-to-textile recycling capacity, improving the aesthetic and functionality of textiles, and supporting design as a driver for sustainable innovation in the fashion/textile industry. Furthermore, the Partnership will promote the digital transformation of the textiles ecosystem and stimulate skills development to meet the demands for technological advancement and new digital and smart specialisation approaches.

The years until 2030 will be decisive in building the necessary knowledge base and technology infrastructure to be able to fully implement sustainable and circular business practices in textiles at a large scale and to reap the benefits in the years thereafter to ensure the textile sector's contribution to the broader goals of the EU Green Deal and Fit for 55 strategies.

With a substantial and purpose-built research and innovation support programme Europe can ensure research, technology and industry leadership in this strategic sector of the economy, thereby creating many opportunities for European technologies, standards, best practices and business models that can be adopted around the globe, especially in countries that currently account for the largest production and consumption impacts in this industry.

¹ COM(2022) 141 Final, EU Strategy for Sustainable and Circular Textiles, p10

Overview

The textile ecosystem is an integral part of the EU economy, with a turnover of EUR 150 billion and over 147 000 companies. It employs around 1.3 million workers, with small and medium-sized enterprises representing over 99.5% of all businesses and employing 74.4% of the workforce. The textile ecosystem encompasses the transformation of natural, man-made synthetic and artificial fibres into yarns and fabrics, home textiles, industrial filters, technical textiles, carpets, clothing and footwear. Furthermore, Europe's luxury brands shape the global fashion and design landscapes.

The textile and clothing industry is vital to many European regions like Lombardy, Tuscany and Piedmont in Italy, Norte in Portugal and Cataluña and Comunitat Valenciana in Spain. Over 40% of EU apparel is produced in Italy and a few other countries. Bulgaria, Portugal, and Romania are the workforce's highest shares of the textile industrial ecosystem. The European textile ecosystem operates in global value chains, with imports mainly from Asian countries (30% from China) amounting to EUR 106 billion in 2021. On the other hand, EU exports had a total value of EUR 58 billion, making the EU the second-largest exporter after China.

The sector's labour-intensive nature and concentration of small and medium-sized enterprises make it an **essential contributor to social and economic cohesion in Europe**, with significant potential for further modernisation and innovation. While the textile industry is often called a "traditional" one, its modernisation efforts have led to increased productivity and the shift towards high-quality products.

Textile Value chain

The textile value chain refers to all the activities involved in the life cycle of a textile product, including designing, product development, production, distributing, retailing, and disposing of it after its useful service life. The value chain begins with raw material (natural or man-made), fibre production and fibre preparation, spinning fibres into yarn, creating and fabric finishing, cutting, sewing, and distributing to consumers. Textile products can be recycled or re-used for a different purpose, but ultimately they may end up in end-of-life treatment, such as in a landfill or incinerator plant. The value chain is complex, involving physical processes and non-manufacturing activities like design, marketing, retailing, advertising, publishing and sales.

The textiles ecosystem comprises various products, including high-end and technical textiles for multiple applications such as automotive, medical, agrotextiles, and protective equipment. Technical textiles are developed and produced for their performance or functionality rather than appearance and include a range of products and applications such as industrial filters, textiles for medical and hygiene applications, protective textiles, and functional clothing for sports applications. Technical textiles are made from natural and synthetic fibres and produced through various processes like knitting, weaving, braiding, nonwoven, and tufting.

The textiles ecosystem is interconnected with other industrial ecosystems through its value chains. Textile materials have unique properties and can be functionalised differently, making them irreplaceable in many applications. Furthermore, textiles and textile-based composites are expected to replace many metal and plastic materials currently used in automotive, shipbuilding, aeronautics, machinery, electronics, medical devices, construction, and agriculture. As the world's population increases, new application areas for textiles are emerging, and user requirements for textile products are rising, resulting in the growth and evolution of the industry.

