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EDITORIAL #20

Fashion and Textile Design Reconstruction

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The theme of issue 20 of PAD "Fashion and Textiles Reconstruction" is grafted onto the topicality of the emergency dictated by the Covid-19 pandemic, with the aim being to discuss critical and innovative thinking that lead to new paths of meaning in the creative and productive areas of Fashion and Textiles. Current events have dramatically resulted in complex choices to deal with periods of crisis whose aspects – environmental, health, social, cultural, economic, etc. – are interconnected and feed, in times like these, inequalities and vulnerability, thus distancing the results and opportunities of an extended and combined intervention.

Even if the emergency in all its forms requires timely interventions, untimeliness is the figure of our time (Agamben, 2008); it denotes the nature of human action that distorts the rhythm of the reproductive cycles of ecosystems in the name of the increasing reduction in *lead time*, as a response to the market. The other aspect of untimeliness can be found in the unexpected and unsolicited response of the phenomenology of the emergency, as an effect of the absence of any sustainable action that exposes society, as a whole, to serious risk and the biological basis upon which the forms of civilization are perpetuated. The terms absence and "untimeliness" (Agamben, 2008) constitute the ambivalence of contemporaneity, characterized by multiple aspects that irreversibly shape the forms and ways of the civilizations in which they are produced. We suddenly notice phenomena that punctuate contemporaneity, crossing time, eliminating linear dynamics, and significantly influencing the duration, propagating in an untimely way (Agamben, 2008) and causing a serious impact on ecosystems and the relationships between them.

Nevertheless, the untimeliness of human doing flaunts its own rhythms to reach unimaginable levels of production efficiency, with the compromise requiring giving up something or at least deferring the negative effects due to the absence of a consequent action. This would make the effects on the ecosystem, initially controllable and then subsequently sustainable.

However, this attitude does not facilitate equally untimely responses in the implementation of sustainable perspectives. Therefore, the manifestation of unexpected and unsolicited phenomena, which include emergencies, have a parallel in the equally and unexpected response of the natural systems' ability to resume their own rhythm as well as recuperate lost time and space, with these dynamics representing the countertrend to the untimeliness of human doing.

In other words, the appearance of the emergency is the result of the impact of human activity on ecosystems, as the effect of partially or not implemented sustainability. In concrete terms, the short or medium-term effects of human action are to be identified in unexpected phenomena that overwhelm and transform the ways and times of the manifestation and production of the forms of civilization.

Covid-19 has highlighted the countertrend to untimely contemporaneity (Agamben, 2020), with it having slowed down time, while also restricting and alienating the space for action. Where ways, spaces and times have not been established to implement truly circular and sustainable systems for the design, production, communication and distribution of tangible and intangible assets, the emergency has put all the production, social and cultural systems into crisis mode.

The most critical sectors undoubtedly include Fashion and Textiles, which have demonstrated all their limits of the lack of upstream coordination and adherence to the principles of the circular economy and system resilience. From the data collected and reported by the Ellen Macarthur Foundation (2017), it is clear that, in addition to the production of clothing or textile fibres, maintenance involves high risks for ecosystems every year due to the releasing of half a million tons of microfibres into the ocean, the equivalent of 50 billion plastic bottles. The dyeing of fabrics is the second cause of water pollution on the planet; 7,500 litres are needed to make a pair of jeans. 8% of the global greenhouse gas emissions can be attributed to the clothing and accessories industry. The Ellen Macarthur Foundation (2017) reports that the textile sector, with its 1.2 billion tons of CO_2 per year, exceeds the combined emissions of aviation and maritime transportation.
Local production processes have a significant impact on ecosystems, triggering irreversible processes, the effects of which spread elsewhere, putting the global balance at risk. Topicality ends in an unconditional trust in innovation, vice versa, in times of emergency, there is a sort of "absence of technological protection" (Galimberti, 2020). A more natural rhythm imposes and determines itself: "We are faced with the unexpected: we thought we were in control of everything and instead we control nothing in the instant in which biology slightly expresses its revolt" (Galimberti, 2020). The change of pace requires considering the nature of the application of innovation and the ability to integrate humanistic knowledge into technology that introduces a relevant aspect, the collaboration in the *man-machine* relationship.

It is no coincidence that the next industrial revolution, Industry 5.0, will be based on the concept of *empowering people*, within the manufacturing process, highlighting the importance of the so-called *human touch*.
The promises of the new industrial paradigm, based on the collaboration between the human workforce and artificial intelligence, strengthens the scope of a circular economy, capable of renewing itself through the themes of collaboration and cooperation. The latter strengthen the relationship between man and machine for which it is essential to formulate a framework of integration; founded on artificial intelligence encountering human intelligence, with the need to modulate its aspects so as to include all the diversity it is capable of.
The expansion of the manufacturing sectors of Fashion and Textiles is hoped for and preferred by trying to establish a dialogue that goes further. The appearance of a distant or close dialogue between different thematic areas is encouraged by the call that adopts the dichotomy absence-untimeliness as a picklock to unhinge, vice versa, to unite in a necessary relationship of cause/effect, terms such as: sustainability and emergency, resilience and resources, technology and production, protection and danger, confrontation, and dialogue.
Fashion and Textiles formulate a sort of phenomenology of the relationship between absence and untimeliness, emblematic sectors of the impact on the environment, their consistency in quantitative and qualitative terms takes the discussion far beyond its own disciplinary boundaries.

The theme of issue 20 of the PAD Journal launched the comparison and discussion on the **absence of sustainable action**,

the **untimeliness of the emergency phenomenon**, proving the **absence of technological protection** for the **safeguarding of human values and well-being**. The emergency now discusses **and compares the different thematic areas** in Fashion and Textiles Design so as to inspire and promote the **creation of a new dialogue** closer and coordinated, but effective, to **reconstruct the internal and external links**.

Furthermore, the **theme** has solicited reflections and solutions for the **reconstruction of the real value chain**, in harmony with the needs of consumers and the protection of ecosystems. The reflection aimed at reconstructing the guiding values in the textiles/clothing sectors launches and takes up the challenge of the need for a sustainable and effective response, not only regarding production processes, but aspires to a real effect in the re-elaboration of interpretative, social, and cultural aspects. Sectors based on communication as a means of persuasion par excellence, Fashion and Textiles are called to reinvent themselves in the role of **(in)form**, **(re)new**, **(re)build** and **(re)balance** and **pacify** the relationship between human needs and ecosystems so as to make coexistence possible.

The volume contains the results of the open discussion, presented in the form of a dialectical comparison between multiple design research areas on the assumption that different systems, logics, methods, and tools establish a dialogue with the aim of creating **complex and problem-solving visions**. The purpose of Design, in addition to providing answers to some obvious inconsistencies, explores the dimension of **conscious design action** in **reconstructing** useful and complementary synergies.

The social and educational aspects, environmental compatibility and the economic challenge are the main references from which the diachronic confrontation for the sectors of Fashion Design and Textiles arose.
The contributions of the issue have been organized into three sections, reflecting the typology of the text in terms of the wideness of the discussion, in the case of the first section *Theoretical Overview*; the approaches of the second section, *Sustainable Approaches*; and operational purposes, *Practices & Tools*, of the third.
The first section includes contributions from: Sonia Seixas; Kellie Walters; Elisabetta Cianfanelli, Debora Giorgi, Margherita Tufarelli, Leonardo Giliberti, Paolo Pupparo, Elena Pucci; Regina Rech and Giovanni Conti.
With reference to design theories and practices: Sonia Seixas, in *The emergence of Sustainability and the Textile and Fashion Design Education*, analyses different aspects of educational models in higher education, adhering to the critical perspective of ideas and possible paths to follow as essential tools for new creative and design thinking for young designers. Kellie Walters, in *New Trend Landscapes: Coronavirus' Long-Term Impact on Fashion and Trend Forecasting*, compares the tools of the Fashion industry with the forms of conscious consumption. The response of the fashion industry is to increase the value of the items thanks to creativity to reduce production, a criterion of economic and social sustainability. New ideas and knowledge are investigated according to a complementary logic to present new proposals and visions on society, products, and forms of consumption. New tangible and intangible resources and skills are prepared to promote multidisciplinarity as in the case of di Elisabetta

Cianfanelli, Debora Giorgi, Margherita Tufarelli, Leonardo Giliberti, Paolo Pupparo, Elena Pucci, in *Metamorphic Fashion design. Nature inspires new paths for fashion communication*, where Interior, Character and Fashion Design, Direction, Performance Art coexist to propose another consumption model; Metamorphic Fashion represents the reproducibility of the catwalk event as multimedia content, and allows for its expansion, scalability and use anywhere and at no additional cost.

Sandra Regina Rech and Giovanni Maria Conti, in *Fashion and Work Organizational Ecosystem: prospects and post-COVID-19 scenario*s, offer a broader vision of organizational ecosystems that can integrate, with the use of new technologies and artificial intelligence, the organizational relationships between user, producer and environment in compliance with the needs of the new and sudden emergency, introducing strategies for competitiveness and remote collaboration.

In the second section, dedicated to Sustainable Approaches, Giulia Scalera, in *Sustainable Fashion Trend. Enhancing sustainability in fashion through visual communication media*, discusses the constant clash between the need for sustainable systems, the rules that impose objectives with specific timings, the difficulty of companies to adhere to these compromises in a short time and in compliance with a sustainability that requires profound changes, in the hope for a re-foundation of the Fashion system.

The reason for the excessive production of fast fashion, Chiara Del Gesso reminds, in *Sustainable fashion: from material to immaterial through biodesign*, is not to be found only in the materials and processes, but must be compared with the

social, symbolic, and immaterial needs; where users satisfy their need for representation in compulsive buying, with research in the field of biodesign playing a central role. An alternative approach, not only to current production models, but with a significant impact on current environmental aspects, as well as user interaction. In this sense, Ilenia Amato, in *New advanced clothes*, discusses the tangible and intangible relationship made of technological and intelligent materials capable of renewing personal ties with technology and society in constant and rapid evolution. New materials respond to the behaviours that arise in society that influence and inspire, innovating the way of thinking about clothing and fashion.
The third section opens with Margherita Tufarelli, *Fashion Heritage and the value of time: the dual role of archives for sustainable acting*. The author addresses the importance of past, present and future memory and identity, proposing the historical archives of fashion as an example and tool for a perspective vision that incorporates ways of doing and being from the past. Thus, brands that look to their past re-interpret their imprint, relaunching historical content and identity; the brands champions of uniqueness promote the current image that passes through its history.
If archives preserve and support historical and identity, social and collective memory, coworking spaces, as described by Giulia Bolzan de Morais e Karine de Mello Freire, in *Coworkings as Focal Points for the Development of New Models for a Sustainable Fashion: Challenges and Opportunities*, are places of convergence and where identities can be shared and discussed, stimulating the renewal of models of collaborative design, focused on transparent social and productive innovation.

Gabriele Pontillo and Roberta Angari, in *Acting responsibly Design as a sustainable practice for society*, propose a critical design debate with ethical and transparent methods, with them configuring a socially useful response in the safeguarding of sustainable ecosystems, while preventing unforeseen risks. At the vanguard of respectful productive actions and conscious of a renewal of disciplinary skills, design is responsible for playing the role of a convergence area of several disciplines. According to Juliet Seger, the social and community capacity of manual practice and especially of clothing making is, in *The Human Touch. An Ethical Discussion on Sewing Technology in the Age of Digital Transformation*, a fundamental element of contemporary ethics. The use of hands as the main factor of production requires a reading of the technologies related to the practice of sewing through the principles of the Matrix of Convivial Technology, which has its origins in the Degrowth Movement. Seger broadens her theoretical framework when she refers to social technology as the best way to design a fairer fashion supply chain.
Rossana Gaddi and Roberto Liberti, in *Culture, fashion design and communication in times of emergency*, conclude this issue of PAD by proposing an enlarged and holistic vision on the tangible and intangible values of fashion as a form of social expression. The territory and its cultural and identity geographies can find in design an expressive force capable of disseminating its values, the spirit of the place and its community. Tradition needs more communication and branding to convey its ability to reinvent itself, to dialogue with both society as well as with different cultures.

The ambivalence between rational and emotional behaviour in contemporary societies is expressed in the depletion of resources, inclined to indulge in consumption tout-court; the spark of the pandemic crisis from Covid-19 turns the spotlight, once more, on the urgency to act in a concrete and coordinated way.
PAD#20 opens the discussion and thanks to the heterogeneity of the contributions, the reflections are aimed at reconstructing a system of values that design can bring to Fashion and Textiles.
The issue closes with the presentation of an extraordinary development model at a national level, Moda Portugal, which reconstructs and strengthens the social and cultural ties between the creative-productive design areas of Fashion and Textiles and the institutional ones. An entire country, Portugal, moves together, constitutes a place for a real/virtual dialogue, designed to create profitable interactions for all the players in the *value-chain*, highlighting a broad consensus and a unified project for the valorisation and promotion of the cultural and productive substance of the territory.

Opening photo: Ettore Spalletti, "Ce qu'il y a de plus profond dans l'homme, c'est la peau", Librairie Marian Goodman, Parigi 2018. Photo: Maria Antonietta Sbordone.

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THEORETICAL OVERVIEW

The Emergence of Sustainability and the Textile and Fashion Design Education

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Keywords
Sustainability, Circular Economy, Fashion and Textile, Higher Education, Design Education.

Abstract
This paper intends to reflect on the relationship between design and academia and its context in a fragile and integrated ecosystem challenges such as the fashion system and its sustainability in a strategy of circular economy and change of social paradigm for the emergency of the future.
Design theories and practices are presented as fundamental for the sustainability of the fashion system and for human survival. Different approaches will be confronted in a critical perspective of ideas and possible paths to follow as essential tools for a more conscious and design creative thinking.
The methodology will be carried out through a review of literature where it is intended to review fundamental concepts and to proceed to a critical, constructive, and real analysis on the competences of the students. Develop strategies to raise awareness about sustainability concepts and circular economy allowing to understand its importance for its learning and future. The expected result will be to identify large thematic areas indispensable to design and transversal to education which are consistent with the evolution of the textile and clothing industry and with the needs of the consumer. Also, a reflection on the importance of the theme in the current and future economy.

1. Introduction

This study aims to reflect on the relationship between the design area and academia and its context in a fragile and integrated ecosystem such as the fashion system and its sustainability in a strategy of circular economy and social paradigm shift. It begins with a review of current literature on the underlying themes - society, consumer behavior, design, and sustainability - by conducting a constructive analysis on the need to develop strategies to raise awareness about the concepts of sustainability and circular economy, understanding its present and future importance.

21st century society should rethink consumption by purchasing products more consciously. It should be reflected on the material consumption exacerbated as an ideal lifestyle that generates an increase in production, for a society capable of producing and maintaining economic development reducing excess and consequently improving the quality of the environment, being social as physically (Manzini, 2008). It is important to rethink consumption behavior to make the human being aware of more conscious spending to protect the planet and himself. This awareness of change must also be instilled in the design education system to make students, as future designers, and users, aware of sustainability issues, not only at the environmental level but also at the economic and social level.

The textile and clothing industry proves to be one of the biggest environmental problems in landfilling waste. In this sense, strategies should be considered in order to minimize impacts and rethink the life cycle of fashion products, espe-

cially in an area where there is a lot of diversity of materials and processes (Fletcher & Grose, 2012). Considering the Portuguese reality, higher education in design associated with the textile and clothing industry is recent dating to its first undergraduate course in Fashion Design in 1992 at the Lisbon School of Architecture of the Universidade de Lisboa (Faculdade de Arquitetura de Lisboa, 2020). It will be analyzed how it is integrated into the study plan of undergraduate courses in Fashion and Textile Design in Portugal contents related to the theme of sustainability and circular economy.

It is intended to confront the business and be productive with its social reality and think on the effects that this analysis should reflect on the teaching of fashion and textile design in future professionals, but also citizens and consumers, thinking on the importance of sustainability in the current and future economic, deepening and generating knowledge.

2. The Society and the (un)Sustainability

Today's society should rethink consumption by purchasing products more consciously. Several authors address this problem by warning of its consequences. Gilles Lipovetsky (1987) mentions that the fashion system is the temporal dynamics that produced the consumer society and "modernity" considering the obsolescence of products produced by the fashion industry, as well as its ephemerality. It considers that fashion manifests itself rapidly in the change of products, prevailing the rule of ephemeral in production and consumption "(…) the fashion of our societies is identified with the institutionalization of waste, the creation on a large scale of artificial needs,

the normalization and hypercontrolled of private life"[1] (Lipovetsky, 2009 [1987], p.185). Jean Baudrillard (1970) alludes to the illusion created in the consumer society considering the pleasurable consumption and its dependence, but it never happens in isolation, and this, reflected in consumers, is a system of exchange and production of coded values. Humankind seeks pleasure, as if this were the only purpose of life resulting in an absence of reflection, distancing himself from moral values. Ezio Manzini (2008) narrates in his writings that sustainability demands a discontinuity of a society where the continuous growth of production and material consumption as an ideal lifestyle, one must reflect and change the paradigm for a society capable of producing and developing reducing these factors improving the quality of the environment, physically and socially (Manzini, 2008, p.19). He considers the changes are still very tenuous and designers are unfortunately part of the problem, and this process should be reversed. Designers can and should take the other side of the line and become part of the solution. Designers have the faculties to help in this problem tracing new horizons, so that in the future, guided by the issues of sustainability and acquiring a new vision of the world, to realize in association with society the necessary changes for a life with more quality, with isonomy and environmental consciousness (Manzini, 2008).

