



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

YOUTHFUL BEYOND YOUTH

**Independent innovation and digital
fabrication for active ageing in
European fashion and textile
sectors**

15th of June 2021





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Index

1. Technologies, themes, markets	4
1.1. Focus on digital fabrication	4
1.2. Fashion and age	8
2. Independent innovation in fashion and textile	12
2.1 Makerspaces and Fab Labs	13
2.2 University Fab Labs	17
2.3 Fashion start-ups	18
2.4 Incubators	18
2.5 Independent centres of cultural production	20
3. Independent innovation in UE	22
3.1 Overview of European fashion and textile industry	22
3.2 Country sheets	30
Austria	30
France	37
Germany	40
Ireland	43
Italy	45
Netherlands	49
Portugal	53
Romania	57
Spain	58
Switzerland	61
United Kingdom	64
3.3 Collaborative design methodologies	67
Policy-influenced innovation	68
Research-led innovation	69



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Maker-spaces for active ageing	69
Independent innovation for wearable technologies	71
4. Policies and strategies	73
4.1 The views and visions of fashion&innovation experts	73
Competences	73
The sector ecosystem	75
Quality of life: current and potential contributions from the textile and fashion industry	75
Elderlies: a market niche?	76
4.2 The orientation of policies for the fashion and textile industry	77
References	83
Appendix A	88
Information on the database construction	88
General considerations from the database	89



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

1. Technologies, themes, markets

1.1. *Focus on digital fabrication*

The field of fashion is rich in creative and innovative trends, which entail changes in business models, new communication strategies, emerging patterns of consumption and new production techniques and materials. Crucially, these new trends are mainly the result of the integration between the fashion system and current technological advances: fashion is a sector being deeply transformed from the inside out by technology (Manenti, 2016). Technology and fashion have become an indissoluble combination. On the one hand, technology affects textile production and packaging, communication and distribution, transforming the entire production and distribution process. For example, AI is used in collecting and analysing consumer and market data to predict fashion trends, while 3d rendering is increasingly becoming a tool used in product presentation and as a pre-selling tool. On the other hand, technology has become an integral part of products, especially thanks to 3d printing technologies. We will mainly focus on technology in production and products.

The relationship between fashion and technology is becoming stronger and is leading to the transformation of fashion goods in technological products: the role of clothing has evolved from mere body protection, maintaining the body temperature, and fashion, to advanced functions such as various types of information delivery, communication, augmented reality and release of therapy or support for movement. With a wireless internet connection, the integration of circuits and sensors, and a portable power supply, clothes become a novel electronic device.

While the production of high-tech fabrics was traditionally directed to sportswear, to ensure maximum comfort and performance, in recent years we have witnessed the prototype and the production of wearable technologies for leisure and luxury clothes, whose deployment is permitted by the development of research to make flexible the components of electronic systems, such as silicon. The new wave of wearable technologies and accessories, from the forthcoming Facebook Glasses to the Apple and other tech brands watches, signals that wearable tech is moving out of science-fiction movies, onto our lives and bodies.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Plus, digital fabrication – intended as the process that joins design with production through the use of 3D modelling software or computer-aided design (CAD) and additive and subtractive manufacturing processes – is growing and can have a huge impact on various levels of manufacturing in the fashion industry (Mizuno, 2014).

A first method of integration between fashion and technology is the insertion of technological components in the fabrics, through different systems, with the aim of expanding the functionality of the fabrics and therefore of the clothes.

One of the first technologies used in this case was the OLED, organic materials capable of emitting flexible light if fed by electric current. The OLED technology allows the printing of such material on almost any media, including tissues, thus allowing the development of bright fabrics while maintaining the characteristic softness of the fabrics.

Another technology that is having interesting developments is the integration of computer systems to textile fibres to capture and share information from the body and between people, either for medical and social purposes. Some applications are designed to measure the vital signs of individuals who wear a particular dress or to charge the batteries of mobile phones or MP3 players via an integrated solar panel. Others integrate in clothes devices that allow to connect to social networks and to exchange data (music, pictures, phone numbers).

In addition to the wearable technologies, applications also include smart materials such as phase change materials for active thermoregulation for sportswear or breathable membranes in memory shape polymer, which vary their permeability to vapour as a function of temperature.

3D printing seems to be the technology that will disrupt the fashion industry (Sisson & Thompson, 2012; Sun & Zhao, 2017). It could be both additive and subtractive and in fashion has been integrated in different manufacturing processes as laser cutting, knitting, weaving, sewing and embroidery. In recent years, 3D printed fashion products have been mainly related to fashion shows and experimentation. Some notable examples include the haute couture of the Dutch designer Iris van Herpen, one of the most prominent fashion designers (Lady Gaga and Tilda Swinton are two clients and collaborations) who realised collections that bind emerging technologies like elaborate 3D



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

printing or laser-cutting with delicate handwork such as embroidering or draping; wearable technology by Pauline van Dongen; the experimentation for high-level runners carried out by Nike with Nike Flyprint, the first 3D-printed textile upper in performance footwear; the collection of 3D printed “Ascot” hats launched by Milliner Gabriela Ligenza, ...

Furthermore, digital fabrication has also been used extensively in the creation of accessories and jewellery, to develop prototypes, and customizable products that provide consumers an interactive choice-driven experience.

This new way of manufacturing opens different perspectives (Sun & Zhao, 2017), in:

- **design and product development:** fashion designers need to develop competences in 3d CAD software, they have to deeply know the use of new materials, and they have to start working in interdisciplinary teams.
- **sourcing and manufacturing:** there could be a transition to a new model of manufacturing (Localized manufacturing) and labour reorganization. There could be a shift to back reshoring manufacturing, as recognized by more than 50% of fashion manufacturing executives, considering shifting manufacturing back to the United States from overseas (Morris 2015), thanks to the introduction of this new technology. Secondly, since the comparative advantage of Asian countries is based on factor-cost differentials, but labour input in 3DP is relatively modest compared to traditional manufacturing, the massive introduction of this technology could reshape fashion industry geography. Finally, it is a technology that allows you to respond more efficiently and quickly to demand, reducing time but also waste of materials.
- **retail, distribution and consumer:** mass-market fashion brands are using 3DP to produce customised products for consumers, providing a technologically advanced answer to one of the business models of contemporary fashion. Mass customisation is a production model that combines elements of mass production with those of bespoke tailoring. In the past, luxury goods used to be highly customized and expensive products based on the buyer’s personal preferences, tastes and budget. But as mass production began to replace craft production as the dominant form of economic activity, the opportunity and the economic viability of high customization and differentiation of products lost its strength. Today, the rise of a new business model, called “mass



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

customisation”, enabled by technological innovations brings back individuality in the product design process. The pioneer of this business model for the fashion system is Levi Strauss, which in 1994 launched its Original Spin jeans for women. Louis Vuitton, with Mon Monogram, Prada with Customize, NikeiD and Burberry Bespoke are the most known examples of projects of mass customisation. The secret of this process is called modularity: the company creates a series of standardised production modules, which can then be assembled in a varied and innovative way. It is necessary to identify which key elements of a product could be customisable (according to production feasibility and costs) to offer the right degree of variability still ensuring manageable and scalable production. Digital manufacturing has opened up new opportunities for this business model: for example, the N12 bikini designed by Continuum Fashion, a completely 3D-printed swimsuit, the works of the craftivist Zoe Romano (openwear.it), the custom-designed products of the Belgian company Materialise, the Under Armour 3D-printed midsoles for peak athlete performance, ... In this manner, 3DP had moved production closer to the end consumer and contributed to redefine the roles of users and designers and bringing out a clear space for co-design practices.

- **sustainability optimization:** 3DP lead to minimal wastes in the production process, supports the recycling of material, is an energy-saver process.

While manufacturing needs to metabolize technological innovations in order to effectively introduce them in the production process, research has gone even further. [bioLogic](#), a research team in MIT’s Tangible Media Group in the Media Lab under the direction of Professor Hiroshi Ishii, has created a new fabric – that could be named as “performance fabric” - that connects biomaterials with textile design. They say, “we are imagining a world where actuators and sensors can be grown rather than manufactured, being derived from nature as opposed to engineered in factories.” This is the concept of “radical atoms”: making materials that transform dynamically.

One of the first experiments in this sense is the embedding of the bacteria *Bacillus Subtilis Natto* into fabric to ventilate garments, thanks to the behaviour of the bacteria, that expands or contract in relation to atmospheric moisture. They harvest the bacteria cells in a bio lab and bio-print them, giving life to a “second skin” which is responsive to atmospheric moisture changes. This fabric was



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

used to make some suits for dancers. In a first phase, the reactions of the dancers' body during the performance were mapped, for example by keeping track of the areas where the body sweats the most. On the basis of this mapping, suits have been created that react by ventilating the areas most subject to sweat, when this occurs, thus enabling sweat to evaporate and cool down the body through an organic material flux.

A second step is applying this technology to creating sportswear that regulates athletes' body temperatures, thereby enhancing performance, made with New Balance. The ultimate objective is to explore how the physical materials and physical environment can be smarter, more adaptive and become part of us, acting as an interface that can communicate with the body.

1.2. Fashion and age

The monitoring of the demographic situation within the countries of the European Union points to a continue and sustained trend of ageing population. The most recent statistics (2019 data, Eurostat 2021) report that more than one fifth of the population in EU27-member countries is aged 65 years old or older, while young people aged up to 14 years old make up about 15,2% of the European population. The United Kingdom presents similar figures relating to its population structure.

With life expectancy increasing at a similar pace in all European countries, a further significant factor to consider is the progressive ageing of the older population: the age segment of 80 years and above growing faster than any other age segment of the European population.

The old-age dependency ratio (defined as the number of individuals aged 65 and over per 100 people of working age defined as those aged between 20 and 64) for member states is of 31,4% (2019 data, Eurostat 2021), with countries as Italy, Finland and Portugal reaching respectively 35,6%, 35% and 34%. The United Kingdom presents an age-dependency ratio of 28,9%.

Nearly 36% of people in the age group of 65 years old and above reported a disability (Eurostat 2012), almost 50% reported difficulties with at least one personal care or household activity and of them 2 out of 5 reported a lack of assistance with those activities. These figures are also similar worldwide. The world demographic forecasts, carried out by the United Nations in 2012, recognise, in fact, an increase in the world population in 2050 mainly due to the prolongation of life.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Due to the positive trend in life expectancy, the question of how to live, not only longer but healthier, needs to be urgently addressed. In Europe, as in many other countries, the future health of the population as a whole will in fact be strongly influenced by the aging of the population itself. This increased longevity has often not occurred in parallel with advances in people's quality of health and well-being, as demonstrated by the gap between the extended lifespan and the increase in chronic diseases (OECD 2010).

Active and healthy ageing is thus a societal challenge shared by all European countries, but also an opportunity. It is a chance for Europe to establish itself as a global leader that is capable of providing innovative solutions also through a redefinition of the potential role of industries that might seem distant from this problem.

The ageing population will in fact impact many sectors of EU economy, and technological innovations will have an important role in defining the perspectives of Silver economy, as the economic activities linked to the aging of the population are defined. Some sectors are at an advanced stage of implementing solutions for a better quality of life for an ageing population: e-health, autonomous cars and transport, smart homes, communications. Others need to reflect on their role in a society that is changing so quickly and pervasively. For this reason, we will try to make a brief summary of how the textile and fashion sector can face these changes in society and contribute to supporting active ageing, reducing the problems resulting from this process and improving the quality of life of older people.

Innovation on active and healthy ageing is heavily dependent on the public sector: public procurement and pre-commercial procurement are important instruments to stimulate Research and Innovation in order to meet societal challenges, for example in EU through Horizon 2020 calls. In the textile and fashion sector, the low investments in the Silver economy (witnessed in the interviews carried out) could be linked to the perception of a low possibility of exploiting the market, which acts as a deterrent for private investments.





But this perception does not coincide with the available data. The latest Household Budget Surveys (2015) explores the consumption purposes of households in EU member countries, allowing to investigate the data by age of the reference person. Households where the reference person is aged 60 years or over record a mean consumption expenditure of 23.439 Euros (Eurostat data 2015), a value higher than the analogous for households where the reference person is younger than 30 years old and lower than the analogous for households where the reference person is aged between 30 and 59 years.

<i>AGE (years)</i>	<i>Less than 30</i>	<i>30 to 44</i>	<i>45 to 59</i>	<i>60 or over</i>
<i>Mean consumption expenditure (2015)</i>	22.250	28.949	30.425	23.439

Although not broken down by age group, the survey also informs us that the mean annual consumption per household in clothing and footwear is of 1.227 Euros.

The breakdown of the total expenditure by consumption purpose indicates that in households where the reference person is aged 60 years or over 3,4% of the budget is spent in clothing and footwear. This figure is lower than the analogous for households where the reference person is younger, with a maximum relative expenditure of 5,5% associated to the age group from 30 to 44 years old, who often have growing children, who need changes of clothes and accessories even several times a year.

<i>AGE (years)</i>	<i>Less than 30</i>	<i>30 to 44</i>	<i>45 to 59</i>	<i>60 or over</i>
<i>Household % expenditure in clothing and footwear (2015)</i>	5,3	5,5	4,9	3,4

However, if we consider the fact that the number of people over 65 is an important share of the population, their specific expenditure in fashion - even of lower level - entails a significant total amount of expenditure in the sector.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION



TUS
Limerick School
of Art and Design



IPCA
INSTITUTO POLITÉCNICO
DO CAVADO E DO AVE
ESCOLA SUPERIOR
DE DESIGN



FONDAZIONE SANTAGATA
for the ECONOMICS of CULTURE



**Crafts
Council**



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

2. Independent innovation in fashion and textile

This section is aimed at identifying the most relevant categories of actors who are currently pursuing innovation in the fashion and textile field, with a particular attention to the independent offer. The underlying intention is to understand to what extent and at which conditions independent and smaller producers hold an advantage in the innovation processes concerning larger firms. *What actors have the most power to disrupt and transform? Which actors are currently pursuing innovation?*

The fashion and textile industry, in fact, embed deeply rooted issues which call for solutions and collaboration by different actors to disrupt the status quo. It can be considered a time of opportunity for fashion and textile entrepreneurs to build innovative business models that explore these trends while, at the same time, pursuing social value creation, besides the economic one.

Going back to what has been previously recalled, innovation research in fashion and textile may be towards innovative materials and processes (i.e. sustainable raw materials, zero waste, wearable technology, etc.) and technologies in order to pursue a lower environmental impact (i.e. upcycling, recycling, “vegan”; CSR and vertical integration, fair trade, locally sourcing, collaborative consumption, second hand, etc.). Considering what has been mentioned in Section 1.1, for example, short-to-medium term technological trends that have the potential to impact fashion business models include wearable technology and augmented reality: smart wearables can open up alternatives, for example on better detecting when and how to discard garments, or for tech applications in various sectors, for example leisure, luxury, and sportswear. Furthermore, innovation in the fashion and textile field today means also enhancing the level of customization: it depends on the change in the role and instances of the consumers, therefore in higher consumer awareness (Drift for Transition report, 2018). Evidence of this behavioural change from the side of consumers is, for example, the proliferation of bottom-up initiatives such as the do-it-yourself movement, “lowsumerism”, and slow fashion, that directly impact how fashion firms design and transform their business models.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

The fashion industry is highly fragmented and globalized: indeed, the 10 biggest brands and retailers have a joint 10% global market share, while it involves numerous small and medium-sized enterprises throughout the value chain; concerning European textile and fashion companies in particular, according to Euractiv (2016), they are predominantly Small-medium enterprises. SMEs are breaking the rules of the traditional business model which leads to fast fashion and are increasingly pursuing a multi-stakeholder collaboration (Todeschini et al., 2017). On the other side, technology has driven rapid changes in the roles of designers, makers, and users among industry and academic professionals: these groups are expected a much more intimate relationship with the demand than before; the designer's roles are expanding and becoming highly complex, while future users will be concerned with reshaping the usual manufacturing flow (Drift for Transition report, 2018). These factors and actors have a strong potential in innovating the fashion and textile sector.

Therefore, in the European fashion and textile sector, innovation is generated, besides traditional places of education and specifically devoted to cultural and artistic production, in multiple and various realities, in particular by actors that can sustain the transformations in the industry, through promoting new entrepreneurial realities and modes of production.

These innovative actors are usually sustained by private investments, bottom-up or top-up public initiatives, institutional intervention solicited from below and subsequent collaboration between institutions and private entities, and so on. These innovative projects may be connected to urban qualification and the creation of innovative hubs (Friel et Borrione, 2020), offering services to creatives and their activities, creating opportunities for exchange and discussion for young people and hosted professionals, as well as contributing to the creation of widespread knowledge on the issues of innovation, digital and creativity through activities, workshops, courses, as well as offering community services (workshops, cultural events, activities for children, etc.). The actors presented in the paragraphs that follow are those we have deemed to be interesting examples of independent innovation in the European fashion and textile panorama.

2.1 Makerspaces and Fab Labs





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

“Maker” is the term referring to individuals or groups producing objects as part of the do-it-yourself culture: this definition is extremely vague, in part as the maker movement is extremely heterogeneous and widespread (Van Holm, 2014). Makerspaces are also commonly known as “hackerspaces” and “Fab labs” and are generally understood to be community workshops where members, the “makers”, share tools for professional gain, hobbyist objectives, and more. As it may be inferred, there isn’t a single term which perfectly captures all the variety of spaces available: makerspaces attract individuals who identify as makers and support members by spreading the cost of industrial tools and gathering the community to share knowledge, time, and effort on projects. These spaces are often extremely versatile, being usually active in multiple sectors of activity and promoting a multidisciplinary approach in production and collaboration processes.

Fab labs, in particular, are small laboratories, generally open to the public, which offer tools and services for digital production: the concept of the Fab lab was born around 2000 at the Massachusetts Institute of Technology (MIT) from the intuition of Professor Neil Gershenfeld for the realization of a collaboration programme between the Grassroots Invention Group and MIT’s Center for Bits and Atoms to elaborate remote projects in digital form. The Fab lab network currently includes centres spread all around the globe which usually provide an extensive selection of manufacturing and digital prototyping tools to a large and varied user base, and some might belong to a wider collection of community spaces. The Fab Lab City Manifesto claims that fab labs: *“commit [them]selves to implement the ten following principles to enable the urban transition towards locally productive and globally connected cities. We embrace strategies in circular economy and digital social innovation, and foster collaboration between a global network of European and worldwide cities and territories to meet the planetary challenges presented by climate change and social inequalities.”* The cited ten principles are: ecological, inclusive, glocalism, participatory, economic growth and employment, locally productive, people-centred, holistic, open source philosophy, experimental. Therefore, Fab labs commit themselves to be transformative agents in the society, using a social and environmental innovation narrative (Smith et al., 2015), where different skills can meet to create shared innovation through sharing knowledge.

Moreover, makerspaces and Fab labs usually offer formal training and are organized with a formal staff to operate in the space, while others are completely self-organized and run by members: these





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

interactive makerspaces can also foster a community by creating other modes of interaction, such as classes or activities. The spaces are equipped with a series of technologies and computerized tools able to realize, in a flexible semi-automatic way, a wide range of objects and operations. These tools are mainly 3D printers, laser cutters, control cutters, vinyl cutting machines: although Fab Labs cannot compete with production mass, these places have proven over time great potential to provide their users with knowledge and tools to make products on their own; indeed, the technological machinery can be adapted to local or personal needs in ways still not accessible to productions on a large scale. Communication devices, sensing technologies, building structures, arts and crafts are all within reach using the tools and materials; a few examples of high-profile projects made in Fab labs include solar and wind turbines, wireless data networks, thin client computer interfaces (Beyers, 2010), but not only.

The vast majority of makerspaces and Fab labs provide support and educational opportunities. It is the case, among the others, of the MUSE FabLab belonging to the Science Museum of Trento, a digital manufacturing laboratory and at the same time an exhibition space in which the culture of “doing” enters a perspective of community and knowledge-sharing: the Fab Lab is completely open and immersed in the museum experience, allowing visitors to witness live the creation, prototyping, and teaching processes of the people who animate it. “Learning by doing” is a fundamental principle which affects all participants and guarantees a direct co-working experience through totally non-hierarchical multidisciplinary communities of which artisans, graphic designers, and computer scientists are part, generating creative capital quickly through non-hierarchical processes. This organizational structure also favours open contexts and flexibility to find applications in a high variety of domains.

For example, Arduino is a technology that well represents the spirit of makerspaces and Fab labs: it consists in an electronic platform, born originally in Italy in Ivrea in 2005, which in a few years has changed the sector of Electronic Design, democratizing the most pervasive technologies that characterize the contemporary world. With Arduino, anyone can create an interactive electronic product simply and immediately, without needing to be a technician or having specific skills in computer science or electronics. Unsurprisingly, the first Arduino users were artists, creatives, and designers, and this is one of the reasons why Fab labs have gradually taken over growing importance





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

also for the artworld, and cultural and creative industries, making them a point of aggregation and exchange of skills, where engineers, computer programmers, artists, designers, have converged. As it has been mentioned, these makerspaces and Fab Labs are usually active in multiple sectors, and very frequently in arts and crafts, as well as in the fashion and textile field. The spread and accessibility to Fab labs and makerspaces presents an opportunity in the fashion and digital fabrication, as fashion designs can be made locally. A relevant example, in this sense, is represented by Fab Lab Barcelona, which is active in multiple sectors and carries on activities in the implementation of food recycling and upcycling and civic ecology, as well as research on materials and textiles in collaboration with other entities and organizations: with the project “She Makes”, Fab Lab Barcelona is taking part to a two-year initiative with a consortium of 10 partners in 7 different countries, for the development of an innovation ecosystem promoting gender parity through engaging girls and women innovators belonging to three age groups, local communities and businesses in collaborative innovation activities as well as carrying out networked multi-Lab innovation projects. Fab Textiles is another project promoted by Fab Lab Barcelona, which is “*implementing a new approach towards the production and distribution of fashion elements, through using distributed manufacturing infrastructures and knowledge networks*”. Fab Textiles is a cross-disciplinary research platform to investigate how production can impact the way in which we consume and act in the fashion industry.

Fab labs and makerspaces usually offer business support activities, including co-working and collaborative spaces availability; the experience of coworking revealed to be fruitful and particularly spread. These spaces may favour starting new collaborations, contact with potential clients and the possibility to stay in a community of creatives (Friel et Borrione, 2020). Moreover, Fab labs and makerspaces promote social and economic innovation, and, as an element of the sharing economy, they are capable of generating positive externalities for local development: by making knowledge and technologies available to any citizen, they promote a democratized access to innovation and entrepreneurship. As such, they have a key role to play in smart city strategies as they empower citizens and encourage them to innovate and create. Overall, collaboration with institutions such as museums and universities, offering coworking and business development support, access to networks, mutual exchange, and peer learning, is deeply embedded in makerspaces’ and Fab labs’





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

experience. All of these elements position makerspaces and fab labs to enact cultural roles in the urban context as well.