Current situation of the textile cycle: only linear economy landfilling and energy recovery



Main challenges

The industry faces challenges threatening its growth and competitiveness, including environmental and social pressures, green claims, fast fashion trends, adaptation to digitalisation and e-commerce, competition from low-cost countries and connected to it the sector-wide overproduction, lack of skilled workforce, and fragmentation. In the EU, we have strong legal vanguards in water, energy, emissions, chemical management, waste and wastewater, etc. This high performance sometimes it is not recognised by the market. The companies produce with a high standard, but the international market does not recognise it. However, these should be translated into opportunities by focusing on developing sustainable practices, investing in technology, and improving working conditions in textile and clothing factories worldwide to remain competitive and relevant in the global market.

The continued growth of textile production and consumption significantly impacts the climate, water and energy consumption, and the environment. Therefore, the European textile and clothing industry must balance the "triple bottom line" of people, planet, and profit by implementing **sustainability** and circularity principles in response to market and regulatory requirements. Furthermore, the industry must make significant technological, financial, and human efforts to align business operations with sustainable practices to meet the increasing end-market demand of a growing population while operating within sustainable planetary limits. There are already successful examples in the textile sectors where circular materials and processes have been successfully implemented, but the market does not yet recognise this implementation.

The textile industry has undergone a significant **digital transformation** in recent years, driven by increasing consumer demand for personalised products, integrating IoT applications in textile manufacturing, automated production and logistic processes and new industry 5.0 approaches that are significant in textile production where the human workforce will remain crucial. In addition, the Covid-19 pandemic has further accelerated this need for digitalisation. The pandemic has shown that buyers do not need to be as actively involved in manufacturing as before by implementing a more digital way of working. As a result, their orders can be monitored from a distance, a trend that will most likely continue in the future.

The European textile industry faces intense **global competition** due to various phenomena such as globalisation, liberalisation, relocation, and international outsourcing. Therefore, the sector must promote greener and fairer value chains across borders and continents to compete.

Maintaining the industry's success requires a qualified and **skilled workforce**, which is a vital asset for the competitiveness and growth of companies at the regional, national, and European levels.

Therefore, the industry must provide the necessary training and qualifications to attract younger workers and adapt education schemes to the sector's needs.

Finally, the industry needs a more coordinated approach to join forces between R&D&I and the supply chain, to avoid **fragmentation**. By working together, the industry can develop more innovative and sustainable products and improve the value chain to enhance its competitiveness and growth.

Innovation capacities

The European Union textile and fashion industry is highly innovative, ranking high in the number of patents (over 6,600 between 2015 and 2019), and it also boasts the highest number of registered industrial designs in the world (208,000 in 2019).

However, trade secrecy is the preferred protection mechanism as companies prefer to avoid public disclosure of innovations and reduce the costs and administrative burden of obtaining and maintaining IP rights. Germany is the leader in patent applications, followed by Italy and France, with Italy and Germany, being more active than other EU players.

However, this industry's innovation scope exceeds R&D expenditures and IP rights. Marketing and organisational innovations and applying breakthrough technologies are equally important drivers for innovation.



Figure 1 - Percentage of patents by textile companies in the EU Member States

The sector is primarily made up of SMEs, and as a result, R&D and innovation activities are often limited by a lack of financial resources and strategic direction. However, textile clusters have emerged in various European countries, bringing together industry, academia, and research centres to advance a more knowledge-based and innovative sector. These clusters strengthen the linkages and cooperation between companies, improving their competitiveness and productivity. Additionally, textile clusters drive the growth of universities, research, and technology support services and generate increased tax revenue that can be invested in the public good.

Design and new product development are typical functions in most textile and clothing companies, but they often rely on collaborations with external knowledge and research or technology service providers. These external service providers can range from small operations with limited technological facilities to large organisations with several hundred researchers, specialised technical staff, and extensive state-of-the-art specialised installations. While public authorities have generally reduced their direct financial commitment to these centres, most income is generated by contract research, consulting, or testing work for private sector customers or by competitive project-based public funding.