Thinking on the point of view of the previous authors it is imperative to alert a change in consumer behaviors to more

1 "[...] o devir moda de nossas sociedades identifica-se à institucionalização do desperdício, à criação em grande escala de necessidades artificiais, à normalização e ao hipercontrole da vida privada" (free translation by the author).

conscious consumption to protect the planet, and this should also be instilled at the teaching level in design, sensitize and empower students to sustainability issues and not only at the level of materials, but also at the social and economic level, including methodologies and processes. To do it will be necessary to reflect on the educational system, rearranging the study plans evidencing practices of social, environmental, and economic responsibility to impregnate at the personal and professional level.

3. Design Theories and Practices in a Paradigm Shift View

Design as a part of the complexity of the current social, cultural and productive environment presents itself as an increasingly important activity in the contemporary world. Bruno Latour (2008) revises the term *design* in a vision of the contemporary world, placing design in a central position. It considers that one sees an extension of the design, which goes beyond form, function, and aesthetics; which integrates concept and experience, represents the change of the world-view, one new "vision of the world" that accepts design.

> (…) the little word "design" could offer a very important touch stone for detecting where we are heading and how well modernism (and also postmodernism) has been faring. To put it more provocatively, I would argue that design is one of the terms that has replaced the word "revolution"! (Latour, 2008, p.2)

Victor Margolin (2007) saw a change in the role of designers in the face of the challenges of contemporary society having the ability to intervene in material and immaterial form.

Designers should not merely be product creators, they can assume the role of mediators occupying a dialectical space between the current world and what could be. Victor Papanek (1972) mentions that designers should understand the social, economic, and political contexts considering that design is a constantly changing discipline, in contact with other knowledge, transforming the thought process and the practice of design (Papanek, 2006 [1972]).

Faced with these thoughts on the practice of design in the contemporary world, in today's society, it can be told that design is in a paradigm shift. Thus it is considered important an approach to this change, in which designers must understand and absorb that design begins to have increasing importance for a greater understanding of the design and design process and its relations with the complexity of the contemporary world, and should be integrated and interconnected in teaching in design.

4. Education for Sustainable Development

United Nations Educational, Scientific and Cultural Organization (UNESCO) carried out an initiative for the Education for Sustainable Development (ESD) which defend the reorientation of the industrial model of education with significant pedagogical implications for the cultivation of knowledge, skills, and values structured in order to support sustainable development (UNESCO, 2019).

"The disorder of ecosystems reflects a prior disorder of mind, making it a central concern to those institutions that purport to improve minds. In other words, the ecological crisis is in every way a crisis of education". (Orr, 2009)

ESD is supported by the definition of sustainable development from the World Commission on Environmental and Development (WCED), a concept introduced by the *Brundtland Report* (United Nations, 1987) that define sustainable development as sustainable when "(…) meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987, p.6).

> (…) sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.
> (United Nations, 1987, p.43)

ESD encourages a transdisciplinary approach to environmental, social, and economic issues by highlighting critical and creative approaches, long-term thinking, dealing with uncertainty, and solving complex problems. Emphasizes the mutuality between the environment, the economy, society, and cultural diversity, from local to a global level. It is necessary to act responsibly understanding that current attitudes will be repercussions for the future for the life of the human being and the planet (UNESCO, 2017).

A fundamental change is needed in the way we think about education's role in global development, because it has a catalytic impact on the well-being of individuals and the future of our planet (…). Education can, and must, contribute to a new vision of sustainable global development (UNESCO, 2017, p.7).

In view of this framework, the incorporation of ESD in education allows integrating the concepts of sustainability and sustainable development preparing students for a change of behaviors and more conscious and sustainable decision-making. Promote skills of reflection on future scenarios, critical and creative thinking, decision-making collaboratively, in a vision of improvement of the planet.

5. Education in Design and the Sustainability

The Textile and clothing industry is one of the most polluting industries (Boström & Micheletti, 2016) sustainability being a topic of debate, research, and attention (Shen et al., 2014). Designers and design theorists in other product fields have long been concerned with sustainability issues like Victor Papanek (1984) who believes that the design response must be unifying and positive, it must be the bridge between human needs, culture and ecology "Ecology and the environmental equilibrium are the basic underpinnings of all human life on earth; there can be neither life nor human culture without it" (Papanek, 2009 [1984], p.469). According to Victor Papanek (1995), ecology and environmental equity are the basic foundations of human life on the planet, there is no culture or life without the planet. The author explains how designers can create a safer future through better choices. The author highlights how the designer produces pollution through six key points: the choice of materials, the production method, the packaging, the finishes, the transport and, the waste, all these elements contribute to what Papanek describes as "a life cycle assessment". A reference that design education should be based on ecological ideas and methods (Papanek, 1995).

> "(…) It is estimated that the product design and development phase carries approximately 80% or even more of the environmental and social impacts of the product including the manufacturing, use and disposal phase" (Charter & Tischner, 2001, p.120).

William McDonough and Michael Braungart (2002) address issues related to the environment and sustainability in the book *Cradle to Cradle: Remaking the Way We Make Things.* They say that with the creation of quantities of products in an exaggerated way these end up being discarded, and that design can save this cycle of *cradle to grave*. Designers can create environmentally friendly products by ensuring that they remain in circulation and use. They mention the importance of starting creatively on solutions that will allow rethinking the notion of disposal implementing a strategy of change. Consider a better framework of economic concerns in line with environmental and social issues, the concept of the circular economy, eliminating waste by visualizing future life. Tony Fry (2009) suggests a redirected premise of *design futuring* based on practice. He advises a *new design intelligence* focused on being a designer and the current world making it sustainable. It states that designers need changes in their own being, not to be so involved in materiality but to consider what they project in a more conscious way, thinking about the implications of products in a world with finite resources to bring new awareness and responsibility to designers. This new vision promotes transdisciplinary practice as a new method of thinking and working "By its very character, redirective practice can never be universally or theoretically generalised - it can only ever be situated and circumstantially reactive" (Fry, 2009, p10).

Faith Kane and Rachel Philpott (2013) suggest a heuristic style of interdisciplinary practice around textile creativity and sustainability that they call *textile thinking*. They suggest that professionals who work directly with textiles have some knowledge "specific blend" of materials that is essential in developing sustainable solutions. They mention "(…) handmaking and craftsmanship are key processes used by textile practitioners to develop understanding of both materiality and concept" (Kane & Philpoot, 2013, p.5). According to Kate Fletcher (2009), sustainability actions occur with small progressive changes because they are relatively simple to realize, however, in the challenge of a more sustainable fashion it is also necessary to make changes at a deeper level and consequently in the long term. It is important to look at the philosophies of design that consider sustainability for the process of change to be beneficial in the fashion universe. Annie Sherburne (2009) highlighted the role of a designer in the aesthetic creation of fashion products and suggested that the use of methods and materials can be a starting point in the process of creating a more sustainable fashion. Creativity and aesthetics should not conflict with ecological and social sustainability.

Fernando Moreira da Silva (2019) mentions that at each stage of the production process of a fashion product design plays an important role not only in terms of its functionality and aesthetics but also its intangible value. At the level of teaching, it is important to instill the trans and interdisciplinarity of the different disciplines and areas that interact in fashion design generating a new form of thought and action to allow the achievement of more holistic results, new strategies, and

competencies, generating a change of attitude and mentality in students.

Thinking on these thoughts it can be considered that the aesthetic aspect in conjunction with sustainable thinking can be complex, however, the choice of materials should be an essential part and correlated with the aesthetics of any product, including fashion products. The designer acquires a new role to work in a sustainability structure with emerging ways of visualizing the process and practice of sustainability. Fashion products are influenced by consumerist material culture and education with a sustainable vision in this area is extremely important in an alternative view of questioning. The challenge is to explore territories that are connected to human experience and ecological values in any product. Sustainability education places the central importance of bringing together and not destroying so designers can make a valuable contribution to society, thinking and acting in a new way by dissolving mental and disciplinary boundaries (Jones et al., 2010; Wals & Blewitt, 2010). Design education for sustainability should include critical thinking, learning, and questioning the world. Use the tools of Design Thinking combined with sustainability enabling changes and improvements in the way of thinking and consequent projects. Iterative, affirmative, reflexive, practical, and visionary skills, understanding the relationship between producer and consumer, between technology and society, can be a path to sustainability issues, sometimes complex, multifaceted, and unlimited issues.

But these thoughts and ideologies are not always facilitated. Studies by Cosette Armstrong and Melody LeHew (2015) identify some barriers related to students in design teaching

with a sustainable vision, they mention the difficulty on the part of students in understanding content outside their field boundaries, outside the creative imagination. Addressing complex and scientific issues often generates frustration in design students by demonstrating reluctance to understand their importance, often associated with the difficulty in generating critical thinking and thinking in a non-linear way to search for solutions to complex problems, understanding, and awareness of more global issues, and more specifically, social responsibility and ecological literacy which on the part of students comes out of their areas of creative interest.

> "(…) Imagination, ingenuity, improvisation, empathy, the ability to contribute to and shape convention, will be at least as important as technical know-how in design, materials, and processes" (Williams, 2013, n.p.).

6. Higher Education in Fashion and Textile Design and Sustainability Practices in Portugal

This study addresses Higher Education in Fashion and Textile Design in Portugal of undergraduate courses and there are five training offers (Direção Geral de Ensino Superior, 2020). To analyze the issues related to the theme of sustainability in the existing national fashion and textile education offers it was started by investigating the study plans of the courses (Escola Superior de Artes Aplicadas, 2020; Escola Superior de Artes e Design, 2020; Faculdade de Arquitetura de Lisboa, 2020; Universidade da Beira Interior, 2020; Universidade do Minho, 2020). Only two of three offers integrates in their study plans specific units related to the theme os sustainabili-

ty, the undergraduate course from the School of Applied Arts integrates in the second year the unit *Sustainability in Fashion* that aims to engage a responsible awareness in students through the exploration of emerging concepts in fashion and to experiment alternative processes of design and production of clothing (Escola Superior de Artes Aplicadas, 2020), and the undergraduate course from the University of Beira Interior integrates in the second year the unit *Sustainable Fashion Design* that aims to internalize the importance of sustainable design applied to the textile and clothing industry developing sustainable design projects considering the entire product life cycle (Fig. 1) (Universidade da Beira Interior, 2020).

Institution	Course (undergraduate)	Year of implementation	Sustainability unit/discipline
Lisbon School Architecture of the Universidade de Lisboa	Fashion Design	1992	No
Higher School of Applied Arts from Polytechnic Institute from Castelo Branco	Fashion and Textile	1999	Sustainability in Fashion
University of Beira Interior	Fashion Design	2000	Sustainable Fashion Design
School of Art and Design	Design with a specialization in Fashion	2004	No
University of Minho	Fashion Design and Marketing	2005	No

Figure 1. Sonia Seixas, Higher Education undergraduate courses in Fashion and Textile Design in Portugal, 2021.

Given this scenario some undergraduate courses in the area under study do not include the specific teaching of sustainability in their study plans, only two integrate them. It does not mean, however, that in the other undergraduate courses these topics are not addressed but will be in an optional vision

through optional subjects or, teachers, whether they address these themes. This panorama leads us to reflect on the need to update the study plans in undergraduate course in Fashion and Textile Design in Portugal in order to integrate the concepts and issues of sustainability as a curricular unit, this being an emerging concern of the 21st century and to which textile and clothing industry has contributed as one of the most polluting industries (Boström & Micheletti, 2016).

7. Discussion

The goal of this study goal was to reflect on the relationship between the design area and academia and its context in a fragile and integrated ecosystem such as the fashion system and its sustainability in a strategy of circular economy and social paradigm shift. Based on the results of this research integrating into the undergraduate courses of Fashion and Textile Design the concepts of sustainability and circular economy will promote a change in the fashion system industry and consequently in the consumer consumption behaviors in a vision of a sustainable planet. Students will also experience a learning opportunity allowing them to act as change agents in understanding the design process and its relations with the complexity of the contemporary world (Fletcher & Grose, 2012; Manzini, 2008; Papanek, 2006 [1972]; UNESCO, 2017). In this sense it seems to be relevant to rearranging the study plans in this field evidencing practices of social, environmental, and economic responsibility, namely in Portuguese reality that which was one of the realities observed in this research.

8. Conclusion

The need to consider circular economy and sustainability in fashion system, academia and consumer behavior is gaining awareness among researchers. This research focused on reflecting on the relationship between design and academia and how the theme of sustainability is dealt with in undergraduate courses in Fashion and Textile Design namely in the Portuguese reality. This research was outlined in Higher Education in Fashion and Textile Design in Portugal due to the importance of this industry in the country, considered one of the most important sectors of the national economy due to the creation of wealth and employment, and in this sense the academy must be aligned with the problems generated by the current fashion system (Direção Geral das Atividades Económicas, 2018).
Through the literature review it was possible to observe that a paradigm shift is emerging towards more conscious consumption in a current and future vision of the planet. A change in consumption patterns is considered imperative, and it is essential to raise awareness of the human being so that he understands that his acts of consumption generate consequences for the future of the planet. It is urgent to reflect on the direction of (un)sustainability generated by today's society, in an environmental, economic, and social vision. Design has a word to say on these issues, the designer must understand and absorb its importance in a greater understanding of design process, considering the issues inherent to sustainability in all phases of the process. Search for solutions to complex problems with more conscious and sustainable decision-making in a collaborative way, including reflective practices in a current and future vision in the relationship with objects and society.

Regarding fashion and textiles products the aesthetic aspect should be considered together with the choice of materials in critical, constructive, and sustainable thinking. Understanding the relationship between producer and consumer, between technology and society, can be a path to sustainability issues, sometimes complex, multifaceted, and unlimited issues. These issues should be addressed in the education system, students should be sensitized and acquire skills on the importance of sustainability and circular economy in the design phase. There must be an interdisciplinary correlation to allow more holistic results, new strategies, and competencies, generating a change of attitude and mentality. The students need to acquire social skills to help them deal with the uncertainty of an unsustainable future. Feel socially and ecologically responsible to be able to translate values and knowledge into more environmentally friendly projects.

The research allowed us to realize that the theme of sustainability in the five undergraduate courses in Fashion and Textile Design in Portugal is still in a very embryonic phase, only two offers integrate it, the University of Beira Interior and School of Applied Arts. This panorama leads us to reflect on the need to update the study plans of undergraduate course in Fashion and Textile Design in Portugal to integrate the concepts and issues of sustainability as a curricular unit, being a concern of the 21st century and to which textile and clothing industry has contributed as one of the most polluting industries. It is also worth reflecting on a strategy of approximation and interconnection between academia and industry to adjust the study plans combining academic teaching with practical experience in an interdisciplinary vision sharing research and innovation.

It is expected that this study will contribute to creating opportunities and conjunctures for the increase of sustainability themes in the field of Fashion and Textile Design, particularly in Higher Education in Portugal.

Acknowledgments

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New Trend Landscapes
Coronavirus' Long-Term Impact on Fashion and Trend Forecasting

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Keywords
Trend Forecasting, Diffusion of Innovation, Coronavirus, Fashion Industry, CMF.

Abstract
Coronavirus' disruption to normalcy shows signs the fashion industry is changing in a way that will disrupt the trend cycle for fashion and consumer products. Production slowed in January 2020 due to supply chain strains, the globe shut down and stay-at-home orders kept fashion weeks from happening. Brands reflected on their previous calendars and extensive multi-season line releases creating a call from industry to slow down the fashion calendar and push towards key shows, focusing on impact over filling the calendar. Additionally, consumer conscious has changed in the course of 2020. Social justice, political activism, and human existence are impacting personal expression in the mass market. Consumers are not focusing on whether their aesthetics are on-trend and instead are ranging from flamboyance to practically. Fashion went digital, rooted in trend expression moving to social media. Combined with the fashion industry's call to slow down, it is expected that there will be long term changes to the trend cycle. This paper begins by investigating decreased production and shifted consumer conscious will lead to a lasting slowed diffusion of innovation curve; then uses methods of aesthetic trend forecasting to dive into the aesthetic consumer foci after of 2021.

1. Background: Coronavirus' Direct Impact on Industry

In January of 2020, the fashion and product industries started to see the impact of the coronavirus. Factories were shutting down or creating shifts for employees that lagged production and product had to be shipped by boats rather than air because of flight restrictions and risk to flight crews. The start of 2020 slowed every major product based industry, but fashion's impact is detrimental to the entire aesthetic trend forecasting industry because of the key role that Fashion Week plays in the trend cycle. (McAlpine, 2020)(McIntosh, 2020). Quickly the pressure of making fashion week happen amidst the beginning of the pandemic shifted to uncertainty about the scale of the virus' impact. Some brands at Milan Fashion Week continued to show their collections like Dolce & Gabbana showing it's 121 look show while Giorgio Armani uninvited its guests the day of their show and shifted to live-streaming its Autumn/Winter 2020 show as a way of protecting those originally invited (*Milan Fashion Week*, 2020) (Barry, 2020). By the time Paris was gearing up, United States based buyers canceled their travel plans to these events. Showrooms didn't have the chance to orchestrate virtual showrooms, meaning all those key Autumn/Winter 2020 looks would never make it to storeroom floors or reach consumer's wardrobes, in addition to the slowed or entirely halted production for vendor precautions (McAlpine, 2020). Many brands are going bankrupt, but this paper focuses on those brands that will last through the pandemic and continue creating content after Covid-19 (Aleksander, 2020).