2.2 University Fab Labs

Many universities have indeed initiated programmes to encourage entrepreneurship in the fields of culture and support the entrepreneurial attitude also in students of artistic subjects such as art and music. These are hubs created to promote the employability of students and graduates and enhance the professional profile of the teaching and technical staff university administration. As a recent development in the European panorama, University Fab labs and makerspaces focus on encouraging creativity and interdisciplinary collaboration, as well as entrepreneurship, and experiential education. There are many types of university makerspaces, ranging from teaching labs renamed as makerspaces to large multidisciplinary makerspaces. The physical space contains specialized tools and equipment typical of Fab labs (e.g., 3D printers, laser cutters, computer-controlled embroidery machines, etc.) that allow students to develop projects and unstructured activity, thus improving outside-of-the-classroom experiential learning.

Interesting examples are Fab Lab Limerick, belonging to the School of Architecture of the University of Limerick (Ireland); IPCA Fab Lab (Portugal), Santa Chiara Lab and Politecnico di Milano (Italy). This last one consists in a makerspace where digital design and manufacturing processes are concretely experimented. A further example of Fab lab which is active in the fashion and textile field is the Digital Anthropology Lab in the University of the Arts, London: *“We use the lens of anthropology to facilitate collaborations between fashion, aesthetic, body, craft and society to help organisations prepare for an ever more connected future. We develop projects with industry and academic partners to create research and knowledge exchange outputs in hybrid fields. We develop new methodologies of digital practice, research application and student experience.”* The experience of this university makerspace draws from perspectives in computing, design, sociology and fashion; the project “Wearables” consisted in the implementation of a space to critically reflect on what should be enabled through worn items.





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

The mentioned examples are located in large cities with a vibrant local economy; an interesting example of a makerspace born in a university located in a smaller city, for example ITA GmbH in Aachen, Germany: ITA considers itself an implementation research institute. One of their key tasks is know-how and technology transfer for the benefit of the relevant companies, therefore their industry partners for research and development field with a focus on technical textiles, chemical fibres, textile machinery, fibre reinforced composites, bio-hybrid & medical textiles as well as for technology transfer to other industries. The ITA GmbH works for finding comprehensive solutions along the textile chain through a close collaboration with the Institut für Textiltechnik.

2.3 Fashion start-ups

Small-scale activities may represent important actors in the fashion and textile panorama to pursue innovation and technology-oriented start-ups in the fashion industry constitute a significant example, especially those focused on sustainability. Among the technological innovations that currently impact business models in fashion, alternative fibres seem to be the most prominent innovations (Drift for Transition report, 2018), as it is the case for Orange Fiber, a start-up that aims to create sustainable textiles from citrus juice byproducts. The idea was born from the fact that in Italy alone, more than 1 million tons of citrus byproducts are wasted every year: Orange Fiber came up with the idea to reuse this waste by transforming them into cellulose fibres, thus developing an innovative fabric to be used later for manufacturing clothes. To do so, the start-up designed and patented a process based on nanotechnology that replaces highly polluting raw materials with natural elements: their business model leverages the sustainability drivers of sustainable raw materials, recycling, local sourcing, zero waste. Fashion start-ups are typically born sustainable, as the commitment to promoting social and environmental sustainability tends to be key values and motivations of their founders and partners: flexibility is then a key success factor for these entrepreneurs to design innovative business models that embed many of the trends and drivers mentioned above. Usually, fashion start-ups tend to proceed cautiously, experimenting with small-scale green initiatives and addressing structural issues, such as promoting transparency in supplier selection and management.

2.4 Incubators





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

In general, incubators are companies whose objective is to accelerate the growth and success of start-ups and other companies in their initial phase, attracting the injection of capital by governments, universities, economic development agencies, and other financial investors. They provide capital, business support and network, in exchange for a share of a business, usually a percentage of common equity. Incubators can promote positive changes in the cultural ecosystem through the promotion of the culture of innovation and collaboration, as well as strengthening local skills. Fashion accelerators, in particular, usually help fashion start-ups to develop their innovative strategy by providing a varied array of services: for example to establish a business model, to provide them with a studio and related facilities, or to offer designers and entrepreneurs a community and networking opportunities. On this last point, incubators may foster connections along the supply chain, and link the start-ups to the proper manufacturers, raw material providers, etc. Fashion incubators are usually tech-oriented: as already mentioned, augmented reality or artificial intelligence are currently transforming how users and customers can virtually try on garments, and incubators may provide businesses with the needed technologies; founders have the chance to work in a studio space at lower costs with related facilities such as printers, CAD, graphic tables, drafting tables etc. In this respect, fashion incubators perform a parallel activity to fashion schools and academies, offering business mentoring, educational seminars, infrastructures and employment opportunities.

University incubators, in particular, often favour birth or growth of innovative business projects: their connection with the training system can stimulate the exchange of knowledge on professional needs and know-how in the local labour market and environment. For example, London's pioneering fashion-tech business incubator, the Center for Fashion Enterprise (part of London College of Fashion), offers workshops and expert advice; so far, 750 fashion businesses have benefited from their support.

Incubators can favor the development of an ecosystem of actors who collaborate and share resources to pursue innovation in a given district or area. One last example, which is not strictly related to fashion, is FabLab Lisboa, which appears as a unique hub devoted to entrepreneurship, as well as one of the most innovative initiatives of the kind at the European level. Indeed, one of the objectives of FabLab Lisboa is to foster an ecosystem for innovation through the Lisbon Incubator Network which





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

aims at federating initiatives in favour of entrepreneurship, including incubators, Fab labs, and co-working spaces.

2.5 Independent centres of cultural production

Other spaces that can be mentioned in the present list are represented by independent centres of cultural production. These spaces go from creative laboratories to youth circuits and all those artistic and creative productions that are not conveyed by institutional channels, or by organizations that have established themselves through the market or the public sector involvement. They can be in rural areas and minor urban contexts, and the governance of these spaces is often informal, though entrusted in pacts of collaboration and cooperation between associations: their internal structure often consists in people who share resources and skills that aim to create new models of production, promoting economic sustainability that allows designers and artists to work with large degrees of freedom of expression and content. Thanks to the nature that lies at the intersection of production culture and new spaces of sociality, new opportunities for artistic expression and experimentation take space, developing processes of cultural innovation with a social and civic impact. One example in this sense can be considered the Lottozero Laboratory in Prato, Italy: Lottozero is a creative hub, design office and consultancy studio, with the purpose to encourage the development of emergent talents, through residences of creative production and collaborations with consolidated realities of the territory. It counts a textiles laboratory, a coworking space and an exhibition area, which became a reference base for international networking in the textile sector. This hybrid textile laboratory contributed to revitalize the city of Prato, one of the principal European textile districts: the restructuring of the disposed store in the district known as Macrolotto Zero, characterized by social marginality and degraded buildings, demonstrated how the recovery of a physical space and the creative reactivation of the community is an engine for the regeneration of creative capabilities of people, and positive economic impact.

In the past few years, the number of Fab labs and makerspaces opened by universities, public institutions, as well as fashion startups active in fashion and textile and private companies has been





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

exploding. It should be noted that Covid-19 pandemic changed the definition of work and education for billions of people around the globe. As the societies re-open, new norms for organizing the way we operate and work have been adopted – and it is normal to expect that these small-scale realities will be affected. In the next few years, it will be very interesting to observe how they will evolve and be affected by new norms and changes in the way we work.





3. Independent innovation in UE

3.1 Overview of European fashion and textile industry

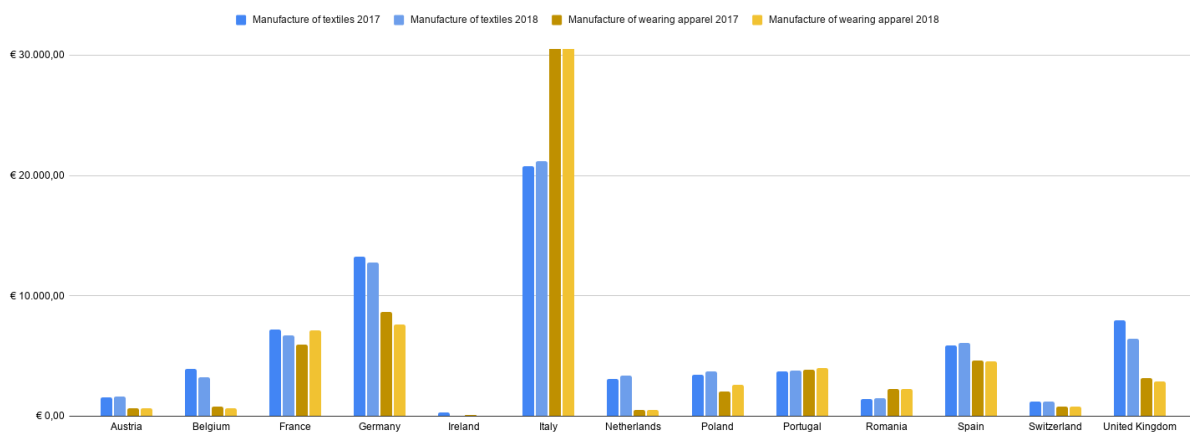
Fashion and textile are a diverse sector playing a relevant role in the European manufacturing industry and generate a turnover of 166 billion euros. In the last years, a number of upward trends emerged in the fashion and textile sector, and exports, turnover, number of companies and employment increased. The top producers of textiles and fashion goods in the European Union are Italy, Germany, France, Spain, Portugal, UK, Belgium, Poland, Romania and Austria: they produce clothes, carpets, home textiles, cellulosic fibers¹ and technical textiles used in various sectors.

European textile and fashion companies are predominantly SMEs, and they directly employ 1.69 million people, 70% of whom are women; companies of less than 50 employees account for over 90% of the workforce and produce almost 60% of the value added.

The following tables provide the turnover and production value in million euros of manufacture of textiles and of wearing apparel in 2017 and 2018.

Turnover or gross premiums written - million euro

NACE_R2	C13 - Manufacture of textiles		C14 - Manufacture of wearing apparel	
	2017	2018	2017	2018
EU27_2020 - European Union - 27 countries (from 2020)	70.000,0	73.548,9	67.845,4	68.018,0

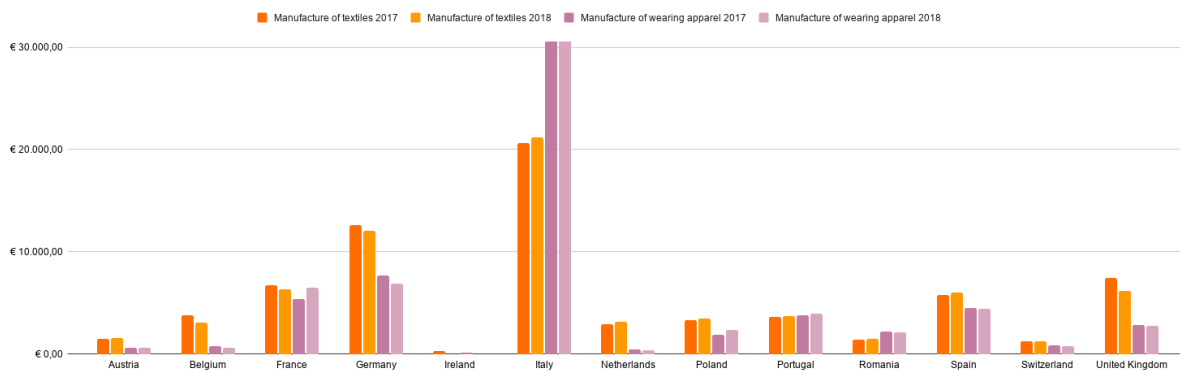


¹ Cellulose or *cellulosic fibers* are fibers structured from cellulose: they are created by dissolving natural materials such as cellulose or wood pulp, which are regenerated by extrusion and precipitation.



Production value - million euro

NACE_R2	C13 - Manufacture of textiles		C14 - Manufacture of wearing apparel	
	2017	2018	2017	2018
EU27_2020 - European Union - 27 countries (from 2020)	70.000	70.566	64.118	65.194



Textiles and fashion companies are increasingly collaborating with other industries, consumers and authorities (Euratex, 2016). With the adoption of new technologies, more and more fashion tech startups are entering the market, thus changing the traditional relationships between consumers and brands. For example, the International Fashion Academy Paris together with the Global Brands, led the Unthreading Project: the initiative has allowed students to understand how to develop accessible and sustainable apparel, meeting the fashion needs of a diverse consumer base, for example, disabled people. These perspectives on consumption are also reflected on the side of legislation: recent EU legislation on fibres names and labelling aims to ensure consumer protection and to provide correct information to stakeholders.

Independent innovation in fashion and textile field in the EU

The data collected on independent innovation in fashion and textile refers to the following European countries: Belgium, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom, Austria, Switzerland, Poland and Romania, which have been selected given their relevance in the European panorama of the production of textiles and fashion apparel.



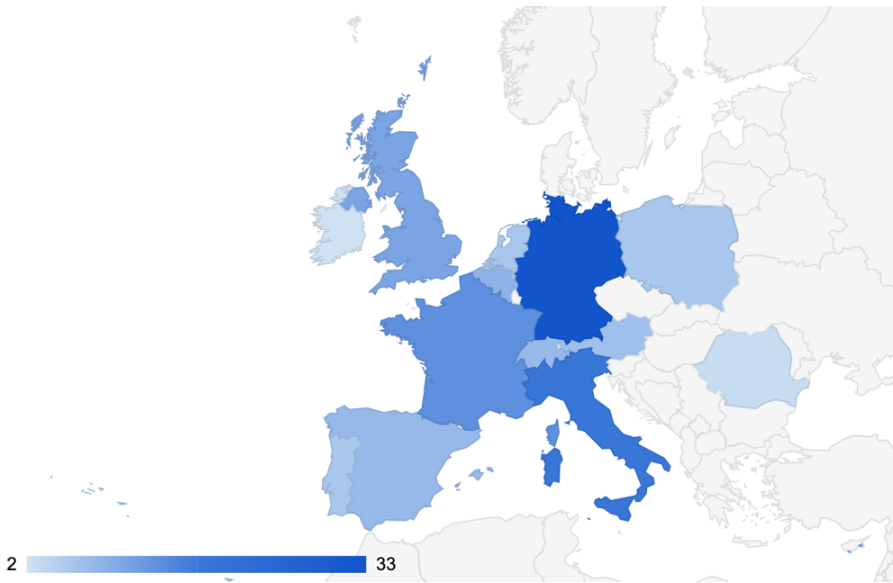
Of the 357 independent innovation centers mapped, 132 are currently active in the fashion and textile field (around 37% of the total). The following table summarizes the number of fashion and textile centers per country and its weight on the total amount of mapped centers in the European area of reference, as well as the percentage over the total centers active in that country.

Table 2: Active centers in fashion and textile: distribution of mapped centers in relation to city dimension; percentage of centers active in fashion over total fashion centers per country; percentage of fashion and textile centers over total centers

Country	Capital	Large	Medium	Small	Village	Total Centers Active in Fashion	% Active in Fashion	% over total centers
Austria	3	2	0	0	2	7	5,3%	33,3%
Belgium	4	3	2	0	0	9	6,8%	34,6%
France	3	7	1	1	2	14	10,6%	37,8%
Germany	6	20	3	3	1	33	25%	55,0%
Ireland	0	0	1	0	1	2	1,5%	33,3%
Italy	1	10	2	4	2	19	14,4%	29,7%
Netherlands	2	2	1	0	1	6	4,6%	25%
Poland	3	3	0	0	0	6	4,6%	66,7%
Portugal	1	2	1	1	1	6	4,6%	40%
Romania	0	3	0	0	0	3	2,3%	75%
Spain	2	6	0	0	0	8	6%	26,7%
Switzerland	1	2	1	4	0	8	6,0%	44,4%
United Kingdom	2	9	0	0	0	11	8,3%	25,6%
TOTAL	28	69	12	13	10	132	100,00%	
%TOTAL	21,2%	52,3%	9,1%	9,9%	7,6%	100,00%		

The countries with the highest number of active centers in fashion and textile are Germany (25% of the total fashion centers mapped), Italy (nearly 15%), France (11%), and the UK (over 8% of the centers mapped).

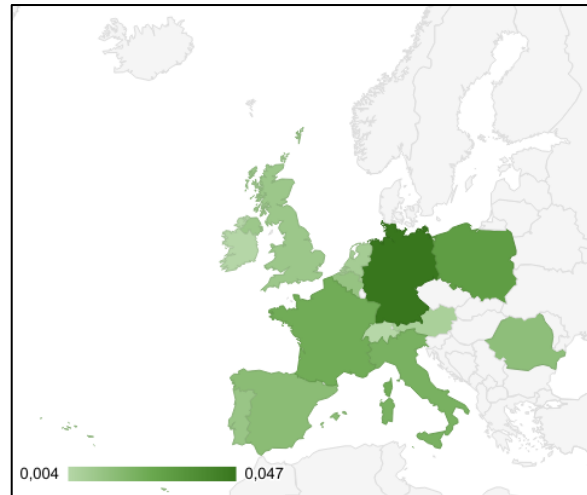
Figure 1: number of active centers in fashion and textile



Comparing these numbers (Total centers active in fashion per country) with the total mapped centers per country, Germany (55%), Poland (67%), Portugal (40%), Romania (75%), and Switzerland (45%) are the countries with the highest concentration of total centers active in fashion. The distribution of the mapped centers active in fashion and textile in relation with the city dimension emerges to be in line with the one relative to the total mapped centers.

Figure 2: active centers in fashion and textile over the yearly consumption per capita on fashion and textile products

Countries	Yearly consumption per capita on fashion and textile products (million euros/inhabitants) (Euratex, 2016)	Total Centers active in fashion and Textile	Active centers in fashion and textile / Consumption per capita in fashion and textile
Austria	€ 1.000	7	0,7%
Belgium	€ 700	9	1,3%
France	€ 600	14	2,3%
Germany	€ 700	33	4,7%
Ireland	€ 500	2	0,4%
Italy	€ 900	19	2,1%
Netherlands	€ 700	6	0,9%





Co-funded by the
Creative Europe Programme
of the European Union

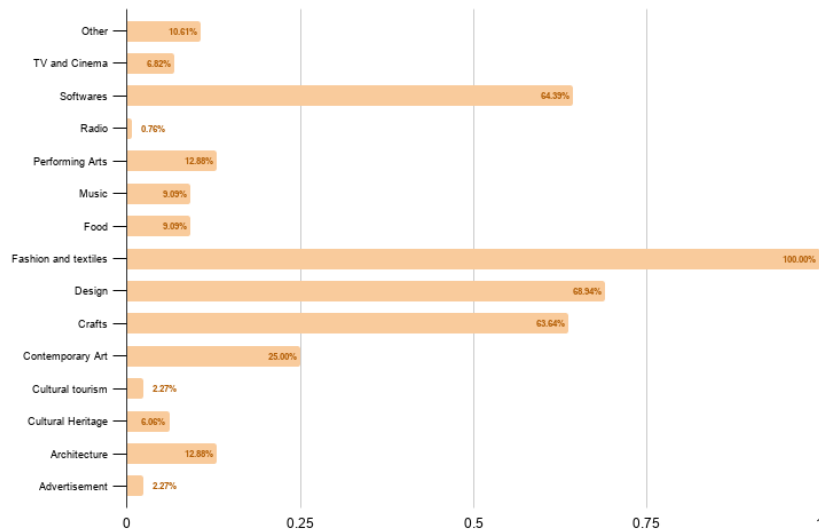


FUSION

Poland	€ 200	6	3%
Portugal	€ 500	6	1,2%
Romania	€ 200	3	1,5%
Spain	€ 500	8	1,6%
Switzerland	€ 2.200	8	0,4%
United Kingdom	€ 1.000	11	1,1%

The 132 centers active in the fashion and textile field offer activities and promote initiatives and events in multiple related sectors. As it emerged from Chapter 1.3, one of the main characteristics of Fab Labs and makerspaces is their multi-disciplinarity and flexibility towards different uses of the available infrastructures (spaces, technologies and machineries).

Figure 3: other sectors of activities of mapped centers active in fashion and textile



Design (69%) and Crafts (64%) are the most frequent sectors of activity, as well as Softwares (64%). This is a good indicator of the level of use of digital tools in makerspaces and Fab Labs active in fashion and textile pursuing innovation in this field. Other relevant sectors of activity related to fashion and textile are Contemporary Art (25%), and related sectors (Architecture and Performing Arts, both around 13%).

The mapped centers active in fashion and textile belong to the following networks and hubs:

Table 3 and 4: networks, hubs, and universities to which the centers active in fashion and textile belong to; type of network





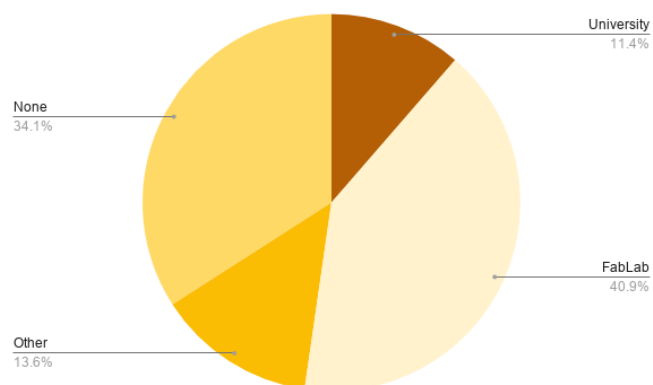
Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Networks	Amount	% over total fashion centers
Cergy Université	1	0,8%
Deusto University	1	0,8%
Eurecat	1	0,8%
FabLab	52	39,4%
HappyLab	2	1,5%
KU Leuven Campus Kulak Kortrijk	1	0,8%
London College of Fashion, University of the Arts London	1	0,8%
Łukasiewicz - Textile Research Institute	1	0,8%
None	45	34,1%
Politecnico di Milano	1	0,8%
Rhine-Waal University of Applied Sciences, Faculty of Communication and Environment	1	0,8%
RWTH Aachen University	1	0,8%
Swiss FabLabs	2	1,5%
Technical University "Gheorghe Asachi"	1	0,8%
Università degli Studi di Siena	1	0,8%
Université Libre de Bruxelles	1	0,8%
University of Paris	1	0,8%
University of Siegen	1	0,8%
Verbund Offener Werkstätten	15	11,4%
Westphalian University	1	0,8%
UL School of Architecture	1	0,8%
Grand Total	132	

Type of network	Abs.	
	Value	%
University	15	11,4%
FabLab	54	40,9%
Other	18	13,6%
None	45	34,1%
Total	132	





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

The 34% of the centers active in fashion and textile are totally independent, while it emerges a strong concentration of hubs belonging to the Fab Lab network (41%, including local Fab Lab network, such as Fab Lab Lazio in Italy, Swiss Fab Labs, etc.), as well as part of a university department devoted, for example, to design, fashion, or architecture (around 12%).

Around 82% of the centers active in fashion and textile offer training, courses, and workshops in the fashion and textile field; more precise information will be given later in the data on specific countries.

Table 5: counted trainings in fashion and textile per country; ratio of trainings over total centers active in fashion and textile per country; percentage of centers offering trainings in fashion and textile per country.