Universities, polytechnics, colleges or universities of applied sciences play a critical role in higher education, providing advanced knowledge and qualifications in specialised scientific subjects or professional domains. Many of these institutions also offer practical research and small-scale manufacturing trials and testing as part of internal research work or collaborative projects with external partners, including industry (mostly big players). Based on the long-standing tradition and technological advancement of the European textile and clothing industry, a large, highly diversified, internationally leading textile higher education and fundamental research infrastructure exist across Europe.

Technical research centres are essential as service providers for the textile and clothing sector. These centres mainly operate regionally and are very well embedded in the industrial landscape. Consequently, they often play a significant role in companies' innovation process and, in this way, in securing competitive advantages and the success of the textile sector.

Nevertheless, as the textile & clothing sector's competitive environment changes, the technological centres face difficult strategic questions.

Overall, sustained and concerted efforts by all stakeholders over the following years are necessary to bring about systemic change with a measurable impact on global climate change, biodiversity, environmental and human health and well-being, without undue losses of prosperity. With suitable investments in technology and innovation and the support of networks and clusters, the European textile industry can continue to evolve and maintain its position as a global leader in product innovation.



Solution only by Cooperation and Open Innovation

STEP2030

Based on the "ERA Industrial technology roadmap for circular technologies and business models", the estimated investment requirements for achieving circularity in the textile sector by 2030 and expanding the textile recycling industry throughout the value chain, including collection, sorting, and recycling, are within the range of EUR 5 to 7 billion. In the fashion sector, circularity could reach 80% by 2030 if the respective investments are made.

While Horizon Europe is the EU's primary funding programme for research and innovation, the textile industry faces challenges in securing specific funding due to low success rates in a highly competitive funding environment as well as high fragmentation of textile-specific calls in the different funding programmes due to the lack of a dedicated research and innovation programme. That leads to SMEs being discouraged from participating in open calls, and these companies miss out on innovation and research activities. Furthermore, the current funding programmes often publish repetitive calls that only support one-sided research and innovation activities that lead to a duplication of efforts and parallel structures.

As suggested in the stakeholder consultation report on the co-creation process for a transition pathway in the textile sector, a co-programmed European Partnership under the Horizon Europe Programme would best enhance innovation capabilities in the textile ecosystem.



The strategic objectives of the Partnership include:

- securing sustainable and diversified raw materials (recycled fibres and sustainable bio-based fibres represent opportunities to replace raw materials with high life cycle environmental profiles at an increasing pace)
- increasing textile-to-textile recycling capacity, improving the aesthetic and functionality of textiles
- supporting design as a driver for sustainable innovation in the fashion/textile industry

Additionally, the Partnership will enable the digital transformation of the textiles ecosystem and stimulate skills development to meet the needs for technological advancement and new digital and smart specialisation approaches.

The ensemble of the confederations and research networks that support this Partnership proposal ensures a broad coverage of EU Member States. In addition, leading European fashion and design brands, waste management industry representatives, and environmental NGOs are essential stakeholders that should also be part of the Partnership. The formal contributions and commitments of the partners, in kind and/or financial contributions, and co-funding of the R&I activities would be provided by the private sector stakeholders in line with the general financing rules of Horizon Europe.

STEP2030 is a ≤ 1 billion public-private partnership between the European Union and the Industry, operating from 2025-2030 within the framework of Horizon Europe. The EU will contribute up to ≤ 500 million, mainly for textile research and innovation projects, while the private stakeholders from the sector will provide at least ≤ 500 million in in-kind contributions and additional activities. The total turnover of the sector in the EU is 150 billion \leq . If the sector spent 1% of the turnover on innovation it would mean that roughly 1.5 billion \leq would be available as contribution to the partnership.