More importantly, these shows are key influences into a whole cycle of continual trend innovations in every fashion

and product industry. The traditional trend curve operates like the example in Fig. 1, called the diffusion of innovation curve (Raymond, 2010). Innovators create trends which are picked up at fashion shows from designers. Colors, patterns, textures, accessories, footwear, etc. that repeat between multiple designers and connect to consumer behavioral drivers start to be implemented onto smaller brands that influence early adopters 2-3 years down the road. Early adopters circulate these trends through social events and social media, as they begin reaching mass market spaces, where early mass market consumers start to pick up on these trends within a year. Between 6 months and a year, late mass market consumers start to pick up the trend, then another year later, mass market consumers start to pick up the trend and eventually, laggards pick up the trend as it approaches trend death.

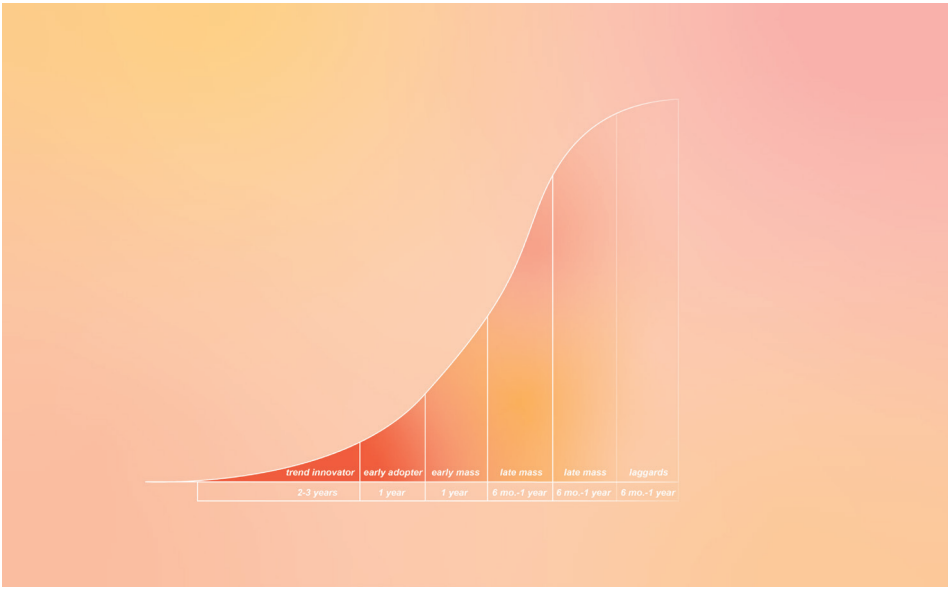

Figure 1. Kellie Walters, visualization of a typical diffusion of innovation (Raymond, 2010), 2020.

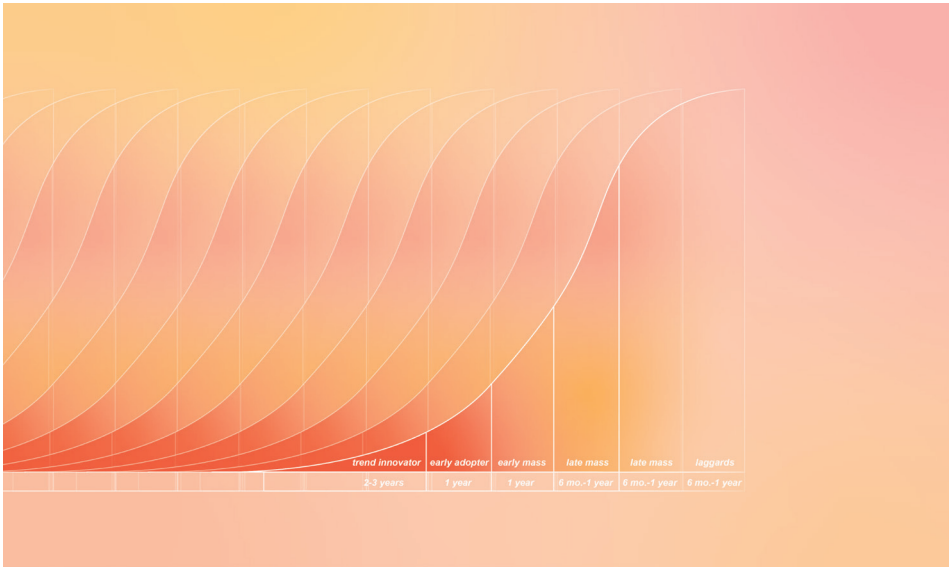

Figure 2. Kellie Walters, visualization of how different trends diffuse over time, 2020.

Typically, these trends overlay on top of each other as in Fig. 2. What has happened as a result of the coronavirus' impact on the diffusion of innovation curve, is that every consumer in this curve is involved in a disruption of the trend cycle. As people have been in lockdown, there are multiple aspects of the trend cycle that have been dramatically disrupted. Not only are fashion weeks canceled so trend innovators are not sharing their new trends with industry, but the influence that street style has on early adopters is not circulating, early mass market consumers are not going out and sharing trends with their friends in social spaces, and the general mass market consumer does not have the pressure to purchase new fashion items due to lockdown and social distancing. The entire dispersion of trends for mass market consumers has been entirely disrupted (see Fig. 3) (Martin, 2020).

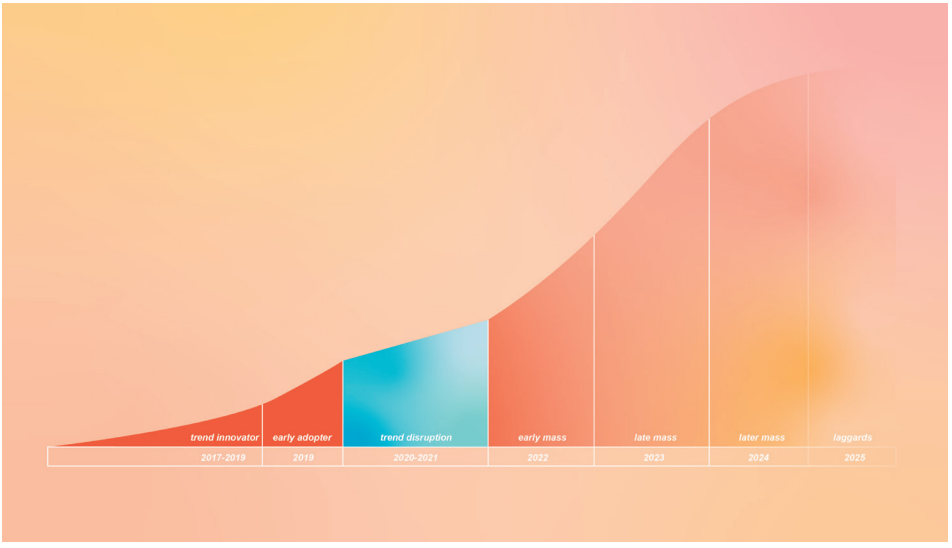

Figure 3. Kellie Walters, visualization of diffusion of innovation disruption due to coronavirus, 2020.

In a singular spectrum, this disrupts trends currently about to reach mass market that don't pick up as much excitement as projected, missing a cycle of new trends circling around early adopters that is amplified by the limited diffusion of trend via social interactions. I expect that this trend disruption will have a ripple effect on the entire industry for 5 years when we look solely at the trend disruption (see Fig.4). This is based on a model where we go back to the previous fashion calendar in the fall of 2021. What puts this into question and hints at a permanently shifted trend cycle, are responses from the fashion industry calling to slow fashion schedules and a shift in consumer conscious. This is amplified by social justice within the fashion industry, focus on sustainable production, and heightened consumer awareness of greenwashing, which together will cause a much more disrupted trend cycle than the projection in Fig. 4 (McKinsey Fashion Scenarios, 2020).

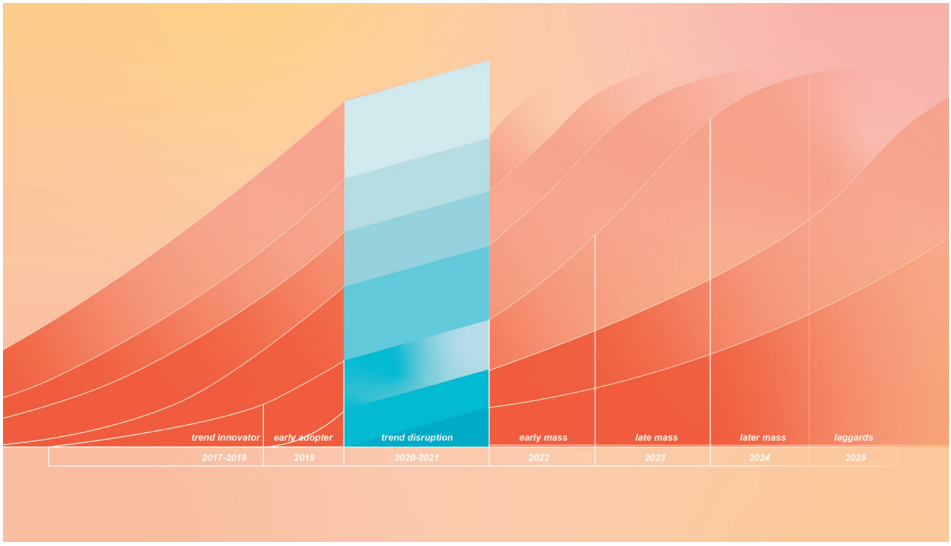

Figure 4. Kellie Walters, visualization of diffusion of innovation disruption across different trend timelines due to coronavirus, 2020.a

2. Signs of a Re-Structured Fashion Industry Post-Pandemic

The fashion industry does not only contribute to a culture of over-consumption and the continual purchasing of clothes, but has its own internal problem of overproducing in the first place, creating overstock in addition to consumer over-consumption. This overproduced volume not only puts even more pressure on the consumer to purchase the overtook, but puts pressure on the buyers to sell the overstocked items to consumers as well. This is also worsened by the relationship between the extensive show calendar mixed with MOQ (minimum order quantity from vendors). Designers are forced to keep up with a high demanding schedule of fashion weeks and increased demand from buyers that lead to constantly producing a wide array of ready-to-wear collections for each buyer at each fashion week. This schedule puts season irrele-

vant and season non-functional clothing onto buyer shelves at times that don't align with consumer season needs (Aleksander, 2020). In order to get those clothes on shelves, designers must submit to their MOQs, even if the sales forecast is less than the MOQ, leading to the root of this extreme overproduction (Vikman, 2019).

In response to the halted show calendars due to coronavirus, the British Fashion Council has put together a call to action along with the Council of Fashion Designers of America, calling designers to a new standard for fashion calendars. This message focuses on specific ways that the industry should re-think the way that collections are shown. The recommendation is to have more strategy in the collections, releases, and decreasing production, focusing on release dates so items reach stores at the time that consumers need them for their respective season.

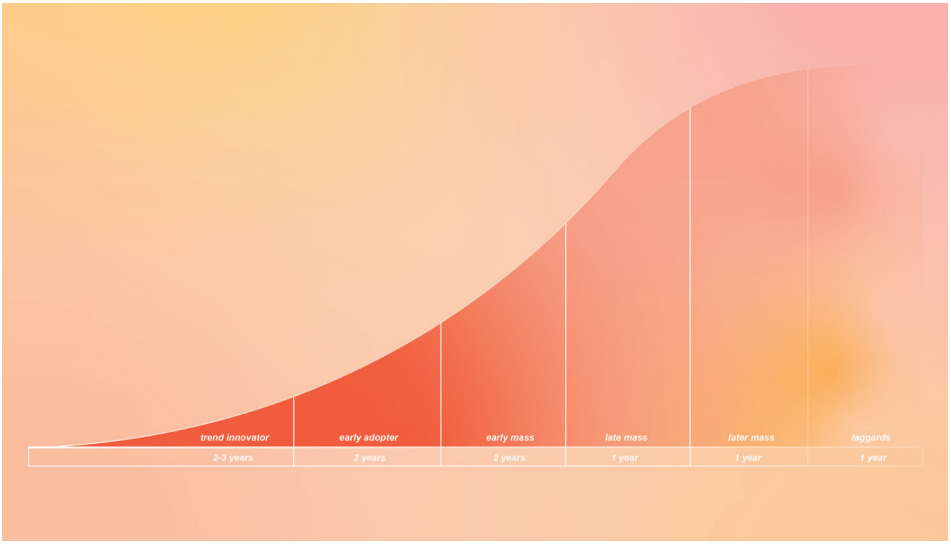

Figure 5. Kellie Walters, new trend landscape after the impact of coronavirus, 2020.

The message calls for no more than 2 main collections shown each year in order to reconnect to fashion's creative roots, to be more intentional and creative in the specific collections that are shown, while also reducing stress and pressure on the designers and their teams. These institutions realize the importance of commercial needs for pre-collections, but they recommend that the industry returns to the being presented only in showrooms. Once the pandemic is at bay, they recommend selecting only one fashion capital for each seasonal collection to reduce strain on journalists and buyers who continuously travel during the current fashion calendar. Overall this call is meant to increase the value of items due to the focus, creativity, and reduction in the amount of goods produced, adding to improved sustainability (Open Letter to the Fashion Industry, 2020) (Fashion Industry's Reset, 2020).

The response from many designers has resonated with this. Alessandro Michele, creative director for Gucci admitted that "we went too far" (McAlpine, 2020). That the fashion's schedule of up to 8 collections a year rather than 2 was pushing the industry to the brink of exhaustion and bankruptcy (Aleksander, 2020). This time to pause has allowed people to speak up about these existential questions that the industry has asked themselves for a long time (McAlpine, 2020). While many brands stick behind the call and are in agreement that the fashion industry was in an incredibly unsustainable place - both in regards to climate and exhaustion - this moment gives the industry time to restructure and re-set their schedules and demand (Amed et al., 2021).

Other brands like Chanel, Dior, and Off-White, disagree with these changes, and would prefer to stick to the previous calendar of pre-established 6-8 shows a year. For these brands, Covid-19 has not provoked a re-structuring of the industry, but prompted a shift in medium to displaying collections virtually in a myriad of creative ways (Briedis, H., Kronschnabl, A., Rodriguez, A., & Ungerman, K., 2020)(Williams, R., 2020) (Amed et al., 2021). Although this means that some brands might want to retain their previous show schedules, the virtual aspect has allowed buyers to commit time to showroom appointments instead of previously driving across cities to attend all the showrooms.

3. Disrupted Diffusion of Innovation

As discussed earlier in this paper, the coronavirus alone throws disruption into the diffusion of innovation curve through the supply chain, but a long term adjusted show schedule will really adjust the diffusion of innovation curve for the long-term. Moreso, there have been significant shifts to consumer conscious that will further reinforce this long-term adjusted diffusion of innovation curve.

3.1. Consumer Conscious Changing

We must first analyze the sociological, political, and economic stressors on consumers over the past year to understand how consumer conscious has changed. In the US, the murder of George Floyd, Ahmaud Arbery, and Breonna Taylor sparked global protests and throughout 2020 and 2021 in response to a myriad of political issues. The US prematurely opened, while Europe opened with restrictions, then went back into lockdown

as the US and Europe faced massive second-waves. At the same time, we had been quarantined and working from home for months with no end in sight. The public is trying to settle with being at home for such long periods of time, figuring out how to work from home with family around, coping with the stressors of a pandemic, and learning how to re-adjust to a new way of living. Consumer conscious is changing at its core. Our experiences have stretched across the entire year, making habits and values shift for consumers fundamentally in regards to the purpose of fashion in their lives, sustainability, and personal expression, showing signs of new influences for consumer drivers in fashion and products, impacting aesthetic trend forecasts (Amed et al., 2021) (Amed et al., 2019).

In addition, the increased time that consumers have spent at home with limited activities lead to a growth of consumer education on the supply chain of the industry paired with increased care for social justice within the industry and consumers are focused more on brands that champion fairness and social justice. This was a trend we were already seeing, but was increased by the pandemic. (Amed et al., 2021). For brands, this must come from a "chang[e] in belief systems and associated business logic" and that there is an "economic value in operating in a more responsible manner (Kansara, V. A., 2021)." This intentional change from brands needs to be genuine and deeply embedded as there is a new greenwashing awareness that didn't used to exist (Kansara, V. A., 2021).

3.2. Consumers Creating Their Own Aesthetics

Consumer home spaces and attire started to reflect stay-at-home changes to our daily lives and were being shared

via social media. This included hacked home office spaces, zoom-friendly work attire that is upgraded for torso-down loungewear, the focus on calming home goods, and being personally inspired for personal expression through fashion and beauty. Hoards of people started creating their own aesthetics that rejected trends in fashion and beauty while being documented in a way that deviated from typical ways of sharing beauty and fashion, creating an impact of a mass shift away from key CMF trends (Martin, 2020).

Most importantly, there is trend rejection occurring all the way from the most trend influential early adopters like Bella Hadid and Kendall Jenner, down through indie media, and to friends and neighbors. Fellow trend forecasters in industry are not waiting to see the new Virgil Abloh release, St. Lauren's next politically charged show, or what Kendall Jenner's street style at Milan Fashion Week is. Instead, the focus is on observing how consumers are deviating from aesthetic trends we were originally tracking due to social, political, and economic pressures that are shifting consumer expression which are all being communicated and diffused via social media and digital means. In result, brands will be "applying smarter approaches to assortment, aiming to reduce complexity and realign collection drops with clear consumer opportunities (Amed et al., 2021)."