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Austria	33	4,7	5	71,4%
Belgium	35	3,9	6	66,7%
France	25	1,8	12	85,7%
Germany	239	7,2	27	81,8%
Ireland	10	5,0	2	100%
Italy	60	3,2	16	84,2%
Netherlands	13	2,2	6	100%
Poland	23	3,8	6	100%
Portugal	5	0,8	5	83,3%
Romania	0	0,0	1	33,3%
Spain	20	2,5	7	87,5%
Switzerland	8	1,0	8	100%
United Kingdom	26	2,4	7	63,6%
TOTAL	497		108	81,8%

The mapped makerspaces and Fab Labs active in the fashion and textile field offer support for business development, especially for the following activities. Examples will be provided in the country sheets.





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

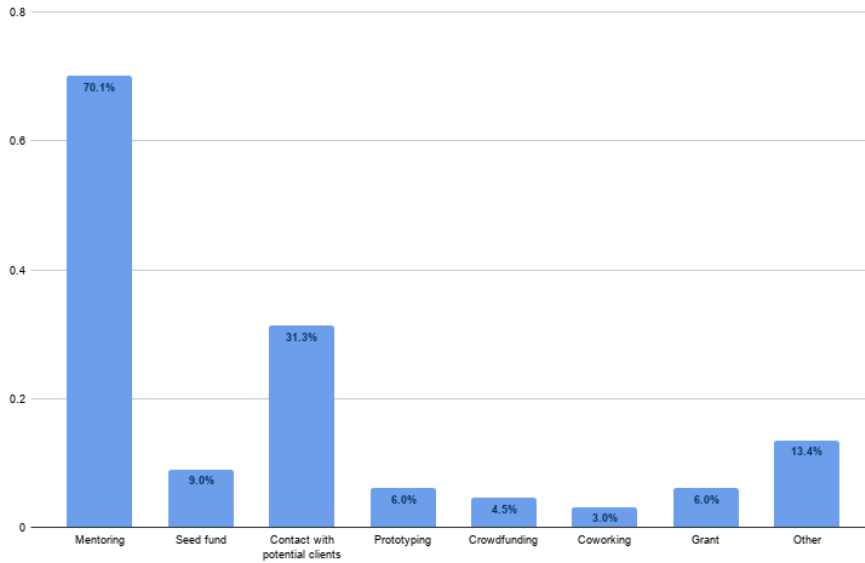
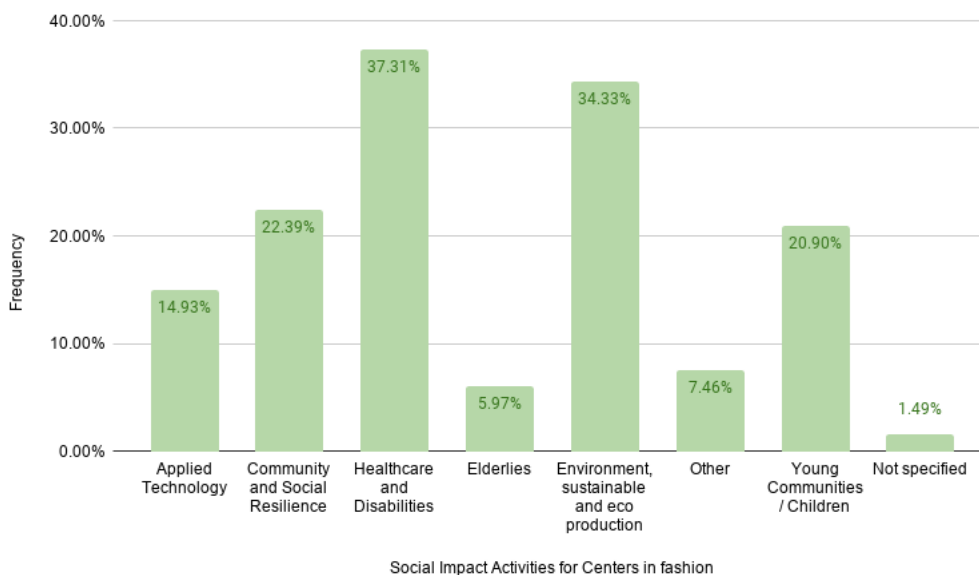


Table 6: Type of business development activities carried on by centers active in fashion and textile

Moreover, the mapped centers active in the fashion and textile fields are usually involved in multiple parallel and complementary activities towards social inclusion, linking design with social impact; more specific examples will be later provided in the country sheets.

Table 7: social impact activities for centers active in fashion and textile





As shown by Table 7, there is a relatively low involvement (6%) in active aging and activities involving the participation of elderlies. In the whole database, 12 activities have been detected, of which 4 in the centers active in fashion and textile; 8 centers develop products for elderlies, but only 2 of them include textiles and fashion products. More details and exemplification will be provided in the country sheets.

Table 8: number of mapped centers offering activities and products for elderlies.

Focus Elderlies	Activities	Products	Including textile products
All Centers	12	8	2
Centers active in fashion and textile	4	6	2

3.2 Country scenarios

Austria

According to Euratex (2016), Austria is among the countries with the highest consumption per capita in Europe, with 1000 Euros spent per inhabitant, as well as among the leaders in the production of cellulosic fibres in Europe. According to a report by ICEX, Austrian consumers are increasingly preferring brands that are sustainable, and the local retail sector offers great opportunities for brands that can identify and cater to a specific niche. Consumers prefer sustainable brands and are increasingly prioritizing labels with ethical supply chains, fair working conditions and low environmental impact.

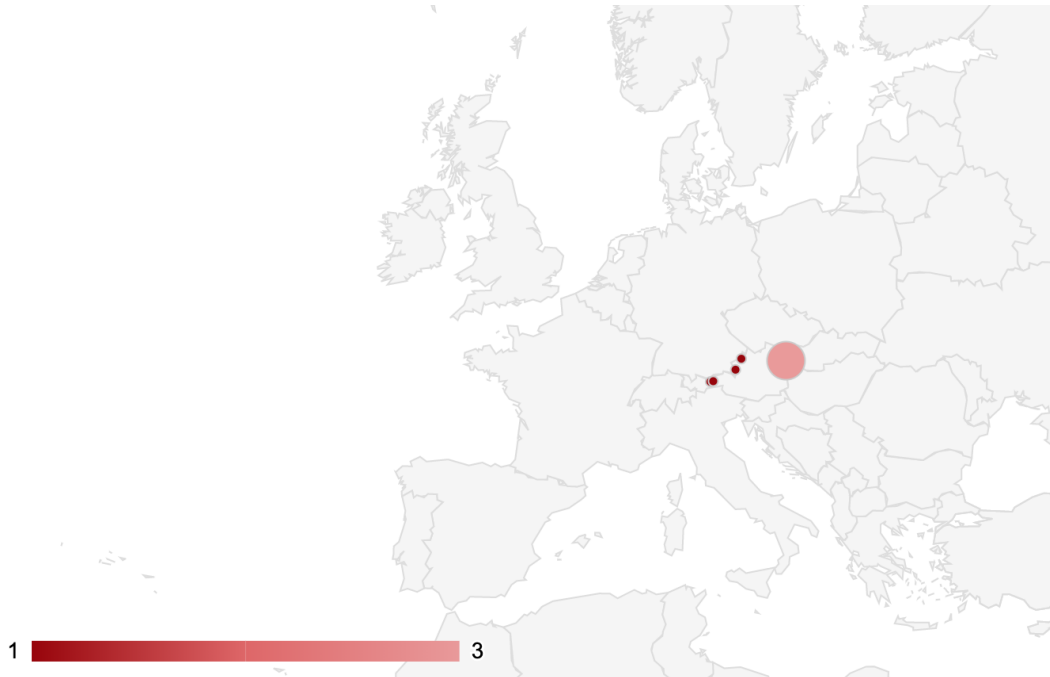
- In total, 21 mapped centres are active in the country, of which nearly the 33% is active in the fashion and textile field (7 centres, contributing to the 5,30% of the mapped centers active in fashion and textile)
- The capital, Vienna, hosts 3 mapped centers active in fashion and textile, while 2 centers are located in large cities, Innsbruck and Salzburg, and 2 in the villages of St. Martin im Innkreis and Wattens



Co-funded by the
Creative Europe Programme
of the European Union



FUSION



- Of the total 21 mapped centers, three centers belong to a University: Carinthia University of Applied Sciences, FabLab Graz University of Technology, and the Smart Production Lab FH Joanneum University of Applied Sciences. Apart from the FabLab network (2 centers), two other networks have been detected as popular in this country: Happy Lab (2 centers), and Industry Meets Makers (6 centers); the rest of the centres are totally independent. In particular, the centers active in fashion and textile are distributed on the following networks:

Austria	7	
HappyLab	2	28,6%
FabLab	1	14,3%
None	4	57,1%

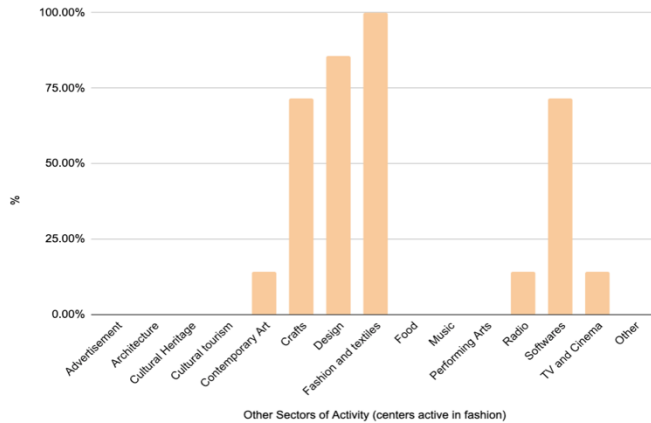


Co-funded by the Creative Europe Programme of the European Union



FUSION

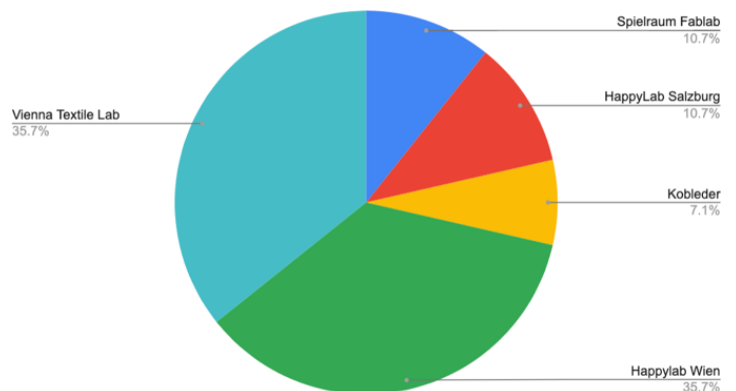
- Other sectors of activities of the centers active in fashion and textile are mostly Design (85,71%) and Crafts (71,43%), but also Softwares (71,43%), Radio (14,29%), TV and Cinema (14,29%) and Contemporary Art (14,29%)



Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	% centers offering fashion trainings
Austria	33	4,7	5	71,4%

- The 71,43% of the mapped centers active in fashion and textile offer activities, courses and training in Fashion and textile. The most active centres are “Happy Lab” in Vienna, with 10 fashion trainings held in 2019, and the Vienna Textile Lab (10 fashion courses, as well), which offers courses and activities in “Environmental sustainability”, aside from fashion and textile.

Number of Trainings



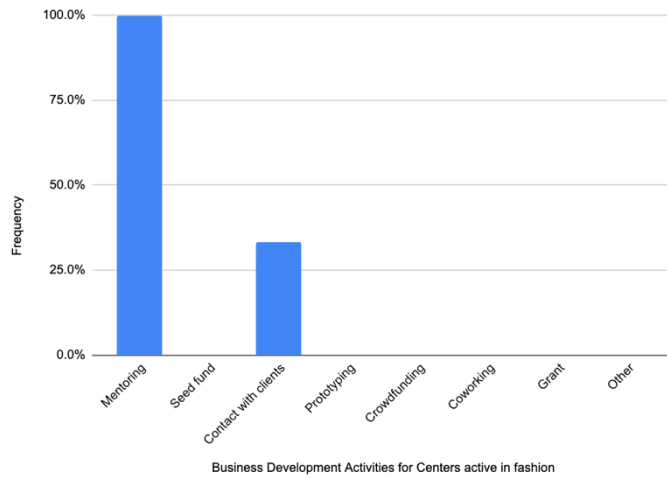


Co-funded by the Creative Europe Programme of the European Union



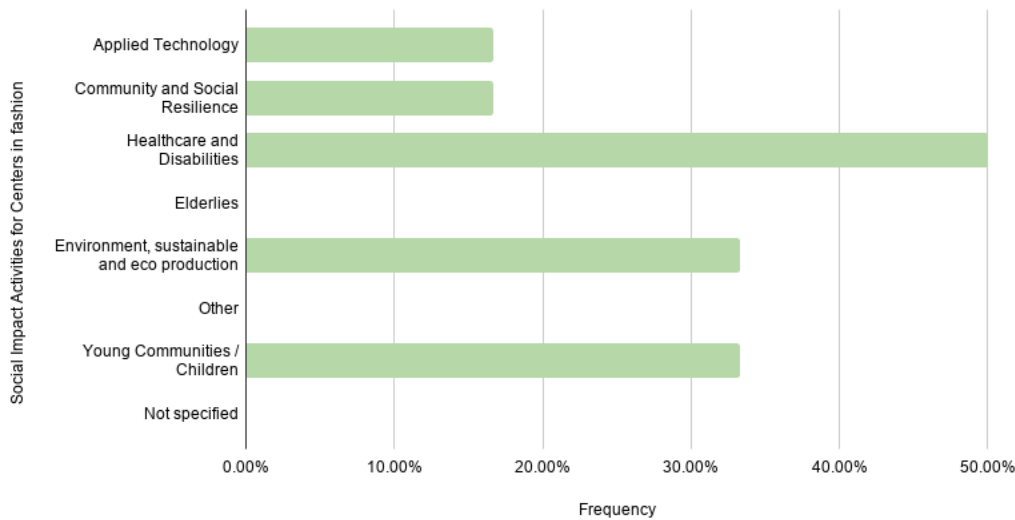
FUSION

- The 42% of the mapped centers active in fashion and textile are active in business development activities, as contact with potential clients (33%), and mentoring (100%).



such

- The 85,71% of these centers declare to be active in social impact activities, especially in healthcare and disabilities (50%), which are often carried on jointly with activities for children and the community (33%).



Two centers offer activities in the field of environment, eco and sustainable production, for example employing upcycling practices (Maker Austria) and alternatives to synthetic dyes: for example, the Vienna Textile Lab produces dyes made from bacteria, as an alternative to the petrochemical-based ones. Finally, Kobleder, the independent centre in the village of St. Martin im Innkreis, worked for the production of lightweight multidirectional 3D knitted



seating for passengers in drone taxis and has been awarded in the Worth Partnership Project for this initiative.

Belgium

According to Euratex (2016), more than 30% of European carpets are produced in Belgium, and the rate of consumption per capita of fashion and textile in this country is relatively high (700 Euros/inhabitant), at the same level as the Netherlands and Germany. In particular, Flanders is home to one of the largest textiles cluster in Europe and a rich innovating ecosystem: the region counts on a strong tradition in high quality textile manufacturing, and nowadays it keeps on innovating in this field with smart and technical textiles, e-textiles and sustainable fibers.

- Overall, 26 independent centers have been mapped in Belgium (7,28% of the total mapped centers); around the 35% of these are active in the fashion and textile field (9 centers), contributing to the 6,82% of the total mapped centers active in fashion and textile.
- 4 centers active in fashion and textile are located in Bruxelles (45%); 3 centers are located in the large city of Antwerp, while two centers are located in medium sized-cities, Ixelles and Kortrijk.



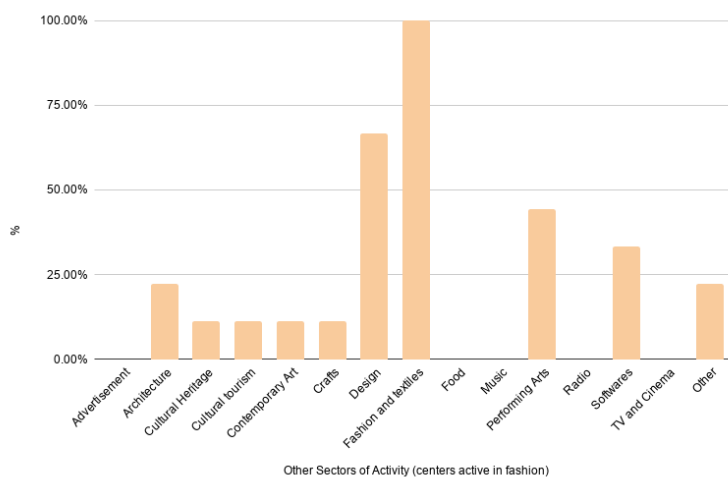
- Around the 30% of all the mapped centers in Belgium belong to the FabLab network, and 27% are totally independent; moreover, 4 centers belong to universities: Archibald Godts, Theresa Bastek, Design Academy Eindhoven, FabLab, University of Mons, KU Leuven Campus Kulak Kortrijk and Université Libre de Bruxelles. The networks and hubs of the centers active in fashion and textile field are the following:





Belgium	9	
KU Leuven Campus Kulak Kortrijk	1	11,1%
FabLab	4	44,4%
None	3	33,3%
Université Libre de Bruxelles	1	11,1%

- The other sectors of activity of the centers active in fashion and textile in Belgium are, mostly, Design (66,67%) and Performing Arts (44,44%), but also Software (33%) and Architecture (22%).



- Around the 66% of the mapped centers active in fashion and textile offer activities and trainings in these fields. In particular, Cityfab1 in Bruxelles is particularly active, with 10 training offered in 2019, as well as Centexbel-VKC center in the KU Leuven Campus Kulak in the city of Kortrijk, which offered 20 trainings and courses in the field, as well as Mentoring, Technological consultancy, Patent cell for businesses.

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	
		Centers offering Training	%fashion centers offering trainings
Belgium	35	6	66,7%

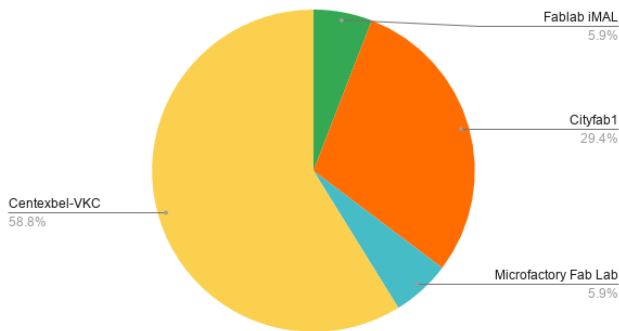


Co-funded by the Creative Europe Programme of the European Union

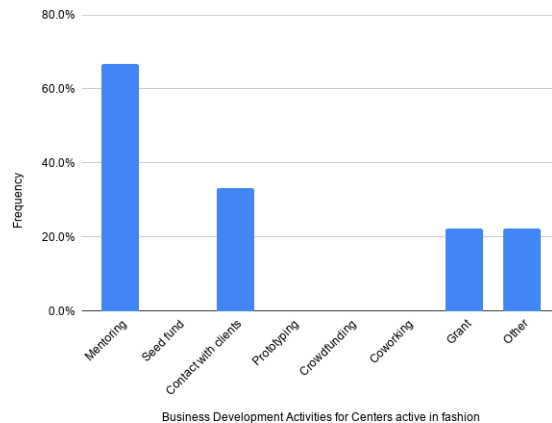


FUSION

Number of Trainings



- All the mapped centers active in fashion and textile in the country offer business development activities, too: particular, 67% offer mentoring services, 33% boost the contacts with potential clients for businesses, but offer grant (22%).



in
also

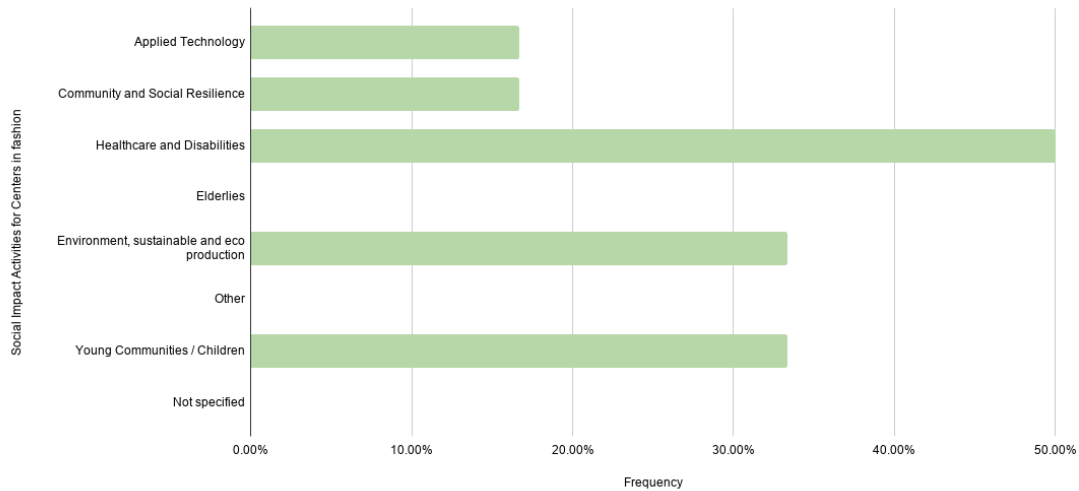
- About half of the centers (nearly 55%) are involved in social impact activities, such as environment, sustainable and eco-production (44%), and healthcare and disabilities (40%), but also Applied technology (20%) and community and social resilience initiatives (20%), including housing projects (Fablab iMAL, Bruxelles). In particular, Resortecs® offers global patented solutions that enable garment recycling thanks to automatic disassembly of apparel at industrial scale.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION



France

France is ranked third in the European Union total textile and clothing turnover, after Germany and Italy, with an average expenditure on 600 Euros per inhabitant spent on clothes and textiles per year. With its designers, France performs great influence in the fashion and clothing industry. Although it cannot compete with other low-priced markets of ready to wear products, France has started focusing on innovative and technical textiles while still supporting their fashion industry. France actually creates 24% of Europe's technical textiles, being involved with medical textiles in new and creative ways.

- In total, 37 mapped centres are active in the country, of which 14 (37,8%) are active in the fashion and textile field, contributing to the 10,61% of the total mapped fashion centers.
- The centres active in fashion and textile are distributed in the country mostly in Large cities (50%), but those are more concentrated in the Capital, Paris (42,85%), one of which belongs to the University of Paris.