Key areas of intervention

STEP2030 is a Public Private Partnership (PPP) dedicated to sustainable EU textile production and use, covering technical textiles and fashion with the vision to make the EU the first region to implement truly sustainable textile production and use. The main objectives are to create the knowledge and technology base for competitive, sustainable textile production within the EU, for the circular use of renewable materials, for the prevention of harmful substances, for net zero emission operations and fair value chains with a local inclusive focus.

The call topics of the textile PPP would focus on realising the above-mentioned vision and can be enlarged to other goals coming to the twin transition of the sector. Also, textile-related topics currently being presented via Cluster 4 and Cluster 6 could be integrated into the Textile PPP.

The PPP would cover 'upstream' aspects, i.e., sourcing the raw materials needed for the sector by teaming up with the relevant sectors (chemistry, agriculture, forestry...). Among the potential synergies with the European agricultural sector and programmes supporting innovation in growing, harvesting and processing crops producing biomass for the textile sector are of special interest.

On the other hand, the PPP could integrate 'downstream' aspects, i.e. sustainable product use and endof-life solutions. The latter would include technical and consumer textiles (clothing, interior) topics. In both cases, the use phase (maintenance, customer/consumer attitudes,...) should be covered.

The textile sector is truly global, and given the significant import into the EU and the considerable export of textile materials, striving towards a (more) level playing field worldwide is necessary. Funding schemes fostering balanced international collaboration, e.g., via standardisation, environmental and social assessment methods or common Safe-and-Sustainable-by-Design principles, should be part of the PPP. Impact studies of EU legislation on global textile supply chains and non-European economies and natural ecosystems are highly relevant.

Finally, via a Textile PPP, a governance structure would be set up, which could help define common targets for the sector and ensure that EU-wide efforts are aligned, thus preventing duplicated work and/or wasted efforts. For the common targets, a clear goal could be the development of monitoring systems, e.g. for the use of recycled materials (as already exists for the plastics industry in the form of the Monitoring Recyclates for Europe (MORE) platform fun by the European Plastic Converters Association EuPC) or for greenhouse gases reporting in fashion industries. This would lead to a uniform and trustworthy assessment and reporting scheme that helps to prevent unsubstantiated green claims and provide science-based targets.

This would also be the body to define study topics dealing with more fundamental aspects of the textile sector, e.g., mapping material streams or developing long(er) term scenarios for the textile sector, serving as the basis for industry investments and EU policymaking.

In summary, by combining the above elements, the public-private partnership can be a crucial enabler to materialise the vision of making the EU the first region to implement sustainable textile production and use.

In addition to that, four innovation topics have been identified that would be of relevance to the Partnership:

1. Durable, circular and biobased materials and processes

The textile industry has a significant environmental impact, with over 65% of the output being synthetic fibres from fossil resources. Meaning efforts must be made to transition from fossil-based to renewable carbon sources to reduce the industry's carbon footprint. This requires scientific breakthroughs, new processing technologies, smarter purchasing decisions, and stakeholder collaboration. While the transition will take many years, optimising resource footprints in production and using current materials and processes can still have a massive impact. Especially exploring the potential of common biomass waste or side streams available in large amounts needs to be thoroughly investigated. Work on secondary raw materials sources (e.g. biowastes, no competition with food crops/wood), yielding a high efficiency and a sustainable production process. There is a clear need for cost competitive bio-based raw materials as current ones (e.g. PA11, PHA) are still considerably higher than conventional PA and PET.

Specifically for natural fibres, additional knowledge is needed on the availability and suitability of alternative fibre sources (e.g., from grasses or agricultural residues) and their sustainable use for the (bio-)economy. This is to alleviate pressure on cotton and wood as primary sources or to deal with the decreasing availability of flax fibres (and linked rising prices) due to increased demand from Asia. A potentially exciting category of biomass could also be valorising crops used for depollution of soils and/or regenerating nature. Also, their further development and optimisation remain an essential topic for bio-based fibres already on the market. Of particular interest is the study of the long-term evolution of their properties (order 1 to 5 years or even more for certain applications), as these will deteriorate over time differently than conventional ones. Next to the fibres, it is crucial that the other steps in the textile manufacturing process also become bio-based. This implies that further development is needed for the (bio-based) dyeing/printing novel bio-based fibres (e.g. washing and light fastness).