Although Fashion Weeks and other shows have been online, they have not circulated as much outside of the fashion industry or on the fringes into product trend forecasting. Key trend innovators and early adopters are not out sharing trends

socially and digital channels become the key most important channels for brands to engage with consumers (Amed et al., 2021). If we combine a future shifted show calendar, digital showcases, decreased production in the industry, combined with fundamentally restructured consumer values, then we start to see that the trend curve will be adjusted not only by the initial slip of the supply chain strain in industry, but slow the diffusion of aesthetic trends, resetting the whole trend curve. The previous curve will be lengthened and stretched out, creating a 9 year trend cycle opposed to the previous 6 year trend cycle. It is expected that trends will circulate will no longer be a wide array of short-term fashions, but instead be fewer cohesive, cross-industry, long-term circulation of aesthetics similar to the trend cycles we saw through the 1960's-1980's.

4. Consumer Driven Aesthetics

The remaining section of this paper uses ethnography partnered with industry aesthetic trend forecasting methods to divulge the resulting aesthetics emerging from the pandemic that are coming from consumers and influencing trend forecasters in industry. Not only does a new consumer conscious lead to a future disrupted trend curve, but leads to an additional impact in the shift of consumer-driven aesthetics. Posts on social media by consumers and Depop creators are sharing looks that deviate from current aesthetic trends that are circulating among young audiences and early adopters in particular. There are aesthetic shifts into 3 areas of fashion and beauty explored below:

4.1. Comfort Reversions

Comfort Reversions is tied to zoom-friendly attire and environments while working from home and social distancing. Without the need to get fully dressed and ready for work, staying in on the weekends rather than getting dressed and ready to go out, and increased focus on home improvement, are the core elements this trend that doesn't care about outside opinion (Martin, 2020) (Marx, 2020). It is all about function over fashion, embracing the realities of the pandemic and kicking it at home with a Nintendo Switch and Netflix binging. Products with soft surfacing, overtly comforting forms, with warm color palettes and soft materials are key responses to this trend. Fashion trends mean little to nothing as function and weather responsive outfits are key along with neutral colors and core comfortable basics. Cotton T-shirts, tank tops, jersey shorts, leggings, biker shorts, sports bras, jersey headbands, crew socks, and functional footwear are in focus. Beauty is nearly non-existent as an outward expression, but skincare is important. At-home facials, face masks, and skincare routines are a formative part of this "rest it out at home" mindset behind this trend. General wellness is tied to this, making aromatherapy, yoga, meditation and their subsequent trending products and interior design aesthetics a primary focus. Products are functional, but must also communicate aesthetics of calm, comfort, and warmth (see Fig. 6).

4.2. Protective Nature

Elements of Protective Nature were already starting to trend in streetwear fashion, but have longer and larger impacts after the murder of George Floyd and political protests in Hong Kong have ignited this trend based on protesting safely.

Figure 6. Kellie Walters, collection of aesthetic consumer expression of the Comfort Reversions trend direction, 2020.

Met with overt police force, tear gas, arrest, all in high heat lead to fashion trends and sharing of tips on how to protest as safe as possible. These ideas are partnered with concentration on social justice within the fashion supply chain as 66% of consumers said they would stop or significantly reduce shopping at a brand if they found it was not treating its employees or suppliers' employees fairly. It is expected as consumers have an increased greenwashing awareness, purchased from justice centered brands, and further educated themselves on brands' supply chains that this consumer's focus increasingly attends on utility and carefully researched items for their wardrobes. Further, consumers will be buying less based on the focus on purpose driven purchases in result of a focus on sustainability (Amed et al., 2021). Handkerchiefs, basic un-identifiable masks, arm bands, belts, strapped bags, and overall utilitarian aesthetics became key.

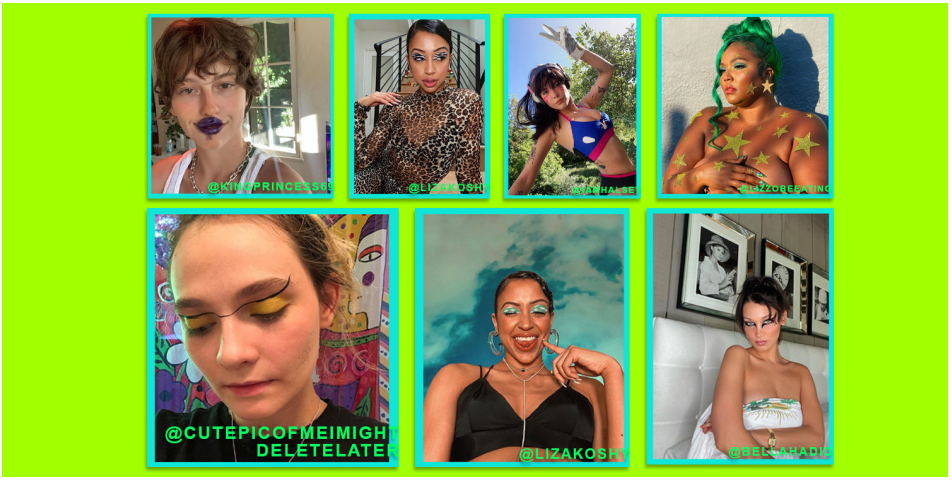

Figure 7. Kellie Walters, collection of aesthetic consumer expression of the Expressive Coping trend direction, 2020.

These fashions have a neutral, nature based color palette, but are paired with extremely bright colors like we typically see when political expression leads to vibrant color expression. In the long term, over-use of pockets, zippers, and buckles will be used. Mixed oversized and extremely well fitting clothing are paired together. In product design, overtly utilitarian forms with knurled or ribbed textures with emphasis on screws and closures are important. Heavy, utility-based, functional aesthetics are a key outcome of this trend (see Fig. 7).

4.3. Expressive Coping

Expressive Coping represents consumers that have been riddled by boredom and turn this time into at-home campy versions of coping. Many have started getting dressed in costumes or doing weekend beauty looks with ultra expression.

These trends are individualized from person to person and reject both traditional tropes of beauty and current upcoming looks (Martin, 2020). This is partnered with consumers' social justice focus explained in the previous section rooted in purchasing from conscious supply chains increases a focus in shopping local and the rise of independent creators (Amed et al., 2021). Bright colors are central to this trend, but applied in light and airy fashion. Personal use of these trends varies from person to person. Some use glitter, apply gemstones to their faces, create scenery on their face, use metallics, and paired accessories very for each individual expression. Outfits also range based on personal expression. There is no key silhouette, pattern, or color palette to this trend since it is purely catered to each individual. Recent trends in patchwork created as a commentary on up-cycled fashion business models are also seen in higher numbers as consumers express themselves and kill time by up-cycling their fashions as well.

Figure 8. Kellie Walters, collection of aesthetic consumer expression of the Protective Nature trend direction, 2020s.

Brands amplify this trend as they are exploring circular economies and up-cycling their own offerings (Amed et al., 2021). Products that play with transparency, iridescence, decorative composites, metallic flops and vibrant color blocked pairings are responses to this trend (see Fig. 8).

5. Conclusion: the Future of Trend Forecasting

The corona virus pandemic has halted the fashion industry calendar and will lead to a pause and disruption to trend cycles in the short term. This is combined with Covid-19 halting our worlds, inspiring influencers and mass market consumers to create new aesthetics and new rituals surrounding fashion and beauty, showing the beginning of an adjusted trend diffusion going forward. Consumer conscious is changing to more interest in social, political, and climate focused issues, impacting the fast-paced fashion industry. This shift in consumer conscious maintains the expected shifted trend curve after the pandemic. Shifted consumer conscious and consumer driven aesthetics derive out of the major societal shifts of the coronavirus pandemic have lead to 3 key aesthetic categories between utilitarian function and extreme expression. Only time will tell how exactly trends continue to unfold and how the future of trend forecasting will adjust in the long term.

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Metamorphic Fashion Design
Nature Inspires New Paths for Fashion Communication

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Metamorphosis, Natural Inspiration, New Fashion Communication Paths, 3d Fashion, Bionic Models.

Abstract
The Covid-19 pandemic has brought to a sudden halt most of the human social, economic and productive dynamics, causing, on the other hand, a rapid acceleration towards digital transformation in order to overcome the limits of physical presence.
In this transformative context is inserted the contribution that aims to describe an experience of applied research to explore new possible models of communication for the fashion system in the digital world. Through the current climate of transformation, the project *Metamorphic Fashion Design* was born, which intends to reflect on the possible responses of the fashion industry in this new phase. *Metamorphic Fashion Design* is a new experiential multiverse in which new relationships have been formed between different disciplines such as Character Design, Game Design, Fashion Design, Interior Design, Performance Art and Sound Design. This project experience has opened to new reflections and new critical insights on how the digital properly declined can consolidate, more and more, as a means of new innovative trajectories throughout the fashion system. The project aims to propose a new form of communication for the excellence of fashion with the possibility of extending this experimentation to the made in Italy system.

1. Over the Fast Model

The Covid-19 pandemic has placed humanity in a condition of generalized uncertainty, sweeping away any balance, and has strongly questioned the sustainability of our production and distribution systems. With a decisive acceleration towards digital, everything seems destined to change, even the modes of communication. The fashion system, due to its volatile and discretionary nature, has been particularly vulnerable to the pandemic crisis, as "the average market capitalization of apparel, fashion and luxury players dropped almost 40% between the start of January and March 24, 2020" (McKinsey, 2020). Indeed, the health emergency has highlighted the transformational urgency for the fashion system, in fact accelerating the acceptance and transition operations towards digital transformation and sustainability, understood as the paradigms of the future. However, this is not a sudden revolution:the entire fashion system has undergone intense changes in recent decades, due to the now consolidated unsustainability of increasingly rapid supply chain and value generation models (e.g. Fast Fashion, see-now-buy-now strategies) (Joy et al., 2012, Fletcher & Grose, 2012, McNeill & Moore, 2015). Nowadays, in times of health, economic and humanitarian emergency, the ultra-fast production and consumption seem to have proven its unsustainability at different levels that require systemic and no longer punctiform interventions.
The model that involves the project, production, sale and consumer behaviour concerns the "life span" of fashion products, which appears to be increasingly reduced not only for the obsolescence programmed by industry, but for the cultural model on which it is based.

Covid-19 is challenging the Fashion system, demonstrating the unsustainability of the globalized supply chain. Thus, the fashion system needs to explore new communication models in the impossibility of presence. If the social distancing does not allow to communicate the collections as before, with fashion shows, events and trade fairs, how can fashion respond and reinvent itself through new channels? The pandemic has offered the opportunity of a reset and a complete redesign of the industry value chain (McKinsey, 2020), as well as communication and presentation models. The project *Metamorphic Fashion Design* aims to capture the transformative need and thus reflect, through the project, on the possible responses of the fashion industry to a recovery that requires a redesign rather than a simple restart. Hence, the project aims to explore new techniques and communication models for the excellence of fashion, with the possibility of extending this experimentation to the entire made in Italy system. On the one hand, the awareness and sensitivity of people involved in sustainability have increased to a "take-make-remake" model (Rinaldi, 2020). On the other, brands have shown a strong will to drastically change what is possible to define as a "worn-out and frenetic practice". This shift in the fashion system involves production rhythms, but most of all, the structural dynamics of communication and event organization. Seasonality could, therefore, no longer be an element to search for in an unsteady way. Still, the opportunity to slow down the whole process from the design phase with durable garments, both in the meanings conveyed and in the materials of which they are made. This new perspective of the fashion system turns attention to an idea of sustainability "concrete and tangible", which thanks to digital technologies

can find a further and predominant winning aspect: the communication of fashion through digital. The opportunity is in the involvement of design methodologies as Game design: within these new paradigms digital and fashion hybridize as the first result of a "new habitat" that we have been looking at for too long on the horizon. Moreover, in the digital realm, games are recognised as narrative architectures related to experience design for their capacity to shape actions, emotions and thoughts (Jenkins, 2004). Therefore, game-like products and services become valuable solutions to enrich participation and customer engagement (Huotari & Hamari, 2017, Wolf; Wünderlich et al., 2020). The use of Game Design techniques and practices defines both an explorative nature in the design of communication and a very fast prototyping and testing capacity, thus connecting various areas of design, cinematography and visual arts in general, promoting a transdisciplinary approach to learning and design.

The new opportunity that the transmediality of new digital technologies offers for the genesis of creative processes opens us to new horizons in which digital natives are able to orient themselves thanks to their ability "to exist, rather than to resist, through their own manifestations" (Cuzzocrea & Benasso, 2020). Consequently, this new awareness is accompanied by the approach to the problems that the fashion system has been highlighting for some time now, related to fast fashion and therefore to the modification, understanding and dissemination of a fashion communication sewn on the global consciousness of the Z generation. The same methodologies with different practices and techniques are then used in oth-

er industrial sectors and not, with which they share the same consequences, but also the same noble objectives. In this regard, Giuseppe Sabella (2020) expresses himself with these terms:

> The pandemic today has led us to review the relationship between man and nature and, with it, to rebuild our habitat [...]. The industry [...] is already on horizons that have broken with the old paradigm, and there is no doubt that this incident in history will accelerate the transition to the new.

2. Fashion Democracy e Game Design

As mentioned before, in the pre-covid it was possible to notice a growing awareness of consumers towards sustainability issues, which consequently reflected and influenced the very responsibility of brands and their communication policies. However, it is interesting to highlight how the attempts and experiences inherent to the "cleaning" of the fashion system have not been sufficient to support a significant paradigm shift. Probably, the structural characteristics of the globalized fashion system have amplified the distance between individual initiatives, confining the experiences of an ethical and sustainable fashion to the "good practices" dimension, and not of systemic change, demonstrating difficulties in disseminating and disseminating progress (Destination Zero Report, 2018). During the crisis caused by the spread of the virus globally, the entire fashion system has suffered a severe recession as highlighted by the International Monetary Fund: "2020 is probably the worst year for the global economy since the Great Depression" (Martínez-Pardi, Seara, Razvi

& Kibbey, 2020). However, we still need radical changes at every level of the fashion industry with a broader shared, and strategic vision on sustainability issues understood as environmental, social and economic sustainability. In this climate of transformation was born the project *Metamorphic Fashion* in which, within the *Fashion Democracy* seminar of the CDLM in Fashion System Design we tried to describe through experimentation a new model for the presentation of fashion collections during and after the pandemic. The project is a unique experience to face the changing conditions of the fashion system, with sustainability awareness related to the entire production process, also sharing a new idea of communication for fashion through the use of tools belonging to the world of Game Design. An interesting example of the fusion between Game Design techniques, fashion and new digital technologies is the one that Nicolas Ghesquière designed as artistic director of Louis Vuitton (Fig. 1). The *skins* designed by Ghesquière are real digital looks that during the League of Legends world final in 2019 revealed the real potential of the fashion-videogames union. The same operation, from the event organization perspective, was proposed by Travis Scott with his live concert on Fortnite video game (April 25th, 2020) (Fig. 1). Thanks to digital platforms such as Twitch and YouTube, these experiences revealed the new balance that digital is redesigning, coming to "host 12 million spectators" (Dondoni, 2020). While in the collaborations between fashion and videogames can bring the risk to downplay Brand Awareness, those experiences, events and performances are setting new horizons of expression for designers and consumers.

Figure 1. Metamorphic Fashion, fashion and videogames.

Animal Crossing Fashion Show (Fig. 1) is another case to the point, where the perfect match between fashion and the digital event is achieved in an in-game collective show. The final synthesis of the Show is a video in which the models are video game avatars that animate the catwalk with the Spring Summer 2020 looks of Craig Green, Bottega Veneta and Chanel, among others. Valentino, Marc Jacobs and Gcds, for example, have recreated the outfits of the spring-summer 2020 and pre-fall 2021 collections in a gaming format.

The synergistic union of brands and products also belonging to distant categories and *worlds* is an experience that fashion has repeatedly promoted and experimented, leveraging on communication and visualization aspects of products often strongly avant-garde. This hybridization between Game design and fashion transforms, therefore, from a simple marketing strategy for the acquisition of new market segments to a complex social and emotional experience. Whatever the intensity of this connection is, in any case, an advantage in terms of sustainability is assured. In particular, on the one hand, Virtual Shows allow a considerable reduction of environmental costs related to the communication sphere of fashion, on the other designing a digital fashion allows investing in creativity without worrying about the life cycle of the product (Fig. 2).

Figure 2. Metamorphic Fashion, digital fashion show.

3. Metamorphic Fashion Design

3.1. Aims and scopes

Metamorphic Fashion Design was born during the most challenging time of the pandemic and is inspired by the very concept of natural metamorphosis to reflect its dynamics and mechanisms in the design of clothes. The initial project brief included the design of a collection of no-size and no-gender garments, to be prototyped and exhibited in an event organized at the end of the seminar. The themes inspired by the metamorphosis of nature, and distributed among the seven working groups are: collaboration, stratification, camouflage, rebirth, balance, connection and protection. In fact, the beginning of the design brief only included the design of clothes inspired by the theme of metamorphosis, as the weeks went by the teams of students together with professors evaluated new dynamics for the final restitution of the results, considering the speed of the digital revolution caused by the pandemic. It is useful to underline that Character Design has many points in common with Fashion Design: both dedicated to the construction of images and we must also consider that wearing a dress is not so far from wearing an avatar.
The latter is chosen based on functional characteristics, but even more for psychological processes of impersonation. Therefore, it is possible to argue that the avatar relates to the dress as the video game relates to the fashion show. Scenography and scenery justify and exalt the aesthetics of the protagonist, the music and the change of rhythm tell different segments of the same story, the choice of a neutral model highlights the costume.