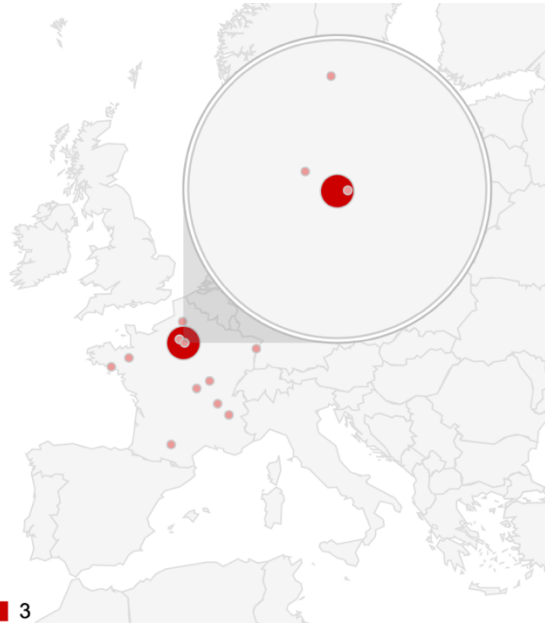




Co-funded by the
Creative Europe Programme
of the European Union



FUSION



- Half of the centers in fashion and textile are totally independent, while 2 belong to universities (University of Paris and Cergy Université), and 4 to the Fablab network:

France	14	
Cergy Université	1	7,1%
eTextile.org	1	7,1%
FabLab	4	28,6%
None	7	50%
University of Paris	1	7,1%

- The centres active in fashion and textile are mostly active in other fields, such as Design (92,86%) but also Architecture (37,71%), Crafts (35,71%) and Softwares (42,6%).

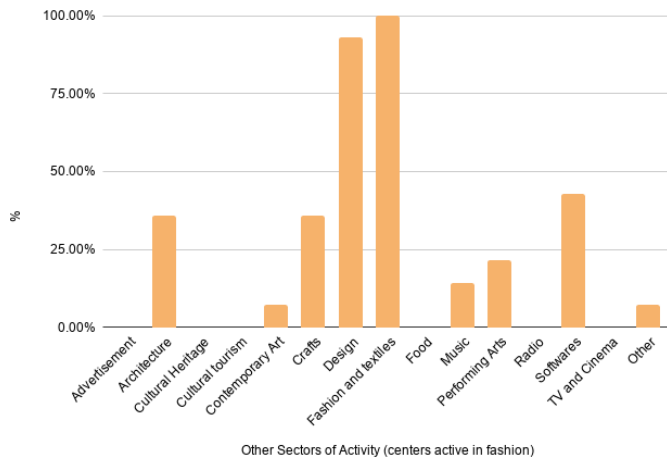




Co-funded by the Creative Europe Programme of the European Union

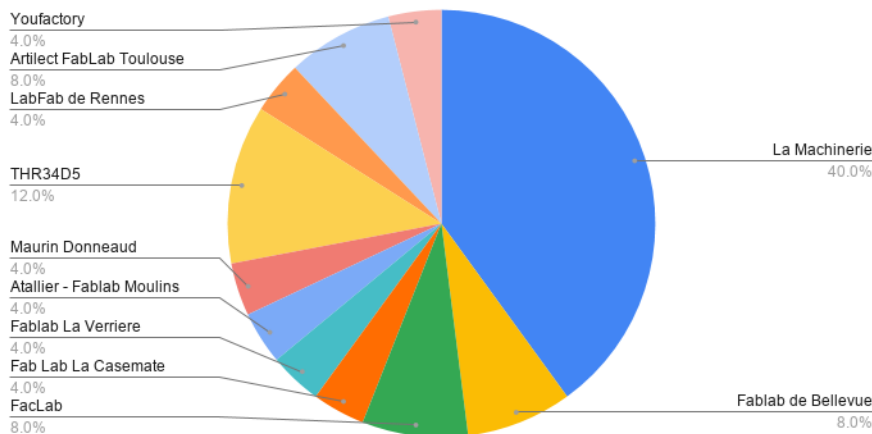


FUSION



- The fashion and textile centres offer activities and courses in fashion and textile in 85% of the cases; the most active centre is La Machinerie in the city of Amiens (independent center), offering 10 courses in 2019 in fashion and textile.

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
France	25	1,79	12	85,7%



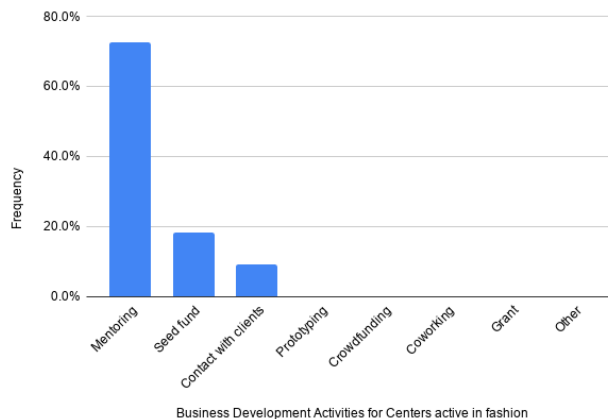


Co-funded by the
Creative Europe Programme
of the European Union



FUSION

- 78,57% of these centres offer business support activities, in majority of cases Mentoring (72,7%), Seed fund (18,2%) and Contact with potential clients (9,1%); no business development support has been detected in the centers active in fashion and textile.



the

- 28,57% of the centers active in fashion and textile are active in social impact activities, and they are mostly located in Paris: with respect to the engagement of the oldest / fragile part of the population, Maurin Doennaud has developed a project on interaction design, where a textile cushion was projected to calm and relax elderly people with cognitive and mobility issues. Moreover, THR34D5, for example, focuses on the production and transmission of design methodologies based on synchronicities and trans-species communities' rhythms, practices a community-oriented design, and holds a media lab for social resilience.

Germany

According to Euratex (2016), over 24% of all technical textiles made in Europe are produced in Germany; on average, 700 Euros are spent / inhabitant per year on fashion and clothing. One issue around textile manufacturing is sustainable production to reduce negative impacts on the environment: consumers are becoming increasingly aware of these topics, which is part of the reason why certified fair-trade textile sales have been growing in Germany.

- Overall, 60 total mapped centres are active in the country, and the 55% of these are active in the fashion and textile field (33 centers, 25% of those mapped which are currently active in fashion and textile)
- 10% of these are located in the capital, Berlin, 33% are located in Large cities.

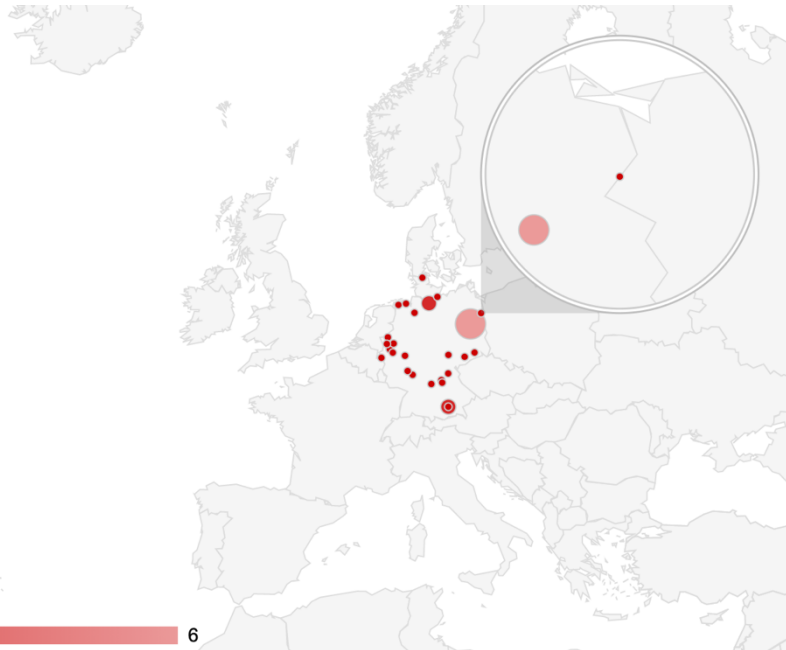




Co-funded by the
Creative Europe Programme
of the European Union



FUSION



- 30,30% of the mapped centres belong to the FabLab network, while the 45,45% to the Verbund Offener Werkstätten network. Moreover, four university centres active in fashion and textile have been mapped:

Germany	33	
FabLab	10	30,3%
None	4	12,1%
Rhine-Waal University of Applied Sciences, Faculty of Communication and Environment	1	3%
RWTH Aachen University	1	3%
University of Siegen	1	3%
Verbund Offener Werkstätten	15	45,4%
Westphalian University	1	3%

- Those active in fashion and textile are mostly active in other fields as well, such as Softwares (76%), Design (48,48%), Crafts (76%), Contemporary Art (42%), but also other, like strategic consultancy and prototyping.

One case is particular, the mentioned centre at the Institute of Textile Technology, at RWTH Aachen University, which is active in: Fashion and textile, Softwares, Mobility, Building and

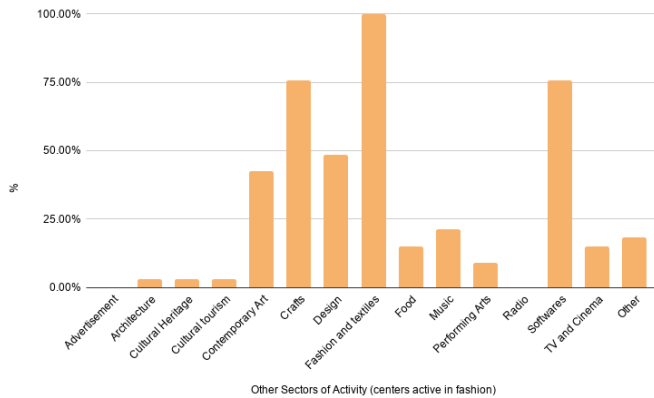




Co-funded by the
Creative Europe Programme
of the European Union



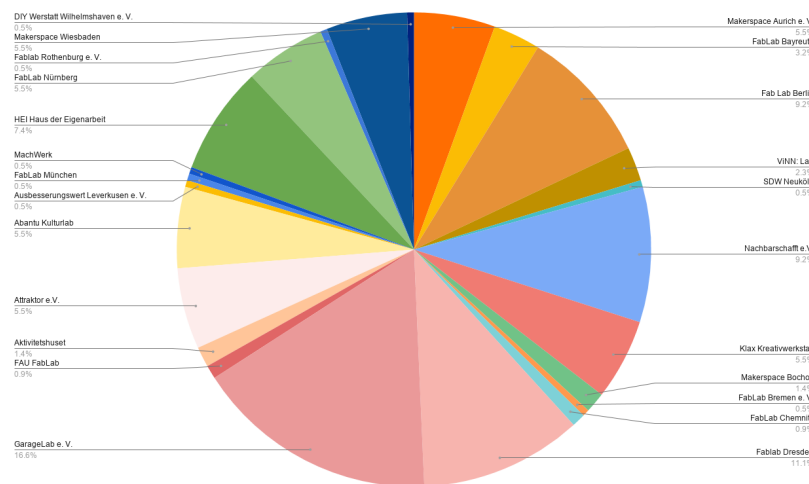
FUSION



living, Health, Energy and environment, Information and communication, Production, Materials Qualification.

- The 45% of the fashion and textile centres offer activities and courses in fashion and textile; among the most active centers we find Fab Lab Berlin and Nachbarschaft e.V. with 20 courses in 2019, Fablab Dresden (24), GarageLab e. V. (36). One of the hubs

does not properly offer fashion and textile trainings: indeed, Fab Lab Fabulous St. Pauli in Hamburg didn't implement fashion-related trainings, but they produced costumes and textile choreographies with the artist Mika Santoni.



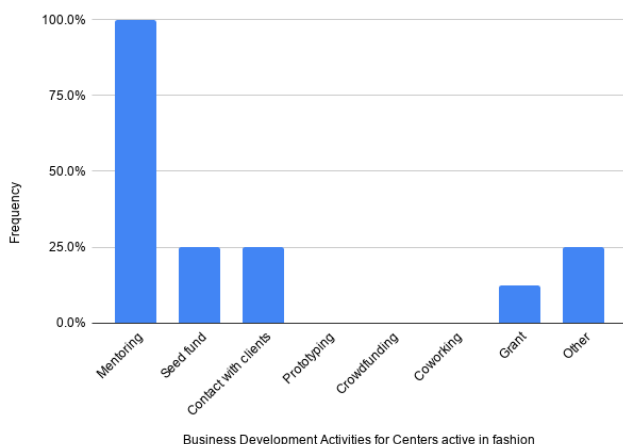
- 24% of the centers offer business development support to companies, of which 100% offers “mentoring”, 1 seed fund, 1, grant, 2 contact with potential clients.



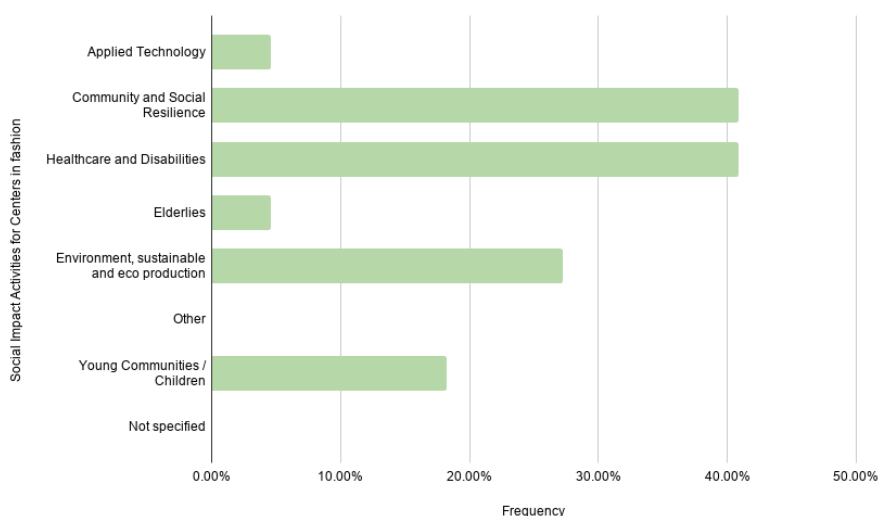
Co-funded by the Creative Europe Programme of the European Union



FUSION



- Moreover, one centre offers repair workshops targeting the elderlies (Ausbesserungswert Leverkusen e. V. in Leverkusen), and more than 85% offer social impact activities, in the following fields: healthcare and disabilities (41%), environment and sustainable eco production (27%), community and social resilience (41%), young communities and children (18%).



Ireland

On average, Irish citizens spend 500 Euros every year on fashion and clothing. Between 1990 and 2005 the production of textiles had decreased by 75%: this long term decline may be attributed to the high cost of labour and other non-wage costs and a general loss of competitiveness.



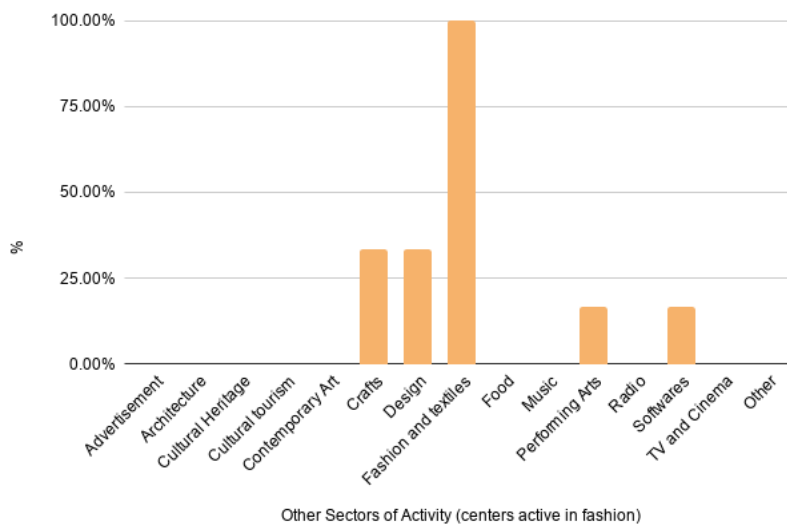
Co-funded by the
Creative Europe Programme
of the European Union



FUSION

A report by the National Design and craft Gallery suggests that Ireland has recently become an attractive and lucrative market for many international design brands and retailers: one initiative pushing in this direction is the Irish Fashion Incubator, opened in 2015, an innovative fashion development delivering affordable studio space in a high street retail environment in Limerick, Ireland. Modelled on the Limerick Institute of Technology’s Hartnett Acceleration Centre in Moylish, which provides space for small to medium sized enterprises, the Fashion Incubator provides studio and retail space for up to 100 fashion students and graduates.

- 2 active centres in fashion and textile have been found, over the 6 total mapped centres in the country (33%), contributing to the 1,52% of the total amount of fashion and textile centers mapped.
- Overall, Irish centres are distributed in the country in small cities, and the one active in fashion and textile is located in Limerick, medium sized city in the South West of Ireland, and Bellyshannon, a village in the northern region of the country;
- Fab Lab Limerick and Fab Lab Ballyshannon belong to the Fab Lab network.
- Fab Lab Ballyshannon is active in other fields too, such as Design, Performing arts, Crafts, Softwares, and they both offered trainings in fashion and textile (Fab Lab Limerick, 9 in particular).





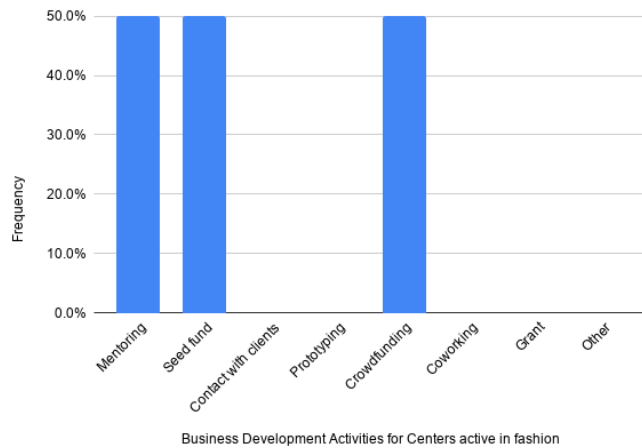
Co-funded by the Creative Europe Programme of the European Union



FUSION

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Ireland	10	5,00	2	100%

- The two centers offer business development activities.
- Fab Lab Limerick is also active in social impact activities, such as Applied technology and Environment, sustainable and Eco Production, as well as projects on open design methodologies in architecture design and building industry.



Italy

Italy produces the 45% of clothes made in all the European Union, and 900 Euros are spent on average per year / inhabitant on textiles and fashion products. The textiles and fashion sectors are amongst the most important sectors of the processing industry in Italy and also plays an important role in the European Union and on a global scale. Its conditions are also essential for textiles and apparel enterprises of other European countries, especially in Central and Eastern European countries, as they purchase Italian textiles and yarn and are engaged in the sale of high-quality processed products. The Italian system is not dominated by large chain stores, and industrial manufacturers still play an important role in the sector.

- Overall, 64 total mapped centres active in the country, of which about 30% are active in the fashion and textile field (19 centers, counting for almost 15% of the mapped centers currently active in fashion at the European level)
- These centres active in fashion and textile are concentrated in large (52%) and small cities (21%), while one center has been mapped in the Capital, Rome.

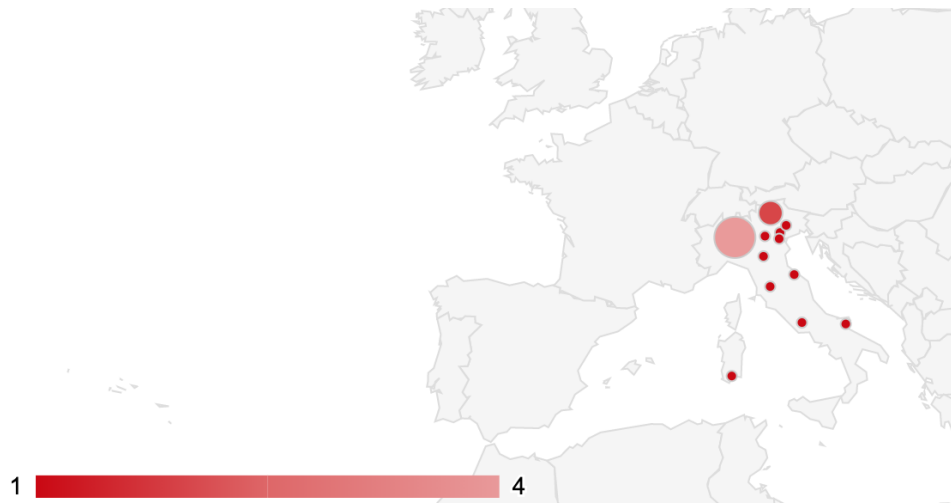




Co-funded by the
Creative Europe Programme
of the European Union



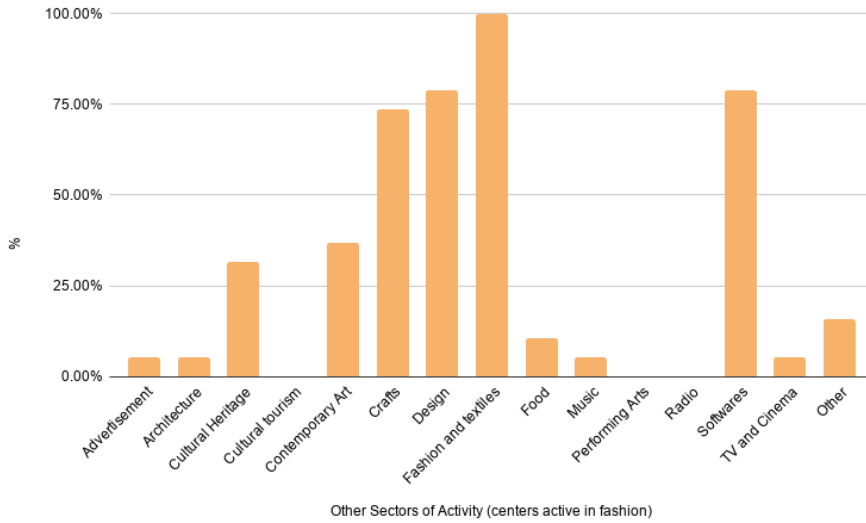
FUSION



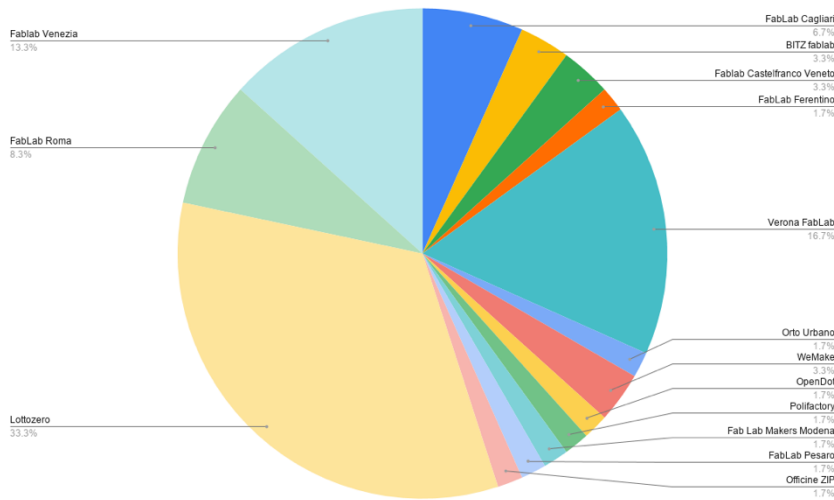
- Over the half of the mapped centres belong to the FabLab network, 33% are independent centres and two belong to a university:

Italy	19	
FabLab	10	52,6%
None	7	36,8%
Politecnico di Milano	1	5,3%
Università degli Studi di Siena	1	5,3%

- The centres of the country active in fashion and textile are mostly active in other fields, such as Design (79%), Cultural Heritage (31,58%), Contemporary Art (37%), Softwares (79%).