Furthermore, we need bio-based solutions for standard textile functionalities: water repellency/proofing, dirt repellency, UV shielding and anti-microbial finishes. EndOfLife management will be key for bio-based materials, similar to traditional materials. To minimise their impact, the various R-strategies and their order remains valid. Additional studies are needed on the environmental impact of bio-based textiles compared to conventional materials to provide science-based evidence to steer towards the most sustainable direction. Therefore, efforts in R&D have to focus on these critical aspects:

- Fibres and fibre additives from the biobased origin for high-end applications
- Replacing petrol-based chemicals for fibres and focusing on biobased polymers
- Exploiting lignin as high-value feedstock for regenerated fibres (not just as filling material)
- Agricultural, forestry and aquaculture innovations for more cost-efficient and sustainable fibre feedstock production and harvesting, e.g. potential use of empty greenhouses to grow feedstock.
- Innovations are required to improve the consistency of the quality of natural fibres and combat climate effects. Potential use of empty greenhouses to grow feedstock.
- Building on existing production capacities for man-made cellulose fibres, also adapt these processes to alternative feedstocks.
- Given the vast expertise with cellulose, look into synergies with the paper industry.
- Dealing with seasonality several types of biomass are only available during a limited period of the year.
- 2. Safe, low-footprint products, processes & responsible supply chains

The industry must strive for greater safety, sustainability, and responsibility in its operations and products, while policymakers need to set legislative frameworks that limit negative impacts. In addition, it is essential to develop a better understanding of the resource impacts of textile materials,

products, and processes and address the lack of transparency and reliable traceability of data in the global textile supply chain.

Accessible material data, relevant knowledge, adequate tools and smart incentives can massively improve decision-making at the design stage and lower the cost and impact of poor design choices. Better design strategies that optimise for desirable product characteristics such as longevity, repairability, recyclability or biodegradability and tools that help implement these strategies in the daily practice of the designer and product developer must be developed, user-tested, widely disseminated and trained. Regarding circularity, research is needed to assess the optimum between reselling, re-using and type of (cross-sectorial) recycling, taking into account the local situation (e.g. urban vs rural) and time ('now' but also the medium and long term). This will, in turn, allow calculating the required collection, sorting and processing capacity, infrastructure, and logistics. Further, prenormative research is needed to define and determine the fraction of recycled content in products and perform environmental impact studies. Sustainability assessment of the entire lifecycle, i.e. spanning collection, sorting, separation and recycling/re-use, is crucial as it allows to assess circular solutions versus linear materials use and to compare various circularity strategies. In both cases, the output of the studies will allow to select the most sustainable strategies, to identify so-called 'hot spots' for improvement and to motivate why to implement circular strategies. Of particular interest are assessing the impact of recycling on microfibre/plastic release, building a database of the CO2 footprint of recycling and related activities and developing a deeper understanding of the leading environmental impact contributors in a circular value chain. In this regard, the sector has to undergo important changes regarding:

- Replacing solvent-based processes and harmful functional chemicals in textiles and textile processes
- Recycling or re-using textile materials, which is still in its infancy as procedures to remove color, legacy chemicals, and chemical dismantling are still to be explored.
- Low-impact textile operations
- Develop methods to increase transparency and support decision-making in the industry towards safe and sustainable textiles Assessments based on the known circular design principles (9Rs)
- Methods to assess and compare the potential lifetime of textile products
- Understanding recirculation for garments and components contributes to extending lifetime and interaction with business models enabling shared use and product service systems.
- Evaluating hazards and fate and exposure of materials and auxiliaries in sourcing, work environment, use phase and end of life to understand safety-related tasks
- Framework of circular design principles per different textile product categories (maybe also material types) vs TRL of recycling technologies; current, near-future, far-future
- Importance of cross-circular (multidisciplinary and multi-stakeholder) dialogue to enable systemic understanding of impacts (Systemic Materials Innovation)
- Importance of time factors on the impacts of design decisions, now, near and far and the potential role of 'cascading' (I.e. how do we design a 10-year garment for an unknown future recycling system?)
- Education and seeding the next generation of designers
- Definition of terms (glossary)