Moreover, with the spread of the pandemic, with the strengthening of digital channels, a new connotation *of Metamorphic Fashion Design* has emerged spontaneously, from a design seminar into a collaborative digital event, also connecting the world of education to that of public institutions. Thus, the final goal was the realization of a video concluding the experience of designing metamorphic garments and then contextualizing the digital fashion show in celebratory habitats of the event itself. Initially, teams created a document inspired by the *Game Design Document* (GDD) that includes a set of descriptive works functional to the exploration of the themes of a video game. In this case, it specifies and synthesizes the individual scenes of the multimedia work. Precisely, for drafting this document, teams analyzed cards and interviews of Character Designer and 3D Artist which describes the process of creating and identifying a character. The GDD (Fig. 4) tries to summarize the elements of the premises: avatar, costumes and variations, setting, movements and features of the character, sounds and storyboard in which to assemble the components.

3.2. The Design Process

The design phase starts with the modelling of the avatars on Blender. This open-source software offers tools for 3D sculpture with which it is possible to model complex organic shapes. Each one of the seven avatars matches the theme of the respective collection, as examples: collaboration-bee, camouflage-grasshopper, and so on (Fig. 3). The *vital breath* with which the avatars come to life is called *Rigging* and coincides with associating a body with the skeleton with which it moves.

Figure 3. Metamorphic Fashion, gang design.

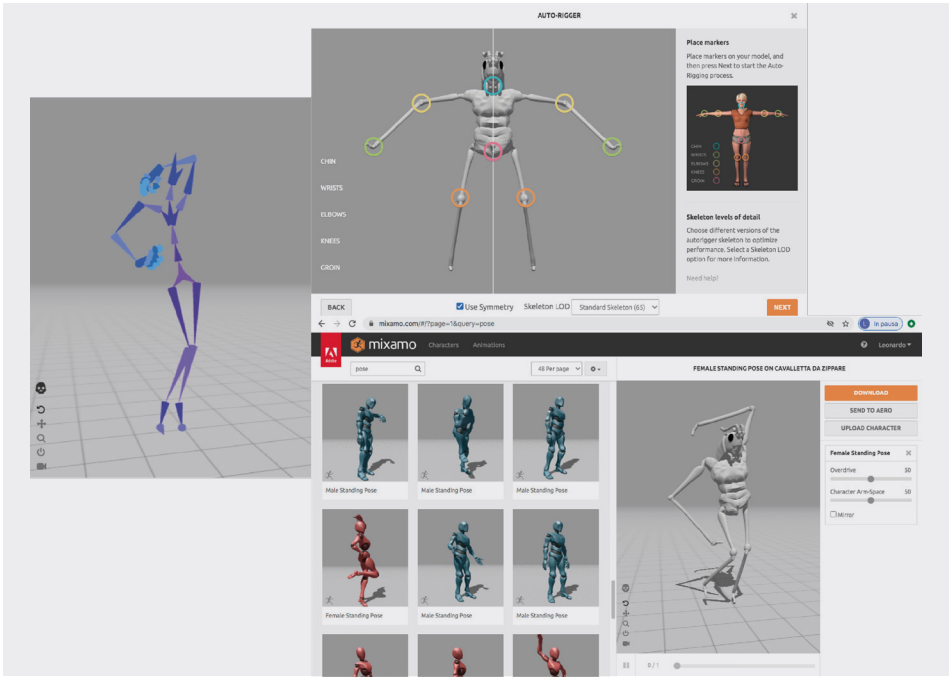
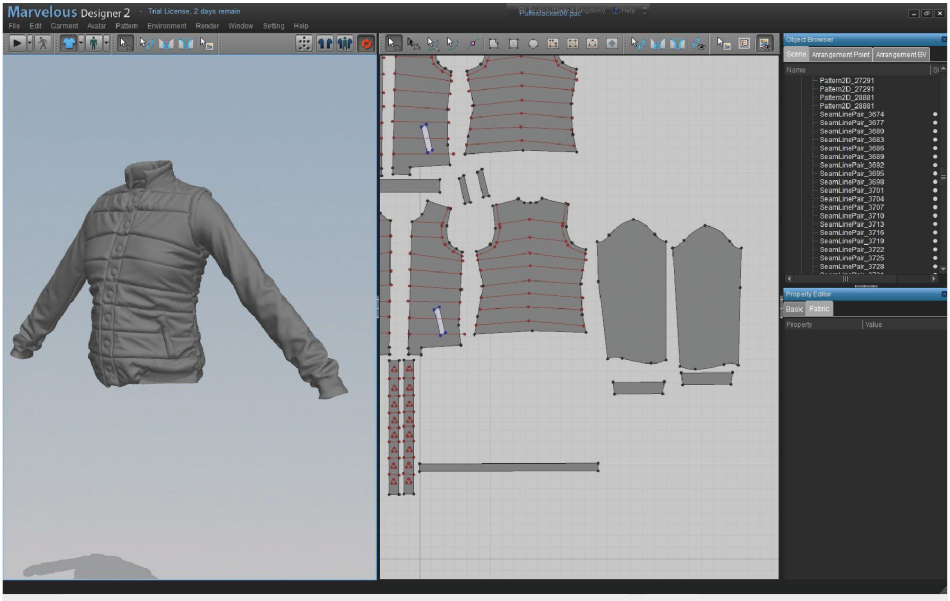


Figure 4. Metamorphic Fashion, mixiamo.



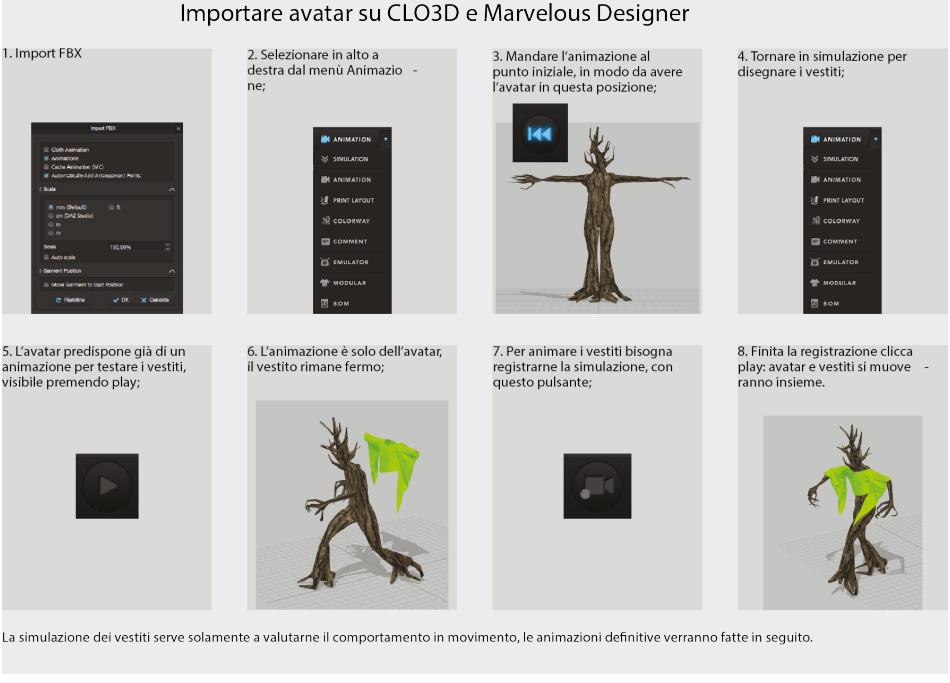


Figure 5. Metamorphic Fashion, CLO3D and Marvelous design.

This operation is obtained with Adobe Mixamo, a software that allows *Rigging* the avatars through the identification of the main articulations (Fig. 4). Mixamo, however, enables to download only single animations of a specific duration, the assembly of individual movements takes place on Blender. Each skeletal joint corresponds to a string of values that record its position at each frame. Through the manipulation of these strings, it is possible to obtain more elaborate and prolonged movements. The working groups have realized the clothes on CLO 3D and Marvelous Designer software (Fig. 5). This phase ends with the simulation of the dress concerning gravity and fabrics features (Fig. 6). B-Union is inspired by the bamboo modules and the collaboration between the parties; Risky Beauty whose fascinating clothes offer protection to the wearer; Pleets Wave in which the pleating connects with the rocky waves of Arizona; Rebirth in which there is the sartorial reworking of animals like the jellyfish.

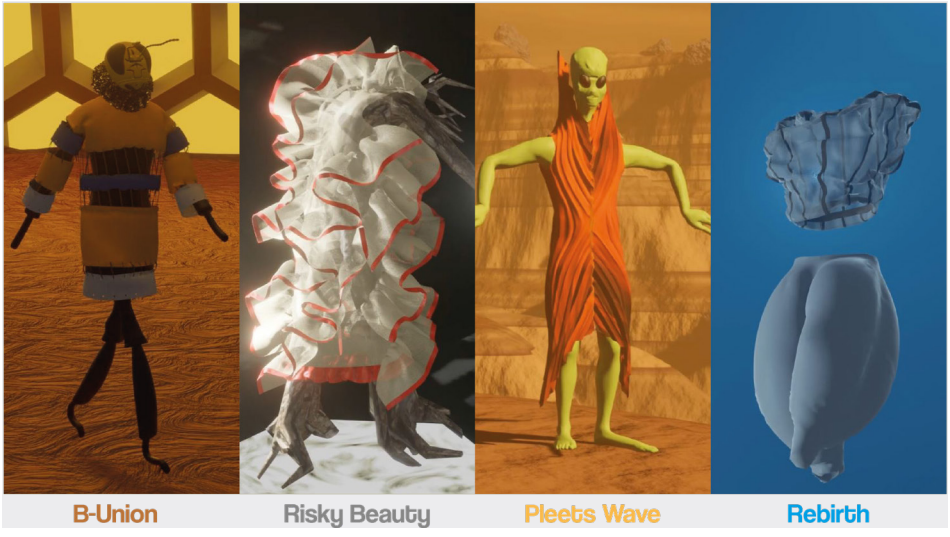


Figure 6. Metamorphic Fashion, clothes.

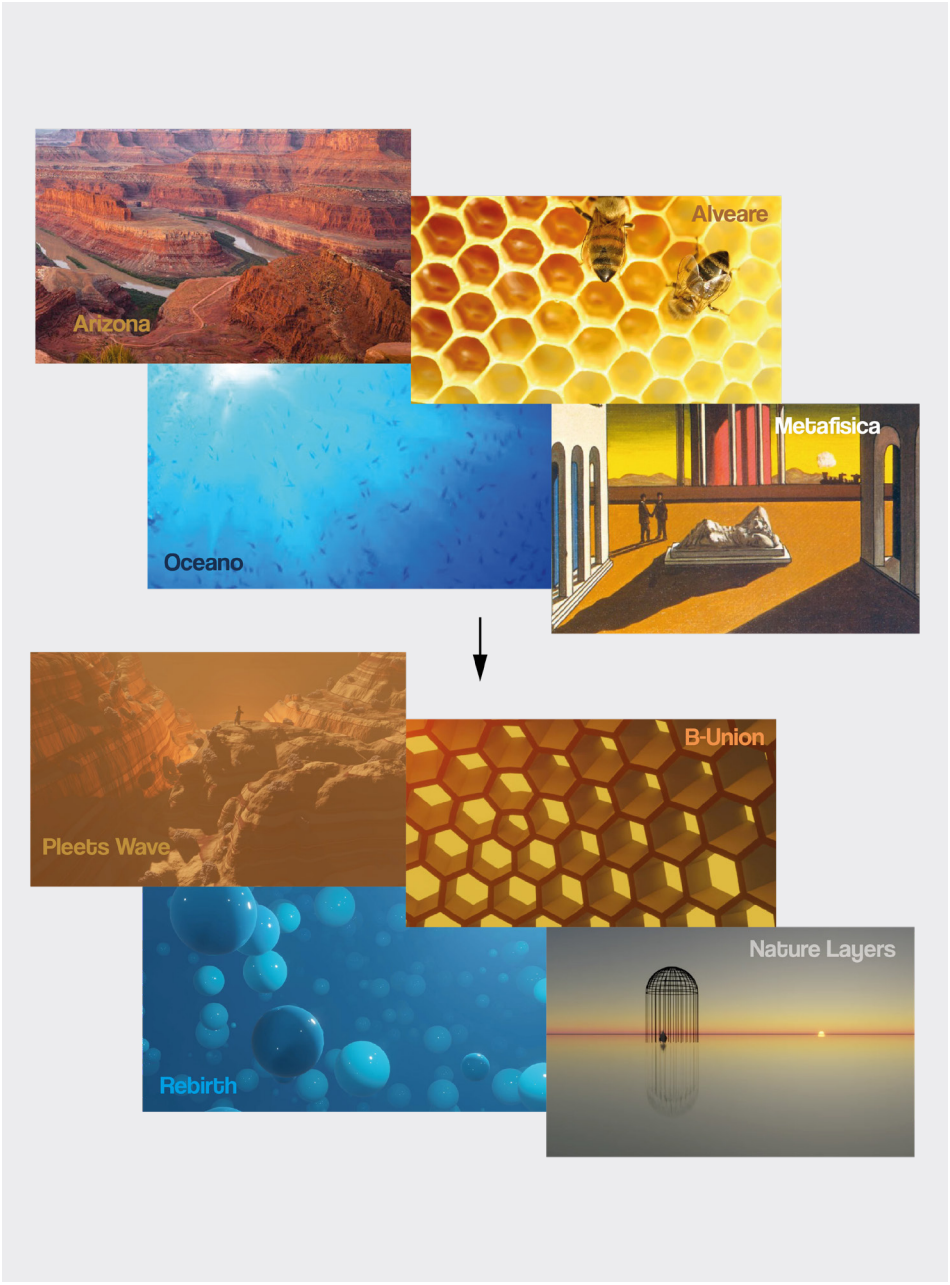


Figure 7. Metamorphic Fashion, environments.

The next step was to contextualize the collections. In the GDD teams described with text and images the place and the atmosphere. The inspirations are postcards of an itinerant journey, from Arizona to a beehive, from the abysses to De Chirico's paintings. These inspirations have been re-elaborated to realize nine scenarios, within which the performances would have taken place (Fig. 7). The variety of settings testifies the richness of this project, but it was necessary to have a context, the framework that would unite all the collections.

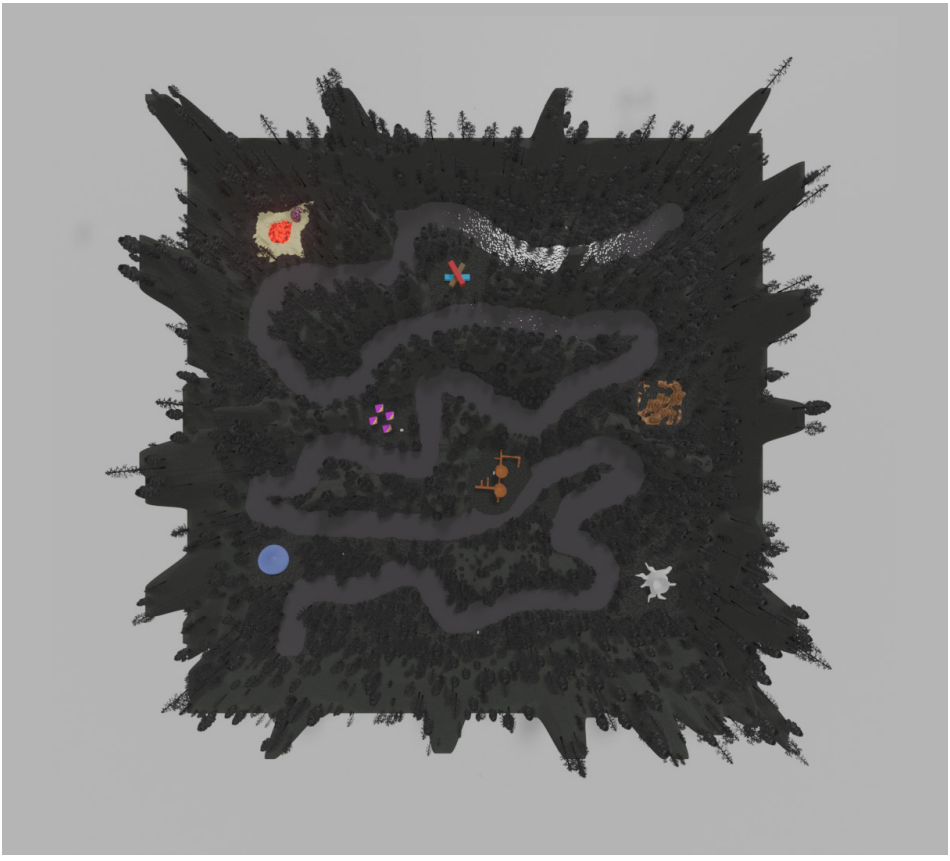


Figure 8. Metamorphic Fashion, forest.