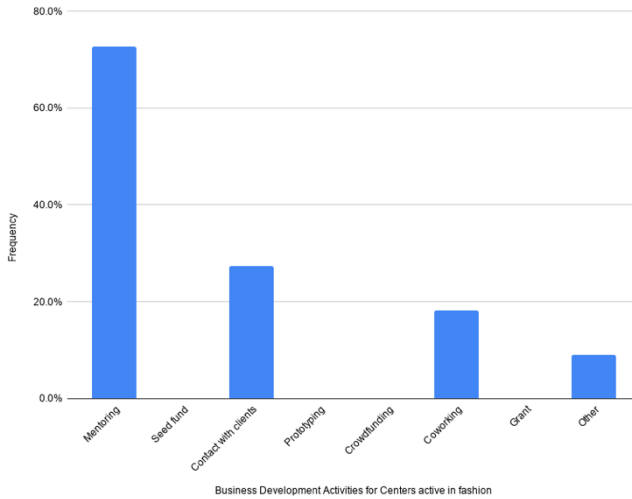
- Those which offer activities and courses in fashion and textile are 84%; other sectors of the activities are agriculture, healthcare, circular economy among those active in fashion and textile. The most active is Lottozero in Prato with 20 fashion training sessions in 2019.



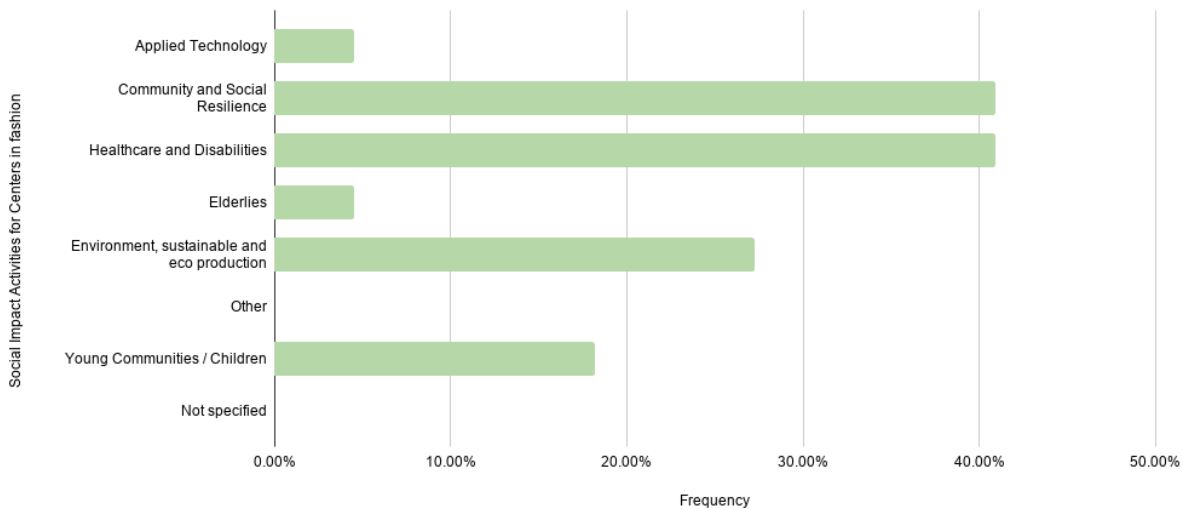
Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Italy	60	3,16	16	84,2%



- 58% of the Italian centres offer business development support, mostly in mentoring (73%), but also coworking (18%) and contact with potential clients (27%).



- 40% of the centres are active in social impact activities, for example Environmental sustainability (43%), healthcare and disabilities solutions (57%), Wearable technology 14%. Fab Cube Vittorio Veneto, in particular, has been tracked as part of an international active aging program.

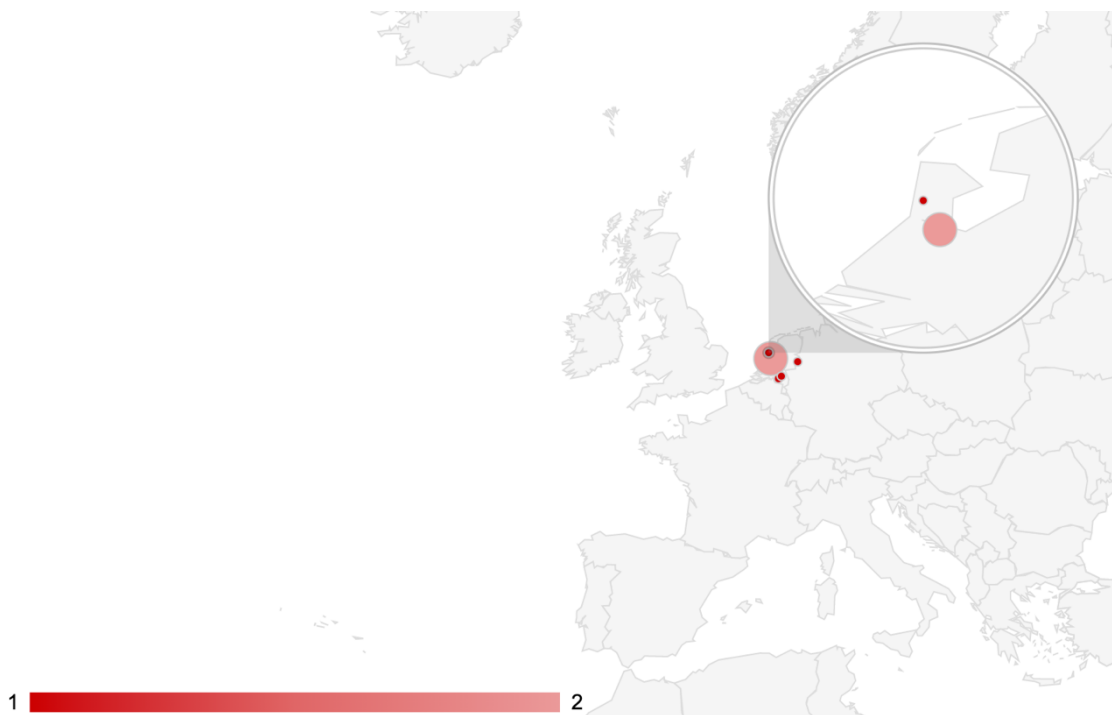




Netherlands

On average, 700 Euros per year are spent every year per inhabitant on textiles and fashion, at the same level of Belgium and Germany. The Dutch garment and textile sector is a €20 billion sector offering employment to 100,000 people in the Netherlands and 60,000 people in other countries working under contract to Dutch companies. Garments – consisting of consumer garments (40%), sportswear (5%) and work wear (5%) – account for approximately half the turnover in the Dutch textile and garment sector. The other half of the sector is equally divided between home textiles (25%), including carpets and furniture, and technical textiles (25%).

- Overall, 24 mapped centres active in the country, with 25% active in the fashion and textile field (6 centers, accounting for the 4,55% of the total mapped fashion and textile centers).
- The centres are distributed in the country in Large cities (33%), and those active in fashion and textile are more concentrated in the Capital, Amsterdam (33%); two centers are located in the large cities of Eindhoven and Enschede; one in the medium-sized city of Alkmaar and the last one in the village of Gemert.



- No centers have been detected in universities; the majority of them are independent centers.



Co-funded by the
Creative Europe Programme
of the European Union

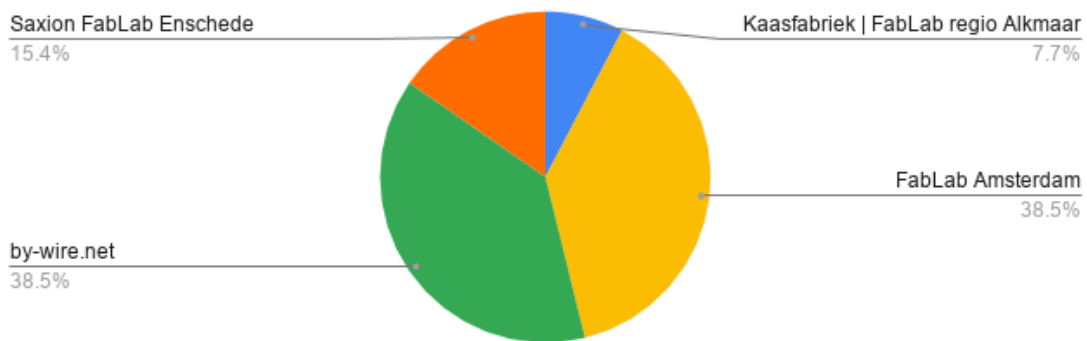


FUSION

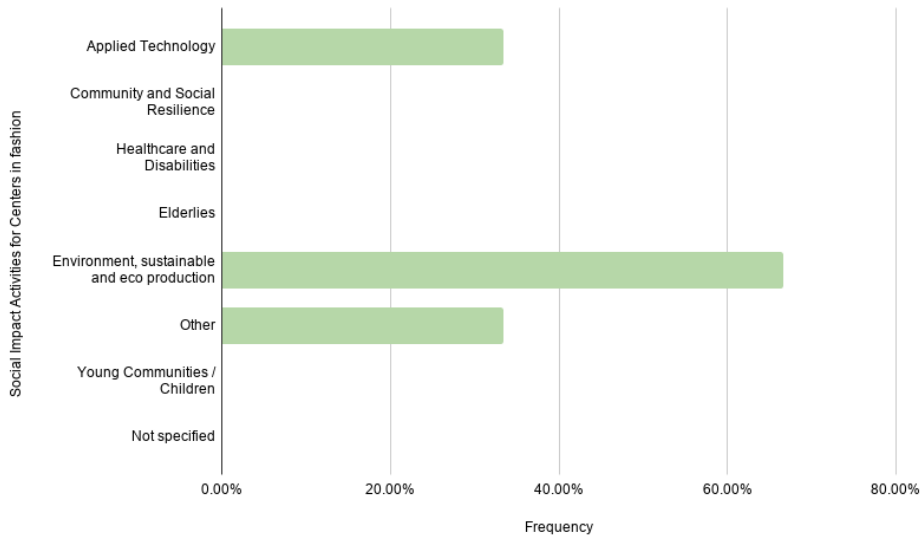
Netherlands	6	
FabLab	2	33,3%
None	4	66,7%

- Only one centre active in fashion and textile is active in other fields as well, such design (50%), and softwares (33%). 6 centers offer fashion and textile trainings and activities:

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Netherlands	13	2,17	6	100%



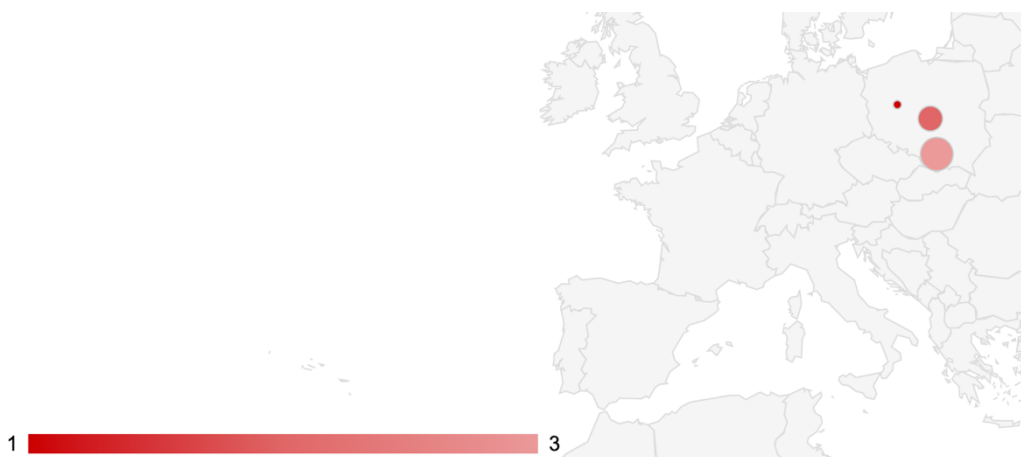
- 2 centers offer business development support, in particular mentoring services (Kaasfabriek | FabLab regio Alkmaar and Saxion FabLab Enschede).
- 3 centres promote activities linking design and fashion with social impact: “New Industrial Order” create personalized knit-code for 3D knitting machines that they use as 3D printers, in order to save waste and energy in fashion: it started as a design research project to create a sustainable fashion supply chain by developing technology for clean, fast and local design and production anywhere in the world, and it now forms part of the EU-subsidized Climate KIC Accelerator (Amsterdam); “One feeling prints” in Gemert, uses natural fabrics, in house processes, and promotes rules and regulations for green production.



Poland

Poland 200 Euros spent on average per inhabitant on clothes per year – one of the lowest values in Europe. Home textiles make up more than 20% of textiles and clothing goods produced in Poland. In the context of predictions resulting from research performed within the National Foresight Programme, it should be emphasised that the textile industry, based on innovative material technologies, belongs to the main developmental engines of the Polish economy.

- 9 centers have been mapped overall, with 66% of these active in fashion and textile.
- Half of these are located in the Capital, Krakow, while the others in large cities (Lodz and Poznan).

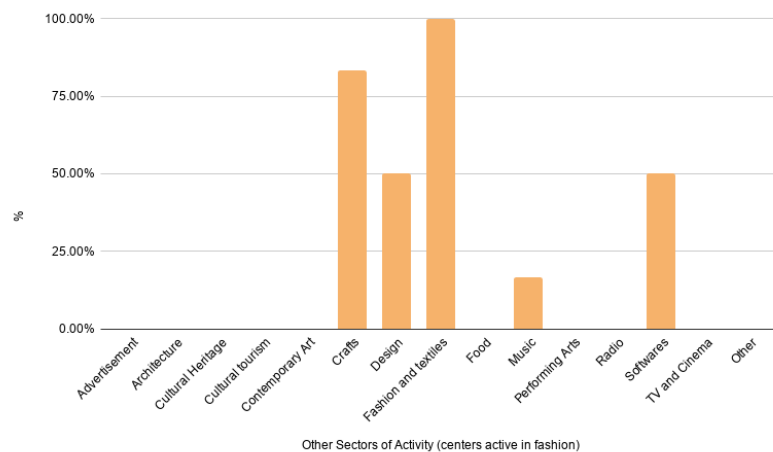




- Half of the centers belong to the FabLab network and one to a university:

Poland	6	
ŁUKASIEWICZ - Textile Research Institute	1	16,7%
FabLab	3	50%
None	2	33,3%

- The centers active in fashion and textile are active also in other sectors, such as Crafts (83%), Design (50%), Softwares (50%) and Music (17%).



- 66% offer trainings in fashion and textile, and those which are particularly active are FabLab Malopolska (12 courses) and FabLab Kraków (5 courses) in 2019, both in Kraków.

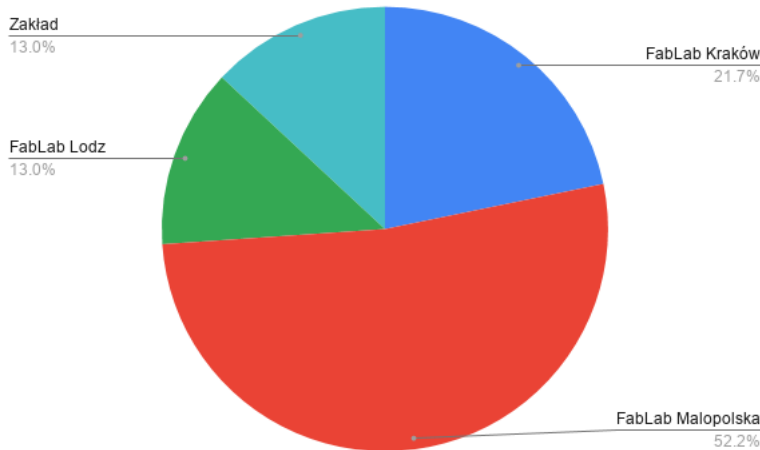
Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Poland	23	3,83	6	100%



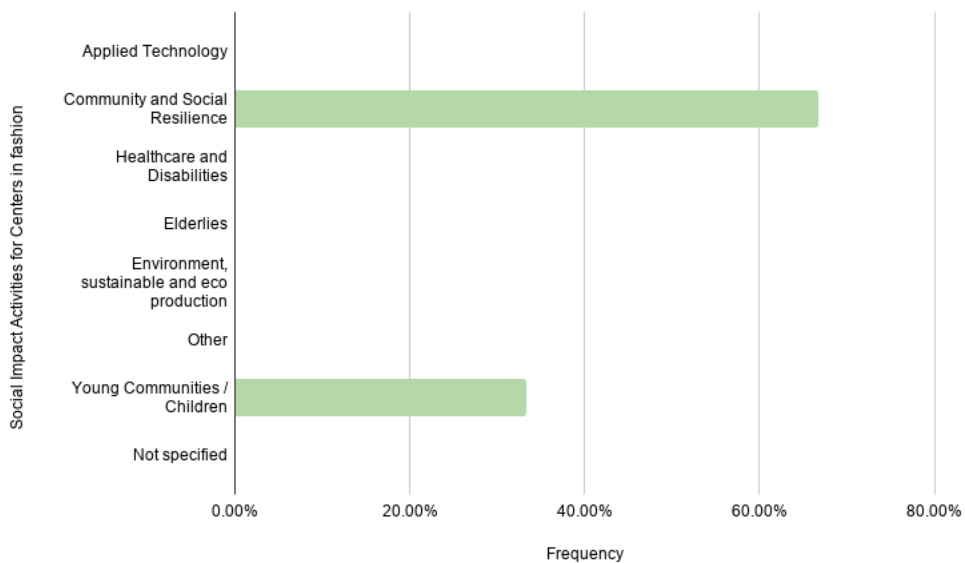
Co-funded by the Creative Europe Programme of the European Union



FUSION



- One center offers business development activities (FabLab Malopolska), including mentoring and contact with potential clients;
- Social impact activities for centers which are active in fashion include community and social resilience (67%) and activities with young communities and children (33%).



Portugal





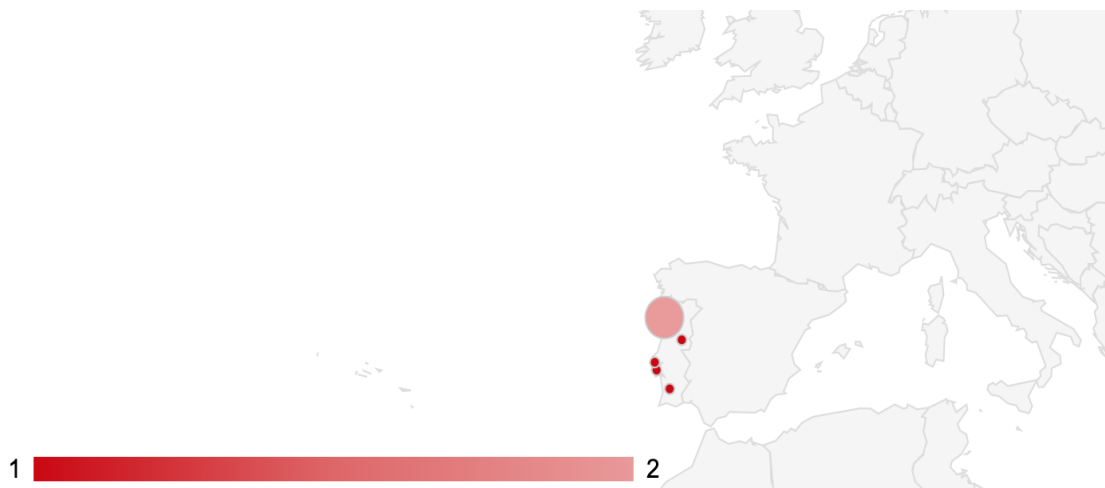
Co-funded by the
Creative Europe Programme
of the European Union



FUSION

According to Euratex (2016), Portuguese region Norte is the top employer in textiles and fashion among all EU regions; in Portugal every year are spent 500 Euros for fashion and clothing items per capita, in spite of a powerful textile industry with great capacity, ambitions and opportunities for production. Portugal is the world leader for high-quality technical textiles, especially performance fabrics and fabrics made from recycled materials.

- In total, 15 mapped centres active in the country, with 40% of these active in the fashion and textile field (6 centers, 4,55% of total fashion and textile centers mapped);
- The centres active in fashion and textile are spread in the capital (1 center), but also in large (2 in Porto), medium (Torres Vedras), small cities (Fundao) and the village of Messejana.



- They all belong to the FabLab network, except one center in Porto (VIVALab), which is independent.