3. Digitalised textile materials, products, manufacturing, supply chains and business models

The digitalisation of the textile industry is a continuous process that offers numerous benefits. It enhances creativity, improves efficiency and low resource footprint, enables new business models, and provides workers with safer and more meaningful jobs. This transformation is possible through digital and biotech technologies, intelligent local textile productions, high-performance materials, and circular economy technologies. In order to achieve this transformation, the industry must adopt principles from the electronics and ICT industries, which can increase productivity, speed, versatility, resource efficiency, and customer value creation. The textile factory will approach the principles of Industry 5.0 and then insert enabling digital technologies such as artificial intelligence, 5G, and digital twins within the value chain with a

human-centric focus along the internal value chain and through the supply chain to become attractive, efficient, traceable and therefore more reliable for customers.

Introducing a digital product passport also needs new ways of secured data collection but would contribute to the sector's green transition. Additionally, the industry must shift from physical to virtual designs and materials, and all stakeholders need to adapt to technology development. More R&D efforts should be made in the following:

- Modelling and virtual prototyping for textile products & processes, which is not yet addressed by the sector
- Robots and AI to assemble, repair and disassemble textile products which are still not possible and, until now, needs to be done
- Implementation of the Digital Product Passport (DPP) to ease access to information about product environmentally sustainable and digital content to promote informed choices in both B2B and B2C environments
- Advanced IT/AI tools for design, simulation, assessment, valuation and sorting & optimisation of textile products, their use and lifecycle impacts, collaborative human-AI design
- Development and utilisation of digital twins of textile products, processes, factories and supply chains
- Al-based expert systems for simulation, assessment and optimisation of sustainability and circularity parameters of new products
- Piloting, upscaling and training for the use of digital design and sustainability optimisation systems for all types of textile-based products and manufacturing processes.
- Collection, processing, analysis and utilisation of all relevant textile sustainability data and guarantee of the FAIR principle while safeguarding the confidentiality and intellectual property of researchers, creatives and businesses.
- Research related to semantic web-related toolsets (semantic web-capable resource description framework vocabularies, possibilities and limits of knowledge graph use for gaining circularity critical KPIs from the web-based data resources).
- 4. Smart high-performance materials

Developing smart high-performance materials, such as textiles with micro-and nano-electronic components and systems, hybrid materials, and textile-based implants, offers significant potential for growth in new markets. Strengthening research and innovation ecosystems and public support for flagship research projects is a high priority to maintain Europe's lead in the fibre and textile industry. The industry must continue to adapt and innovate to meet the evolving needs of its high-added-value end uses. To reach this goal, it is essential to develop:

- Low-cost and low-impact high-performance fibres & textiles
- Textile surface multi-functionalisation for technical applications
- Rapid small-scale manufacturing of advanced textile and hybrid materials/components
- E-textiles for smart wearables and surfaces and their efficient industrial manufacturing
- Bio-engineered/biocompatible materials for medical applications

Proposed governance

A governance structure will be implemented to create a dedicated innovation space for the European textile ecosystem. This entity will comprise private partners such as European associations representing the industry's interests, leading European fashion brands and textile companies, and recycling industry representatives, as well as the above mentions research and innovation entities. The structure will allow downstream calls for proposals to involve the whole textile ecosystem and guarantee a higher success rate thanks to a specific Strategic Research and Innovation Agenda.