Then we drew inspiration from Alberto Savinio's painting *Nella foresta* (In the forest) in which the vegetation in greyscale houses colourful sculptural architecture. A contrast of shapes and colours is also present in *Artesella*, a natural park in Borgo Valsugana that hosts open-air works of art. Our virtual forest measures 1 square kilometer and is fully 3D designed (Fig. 8). The winding of the river guides us to the discovery of this forest and the structures that dot it. The structures, externally, do not always correspond to what is inside, maybe entering a cube as high as we could find ourselves in an infinite metaphysical plane (Fig. 9). A digital artifice that on one side amplifies the surreal taste of the forest, on the other side has allowed us to record the single scenes in different files. The Game design methodologies used in this experience detach themselves from the classic playful principles, to "venture" towards a new form of "Digital Game" in which responsibility and social consciousness are directly proportional to the complexity of virtual reality. As Alessandro Baricco (2018) argues, we are in a condition in which "the elevation of the game to the founding scheme of an entire civilization" predisposes not only new forms of "augmented ethics" (Morace, 2020) but a real new fabric of relationships in which to express and communicate through fashion becomes a social act. The result of the *Metamorphic Fashion Design* project was a 3D animated video that uses the same language of video games: even though we didn't deal with interactivity, we created an imaginary world in which to tell stories of Italian creativity. With adequate time and resources, it will be possible in the future to go even deeper into Game Design, combining the expressive capacity of digital with the immersion of the In-Game experience.

Figure 9. Metamorphic Fashion, structures.

3.3. A Blended Future

The *Learning by Doing* approach to Game Design, a discipline extraneous to the dynamics of CDLM in Fashion System Design, deals with the creation of immersive digital systems, video games, in which to live experiences of various kinds.[1] Multidisciplinarity was the first benefit of this project as it touched disciplines such as Interior Design, Character Design, Fashion Design, Direction, Performance Art and more. Each of these areas was studied in depth for the communication of the same theme, a synaesthetic system in which different elements collaborate harmoniously to express the same message. The second strong point is the ability of the digital to create something that is not real and make it usable: the abstraction necessary to design new worlds is the same used in the artistic process. It is no coincidence that some video games are inspired by surrealist or abstract works. However, we should not make the mistake of thinking that everything is possible in digital: the realization and the rendering must be subject to constraints far from impalpable. The digital tools have high costs, and the skills in the use of the software are acquired in time as for any other instrument. On the other hand, technology allows reaching adequate levels of creative expression. In particular, with the means available to students, it was possible to give life to a performance that in reality, would not have been feasible (Fig. 10). Thus, it is crucial to address that designers usually take into account the feasibility of a project to the detriment of creativity. Still, if the rules in digital are less strict, and the product is designed

1 https://progameguides.com/fortnite-cosmetic/twistie/.

Figure 10. Metamorphic Fashion, character design.

for the virtual environment, then the designer can find creativity opposed by industrial dynamics. A dress designed to be worn in-game, for example, should not necessarily respond to the size and fit system of our world. In the same way, the psychological levers that influence the gamer in the choice of the character and the style that represents him, do not respond to the stereotypical trends we know in everyday life. The brands that want to interface with videogames will have to find a way to connect real and virtual through the transmission of a unique message, which is manifested aesthetically in a suitable way to the different languages. Thus, in the future designers can design fantasy avatars, moving from the fashion to the transformation of bodies. The hope is that the environmental impact of the fashion industry can decrease and creativity becomes, where possible, sustainable digital information.

In this sense, the perspectives that experiences like *Metamorphic Fashion* describe, detach themselves from a *consumed* vision of sustainability to arrive in a more participatory circular and systemic vision. We are aware that environmental or sustainability brands and declarations allow companies to highlight the impact and quality of products, increasing the company's reputation and making it easier for consumers to make informed and ethical purchasing choices (Fabietti, 2015). However, these brands and statements must be credible, clearly understandable and must correspond to a real benefit for the environment or progress towards sustainability. We understand, therefore, that the increase in digital channels and technologies that the pandemic has caused will only succeed in conveying an idea of sustainable fashion if communication follows the same qualities as environmental statements, i.e. it is credible, clearly understandable and accessible.

4. Metamorphosis and Made in Italy

Sustainability is today an immanent value to the whole design process: from the conception to the realization it is necessary to foresee the destination of each element produced. If already in 1970 Tomás Maldonado in his essay, *Design Hope: environment and Society*, condemned "waste in any of its forms" (Maldonado, 1970), today we are no longer faced with a scarce collective awareness, which therefore requires induction of sensitivity on the issues of sustainability, but we direct ourselves through concrete tests and social actions, as in the experience of *Metamorphic Fashion*, towards the continuous and rapid verification of values now inherent in all people. The digital tools offer the possibility to dematerialize

the value while preserving the ability to transmit messages. Its reproducibility as multimedia content, moreover, allows it to be enjoyed anytime and anywhere: there is no warehouse, no transport and no waste. Considering the environmental and energetic impact of fashion shows, designed to exist only once, it is immediately evident that the conditions of the past can no longer exist. Events such as the presentation of the Chanel 2010 autumn/winter collection,[2] in which 265 tons of ice and snow were transported from Scandinavia, are no longer conceivable today. In the face of a further "iceberg effect" that in recent years has highlighted only individual sections of sustainability in fashion. The interdisciplinarity at the base of the *Metamorphic Fashion* design project has been discussed; it is now necessary to analyze its versatility as a tool. In particular, *Made in Italy* has found in the past in the cinema a valid ally for the communication of its identity, can discover nowadays in gaming a language with which to intercept future consumers. We have seen how the contextualization of the garments worn by avatars in the scenarios has amplified the communication of the collections. This systemic convergence can frame other types of products. The Italian design culture, full of meaning and history, flavours and charm, needs an appropriate communication that is "in step with the times". *Metamorphic Fashion* describes a process of dematerialization not too far from the essence that identifies the Made in Italy: the transversal taste that permeates the know-how of the boot and the atmosphere that you breathe in the Italian lifestyle, are intangible values that translate into

2 https://www.vogue.com/fashion-shows/fall-2010-ready-to-wear/chanel.

economic and operational possibilities. In the same way, the creation of multimedia content based on the logic of gaming, suitable for communicating the universe of values we have, can give life to new markets and trigger new social dynamics. It is strategic today to sow to reap the fruits when, in about ten years, the Gen Z grown online will be able to evaluate a product without having to touch it. When the protagonist of a video game has more followers than an influencer and digital will be even more credible than it is today, those companies that will have invested in media languages and the new virtual market will have a competitive advantage.[3] A strategy not to be understood as a replacement of the dynamics in action, but in parallel: the artisan and industrial competence will still be a guarantee of the greatness of man, as well as the physicality of relationships will still be unique and unrepeatable, but the communicative and emotional sphere of creativity will find in digital a palette of a thousand colors and new business opportunities will be generated. The breaking down of geographical and social borders through the digital democratization of fashion will have positive repercussions on the founding values of society. In the perspectives just described the supply chains will become permeable and will facilitate the osmosis of knowledge, through *sensitive* and conscious connections. A new horizon that replaces that of *fast fashion* is prospected. The *porosity* of the supply chains will allow new paths and new relationships between the actors synergistically involved in this new paradigm that we can define as the *porosity* of the supply chains: *Metamorphosis of Fashion*. In this scenario, we

3 https://www.lvmh.it/notizie-documenti/notizie/series-4-la-nuova-campagna-pubblicitaria-di-louis-vuitton/.

have economic, social and environmental sustainability in every production level. The *Metamorphosis Fashion* proposes a proactive and strategic way to the most critical aspects of sustainability and systemic innovation in fashion. Thus, the environmental sustainability component, and the traceability of fashion design processes are combined synergistically with the social and cultural component that digital has helped to transform during Covid-19.

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Fashion and Work Organizational Ecosystem
Prospects and Post-COVID-19 Scenarios

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Keywords
Fashion, Work, Organizational Ecosystem, Organizational Sustainability, Scenarios.

Abstract
Design is the basis of organizations' innovation and sustainability process and an indispensable re-source for meeting short-term sustainability goals and transforming the long-term economic model.
However, it is known that the current configuration of the organizational work ecosystem in the Fash-ion sector has been marked by a panorama of sanitary, social and economic instability. That said, the objective of this paper is to map the organizational ecosystem of work in the Fashion sector from a systemic perspective between the individual, organization, work environment, products, tasks, and tools in a post-COVID-19 scenario and of profound technological changes.
Thus, it is essential to re-think corporate culture and organizational ecosystems through new models of collaboration and inno-vation between partners. The relevance of this study for the Design area is in determining strategies for stakeholders in the present, from the projection of future work scenarios in Italian fashion companies, as vectors of development and a balance factor in the relationships between people, objects, and the environment. The research approach was systemic-constructivist, and the methodological design included Grounded Theory and Triangulation.

1. Introduction

Epidemics and economic crises have disproportionate consequences in certain countries or specific segments of the population, triggering an increase in social, economic, gender, educational, or legal inequalities. In Italy, the pandemic is having a profound impact on the labor market, in addition to the imminent concerns about the health of workers and their families. All Italian companies in the fashion sector, regardless of their size, face serious difficulties, with the real risk of a significant drop in revenues, an increase in insolvencies, and the consequent loss of jobs. As a result, the world of work is affected by the resulting economic shock from this health and social crisis, especially in three main dimensions (ILO, 2020): (1) The number of jobs, both concerning unemployment and underemployment; (2) In the quality of work, such as, for example, wages and access to social protection measures; (3) The adverse effects felt in specific groups in the labor market, such as in the community of women, workers in the service sector and unprotected workers, including self-employed, casual and platform economy workers.

In addition to this scenario of instability, the current configuration of work is also being shaped by the adoption of artificial intelligence in the work environment; by blockchain technology; by organizational innovation; by expanding the workforce, inside and outside industries; by new forms of work; by flexible production processes, and by current national and international regulations. These variables cause inconsistency in the organizational ecosystem of companies in the fashion production chain, which is articulated, in a diachronic and synchro-

nous manner, depending on tangible and intangible resources and skills. Consequently, both the pandemic and the new work configurations directly impact the organization of work, the labor market, the work environment, and the formulation of policies for work. Some jobs are disappearing, and others will cease to exist due to the current world situation and automation in the manufacturing and service industries. Other work is being transformed to include new tasks and interactions, displacement of work activities among employees, or collaboration with machines and computers. Therefore, the entire structure of the work is affected.

On the other hand, there is the emergence of new productive possibilities and inclusive practices in this context. The priority aspects of sustainability give rise to innovative ways of thinking and doing since true sustainability does not mean only "ecology" (SMI, 2016).

> "[…] being a sustainable tout court company means respect for the environment, saving raw materials and economic resources, and the health of workers and consumers, respect for human rights, rationalization of creative and productive processes, stimulating innovation" (SMI, 2016).

Sustainability is strongly linked to the concept of innovation and develops, transversally, from research and academic and professional training, passing through the designers' projects, until reaching the companies' production workshops.
We need to rethink what we design and put on the market, removing the embedded obsolescence that comes from adopt-

ing a model made up of products focused on current trends doing that as a responsible business but also by consumer demand (Mazzoni, 2021).

It is the alchemy that perceives design as a proactive element of responsibility in the confrontation between people and society, as well as a necessary component in the innovation process (Fig. 1) and an indispensable resource for inducing and improving competitive strategies (Franzato & Celaschi, 2012; Bonsiepe, 2011). Thanks to the intrinsic capacity to transform itself to adapt to society's changes, supporting changes, or even anticipating them, the design is the motto for economic growth and positive consequences for the socio-cultural fabric. It is clear that to achieve these results strategically, the significant contribution of all stakeholders involved is necessary: government, business people, designers, employees, consumers.

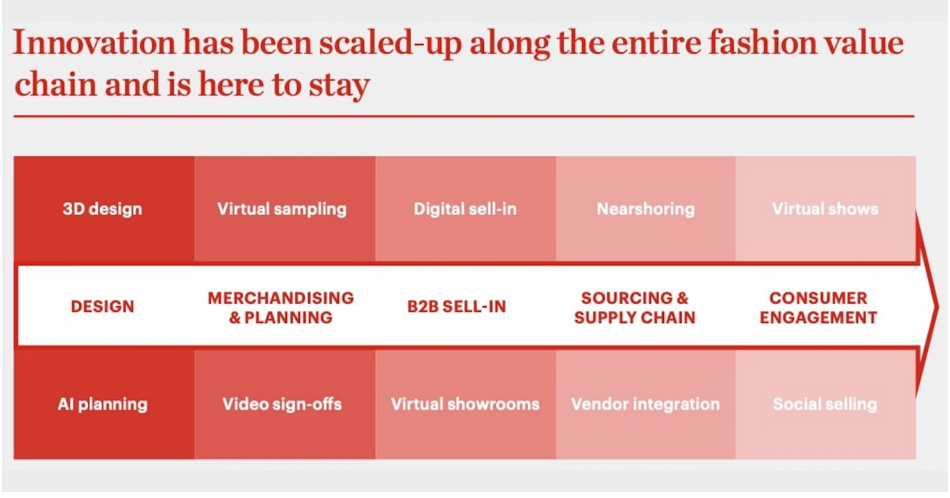

Figure 1. Innovation has been scaled-up along the entire fashion value chain and is here to stay, BOF, 2020.

That said, the objective of this article is to map the organizational ecosystem of work in the fashion sector in a systemic view between the individual, organization, work environment, products, tasks, and tools in a post-COVID-19 scenario and of profound technological changes. Given that, we highlight the questions that guided the preparation of this article:

- How is the outbreak of COVID-19 influencing and will influence the world of work in the fashion ecosystem?
- How to manage a governance system on digital work platforms?
- How to organize the new work settings without affecting the entire production system?
- Is there a job guarantee that protects workers' fundamental rights, an adequate salary, working hours limits, safe and healthy workplaces, skills, and abilities?
- Is it possible to reorient the post-COVID-19 organizational, productive, technological, and communicational processes?

The answers to these questions are not simple. It is known that some gaps and challenges impose obstacles to business models in the scope of fashion, in addition to a limited amount of literature that discusses and prospects the opportunities and challenges of working in the sector.

> "To survive, fashion must recover its function and respond first of all to the needs of the public, of the people in real life, and it must do so by abandoning personalism". (Mazzoni, 2021)

However, prospective activity is one of the most critical and elaborated tools available to managers. It constitutes a factual basis for organizational sustainability. It allows us to capture and perceive the behavior of variables in the corporate environment in an orderly manner, relevant to institutional strategic definitions. Therefore, this work aims to open new horizons for the organizational ecosystem in fashion companies. The reflection will be oriented towards the emergency generated in the textile/clothing sectors and the urgency of a sustainable and effective response concerning the productive processes and, above all, as an effect of re-adaptation of social and cultural interpretative models.

2. Prospective Activity

The effort to know the future has been lost in the history of humanity since remote civilizations. Still, in the 17th and 18th centuries, trend studies were based on mathematical and statistical sciences. Currently, what is fundamental in the generation and implementation of studies of the future is the relational understanding between context, content, and approach, with the purpose of strategic reorientation, as well as the definition and implementation of policies (organizational, scientific, technological, business, governmental, environmental, social).

The term prospective was coined by the French philosopher Gaston Berger in the late 1950s to emphasize the importance of a future-oriented attitude to face future transformations. The word *progetto* originally refers to projecting forward, from the Latin *projectare*, *gettare avanti*, *proporre*, prefigure what is intended to happen (Conti, Poletti & Rinaldi, 2016).

Then this consists of looking ahead in time (as opposed to retrospection) through the intelligent analysis of several factors (individual, social, cultural, political, economic, scientific, technological, environmental, sanitary), whose relative importance depends on the lines of business, multiple data, the opinions of experts and the scenarios for the future.

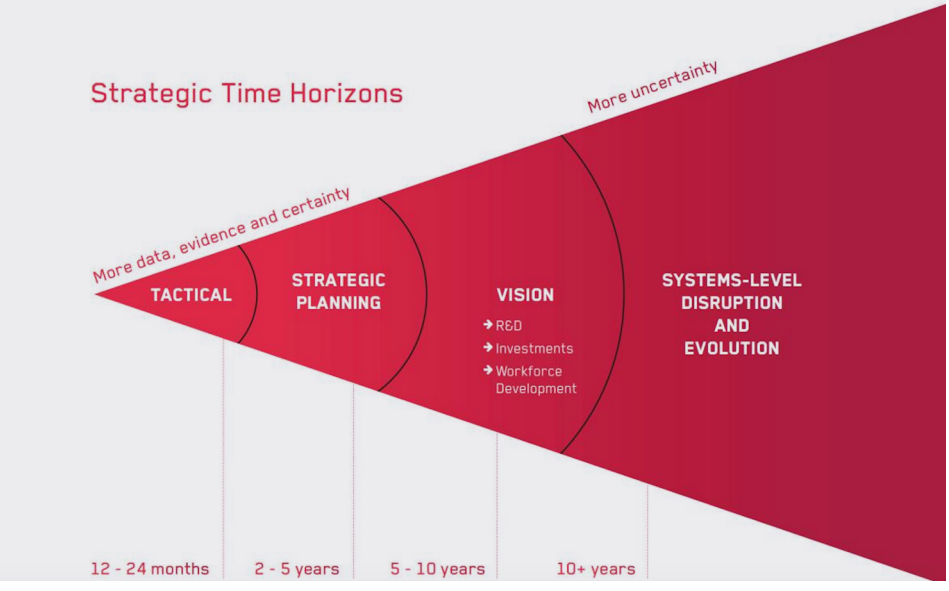

Figure 2. Strategic Time Horizons, Webb, 2019.