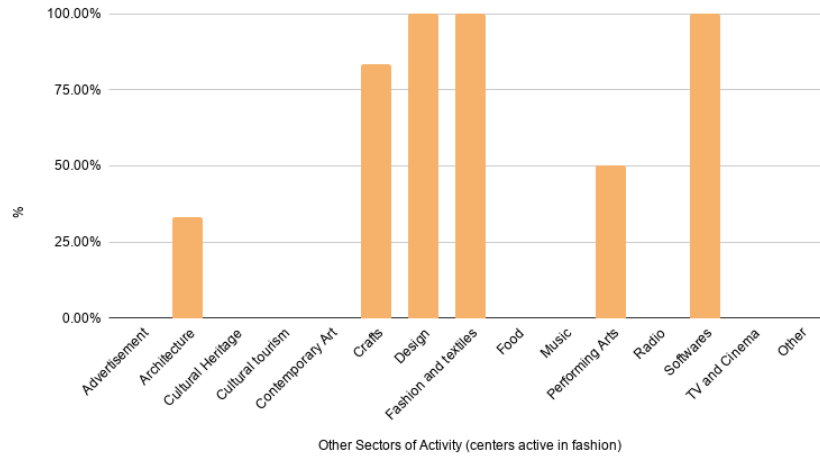


Co-funded by the Creative Europe Programme of the European Union



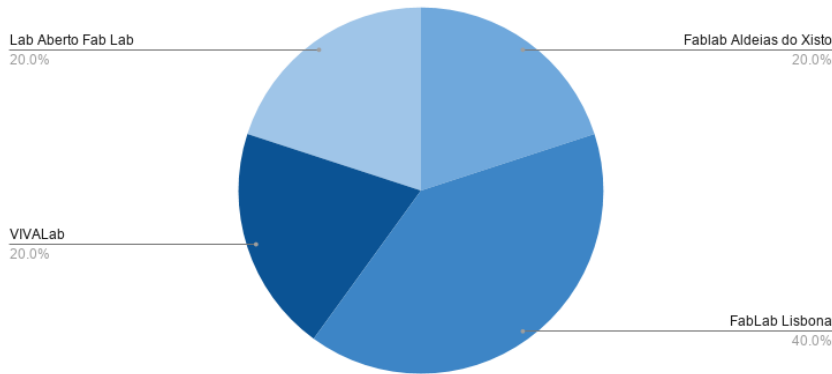
FUSION

- The centres in fashion and are mostly in other fields, as Design, Performing Softwares,
- Two thirds of offer training courses in fashion and



active textile active such Arts, Crafts. them and textile

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Portugal	5	0,83	5	83,3%



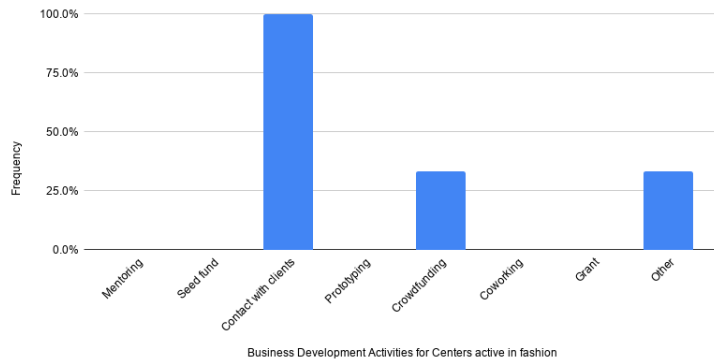


Co-funded by the Creative Europe Programme of the European Union

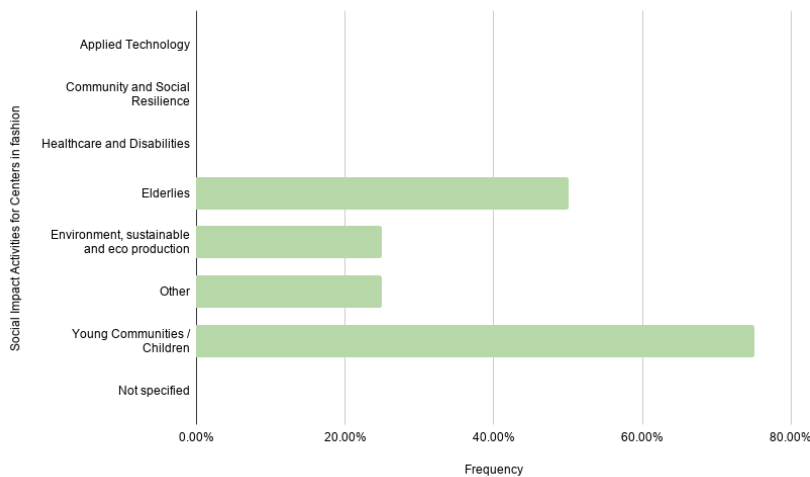


FUSION

- 50% of the fashion centers also support for business development – crowdfunding and contact with potential clients.



- 50% of them are involved in social impact activities, community and social resilience (67%) and young communities and children (33%). No focus on elderlies, but there has been an initial involvement for FabLab Lisboa participates to the project for active aging promoted by RogLab (SLO) – which has been suspended for COVID”.

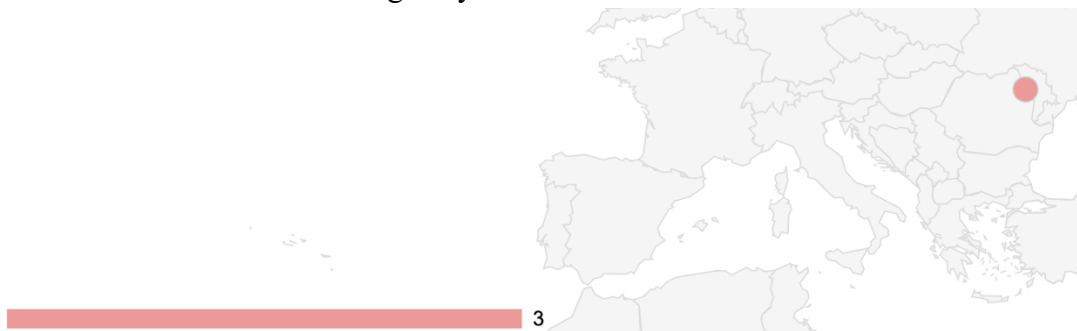




Romania

Romania is the second largest employer in the textile and fashion sector in the EU, 100 euros per year per inhabitant expenditure on clothes. According to the figures of Employers Federation of Textile, Garments and Leather Industry (FEPAIUS), the Romanian textile-clothing industry represented 10.8 % of exports in 2016. 4.51 % of the total Romanian workforce is linked to the fashion industry.

- 4 centers have been mapped in Romania, and 75% active in the fashion and textile field (3 centers, contributing to the 2,27% of the total fashion and textile centers mapped)
- These are all located in the large city of Iasi



- They belong to different networks, including a university center:

Romania	3	
FabLab	1	33,3%
None	1	33,3%
Technical University "Gheorghe Asachi"	1	33,3%

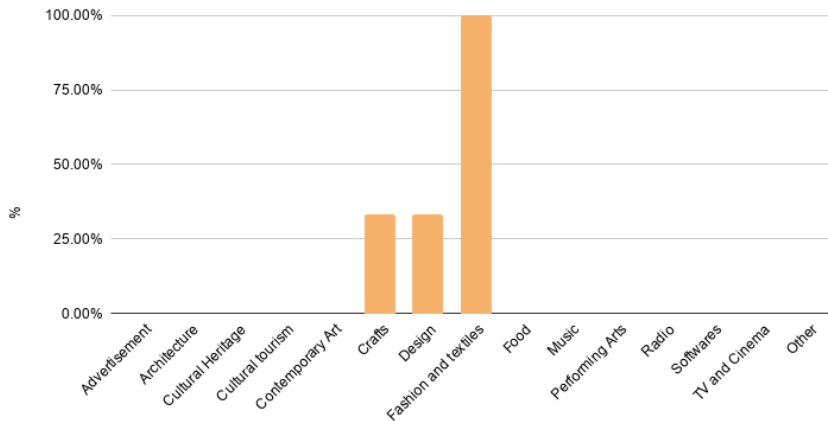
- These centers are active in fashion and textile, as well as crafts (33%) and design (33%).



Co-funded by the Creative Europe Programme of the European Union

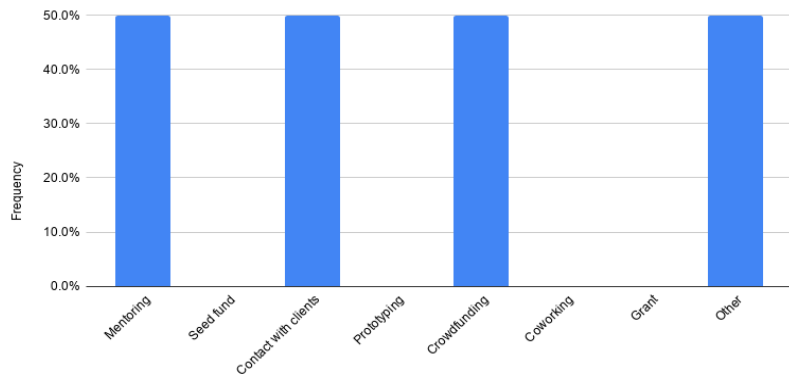


FUSION



Other Sectors of Activity (centers active in fashion)

- 67% offer business development support, mentoring (50%), contact with potential clients (50%), crowdfunding (50%).
- 2/3 are involved in social impact activities, in particular Katty Fashion is involved in sustainable fashion.



Business Development Activities for Centers active in fashion

Spain

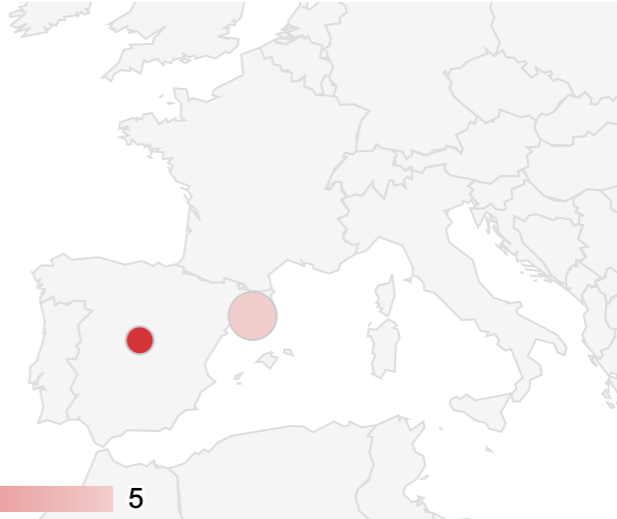
Spain is the second largest extra EU exporter of clothes, with an average expenditure per inhabitant on fashion and clothes of 500 Euros per year, at the same level of Ireland and Portugal. The textile manufacturing is one of the largest industries in Spain and has assisted in stabilizing the sometime challenged economy. Spain's largest industry is in the creation of the machinery - there are over 160 textile machinery companies in Spain, including spinning, weaving, clothing, and dyeing and finishing machinery. These machines are exported all over the world and are known to be some of the best textile machines on the market.

- 30 mapped centres active in the country, with the 26% of these active in the fashion and textile field (8 centers, 6% of the total mapped centers active in fashion and textile).





- The centres are distributed in the country in Large cities (75%), and those active in fashion and textile are mostly concentrated in Barcelona; two centers are located in Madrid.



- 3 centers belong to the Fab Lab network, and 3 others are totally independent; one center belongs to Eurecat, in Barcelona, and the last one is a university center:

Spain	8	
Deusto University	1	12,5%
Eurecat	1	12,5%
FabLab	3	37,5%
None	3	37,5%

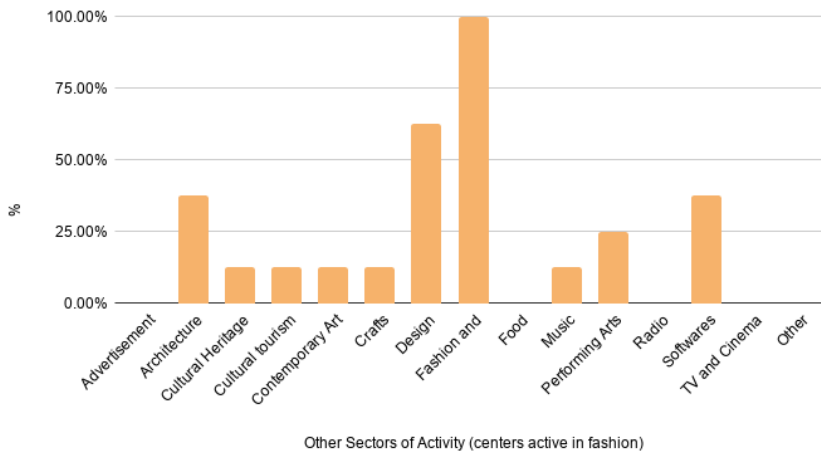
- The centres active in fashion and textile are mostly active in other fields, such as architecture (37,5%), design (62,50%), softwares (37,50%).



Co-funded by the Creative Europe Programme of the European Union

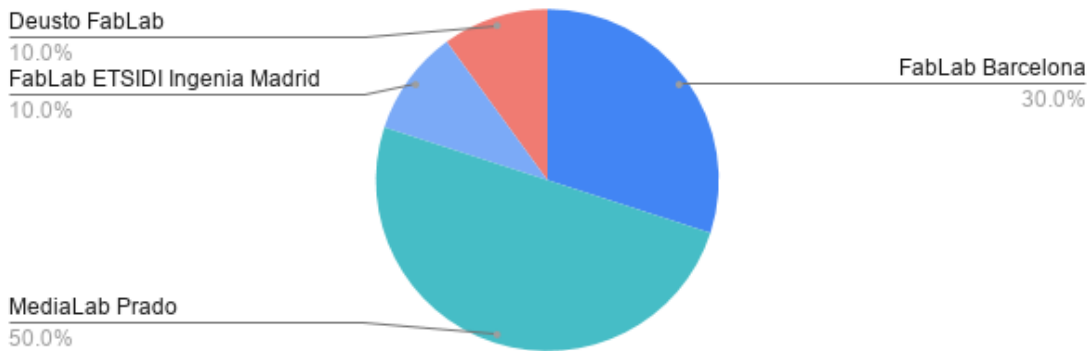


FUSION



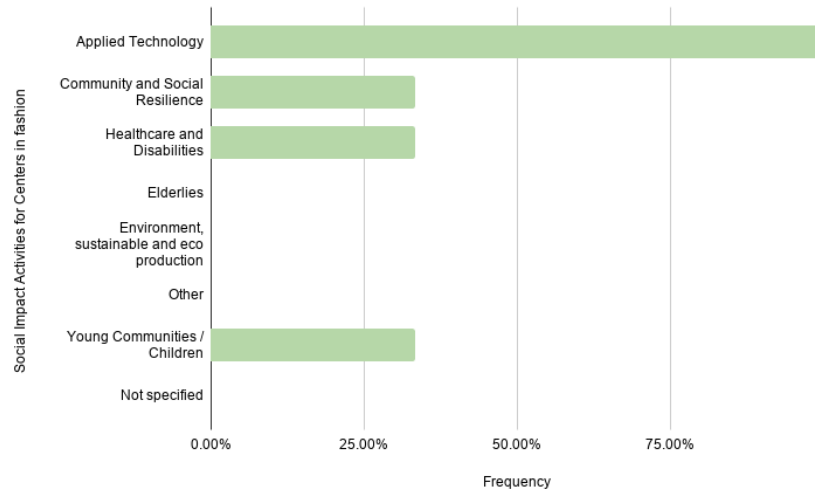
- 6 centers (75%) offer business development support to businesses; 50% offer mentoring activities and FabLab Barcelona and Functional Textiles Unit in Eurecat offer contact with potential clients.

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
Spain	20	2,50	7	87,5%



- These centres are active in promoting social impact towards fashion and design, mostly through applied technology e.g. with the creation of new technologies to make cities smarter (Fab Lab Barcelona); a sustainable children’s nightwear adaptive garment that can grow with the child (Sunsmith Studio); Eurecat’s research unit, which combines knowledge of textile structures and new materials, focusing on the integration of textile wearables and health solutions.

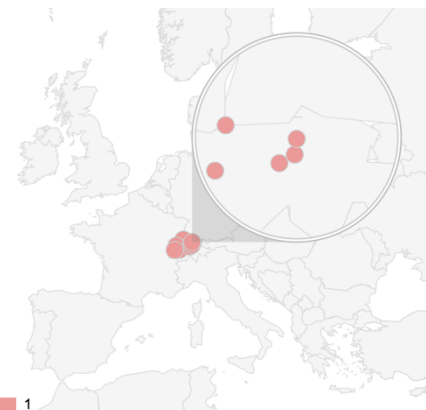




Switzerland

Switzerland’s textiles and clothing industry focuses on the development and manufacture of high-quality products, in both the clothing and home textile segments, as well as in the field of technical textiles. The Swiss textiles sector comprises numerous small and medium-sized companies that carry out research, development and/or production on site in Switzerland.

- In total, 18 mapped centres are active in the country, and the 44% of these are active in the fashion and textile field (8 centers, accounting for the 6% of the total mapped centers which are active in the fashion and textile field).
- The centres are distributed in the country mostly in small cities (Fribourg, La-Chaux-de-Fonds, Yverdon-les-Bains, Zug), 1 in Luzern, medium-sized city, 2 in large cities (Basel and Bern), and 1 in the capital (Zurich).





Co-funded by the
Creative Europe Programme
of the European Union

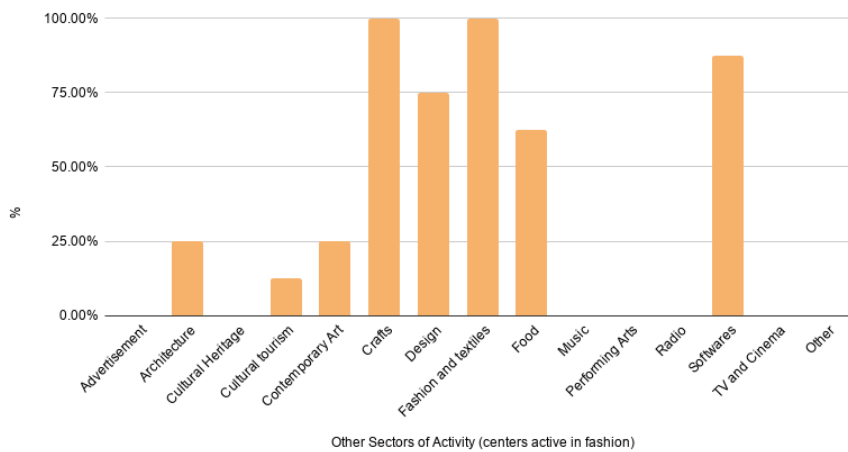


FUSION

- 75% of the centers mapped belong to the Fab Lab network (including the local network of Swiss Fab Labs), while 2 mapped centers are totally independent.

Switzerland	8	
FabLab	4	50%
None	2	25%
Swiss FabLabs	2	25%

- The centres active in fashion and textile are active also in other sectors, such as: Crafts (100%), Design (75%), and Softwares (87,50%).



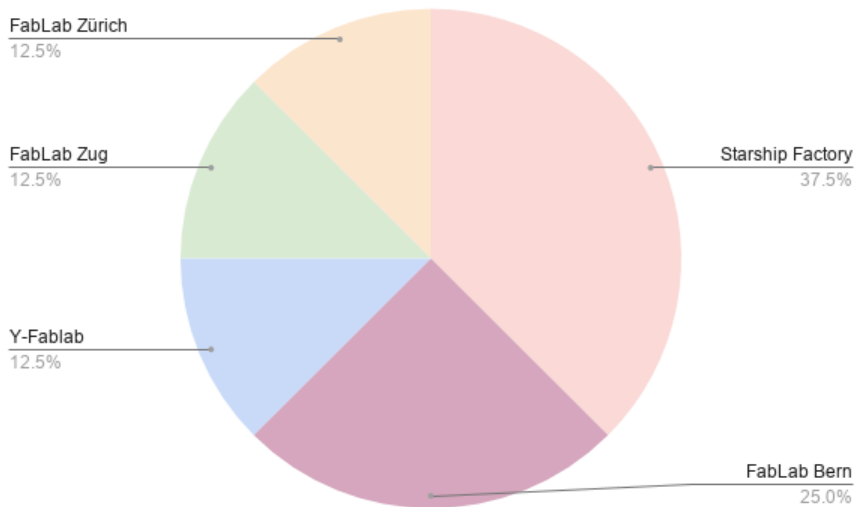
- 100% of the centers active in fashion and textile offer fashion-related trainings, even if it has not been possible to count them in all of the cases:



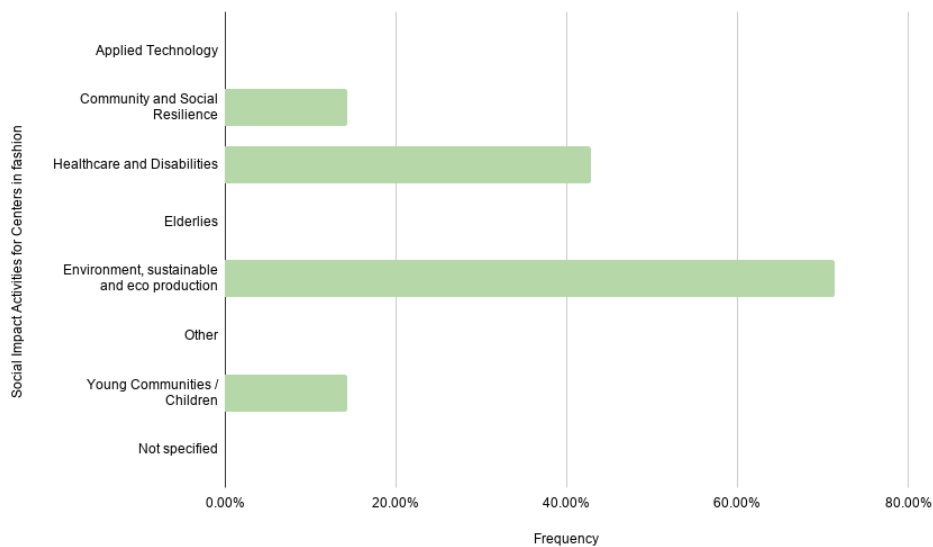
Co-funded by the
Creative Europe Programme
of the European Union



FUSION



- Two centers offer business development support: one belongs to the network of Swiss FabLabs, and the other is independent; they both offer mentoring support.
- 87,5% of the mapped cases pursue social impact activities in connection with fashion and design, for example through sustainable and eco production, as well as young communities' engagement. For example, Fab Lab Luzern develops energies to improve recycling practices most of all about sustainable reuses of plastic materials.





United Kingdom

The United Kingdom is among the countries with the highest consumption per capita in Europe, with 1000 Euros spent per inhabitants. According to Euratex, the total value of textiles in UK is 9 billion Euros to the economy, and it is still growing.

- Overall, 43 mapped centres are active in the country, and the 25,5% of these are active in the fashion and textile field (11 centers, 8,33% of all the mapped fashion and textile centers);
- The centres active in fashion and textile are all concentrated in Large cities and the capital, London.



- One center belongs to the University of the Arts, London, while 36% belong to the Fab Lab network. More of the half of the centers are totally independent.

United Kingdom	11	
London College of Fashion, University of the Arts London	1	9,1%
FabLab	4	36,4%
None	6	54,5%

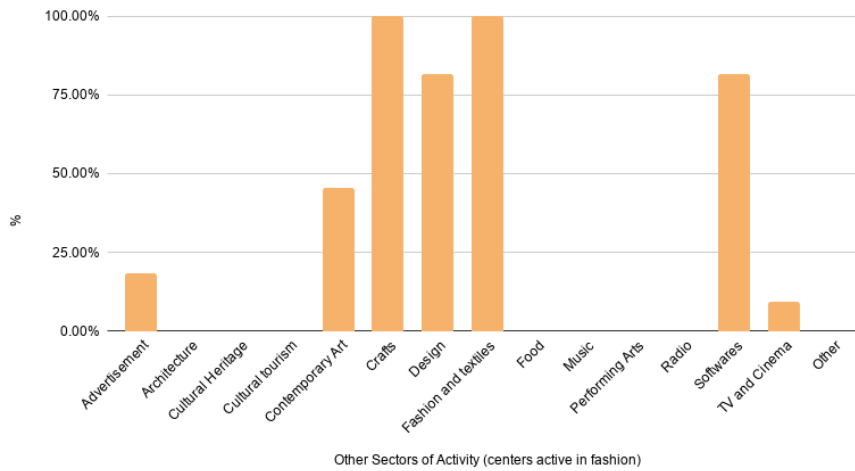
- The centres active in fashion and textile are mostly active in other fields, such as crafts (100%) and design (81,82%), as well as softwares (81,82%).