The primary goal of this entity is to transform the European textile and clothing industry into a sustainable global industrial player that provides significant employment and economic value to Europe. The transformation process will focus on exploiting research, innovation, and knowledge orientation

across all industry business functions and sub-sector activities, including new business opportunities for fibre and textile-based materials, products, and production processes in novel application fields.

The process will also overcome the fragmentation of European textile-clothing research, ensuring that research capacities and activities are developed with scientific-technological excellence, industrial relevance, and resource efficiency principles in mind.

This entity will prevent parallel, repetitive research work and competition where cooperation should be the norm by connecting and valorising existing expert networks, platforms, clusters, and cooperative structures at European, national, and regional levels. As a result, the industry can leverage research, innovation, and knowledge to transform the sector into a sustainable and competitive global player.

Focus: Cascade funding

In order to promote a more sustainable and digital human-centric industry in Europe, targeted funds and programmes should be set up to support SMEs in innovating their products and processes.

Therefore, cascade funding projects, which offer reduced administrative burdens, shorter time-to-grant, and facilitated lump-sum mechanisms, are particularly beneficial for textile SMEs, as they are tailored towards the needs of small businesses. With an allocated budget for cascade funding calls, start-ups and SMEs can apply for funding as third parties through an ongoing project's open call.

Additionally, these calls provide equity-free budgets ranging from €50,000 to €150,000 and come with technical assistance from industry experts who can help in proposal preparation and project execution to free access and support to use testing facilities. As such, they offer a gateway to the innovative European ecosystem and an increased chance of successful proposals due to their lesser-known nature.

Focus: Collaborative research

Due to the industry structure dominated by SMEs with often very limited internal human and financial resources to invest significantly into research or higher-risk innovation activities, public funding in collaborative programmes involving RTOs and academia is crucial. Such external research providers have traditionally acted as some kind of temporary outsourced research units for small to medium-sized companies in the sector, accompanying them across the entire innovation process from idea generation, technology exploration, technical development, pilot testing and validation, scale up and business development and where needed certification, training and other consulting services. Also, co-development with machine, tool or chemistry providers is often needed to turn a new product idea into a scalable and marketable solution.

The constantly growing number of applications for textiles and fibre-based materials increases the complexity of materials, processes and end-market requirements to be managed by companies. Long processing chains with many specialised players that need to be aligned also make collaborative innovation approaches more suitable and promising.

Circular operations require collaboration with new value chain partners such as collectors, sorters, recyclers and re-processers of reclaimed materials, in which many are also SMEs and have limited experience or resources to engage in collaborative research and innovation activities. Since reusability and recyclability are often determined at the initial design, material selection or processing stage, such collaborative innovation programmes are highly needed. A push into more effective use of natural or bio-based feedstock fibres will require strong collaboration with the agricultural, forestry or livestock producers to ensure scalable win-win solutions.

While collaborative research and technology development programmes are important to generate new knowledge and develop new technologies, their market adoption requires many further steps to cross the "valley of death" - the stage between research funding and commercialisation.

New material and processing solutions typically need several iterations to demonstrate their technical robustness and economic viability at increasing scales. These pre-commercial pilot scale units are expensive to build and run and challenging to fund with market-based financing due to a lack of cash flows.

Radically new technology or product approaches often require spin-offs or start-ups as they may conflict with or cannibalise established operations. While digital or otherwise low capital-intensity start-ups are favoured by private sector risk capital providers such as venture capitalists, capital-intensive material and manufacturing start-ups should be favoured by public funding providers.

Industry-wide adoption of new technologies or business models is a long process starting with pioneers but slowly making their way to less innovation-driven companies or market segments. The process can be sped up by active dissemination, technology transfer, coaching and training activities. Such active innovation transfer services can be provided by RTOs, cluster organisations or industry associations but are not always easy to market. Therefore, public support for these activities is a suitable and inexpensive way to accelerate innovation.