Conceptually, the prospective activity is a reliable tool for organizational sustainability. It allows the capture and perception of the behavior of variables in the corporate environment in an orderly manner, which are relevant to institutional strategic definitions. Foresight practice takes place through four different attitudes and/or behaviors towards facing the constantly evolving future:

- Reactive, when it opposes the changes to come and tries to delay, stop or even reverse the future;
- Passive, when it does not perform positive or negative actions, it only accepts the future;
- Active or Proactive, when positive actions are taken to quickly adjust and even take advantage of the signs of change;
- Leadership, when positive actions are taken to initiate, guide, lead, and even accelerate future transformations.

To effectively plan for the future, organizations need to learn to cover different time bands simultaneously and think about a broad temporal spectrum. For any uncertainty about the future (Fig. 2) - be it risk, opportunity, or growth - leaders must think about tactics (12 to 24 months), strategies (2 to 5 years), vision (5 to 10 years), and changes in systems-level (more than ten years). In short, the prospective activity is a tool that allows the company, through a collective reflection on future challenges, to structure and evaluate its strategic and marketing options to clarify its actions (Rech, 2014). Thus, it is clear that the prospective attitude consists of controlling change, acting proactively, preparing for changes, and causing desired changes in the present scenario.

3. Methodology

This explanatory exploratory research is qualitative and involves inductive and deductive processes (Creswell, 2014; Bauer & Gaskell, 2013). Consequently, the research approach was systemic-constructivist, whose assumption was based on the object of study, providing the basis for a transdisciplinary approach and becoming relevant in the design's current complexity.

The methodology was composed of Grounded Theory (Glaser and Strauss, 2017), whose investment as a research reference influences this method's most crucial procedure: the data coding stage. Triangulation was also used (Kawamura, 2015; Denzin & Lincoln, 2006), whose form of multiple operationalization, or convergent validation, is generally used to describe various data collection techniques to build a concept different qualitative or a mix between qualitative and quantitative procedures.

4. Italian Panorama

The Italian Fashion System has developed a very complex structure made up of small, medium, and large companies; again, this industrial system is one of the few to keep the supply chain that constitutes it unchanged. Let us analyze this system from a phenomenological point of view. We will also be able to notice how, in recent years, it is no longer classifiable only as the result of a series of trends and changes that enter the world of aesthetics. However, it must be considered a reflection of a broad cultural, social, and economic dynamic that belongs to the postmodern industrial culture (Conti, 2012, p. 28).

The Italian sphere of fashion is characterized by being a group of micro, small and medium industries highly fragmented, independent, and with a high degree of specialization in different production process stages. These characteristics enable productive flexibility, which guarantees a high capacity for innovation and, consequently, constitutes the competitive basis of the Italian Fashion System in international markets. It is a concept of network business, an inter-relationship strengthened by the link with the territory, which combines productive and organizational strength with

market intelligence to optimize synergies. This context can be seen by the vital position of the national supply chain in the European market for quality fashion products and the sector's export performance in recent years.
Despite being one of the first industries to convert to technology, to invest in R&D continually, and to rethink the production chain with a view to circularity and innovation in the phase of recycling and reusing products, this year, the sector is going through a setback unprecedented that is reflected mainly in:

- Fall in the production of textiles, clothing, leather goods, and accessories;
- Interruption of global supply chains;
- Reduction of hours worked per year;
- Review of the need to design seasonal collections;
- Inventory accumulation, which depreciated quickly due to trends;
- Product price deflation;
- Closing of commercial channels, excluding online channels;
- Reduction in retail sales, particularly in luxury, due to the decrease in the flow of tourists to Italy;
- Cancellation of events.

The pandemic has established an unprecedented global crisis in terms of speed and scope. Similar situations were only experienced during the Great Depression, in the 1930s, and 2008, with the global financial crisis. The economic shock scale is evident in the severe drop in GDP in most countries globally during the first half of 2020. Moreover, the projec-

tions made by major international institutions for the coming years are also not optimistic. It is important to note that, according to the *Studi Confindustria Center* (2020), a decrease of -10% in Italian GDP is estimated this year and a partial recovery of + 4.8% in 2021 (Fig. 3), with the current GDP retraction goes back to the levels of 23 years ago.

	2019	2020	2021
Gross Domestic Product (GDP)	0,3	-10,0	4,8*
Consumption of resident families	0,4	-11,1	5,9
Gross Fixed Investments	1,6	-15,8	9,7
Exports of goods and services	1,0	-14,3	11,3
Total employment	0,2	-10,2	4,0
Debt of the PA (1)	1,6	10,8	5,8*

(1) Values in% of GDP
ULA = equivalent units of full-time work
* Does not incorporate the maneuver outlined in the NADEF for 2021
Including this maneuver, according to government estimates, GDP could reach 5.7% and debt to 7.1% in 2021
Source: Confindustria Studies Center and estimates based on ISTAT data

Figure 3. Forecasts for the Italian Economy, CSC, 2020.

The Italian fashion supply chain is responsible for 8.5% of sales and 12.5% of employment in Italy's manufacturing industry. The sector of micro and small fashion companies, which comprises 55 thousand enterprises and employs approximately 312 thousand employees, together with the automotive category, was one of the most affected manufacturing areas in the initial phase of the COVID-19 crisis (CONFARTIGIANATO, 2020). According to studies by the Ellen MacArthur Foundation (2020, p. 269), "all in all, a 27–30% reduction on year-on-year revenues for the global fashion industry is predicted for 2020". Despite the internationally

recognized quality of products Made in Italy, companies in the sector registered a drop in turnover of around 29.7% in 2020, totaling 29 billion euros.
Many companies were forced to implement recovery plans to recover the financial losses and compensate for the scarcity of materials from industries located in areas affected by the virus's spread. This situation led to a reassessment of local supply chains. It encouraged companies to reshoring, which is the economic phenomenon that consists of returning to the country of companies that had already moved their industrial structures to Asian countries, such as China or Vietnam, or states in East Europe, like Romania or Serbia.
Until the beginning of the pandemic, the companies that opted for reshoring were those that needed to value the Made in Italy brand and position their products at the top of the line or those that did it for simple economic factors. In recent years, the best-known cases of reshoring refer to major fashion brands, including Prada, Ferragamo, Piquadro, Benetton, and Falconeri.

However, to return to the positive trends of the last decade, the sector needs a strategic and articulated plan for regrowth, establishing policies to encourage value and innovation in long-term business models. Also, other issues are pertinent in the current scenario, and that should be considered for the projection of plans, such as:

- Sustainability as a new business model;
- Increase in the resumption and strengthening of the national productive ecosystem;

- Renewal of partnerships in search of innovations for the sector, that is, the relationships of the vertical and horizontal sectors;
- Incorporation of digital fashion and e-commerce;
- Survey of new consumer behaviors due to digital access to purchases.

In summary, this scenario of social and economic uncertainties must be managed with political agility, affirmative actions, and governmental interventions to stabilize the volatility of the markets and overcome the challenges of unemployment, the increase in poverty, the high number of bankruptcies, and the need credit lines for business survival. Today, Italian government officials adjust their contingency plans and examine their priorities to preserve lives, protect their citizens' health, and stabilize the economy within possible limits. Some changes imposed by this new reality are not temporary and will profoundly reshape much of the industrial system as we know it today.

To cope with new restrictions, mitigate the pandemic's damaging impact, and adapt to economic and consumer shifts, companies must introduce new tools and strategies across the value chain to future-proof their business models. Fashion players must harness these innovations and scale up those that work to make radical and enduring changes to their organizations – and the wider industry – after the dust settles (BOF, 2020, p. 32).

The current situation provides essential inputs, which must be

considered in new adaptation and transformation strategies. The widespread impact on all human beings opens an opportunity to reevaluate, rethink, or adapt our ways of life, attitudes, principles, and values. Thus, future actions need to be economically viable, socially just, and ecologically correct concurrently, that is, a development process based on socio-environmental responsibility. In the business context, the pandemic brought the need to revisit priorities within the organizational ecosystem. Currently, the increase in production and consumption is seen as inappropriate. It is necessary to rethink the value given to people, the environmental impact, the engagement for specific causes, and the positive impact on society.

4.1. Prospects and Post-COVID-19 Scenarios

In April of 2020, the designer Giorgio Armani published an open letter on the WWD portal. He reflected on the *status quo* of fashion and how the coronavirus pandemic's situation can contribute to changes in the system. It was a sensitive testimony about a business's inconsistencies, relational dimension, the durability of the products, and the imperative paradigm shift. The document provoked debates and supported distinguished colleagues such as Donatella Versace, Elisabetta Franchi, Marco Baldassarri, and Rick Owens.

Since then, several reports have been published by confederations of industries or market research companies on the post-COVID-19 effects in the fashion sector. With some nuances, everyone warns that the current moment is turbulent, but there are alternatives for the industry. Confindustria (2020) says that the economic, social, environmental, and technological challenges are interconnected. It is crucial to

face them systemically, reconfiguring the Italian industrial sector, vocation, and competitive position in the world panorama. This proposal includes rethinking the value system, new business configurations, business habits, strategic alliances, drivers of innovation, creativity, distribution channels, employment levels, as well as the well-being of citizens/employees, the international division of labor, protection of the environment, and multifunctional collaboration between people and businesses (Creative Industries Lab, 2020).

The original and withstanding idea of sustainability is a powerful aspiration to make better decisions today so that we all benefit in the future. Sustainability involves considering and working toward harmonizing the social, economic, and environmental aspects of the things we do, be it the businesses we run or the actions we take as workers and consumers (Acaroglu, 2020, p. 7).

The real presence of sustainability in the organizational ecosystem makes it possible to assess inputs and control outputs, focusing on the redesign of products and services to result as neutral in these input and output actions. Sustainability is the ability to design strategic business operations, considering the holistic consequences of companies' actions (Fig. 4), without perpetuating only economic motivations.

The organizational ecosystem at work has undergone profound changes since the last century, and each decade has brought new challenges and warning signs for business and government leaders. Some economic trends and social practices were already considered in the business context, but they were accelerated by the global pandemic, challenging commercial operations, and health systems (Acaroglu, 2020a).

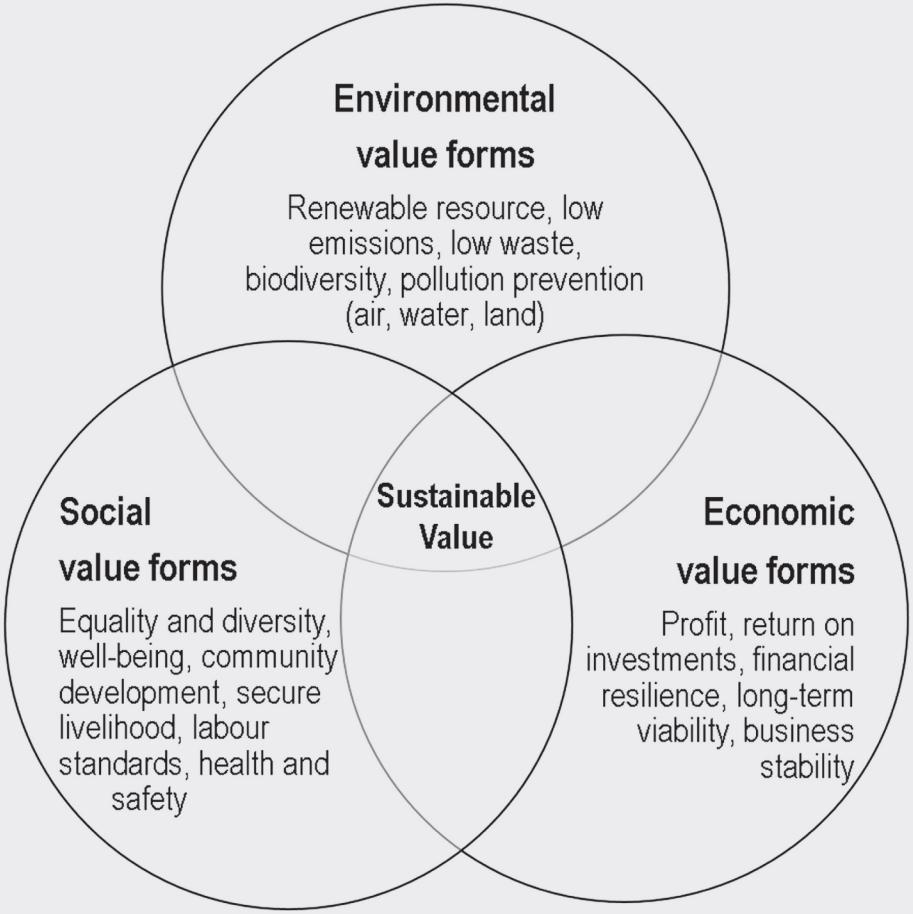

Figure 4. Sustainable Value, Acaroglu, 2020, p. 7.

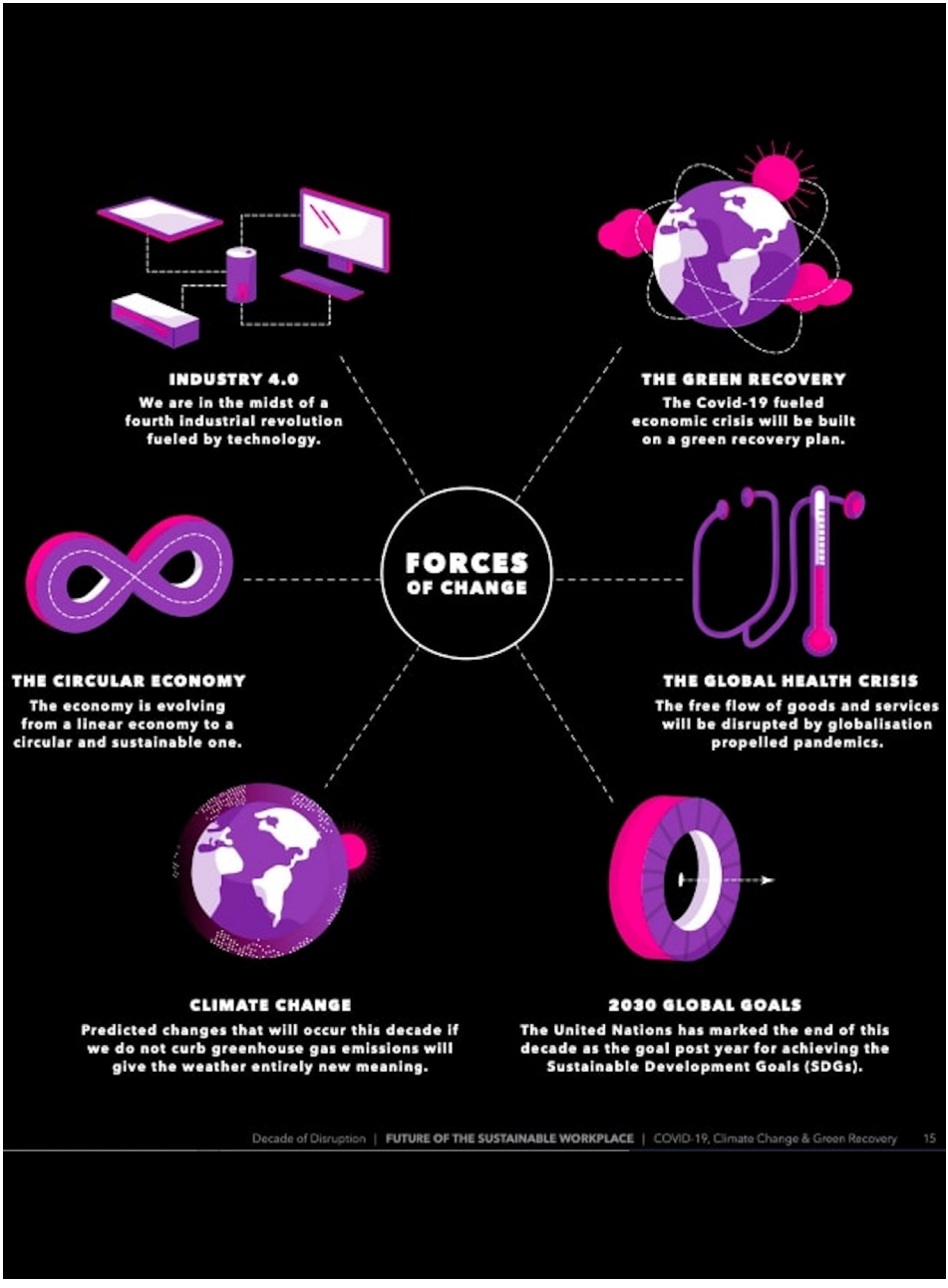

Figure 5. Future of the Sustainable Workplace, Acaroglu, 2020a, p. 15.

New ways of living, working and doing business transactions form the basis for market disruption in the companies' ecosystem.

The drivers of change (Fig. 5) that were already operating in the organizational ecosystem and are manifesting themselves more intensely since the outbreak of COVID-19 are (Acaroglu, 2020a, p. 16):

- The industry 4.0: "Exponential changes in technological development are altering the way we manufacture, produce, and consume goods and operate within the economy, offering significant opportunities to increase efficiency, reduce waste and streamline production processes";
- The green recovery: "In response to the global waste and pollution crises, the Circular Economy calls for a total reconstruction of how we design, produce, deliver and discard goods and services that make up the economy";
- The global health crisis: "As the response to the Covid-19 reminded many that action to abate the negative impacts of climate change also requires collective action and immediate changes to the way we run the economy";
- The 2030 global goals: "Companies all over the world are now tracking their performance against the 17 Sustainable Development Goals and reporting on new actions taken to enable the accomplishment of them";
- The climate change: "Predicted changes that will occur this decade if we do not curb greenhouse gas emissions will give the weather entirely new meaning";
- The circular economy: The European Union is "driving the campaign to build back better by tying economic in-

centives to climate-positive actions for a more sustainable and resilient economy" as a driving force behind the rapid transition to a green economy.