Co-funded by the Creative Europe Programme of the European Union

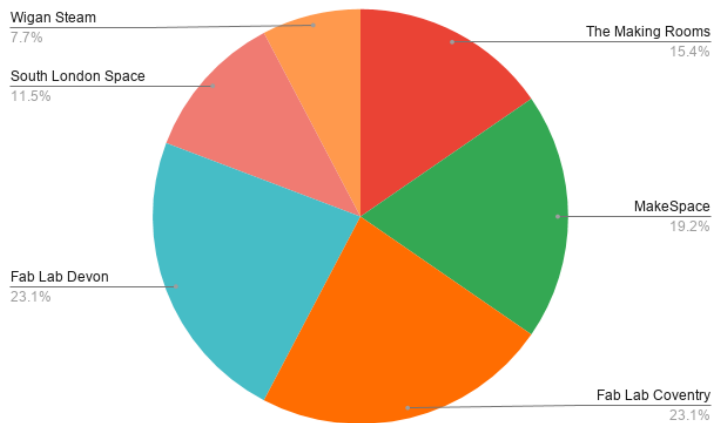


FUSION



- The fashion and textile centres offer activities and courses in fashion and textile (over 50%); 22% transdisciplinary, and one in particular, “Makespace Cambridge”, offers courses in Crafts, Softwares, Robotics, Woodshop, Jewelry.

Country	Total Counted Trainings in 2019	Ratio Trainings active in fashion / Centers active in fashion	Centers offering Training	%fashion centers offering trainings
United Kingdom	26	2,36	7	63,6%



- 64% offer business development support, mostly mentoring (42,9%) and contact with potential clients (28,6%), but also grant (4%) and product development and prototyping in a few cases;

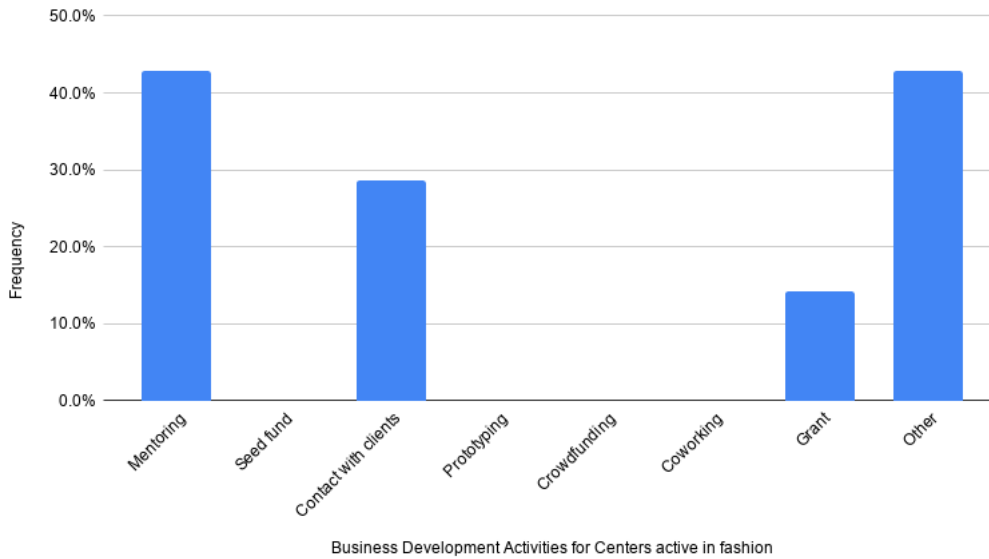




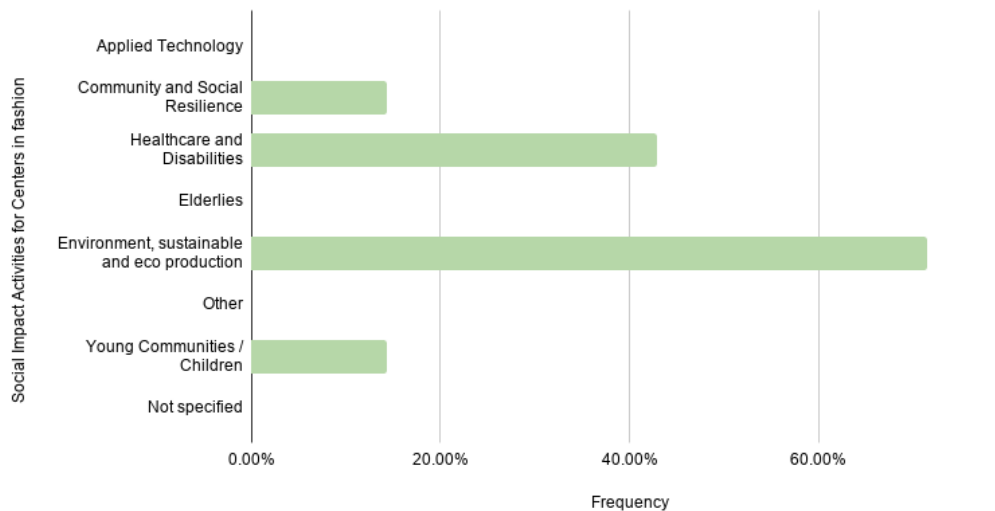
Co-funded by the
Creative Europe Programme
of the European Union



FUSION



- 55,% of the centres are active in the fields of community and social resilience, and applied technology, and one centre in particular, the Digital Anthropology Lab of London College of Fashion, intends to change perception about disability through trans-disciplinary design and innovation initiatives by creating a dedicated research, with an engaged network and online community.





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

3.3 Collaborative design methodologies

Collaborative design methodologies empower consumers to design, or contribute to design, their own products, by providing them the ability to collaborate in an informed design process not only regarding aesthetics, prices and delivery times, but also resources consumption and social responsibility (L.M. Camarinha-Matos et al., 2011). Within the creative and cultural industries, co-design is now commonly adopted by a variety of actors, from commercial brands to cultural institutions, yet extensive research has showed that at all levels little attention is placed on the involvement of seniors compared to that of other categories of citizens, especially within fields with high technological and digital capital. One of the possible explanatory factors is that the most innovative fringes of the design industry are primarily populated by young people, who are oriented to generating solutions for uses or challenges they are most familiar with and who appear to have difficulty in engaging in a process of imagining the older customers (Julia Twigg, 2013), their views, desires, needs. Our societies, as commented by the interviewed operators of digital fabrication spaces, do not generally offer occasions and spaces for intergenerational interconnectedness and this fact impedes sharing and mutual help across age groups. The elderlies often remain at the margins of the co-designing processes also because of a diffuse lack of common language and understanding concerning the nature and potential application of technologies: a fruitful dialogue among designers, makers and the older population requires the conception and adoption of radically different methodologies for brainstorming, co-designing and prototyping to be effective.

The extensive mapping of European independent maker spaces dedicated to digital innovation in the creative industries, and particularly in the fashion and textile industries, presented at chapter 2.1 allowed us to understand that old people's frequentation of such places is still minimal and that a little number of centres is organizing activities dedicated to the elderlies and to active aging. Older people have hardly in any case been identified among the users or guests of fab labs or digital fabrication spaces and this seems to be connected to a variety of reasons, that we will resume in two categories: the location of, and the approach adopted by, maker spaces. As for the first one, a considerable share of maker spaces is located in post-industrial parts of cities, with their opening often associated with major programmes of urban regeneration. Such post-industrial areas are frequently non-residential,



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

therefore not in the immediate proximities of inhabited neighbourhoods, and they may result not easy to reach nor attractive for the elderlies to visit. Another important number of makerspaces is housed within higher education facilities, places with an average low or no presence of elderlies. The approach championed by digital fabrication spaces, in short resumed in the motto “learn by doing”, finds some obstacles when applied to senior users, who are generally not acquainted with digital technologies and digital fabrication. Operators of fab labs actively involving elderlies in their facilities have commented, during in-depth interviews, that such users generally spend a long initial time as observers in the lab, in order to get familiar with the various machineries, the processes and to gain confidence with the overall environment. In their regards, operators of the fabrication spaces act as continuous mediators towards the technologies and, even after explaining and teaching the basic use of a machinery, they accompany the elderlies in the use of the tools. This is done, on the one hand, for safety reasons, and on the other hand to make sure seniors do not lose motivation because of technical impairments. For the elderlies attending maker spaces, the creative process is inspired by seeing how the machines work yet often it does not directly entail the use of digital fabrication but of simpler “old” technological inputs. Nonetheless, operators have commented that older users express positive feelings concerning their involvement in designing processes, associated to personal empowerment and to a feeling of being useful.

At the European level, the inclusion and co-participation of the ageing and fragile population in the fashion, textile and accessories industry is being promoted by a number of supporting initiatives and programmes run by public institutions and private organisations.

Policy-influenced innovation

A case of particular interest for impact and length is the programme “Transform Ageing” funded by the UK National Community Lottery Fund and implemented in the South West of England through a partnership led by the Design Council, alongside UnLtd, the South West Academic Health Science Network and the Centre for Ageing Better. Transform Aging has unfolded with a gradual approach aimed at exploring the challenges of ageing through workshop and co-design sessions involving people in later life, their families and caregivers, entrepreneurs and public workers and subsequently offered cash awards and non-financial support to social entrepreneurs who wanted to develop





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

solutions to the ageing challenges identified. The programme contributed to raise awareness on, and spread, elderlies-cantered co-designing, prototype testing and adaptation methodologies based on design thinking. One of the social ventures created within the frame of the programme, Personal Alarm Watch, has developed a personal watch that has an integrated alarm button, GPS tracker and microphone to be used in case of emergency to communicate with a care team and the family members. The designers conducted extensive design workshops, group sessions and interviews with older people and paramedics all over the UK, eventually getting to a discreet, functional, easy to use and customisable product that has successfully entered the market.

Research-led innovation

At the European level, Horizon 2020 has financed the project WEAR Sustain, aimed at designing and developing wearables, smart or electronic textile innovations. Within the actions dedicated to enhancing the social impact of wearable technologic innovation, the team coordinated by Santa Chiara Fab Lab of the University of Siena has dedicated attention to the potential benefits of such technologies for improving the experience of deaf women in a sound-oriented social environment, balancing the tension between a functional approach to disability and an ethical and aesthetic exploration of technologies supporting disabilities. The jewellery products and accessories created detect sounds and translate them into vibrations and shape changes; when wearing these accessories, deaf women are able to perceive voices and other sounds through their body. The product line, named Quietitude, was designed, prototyped and tested through a collaborative process that has engaged deaf and hearing women, researchers and makers. Although not intended directly for the elderlies' population, the project has demonstrated the potential of digital fabrication for assisting impaired people in their everyday life.

Maker-spaces for active ageing

RogLab, Slovenia's first maker lab, established in 2012 within the Museum and Galleries of Ljubljana, is a Fab Lab that has stood out for the application of digital technologies for the development of fashion products with a high impact on people's quality of life. Its first project Design (Dis)Ability, developed in collaboration with MIT FabLab, tackled various applications of digital





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

technologies to the prototyping of fashionable products for people with physical disabilities. The project has involved both volunteers with physical disabilities and numerous partner organisations and has addressed creatively the challenges and possibilities posed by design, physical disabilities and advanced assistive technologies.

In 2019, aware that although people aged 65 or older and disabled people represent a considerable share of the population the market has not developed diversified high-quality product lines, RogLab decided to launch an enquiry among the elderlies of Ljubljana to assess their interest and needs for the development of innovative solutions for active aging. The positive feedback collected (in majority from women respondents) has led the makerspace to launch an international call for designers willing to develop socially conscious solutions enabling persons over the age of seventy to lead active and independent lives in their homes or in public spaces, be it indoors or outdoors. The call was promoted with the support of 35 FabLabs and workshops from 27 countries and eight proponents were selected and invited to attend workshops of training, mentoring and co-design. The programme foresaw the guidance of experts of different disciplines – fashion designers, medical doctors, economists – and the participation of two volunteer elderlies – a woman and a man. The workshop kick-off, aimed at making designers understand the needs of the elderlies, allowed participants to simulate the experience of an older body through a virtual immersion with googles and other technical devices. In the following days, out of the thirty project ideas developed by the selected designers, four were selected for being prototyped, one of which applying technical innovations for fashion and clothing for active aging. The designed garments, for men and women, were classically tailored clothes with adaptations to non-standardised body shapes and for an easier use for the older generation thanks to the application, for instance, of magnetic zippers and buttons. The elderlies participating to RogLab Open: Active Aging commented that the most satisfactory factor was the feeling of being dignified in their clothes, without having to choose comfort over beauty. All the creations prototyped within the project were exhibited at the MAO Museum of Architecture and Design of Ljubljana, made available by the designers with a Creative Commons 4.0 license and their digital fabrication instructions published on RogLab website. RogLab Open: Active Aging was primarily concerned with raising awareness on the potential of digital innovation for active ageing and aimed at creating makers capacities to understand and respond to elderlies' needs. The fab lab staff identifies in the





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

access and permanence on the market the most challenging step of the process for fashion designers who want to specialize in products for active aging. Independent innovators generally lack the possibility of investment needed and specific support ought to be created for businesses that follow a model based not on scale economy but on adaptability. Added value of the initiative has been the creation of a space for people of all ages to gather, reflect, share needs and exchange possible solutions. Technology has certainly served as a tool, but it is joint-efforts that create solutions.

Independent innovation for wearable technologies

Alma is a studio innovating in the field of female healthcare, operating to develop both technologies and educational tools that contribute to change the narrative around the female body and make accessible practical and inclusive female intimate care.

Conscious of the taboos and stigmas still connected with the female body and to gynaecological health, Alma started up with the intent to create an accessible and easy-to-use technology to monitor female intimate pH and body fluids and support females in preventing and detecting vaginal infections and other diseases. The initiative is promoted by a multidisciplinary and international team, founded by Giulia Tomasello, interaction designer, together with Tommaso Busolo and Ryo Mizuta, material scientists, and Isabel Farina, medical anthropologist. The process that led to prototype development was extensive and highly participated: over the course of 11 months of open conversation with females all around the world, Alma collected information on the experience of women suffering from vaginal infections, and the perceived difficulties connected to discuss intimate health and seek healthcare professional advice.

Evidence was collected through digital surveys and physical workshops and it was eventually analysed both qualitatively and quantitatively, to address in an effective way the most pressing challenges identified. The smart underwear is the first non-invasive tool for monitoring vaginal infections. When symptoms occur, a female will use the underwear in order to identify what type of infection is coming. The biosensor placed in the gusset of the underwear measures pH and other biomarkers present in vaginal fluid. The data will be accessible to the user through the phone and if necessary it will directly connect with clinics for medical support. The modularity of the product allows the biosensor to be removed for washing the garment, therefore responding to the need of



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

making frequent, continuous use of the wearable self-care product. The groups of females who took part in the collaborative research and development process expressed the desire to have a safe space for open conversation on issues relating to female intimate health care and Alma is now working to create a digital community platform for women to exchange experience, and knowledge on the subjects.

Alma is socially oriented, supported by public grants and investors who share the same ethics. In the year 2019/2020, Alma was supported by STARTS (Science, Technology & the Arts), a programme of the European Commission that supports collaborations between artists, scientists, engineers and researchers to develop more creative, inclusive, and sustainable technologies.





4. Policies and strategies

4.1 *The views and visions of fashion&innovation experts*

The following paragraphs present the key points emerging from in-depths interviews conducted to 12 fashion experts or operators of innovative makerspaces working for active ageing (Appendix B presents the full list of names). The international professionals were identified by FUSION project partners in view of their acknowledged experience in the issues of digital fabrication, independent fashion design and of the social impact of the fashion and textile sector. They were asked to provide their current view and vision for future enhancement of the fashion and textile industry, with a focus on those actions and policies that may harness innovation and social impact through digital fabrication. What emerged from the interviews is presented subdivided on the themes of competences to be improved by designers and makers, trends and transformations for the industry ecosystem, suggested orientation to enhance the contributions from the textile and fashion sector on the quality of life, and reflections on the potential of the elderlies as a market niche.

Competences

- *Research skills on consumers' needs*
- *Changing narratives around major social issues*
- *Digital technologies and artificial intelligence*
- *Knowledge of materials*
- *Recycling and upcycling*
- *Responsible business behaviour*

To enhance innovation, designers and makers should increase their capacity to conduct research on the needs of consumers, on the personal and social implications of design and marketing choices and on the possibility to shift detrimental or negative perceptions, also in relation to the stigma frequently connected to aging in our society and to the scarce perceived attractiveness of the niche of products for the elderlies. Research competences would also provide makers and designers the tools needed to



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

work in synergy with professionals from other disciplines, to harness the potential contributions from different fields.

An enhanced ability to use digital technologies and artificial intelligence both for design and production purposes, would offer makers a valuable means to experiment and innovate, to increase efficiency and to reduce the presence of intermediaries in the fashion industry, thus making consumers more involved also thanks to the customisation of products based on individual needs and to do-it-yourself production processes.

For the European fashion sector to place itself at the forefront of relevant innovation, designers and makers should reinforce their technical skills, specifically with reference to knowledge of materials and of their life chain, from sourcing, to production or manufacturing up to disposal and recycling. Such knowledge is deemed fundamental in order to understand the current limits and further potentialities of textiles, to make conscious choices and put in place responsible strategies, therefore adopting materials that are long-lasting, that can be produced minimising the environmental impact or privileging sustainability or circularity. Attention should be placed on all sorts of new materials, synthetic as well as bio-materials. Considering the global scale and interconnectedness of the fashion industry of the 21st century, the experts recommended more awareness and sensitivity on the ethics of sourcing and prompted designers and makers to explore ways to localize production, valuing competences that can be found at the local level, as the direct relationship between designers and producers may constitute a way to revisit and innovate production models and to disrupt cycles that present chronic negative patterns.

A better knowledge of materials and processes would also allow designers to develop garments that can be recycled and whose recycling process is easier and less costly, as well as to use upcycled materials for their creations. This competence is needed to reduce the enormous impact of the fashion industry and to orientate it towards a circular model. Finally, designers and makers are recommended to follow business trainings and to develop an entrepreneurial approach that demonstrates social and environmental responsibility. This competence has been identified as crucial by several of the consulted experts, as it allows to secure the economic viability of ground breaking, innovative or responsible concepts, ideas and products.





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

The sector ecosystem

- *Digital fabrication spaces are widely present*
- *Integration of resources among actors*
- *Relationships and collaborative environment*
- *Large players are not leading digital and technological innovation*
- *More incentives needed to encourage sustainability*

Digital fabrication spaces are now widely present and functioning, being most of the time open to individual makers and designers for experimentation and making. Attention was placed by the interviewed experts on the generally high cost of some last-generation machineries, for instance knitting or weaving machines: this makes their purchase difficult to individual professionals or small brands and therefore calls for an important integration of resources (machineries and know-how) among actors in the sector. In fact, relationships are believed to be the most valuable resource for makers in the textile and fashion industry; the collaborative environment allows to realize ambitious and innovative ideas, to learn and exchange experience. The frequent participation to social gatherings (as conferences, webinars and fairs) is regarded as extremely relevant for professional growth.

The biggest textile and fashion companies, often in a position where investments on a large scale would be possible, are not at the forefront of innovation: the suggestion for them is to integrate technological innovation and to become open production spaces, operating and inspiring places for other actors in the fashion field. The institutional framework should encourage and give incentives to fashion corporations that value sustainability and responsibility: for instance, shorter production chains (that avoid long-distance manufacturing) could be encouraged with investments towards technology-enabled systems of manufacturing with high degree of automation with broader digitization of the workflow. Recycling facilities and machineries, fundamental to promote circularity of productions and to decrease the impact of the fashion industry, are still lacking or out of designers' reach: future support to the sector should also go in this promising direction.

Quality of life: current and potential contributions from the textile and fashion industry

- *Feeling of being comfortable in one's body*





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

- *Inclusiveness and respect of differences*
- *Adaptation to individual and special needs*
- *Aesthetics of orthopaedic or medical products to be improved*
- *More co-designing and prosumer model*

The textile and fashion industry impact on people's quality of life on various accounts. At the emotional level clothes, shoes and accessories can make the difference in the way one feels in her or his body. According to the experts interviewed, the sector has positively changed and become more inclusive and respectful of differences, contributing to respond to individual needs through a differentiation of product lines. The ability to answer to specific needs, that also reflects on physical wellbeing, should be further addressed by means of a transfer of agency to consumers, who could be encouraged to engage in a "prosumer" model in order to personalise products in an effective and relevant manner. Although lines of garments for orthopaedic and medical use are present on the market, the aesthetics of these products is often overlooked and this factor is deemed to discourage purchase and use, as people are expressing a willingness to feel beautiful and comfortable at the same time. More research is needed to further integrate the clothing industry and medicine.

Being present in people's everyday lives, the textile and fashion industry act as ambassadors of relevant contemporary issues and have the potential to foster and favour a change in consumers behaviour towards more responsible and sustainable models. The bigger players in the field are progressively integrating instances and standards that have been championed for decades by attentive consumer groups and trailblazing designers and manufacturers. A challenge for the years to come will be to enhance the contribution to recycling of the sector, shifting the industry towards a circular model that will decrease the environmental impact.

Elderlies: a market niche?

- *Less prone to spend, lower purchase involvement and lower attention to sustainability issues*
- *The youthful years are progressively extending beyond our youth*
- *"Perennials": informed, conscious, tech-savvy*
- *More co-designing and prosumer model*
- *Health-added value: assistive technologies for self-care and self-healthcare*



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

– *Transfer to the niche innovation from innovation-intensive sectors*

The experts interviewed expressed mixed feelings concerning the possibility for designers and makers to consider the elderlies as a promising market niche. On the one hand, those in disfavour reported that elderlies are less prone to spend, do not buy frequently, show relatively low purchase involvement and are less sensible to issues of sustainability. In their view, an investment towards older consumers would not pay off.

On the other hand, those seeing the elderlies as a promising market niche (the majority of the experts interviewed) brought a number of arguments in favour of the thesis and suggested a number of ways for the fashion and textile industry to fruitfully evolve in this direction. According to them, the European population is aging in a way that more and more frequently allows to extend the healthy, youthful years beyond youth. A good share of the “new” elderlies has an interest in keeping an active lifestyle and may be referred to as “perennial”: part of a category of people who live in the present time, are conscious of what is happening in the world, and stay current with technology. This would make progressively more meaningful and effective the development of assistive technologies for self-care and self-healthcare, adopting garments and accessories that allow active security functions as the monitoring of vital signs, the monitoring of movement, or lack thereof. For the elderlies’ market niche, the “health added value” is fundamental and the fashion industry will have to cope aesthetics with answer to needs in order to gain relevance. Ergonomic textiles, materials with drug-releasing properties or able to mitigate the effects of a fall, antibacterial or antimicrobial textiles were cited as promising fields for research and product development.

In order to bring about innovation, designers and makers should also actively involve aging people in the design processes, developing suitable, ad hoc participative methodologies for the conception, prototyping and trial of products.

Lastly, an interesting hint is to transfer to the elderlies’ market niche relevant innovations (for instance new materials, ergonomic models, etc) that are developed in segments of the fashion industry where more investments are currently made, for instance from the sportswear sector.

4.2 The orientation of policies for the fashion and textile industry





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Independent makers and designers are at the forefront of innovation in the European fashion and textile industry, both for the development and application of digital fabrication technologies and for the spreading of socially innovative practices. Policy makers and sector institutions, at multiple levels, are in the position of giving substantial support to the relevance and impact of independent actors by means of specific policy orientation. The following paragraphs highlight the main lines of policy that the FUSION research group foresees as relevant for the sector, either at the Communitarian or national level.