If Europe wishes to pioneer sustainable and circular textiles with the potential to successfully export or disseminate European solutions to the rest of the world, such international transfer could already be incepted at the innovation stage through collaborative research with non-European partners for mutual benefit. As Europe transitions to a circular regional textile production and consumption system, many developing countries will have to deal with adverse effects from reduced need for their raw materials or demand for a low-cost labour force. Innovation transfer programmes can help these countries adopt their own local circularity solutions to serve their growing home market with more sustainable textiles.

Beyond industry innovation and technology adoption, the general knowledge base among researchers, policymakers and consumers about all aspects of sustainable and circular textiles needs to be constantly improved. Expert networks and communities of practice, such as ECOSYSTEX, are crucial to accelerate knowledge diffusion within the European textile research and innovation community and to provide easier access for policymakers and consumer or citizen representatives (including civil society organisations) to up-to-date scientific and non-biased information and data. Such knowledge communities can also be vehicles to launch, implement and update major new empirical data collection and analysis programmes to better understand all aspects of textile sustainability.

Focus: Synergies

The ERA industrial technology roadmap for circular technologies and business models in the textile, construction and energy-intensive industries will be implemented through the Partnership to create synergies with other initiatives. For example, the Made in Europe Partnership, the European Partnership Process4Planet, and the Circular Bio-based Europe Partnership will exchange and align strategic concepts, complementing it in various aspects, such as technological foresight, circularity, and decarbonisation. The Partnership will also engage with technology-focused and climate/circular-oriented initiatives such as the EU Climate Pact Ambassadorship and ensure synergies with the European Social Fund Plus.

Digital Innovation Hubs (DIHs) specialised in textiles will help companies become more competitive by providing access to technical expertise, experimentation, and innovation services needed for a successful digital transformation. In addition, the DIHs will act as one-stop shops to help companies test before investing and secure financing for their digital transformation.

The EIT Culture & Creativity Kic is an Innovation Community designed to strengthen and transform Europe's Cultural and Creative Sectors and Industries (CCSI) by increasing its innovation capacity and

competitiveness. It takes a holistic approach to innovation and focuses on technology, business, artistic, and social innovation. While the Creative KIC embraces the textile ecosystem via the design aspect of fashion, the HEU partnership covers the whole sector with a focus on research and innovation.

The fashion and creative industries have the potential to link creativity and innovation in the new economy, but their contribution to Europe's re-industrialisation is often overlooked. The New European Bauhaus initiative aims to promote sustainable and inclusive living spaces and can play a crucial role in the potential European Partnership on Textiles to transform the textile industry to be more circular and less carbon-intensive. The New European Bauhaus Lab can contribute to the goals of STEP2030 by testing new tools, solutions, and policy recommendations.

Both initiatives aim to create sustainable and innovative solutions that enhance people's lives, and together they can accelerate the transition to a circular and carbon-neutral economy while promoting sustainable and inclusive living spaces.

Commitments

The European Partnership for Sustainable Textiles aims to promote sustainability in the textile industry by bringing together various stakeholders. EU industry associations like EURATEX, representing the textiles and clothing sector, will lead the Partnership in cooperation with other industry organisations. In addition, sectoral innovation clusters represented by EU-TEXTILE2030 will ensure the Partnership's impact at the SME level in regional industrial ecosystems across Europe, and European networks of RTOs and universities like the European Technology Platform for Textiles (Textiles ETP) will represent research and higher education communities. TEXTRANET is a network that joins several well-positioned European institutions with world-class competencies in textile and clothing (T&C) related research and innovation activities, which would be a crucial member of the partnership.

Private sector stakeholders will provide in-kind and/or financial contributions to co-fund the R&I activities in line with the general financing rules of Horizon Europe. EU Member States with a particular interest in the textile ecosystem can also contribute to the partnership.

The Partnership will remain inclusive and aim to recruit new members, mainly to expand its R&I expertise. Its members commit to increasing the textile industry's sustainability through research and innovation, including developing new technologies, reducing the environmental impact of textile production and consumption, and improving working conditions throughout the supply chain.

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