EU LEVEL

Supporting the reshoring process

Currently, most EU fashion companies are adopting the offshoring approach, which means that the creative part of the process takes place in Europe, while the productive part takes place in non-European countries, like China, Vietnam, Thailand, Turkey, Morocco and Mexico. As mentioned in the first chapter, however, the new production processes that introduce digital technologies and 3d printing could upset this scheme making it preferable to produce in Europe, for reasons of time-to-market, production quality and less need to lower production costs.

The reshoring process could be fostered at the EU level, shaping an ad hoc incentive scheme that may include:

- funds that can help meet the necessary investments in terms of manufacturing tools, software and redesign of production processes;
- support for re-training programs for both designers and skilled workers;
- tax incentives for those who operate a reshoring process.

Specializing EIC

An interesting program to support innovation at European level is the EIC Accelerator (European Innovation Council Accelerator), a call dedicated to the development of innovative ideas through grants (non-repayable and/or in the form of equity capital). According to the data at the end of 2020





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

on SME EIC Accelerator, there were 5487 participants and 2869.22 million euros allocated in the various production sectors.

Most of the projects funded by the EIC belong to the ICT, health and energy fields; ideas belonging to the fashion and textile sectors are residual. Among the sectors specified in the calls there is not "Fashion and Textile" one, but projects that have to do with this industrial sector can be identified under the categories ICT, Engineering and technology, Biotechnology, Nanotechnologies. There are just over 20 projects between 2014 and 2020 with this search key.

Considering the recommendations expressed at European level in the document "Innovation for Active & Healthy Ageing" (European Commission 2015), one or more of the EIC calls could be declined on the Silver Economy theme, as done during the Covid-19 pandemic in relation to its containment. That could be a way to create a "Silver Economy *Innovation to Market* accelerator" - as recommended by the EU, with the aim to promote the proposals of SME in various fields related to ageing.

Social Impact Investment

Specific private investment sources, notably Social Impact Investment and crowdfunding, are among the most effective enablers of initiatives aimed at solving the key societal challenges of our time and, in the European Union, there appears to be space for new synergies between EU-funded Research and Innovation projects and such private impact investment streams.

The European and national governments could become SII market steerers (Mackevičiūtė 2020) including the silver economy among the strategic sectors and objectives for impact investment, for instance encouraging initiatives to explore intersections between services (that can be for older people but used by young people, for example) and the sharing-economy, or attracting crowd investors that are traditionally close to the needs faced by the ageing population and their carers (such as doctors, GPs, users, formal and informal carers etc.).

Cooperation and transfer of innovation among actors

For the European fashion industry to maintain its competitive nature, the cooperation and integration among the knowledge, technology and abilities of independent innovation and industry actors should





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

be supported and particularly channelled towards the development of new products and solutions for improving people's quality of life. Makers and designers who are prototyping and producing innovative fashion and textile products often lack the visibility and potential of outreach that industry actors possess; while the industry is lagging behind in the integration of digital fabrication in its production processes and in the widespread response to the social innovation needs that are raised by a growing portion of consumers. In this sense, the capillary presence of Fab Labs and independent maker spaces could constitute a valuable asset for creating connections, expanding integration and facilitating the transfer of innovation throughout the sector.

NATIONAL LEVEL

The change in the production model will necessarily require greater skills related to information technology both at the design level and also in production. For this reason, at the national level and in accordance with the different education programs, it would be necessary to introduce these competences in the different curricula or integrate them into the lifelong learning processes.

New education curricula

Education programmes face an urgent need of adjusting to new knowledge and interdisciplinary collaboration demands. With the aim of supporting fashion and textile industries in a 3DP integrated production model, fashion education would be expected to reconsider existing curricula to include new knowledge and skills. Among the new skills required we can include 3DP design, domestic sourcing, 3DP integrated supply chain management, smart or DDM manufacturing, as well as collaborative approaches with the design and product development sector.

The roles of textile and fashion designers are expanding and becoming highly complex, and the traditional education and training does not commonly include the study of subjects and the development of skills that will be required by the market.

First of all, **3D modelling and rendering techniques** using digital fabrication methods are not part of the education programs of fashion designers, in most cases





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Second, another important area of expertise concerns **the use of new materials**, which need to be studied to develop sustainable products, taking into consideration the product life cycle and processes, since the way the old and new materials are treated in the new production processes changes their properties and capabilities for various product developments and also in terms of reuse and recycling. A further ability to develop will be that of **interdisciplinary teamwork**, together with technicians such as makers and engineers, who will enter the production process from the very first steps in the creation of objects, since their skills will be essential for product development. Fashion designers will need to “learn a new language” in order to work in interdisciplinary teams.

Finally, considering the potential in terms of **co-design** that new techniques offers and also the shift of the demand – since users are expecting much more intimate relationships and interactions than ever before -, it will be essential for designers to acquire co-design and to develop a solid aptitude to analyze society, consumption trends, targets, also thanks to a closer collaboration with sociologists, anthropologists, economists.

Skilled workers specialization

Similarly, the lack of specialized abilities of skilled workers will have to be addressed, by designing on-the-job training programs. Such an education program would have three main purposes:

- **avoid the growth of a severe misalignment between supply and demand for work.** According to the Studies Office of the Italian Chamber of Commerce, for example, technological development is strongly affecting the skills required of workers: in the future, the demand for digital skills will be associated with over 9 out of 10 profiles. and even today, especially high skilled people and skilled workers are difficult to find. The misalignment between job demand and supply concerns almost 40% of the profiles of managers, intellectual, scientific and highly specialized professions sought by companies in 2020. Almost the same difficulty in finding affects technical profiles and skilled workers. The mismatch between labour supply and demand can become really serious in a sector, such as that of textile and fashion, for those European countries where this industry constitutes an important share of GDP.





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

- **Disconnect innovative processes from the workforce.** In fact, it must be remembered that in some countries, characterized by forms of district production organizations, the innovation of production processes has often occurred thanks to workers who have proposed improvements, new uses of machinery, new processes. This is due to an in-depth knowledge of both the final products and the production processes and machines used. Failure to upgrade the skills of workers could continue to interrupt this virtuous cycle that has made the sector strong not only worldwide but has also impacted the development of specialized mechanical industry.
- **Avoid a reduced impact of investments in technologies due to a lack of skilled workforce.** This is clearly the most obvious negative impact.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

References

Adrian Smith, Sabine Hielscher, M. F. (2015). *TSI Narrative - FabLabs. TRANSIT: E*(613169).

Arduino day 2019: Arte contemporanea e tecnologia allo Spazio chirale. (2019, March 08). Retrieved from <https://www.chirale.it/arduino-day-2019-arte-contemporanea-e-tecnologia-allo-spazio-chirale/>

Bertola, P., Teunissen, J. (2018). Fashion 4.0. Innovating fashion industry through digital transformation. *Research Journal of Textile and Apparel*, 22(4), 352–369.
<https://doi.org/10.1108/RJTA-03-2018-0023>

Boosting Belgium's fashion and design SMEs-Projects (2021). Retrieved from https://ec.europa.eu/regional_policy/en/projects/Belgium/boosting-belgiums-fashion-and-design-smes

Bosone, M., Onesti, A., & L, F. G. (2018). *Art , culture , people and economic development*.

Buchel, S., Roorda, C., Schipper, K., & Loorbach, D. (2018). *The transition to good fashion. November*, 45. <https://apo.org.au/sites/default/files/resource-files/2018/11/apo-nid222521-1335346.pdf>

Chaminade, C., Bellandi, M., Plechero, M., & Santini, E. (2019). Understanding processes of path renewal and creation in thick specialized regional innovation systems. Evidence from two textile districts in Italy and Sweden. *European Planning Studies*, 27(10), 1978–1994.
<https://doi.org/10.1080/09654313.2019.1610727>

Coen, L. (2018). *Studi e Ricerche*. www.lettere.unitn.it/221/collana-studi-e-ricerche

Critical wearables research lab. (n.d.). Retrieved from <https://digital-anthropology-lab.arts.ac.uk/critical-wearables-research-lab/>

DAIJIRO MIZUNO, Open design and digital fabrication in fashion in GWILT, Alison (ed.). Fashion design for living. Routledge, 2014.

Denmark in Portugal. (2021). *Textile and fashion industry in Portugal*. Denmark in Portugal. <https://portugal.um.dk/en/the-trade-council/portugal-as-a-market/textile-and-fashion-industry-in-portugal/>.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Europe in the World: The garment, textiles & fashion industry - Fashion Revolution. (2021). Retrieved from <https://www.fashionrevolution.org/europe-in-the-world-the-garment-textiles-fashion-industry/>

European Commission, Innovation for Active & Healthy Ageing, European Summit on Innovation for Active and Healthy Ageing, Brussels, 9-10 March 2015 Final Report

European Textiles and Fashion: Facts & Figures. (2021). Retrieved from <https://www.euractiv.com/section/innovation-industry/infographic/european-textiles-and-fashion-facts-figures/>

Eurostat: Regions in Europe – statistics visualised. (2021). Retrieved from <https://ec.europa.eu/eurostat/cache/digpub/regions/>

Fab City. (2018). *The Fab-City Manifesto*.

FabLab: Esempio di ATELIER contemporaneo (2016, October 16). Retrieved from <https://aaamuseumhub.wordpress.com/2016/10/16/fablab-esempio-di-atelier-contemporaneo/>

Fab textiles. (2020, September 04). Retrieved from <https://fablabbcn.org/projects/fab-textiles>

Facts and Figures, Swiss Textiles (2021). Retrieved from <https://www.swisstextiles.ch/en/branche-1/facts-and-figures>

Farritor, S. (2017). University-Based Makerspaces: A Source of Innovation. *Technology & Innovation*, 19(1), 389–395. <https://doi.org/10.21300/19.1.2017.389>

Fashion Technology Accelerator. (2021). Retrieved from <https://www.ftaccelerator.it/>

Garments and Textiel | International RBC | SER. (2021). <https://www.imvoconvenanten.nl/en/garments-textile/agreement/about>.

Homepage - EURATEX. (2021). Retrieved from <https://euratex.eu/>





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Institut für Textiltechnik of RWTH Aachen University (n.d.). Retrieved from <https://www.ita.rwth-aachen.de/cms/ITA/Forschung/Industrieprojekte/~lqpa/Industrieprojekte/lidx/1/>

Irish Fashion: Textile & Clothing. National Design & Craft Gallery. (2021). <https://www.ndcg.ie/secondskin/designer/irish-fashion-textile-clothing>.

Istat. I distretti industriali. (2021). Retrieved from <https://www.istat.it/it/archivio/150320>

Kohtala, C. (2017). Making “Making” Critical: How Sustainability is Constituted in Fab Lab Ideology. *Design Journal*, 20(3), 375–394. <https://doi.org/10.1080/14606925.2016.1261504>

Lushan Sun & Li Zhao (2018): Technology disruptions: exploring the changing roles of designers, makers, and users in the fashion industry, *International Journal of Fashion Design, Technology and Education*, DOI: 10.1080/17543266.2018.1448462

Mackevičiūtė, R. et al., Social Impact Investment - Best practices and recommendations for the next generation, Publication for the Committee on Employment and Social Affairs, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg, 2020.

‘Made in Romania’: the story behind the tag | Living. (2021). Retrieved from <https://www.euronews.com/living/2018/11/14/made-in-romania-the-story-behind-the-tag>

Manenti, P. (2016, April 29). Local-for-local manufacturing is driving reshoring opportunities. MH&L News. Retrieved from <http://mhlnews.com/global-supply-chain/local-localmanufacturing-driving-reshoring-opportunities>

McQuillan, H. (2020). Digital 3D design as a tool for augmenting zero-waste fashion design practice. *International Journal of Fashion Design, Technology and Education*, 13(1), 89–100. <https://doi.org/10.1080/17543266.2020.1737248>

Miles, I., & Green, L. (2008). Hidden innovation in the creative industries. *Technology*, 11(July), 148–168. <https://doi.org/10.5172/impp.11.2.148>

Office, F. (2021). Households spend on average CHF 210 per month on clothing and footwear - Household Budget Survey 2016 | Press release | Federal Statistical Office. Retrieved from <https://www.bfs.admin.ch/bfs/en/home.assetdetail.6506536.html>





Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Padilha, C. K., & Gomes, G. (2016). Innovation culture and performance in innovation of products and processes: a study in companies of textile industry. *RAI Revista de Administração e Inovação*, 13(4), 285–294. <https://doi.org/10.1016/j.rai.2016.09.004>

Partnership projects - WORTH Project. (2021). Retrieved from <https://www.worthproject.eu/partnership-projects/>

Paterson-young, C., & Karlidag-dennis, E. (2020). *Transform Ageing – Final Evaluation*.

Peppler, K. (2017). Fab Lab. *The SAGE Encyclopedia of Out-of-School Learning*. <https://doi.org/10.4135/9781483385198.n108>

Polifactory (2021) Chi siamo. Retrieved from <https://www.polifactory.polimi.it/chi-siamo/>

Romanian Textile Concept Cluster - Internal Market, Industry, Entrepreneurship And Smes - European Commission. (2021). Retrieved from <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/organisation/romanian-textile-concept-cluster>

Shemakes. (2021, February 25). Retrieved from <https://fablabbcn.org/projects/shemakes>

Sisson, A., & Thompson, S. (2012). Three dimensional policy: Why Britain needs a policy framework or 3D printing. Retrieved from: http://www.biginnovationcentre.com/Assets/Docs/Reports/3D%20printing%20paper_FINAL_15%20Oct.pdf

Sun, L., & Zhao, L. (2017). Envisioning the era of 3D printing: A conceptual model for the fashion industry. *Fashion and textile Journal*, 4(25), 1–16

Škec, S., Özkil, A., & McMahon, C. (2020, November 06). Fablabs, makerspaces, and design SPACES: AI EDAM. Retrieved from <https://www.cambridge.org/core/journals/ai-edam/article/fablabs-makerspaces-and-design-spaces/87D7606D481FC90A9CC57B3975A37B05>

Sleigh, A., Stewart, H., & Stokes, K. (2015). Open Dataset of UK Makerspaces: A user’s guide. *Nesta Report*, April, 16. <http://www.nesta.org.uk/publications/open-dataset-uk-makerspaces-users-guide>

Sun, L., Zhao, L. Envisioning the era of 3D printing: a conceptual model for the fashion industry. *Fash Text* 4, 25 (2017). <https://doi.org/10.1186/s40691-017-0110-4>



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Textile. Invest In Flanders. (2021).

<https://www.flandersinvestmentandtrade.com/invest/en/sectors/textile>.

Textile Industry in Spain (2021). Retrieved from <https://study.com/academy/lesson/textile-industry-in-spain.html>

Todeschini, B. V., Cortimiglia, M. N., Callegaro-de-Menezes, D., & Ghezzi, A. (2017). Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges. *Business Horizons*, 60(6), 759–770. <https://doi.org/10.1016/j.bushor.2017.07.003>

Trajkowska, B. (2019, June 9). *10 European startups with the potential to disrupt the fashion industry*. EU. <https://www.eu-startups.com/2017/05/10-european-startups-with-the-potential-to-disrupt-the-fashion-industry/>.

WEAR Sustain. (2021). Retrieved from <https://wearsustain.eu/dashboards/home>

WW, F. N. (2021). *In Austria, digital and sustainable fashion comes first*. FashionNetwork.com. <https://www.fashionnetwork.com/news/In-austria-digital-and-sustainable-fashion-comes-first,768844.html>.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Appendix A

Information on the database construction

The purpose of mapping the centers of independent innovation has been to build a database of makerspaces and incubators dedicated to technological innovation and digital manufacturing for the cultural and creative sector, with a particular focus on those active in fashion and textile and contributing to pursue innovation in these fields.

The cultural and creative sectors that have been considered are the following:

- Cultural Heritage and Entertainment: Museums, Monuments, Archives and Libraries, Contemporary Art and Architecture, Music and Live Entertainment;
- Content industry: Publishing, TV and Radio, Cinema, Software and Advertising;
- Material culture: Fashion, Design, Crafts and the Taste industry;
- Cultural tourism.

The reference scenario is the European one, and the data collected belong to the following European countries: Belgium, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom, Austria, Switzerland, Poland and Romania. These countries have been selected given their high production of textiles and fashion goods, as it has been underlined in Chapter 2.1.

The starting point of the mapping process has been the identification of the centers belonging to the FabLab Global Network, and then it has been extended to include other independent networks and makerspaces, including university centers and incubators. The map has been built in order to detect - and make available to interested users and companies - the reference incubators for innovation in the fashion and textile fields; the type of support they offer to creatives and businesses; available technologies; the services and structures that support the growth of cultural and creative small and medium-sized enterprises in Europe. A particular attention has been given to active aging initiatives, which have been particularly hard to detect activities, productions and events that promote design, production and / or co-creation for the elderly population.





The questions on which the database has been constructed are the following:

- Question 1: European country in which the center is located;
- Question 2 and 3: municipality where the center is located and postcode of the municipality;
- Question 4 and 5: name of the incubator / center and website;
- Question 6: network to which the center belongs to;
- Question 7: Does the incubator offer activities or events related to one of the creative and cultural sectors?
- Question 8: Are there any digital manufacturing machinery available?
- Question 9: If production machinery is available, who can use it?
- Question 10: For which creative and cultural sectors has the incubator offered training courses over the last year (January-December 2019)?
- Question 11: If in the months of January-December 2019 the center offered training courses in the fashion and textile sectors, how many were there?
- Question 12: Does the center provide support for business development?
- Question 13: What kind of support for business development does the center offer?
- Question 14: Does the center host activities for the elderly population?
- Question 15: If the center hosts activities for the elderly population, which activities are they?
- Question 16: Does the center promote initiatives for the design and production of products for the elderly?
- Question 17: If the center promotes the design and production of products for the elderly in the fashion and textile sector, what type are they?
- Question 18: Does the center promote activities, productions or events that link design with social impact?
- Question 20: What activities, productions or events that link design with social impact are promoted by the center?

General considerations from the database

Overall, 357 active independent centers have been mapped, which are active across different sectors. Almost half of the mapped centers are geographically located in large cities (and the capitals, of course), but it has been assessed that a discrete amount of centers are born and are currently active in villages and smaller towns, as well as in more provincial areas.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Table 1: distribution of mapped centers in relation to city dimension², total number of centers per country and % of centers active in fashion and textile fields for each country

Country	Capital	Large	Medium	Small	Village	Total Centers per Country	% over Total Centers
Austria	7	5	2	5	2	21	5,88%
Belgium	7	9	7	2	1	26	7,28%
France	4	16	2	4	11	37	10,36%
Germany	9	36	9	4	2	60	16,81%
Ireland	1	0	1	1	3	6	1,68%
Italy	3	28	12	12	9	64	17,93%
Netherlands	4	13	2	2	3	24	6,72%
Poland	4	5	0	0	0	9	2,52%
Portugal	4	3	1	5	2	15	4,20%
Romania	1	3	0	0	0	4	1,12%
Spain	6	23	0	1	0	30	8,40%
Switzerland	1	4	1	7	5	18	5,04%
United Kingdom	8	29	4	0	2	43	12,04%
TOTAL	59	174	41	43	40	357	100,00%
%TOTAL	16,53%	48,74%	11,48%	12,04%	11,20%	100,00%	

The centers belong to the following networks:

Networks and hubs per country	
Austria	21
Carinthia University of Applied Sciences	1
FabLab	2
Graz University of Technology	1
HappyLab	2
Industry Meets Makers	6
None	8
Smart Production Lab FH Joanneum University of Applied Sciences	1

² The distribution among cities and urban centers has been assessed considering large cities with a minimum of 100.000 residents; medium cities between 100.000 and 50.000 residents; small cities between 50.000 and 20.000 residents; villages under 20.000 residents.



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Belgium	26
Archibald Godts, Theresa Bastek, Design Academy Eindhoven	1
FabLab	11
FabLab University of Mons	1
idcampus	1
KU Leuven Campus Kulak Kortrijk	1
None	10
Université Libre de Bruxelles	1
France	37
Aix-Marseille University	1
Cergy Université	1
eTextile.org	1
FabLab	15
None	17
Université de Lyon	1
University of Paris	1
Germany	60
FabLab	18
None	4
Otto von Guericke University Magdeburg	1
Rhine-Waal University of Applied Sciences, Faculty of Communication and Environment	1
RWTH Aachen University	1
University of Siegen	1
Verbund Offener Werkstätten	33
Westphalian University	1
Ireland	6
FabLab	4
None	2
Italy	64
Consorzio Cultura Concept	1
Consorzio Innova FVG	1
Cre-ta fab lab	1
FabCube	2



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

FabLab	25
FabLab Lazio	7
Filisofia Digitale	1
La Salle International Campus	1
Maker Island	1
None	17
Historical Museum of Lecce	1
Politecnico di Bari	1
Politecnico di Milano	1
Università Carlo Cattaneo - Liuc	1
Università degli Studi di Sassari	1
Università degli Studi di Siena	1
Università Libera di Bolzano	1
Netherlands	24
FabLab	16
None	7
Rotterdam University of Applied Sciences	1
Poland	9
FabLab	3
Łukasiewicz - Textile Research Institute	1
None	5
Portugal	15
FabLab	10
Escola Superior de Educação de Lisboa	1
Facultade de Ciencias y Tecnologia Universidade Nova de Lisboa	1
Farm	1
None	2
Romania	4
FabLab	2
None	1
Technical University "Gheorghe Asachi"	1
Spain	30
Deusto University	1
Eurecat	1



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

FabLab	16
Higher Polytechnic School, CEU San Pablo University	1
IE School of Architecture and Design	1
None	8
Seville School of Architecture	1
University La Laguna	1
Switzerland	18
FabLab	11
None	2
Swiss FabLabs	5
United Kingdom	43
Bangor University	1
Cardiff Metropolitan University's School of Art and Design	1
Coventry University	1
FabLab	17
Hacklab	1
Hackspace	1
Imperial College London	1
London College of Fashion, University of the Arts London	1
Men's shed	1
None	10
The University of Sheffield Western Bank	1
University of Cambridge	1
University of Exeter	1
University of Plymouth	1
University of Salford	1
University of Strathclyde	1
University of Sunderland	1
University of Westminster College of Design, Creative and Digital Industries	1
Grand Total	357
Total University Centers	45



Co-funded by the
Creative Europe Programme
of the European Union



FUSION

Appendix B

We would like to express our sincere appreciation to the following fashion experts or operators of innovative makerspaces working for active ageing who have dedicated us their time for in-depth interviews.

Persons interviewed concerning collaborative design methodologies (Chapter 3.3)

Giulia Tomasello, Alma

Meta Stular, RogLab

Persons interviewed concerning views and visions of fashion&innovation (Chapter 4.1):

Adriana Cabrera, Fabriacademy

Ana Patrícia Pedrosa, Pedrosa e Rodrigues

Anastasia Pistofidou, Fabriacademy

Braz Costa, CITEVE

Daniel Charny, From Now On Fab City

Davide Dellarole, Associazione Tessile e Salute

Emilie Giles, independent researcher, artist and educator

Gerard Rubio, Kniterate Makerversity

Giusy Bettoni, CLASS

Marina Maffei, Cittadellarte – Fondazione Pistoletto

Tânia Maio, Valérius HUB

Zoe Romano, Serpica Naro