The fact is that we are unaware of the long-term impacts of the pandemic and the potential for an increase in new epidemics in the future. However, absolute certainties are already evident as (MIT, 2020):

- The way of working is changing faster and faster, aided by technology, to reduce risks to human health and increase productivity in times of crisis;
- Business managers are learning to combine events arising from the Covid-19 outbreak, social and economic conflicts, technology, automation, and organizational repositioning;
- The identification of high risk of contagion functions and specific training is essential to protect the health of employees and ensure productivity in these functions;
- Governments must support industrial development, a technology policy available to all, and education systems to ensure national resilience in a future pandemic.

5. Final Considerations

This investigation aspired to the multidimensional, making it possible to examine the scenarios for the future of work in fashion companies and understand the changes in this production chain's organizational design, which is being affected by post-COVID-19 transformations and technological development, contributing to the process of innovation and

changes in the organizational project. Thus, in this process of profound changes in the system, it is essential to rethink corporate culture and organizational ecosystems through new collaborative and innovation models between partners. Design innovation will play a vital role in meeting short-term sustainability goals and transforming the long-term economic model (BOF, 2020a). Therefore, the role of the designer changes, and he "can continue to carry out his function by synthesizing and catalyzing different knowledge; his task will increasingly be that of practicing the profession to exchange, mixing his contributions with those of other professionals involved" (Conti & Franzo, 2020, p. 133). Consumers and employees will continue to demand more from purpose-driven companies that champion their values – from climate change consciousness to diversity and inclusion (BOF, 2020a, p. 7).

Although the priority, at this moment, may be to overcome the crisis without significant losses, companies cannot miss the opportunity to act, redefining responsibilities and functions to reshape the future driven by demand and sustainability. "If the fashion industry and press were to encourage consumers to think beyond buying products that reflect their desires for status, prestige, and social recognition, then garments may inherently achieve a longer, more useful life-cycle" (Gwilt, 2011, p. 23). It is a shortsighted view that reducing the consumption of products from the fashion industry does not make economic sense. It is important to remember that this production chain's future depends, above all, on a balanced and creative approach in the design, production, use, and responsible disposal of fashion clothes.

6. Acknowledgments

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II

SUSTAINABLE APPROACHES

Sustainable Fashion Trend
Enhancing Sustainability in Fashion Through Visual Communication Media

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Keywords
Deep&Deal, Fashionability, Sustainable Trends, Brand Activism, Fashion Communication.

Abstract
From the French Fashion Pat to the Green in Italy brand, governments set sustainability targets to be achieved in the short term, indicating precise dates as an upper limit for reducing environmental impact in the fashion industry. From the Sustainability Manifesto, drawn up by the National Chamber for Italian Fashion, to that defined by the Fashion Revolution association, there are many programmes and objectives identified for the promotion of a sustainable approach in the fashion system. The main objective is to ensure fair and respectful behaviour that acts on the entire supply chain with zero impact actions and productions.
But despite the political actions and the rich literature on the subject, in fact, as K. Fletcher says, there is still a real difficulty and slowness with which sustainability becomes a constant practice, and a working method within the fashion system itself (2018, p. 7).
In the light of the many actions already launched by scholars and designers but not yet widely applied in the fashion system, the article underlines the need to raise awareness and guide companies towards the main themes of sustainability. A dissemination imagined through the design of widely diffused communication products able to enhance the best practices and the main sustainable models already present in the literature.

1. The Sustainable Responsibility of Fashion Between Alliances, Posters and Corporate Communication

1.1. The Role of the Institutions: Pacts, Brands and Green Certifications

In 2013, Domus magazine published the supplement Domus Green, in which sustainability emerged as a fundamental factor in the project that needed to be reflected on from the perspective of prevention, since it was not possible to imagine "acting solely under the ancestral impetus of immediate necessity" (Curzi & Zamboni, 2013) To date, however, we have come to operate with a global health emergency (Covid-19) in progress, and in this state, strained between chaos and uncertainty, the only true fixed point is the sustainable responsibility of the company that in the fashion sector records alarming data of unsustainability.

Since Friedman stated that "there is only one social responsibility of the company, and that is to use its resources in the development of activities aimed at increasing profits, obviously respecting the rules of the game, i.e. in an open, fair and competitive market" (1970) stakeholder theory has broadly broadened the definition and meaning of social responsibility, giving companies more widespread and prospective social commitments. They are widespread because they are addressed to both primary and secondary stockholder and prospective because they are oriented towards the environment and future generations.

A commitment that companies inscribe in the CSR (Corporate Social Responsibility) chapter through a programme of commitments and actions that guarantee the correct and ethical

behaviour of the company from a social and environmental point of view. From suppliers to customers, from partners to consumers, the objective is to ensure fair and respectful behaviour throughout the production chain, with zero impact actions and production. This means efficiency in the use of resources but also the ability to enhance quality: in other words, doing "better with less" (Frey, 2012).

The international debate that compares fashion and sustainability has increased considerably over the last decade, with many initiatives and projects launched by governments, associations and companies.

In particular, in Italy, the CNMI association (Camera Nazionale della Moda Italiana) promotes the *Sustainability Manifesto for Fashion* in June 2012; a detailed ten-point decalogue aimed at promoting, encouraging and directing the industrial fabric of Italian fashion towards ethical and sustainable behaviour. The Decalogue focuses on the value of design, inviting designers and companies to design products that last over time while minimizing the impact on ecosystems so that new fashion products can unhinge the fast offer model, according to which, as Bauman states, "products are designed for immediate consumption, preferably for one-time use, disposal and quick replacement, so that living spaces do not remain cluttered when the objects admired and coveted today are out of fashion" (2004).

In the political sphere, one of the main international agreements Made in Europe comes from France is the Fashion Pat which, signed by 56 leading brands in the fashion and textile sector, aims to achieve a series of objectives focused on three main areas: stopping global warming, restoring biodiversity and protecting the oceans. The Fashion Pat, entrusted by

French President Emmanuel Macron to François-Henri Pinault, President and CEO of Kering, was presented to heads of state at the G7 summit in Biarritz with the aim of structuring an international group that can take substantial sustainable action. From America it is California that organized the SAC - Sustainable Apparel Coalition - alliance promoting coalition pacts between fashion companies that unite for sustainability. In particular, the SAC, in addition to promoting coalitions between companies, has developed the Higg Index, a suite of tools that standardizes the measurement of sustainability along the entire fashion supply chain. The Higg Index identifies 11 assets for environmental assessment and 16 social impacts of great importance on which the sustainable performance assessment method is based. Through these parameters, companies can identify fragile points in their supply chain and continuously improve sustainability performance to achieve the environmental and social transparency required by consumers. Consumers, who are now increasingly educated as well as consciously choosing their products and services, choose one brand over another, with the aim not only of sharing a style and symbolic status, but also of belonging to philosophies and approaches characterized by a profound cultural value in contemporary society. Consumers, in fact, are considered as producers of cultures rather than aseptic messengers (Basile, 2013).

In addition to international agreements, there are many brands and sustainability certificates issued by government bodies and associations that certify the sustainable commitment of fashion companies. Among the main associations, the Dutch Fire Wear, with 137 member companies, produces

detailed annual sustainability reports drawn up according to a series of criteria and values that certify the real commitment of companies in the fashion industry. The interesting aspect of this organization is the public suspension of certification as soon as the company does not meet the required standards. This communication model reinforces transparency policies, so that sustainability is not a marketing strategy "to give a firm a green tinge" (Polonsky et. al., 1997), avoiding the phenomenon of greenwashing.

Brands and certifications that hybridize fashion and sustainability in addition to enhancing a single brand can also strengthen the brand reputation of local brands. Several reports accuse the production models of some big names in Italian fashion, who, despite relocation, affix the *Made in Italy* label to their products. A *modus operandi* that not only damages the single brand but also the image of the entire country. In this scenario, the Ministry of the Environment for the Protection of the Territory and the Environment has established the *Made Green in Italy* label. The label protects companies that base their products on the logic of the LCA (Life Cycle Assessment) with a certificate drawn up according to the European approach of the PEF (Product Environmental Footprint) that integrates the "traditional" method to the environmental assessment of product/service with the Environmental Product Declarations (DAP - EPD) according to ISO 14025.

From the cases described so far emerges a general orientation of the fashion industry towards *Deep&Deal* models, based on a deep and articulated capacity to establish new environmental pacts between industry and institutions. Agreements between generational, corporate and social interlocutors (Morace, 2020).

1.2. The Role of Companies: the Double Register of Corporate Communication for Sustainability

While up to now we have talked about the actions taken by governments and associations, sustainability initiatives also proliferate in the strategic plans of large fashion groups and individual companies, with programs acting on a double register. One tends to optimize the impact of fashion on the environment while the other concerns the ethical awareness of the end customer towards sustainability issues. Bernard Arnault President and CEO of LVMH, says, "our position of leadership involves environmental and social responsibility. We must go beyond mere compliance with standards" (https://www.lvmh.it/il-gruppo/i-nostri-impegni/responsabilita-sociale-e-ambientale/), as the focus is on both an interest in the environment and action towards people.

Marie-Claire Daveu of the Kering group also believes that, in the interview *Per un lusso sostenibile*, published on the group's institutional website, Marie-Claire Daveu speaks out on the thesis that great powers give rise to great responsibilities (Tonfi, 2017). In fact, the manager underlines both the importance of sustainable duty towards the environment and the role of "super brands" as forerunners, to guide small and medium enterprises towards sustainability, to the point of positively influencing consumers as well.

1.2.1. Register One. Towards the Environment

With respect to point one of sustainable business planning, the LVMH LIFE Program emerges, strengthened in 2016 with LVMH LIFE 2020. The group has identified 4 main objectives around which to work to ensure the sustainability of

their *maisons*. The objectives are: Product Objective, aimed at improving production models; Supply Chain Objective, developed with particular interest in the traceability and recruitment of primary resources; CO2 Objective, focused on reducing harmful emissions by 25% in all the group's complexes; Sites Objective, which promotes a minimum reduction of 10% in environmental performance indicators, in addition to a commitment by the individual *maisons* to improve their environmental impact by 15%.

Prada also does solid work in the sustainable field. In particular, during the last edition of the *Shaping a Future* conference, the company promoted the need to act according to the logic of multilateralism, hybridizing local know-how with global actions. A direction that goes towards the *Green New Deal* proposed before the pandemic by the EU. According to the speakers at the Summit, it is only through shared policies between countries that it will be possible to launch valid programs capable of guiding the fashion system towards a new productive and commercial essence that, passing through culture, returns new models of consumption.

"Liberal humanism" has brought great progress in human rights and economic development. At the same time, however, it has developed individualism and consumerism. Today it is not a question of opposing growth and degrowth, but of inviting reflection on what is useful and what is useless and harmful. If we look around us, we see a great number of initiatives that we could define as oases of fraternity. We must try to create a network of relationships for the harmonious integration of these oases, because the problems that are obscuring our future are such that they cannot be tackled alone and call for

collaboration and solidarity (Massi, 2020). Launching complex networks of sustainable cooperation that guide society towards a new civilization based on connected logics made of interaction between company, stakeholders, shareholders and public institutions. In order for proactive exchanges to take place between the parties, it is also important to act on the awareness of all stakeholders with the aim of transforming people's sustainable sensitivity towards a culture of sustainability, as Miuccia Prada says (https://www.pradagroup.com/it/sustainability/prada-impact/sustainability-strategy-UN-17sdgs.html) "You have to understand deeply what it does mean not being sustainable. Culture is the only way".

1.2.2. Register Two. Towards People

From the analysis conducted, not only does the need for action emerge, but also the need for short-term results. Posters, pacts, call to action, always include an expiry date as the maximum limit for reducing environmental impact in the fashion sector.

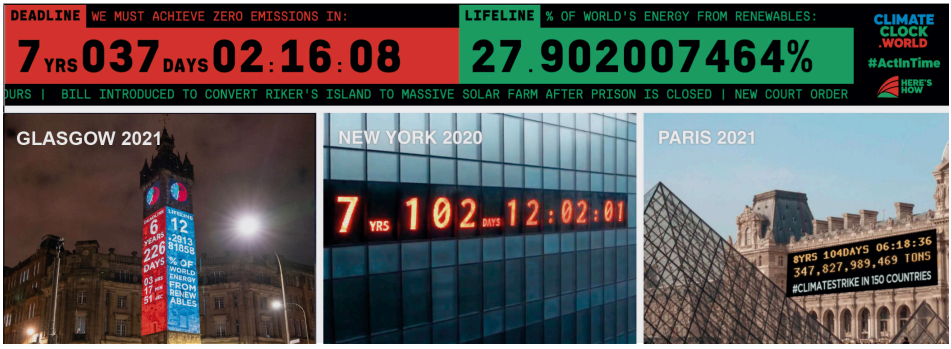

Figure 1. Climate Clock. International awareness campaign to encourage sustainable actions.

A time that also becomes manifesto and action through the *Climate clock* campaign that unites artists, scientists and activists in a community with the aim of fighting environmental disaster. The campaign involves the installation of a physical *Climate clock* in cities, schools, companies or even the use of a *digital climate clock* to be used on websites, social pages and more generally to be extended to virtual interfaces. Currently the clocks can be found on the historic gasometer in Berlin, in Union Square in New York City and in front of the Louvre in Paris. Sudbury and Böltner (2011) have shown that consumers are more likely to choose lower priced products rather than products with higher sustainability standards, even when they are more aware of ethical fashion. In this scenario, it is therefore essential to launch communication plan aimed at raising user awareness with the aim of both influencing consciences and stimulating concrete behaviour. The Gucci company, through the Gucci Equilibrium communication plan (https://equilibrium.gucci.com), shows particular attention to ethical and sustainable awareness actions through multiple projects such as the Gucci Surf game. An Arcade style game that combines the world of gaming, fashion, sport and respect for the environment. Chosen as virtual testimonial Leonardo Fioravante (one of the best Italian surfers in the world), the player is called upon to eliminate plastic from the sea through a game that aims to raise awareness and educate users towards small behaviors that educate them to respect the environment. These initiatives show and demonstrate the power of digital in fashion that through gamification dialogues with the new generations. Those that more than any other will most likely succeed in implementing concrete virtuous models of the circular economy.

Figures 2-3. Gucci Surf. Arcade-style video game designed by Gucci to combat plastic pollution in the oceans.

Analysing the many activities promoted by large fashion groups, it emerges that the conversion towards sustainability takes place gradually and in progressive steps through actions that often represent a small percentage among the many activities carried out by large companies. These percentages, observed from a communication point of view, should be enhanced with visual campaigns showing the real impact of those numbers on the environment. Showing how these apparently small percentages have a major sustainable impact. In this perspective, we also highlight the need to encourage small and medium-sized enterprises with information and training campaigns aimed at demonstrating that, even through small steps (and with small investments), they can cooperate in a general and substantial global change.

2. The Role of Visual Communication Between Fashion and Sustainability

2.1. A Tool for Orientation in the Vast Panorama of Sustainable Fashion

Despite the political actions and the rich literature on the subject, in fact, as K. Fletcher says, there is still a real difficulty and slowness with which sustainability becomes a constant practice, and a working method within the fashion system itself (2018). A difficulty encountered in particular by small and medium enterprises that find themselves having to convert their business models into a single container, scattered between actions, brands and certifications not yet systematized. The same disorientation is found in training. In fact, young students often find themselves navigating through a multi-

tude of articles that deal with the subject from different facets without having a first overview.

In the light of the many actions already designated by scholars and designers and still little applied in the re-foundation of the fashion system, and also in the accentuated condition of disorientation (due to Covid-19) in which many companies find themselves having to re-emerge, the need to collect and enhance the best practices and the main sustainable models already present in the literature is highlighted. A need that, addressed through the skills of visual communication, finds an answer thanks to the design of a visual apparatus capable of changing people's attitudes towards health, safety and other social concerns, aware of the impact that visual communication has on people's attitudes, knowledge and behavior (Frascara, Meurer, Van Toorn, & Winkler, 1997).

The need to identify new communication strategies to "influence" people towards sustainability issues also emerges in the volume *Green marketing. Come evitare la greenwashing comunicando al mercato il valore della sostenibilità* (Iraldo & Melis, 2012). The authors highlight the lack of concrete tools to support companies in the migration process that goes from a heavy industry to a "light" one, where light means the ability to produce revenues in compliance with all the parameters of sustainability.

The *Sustainable Fashion Trend map* was created from these analyses with the aim of identifying, promoting and enhancing the main trends and design models useful for the launch of sustainable practices. Trends that are not linked to a season because, as Blanchard says, sustainability is a trend they are here to stay (2007). They are in fact stable trends that do

not mark a moment but a stable conversion towards new industrial approaches.
A mapping that collects in a single container the possibilities that companies have to convert to sustainability. A communication tool imagined as a *vademecum* of sustainability in fashion so that it can guide companies to become adept at generating profits not only according to the standards of the Global Reporting Initiative (GRI) but also through design and communication skills.
We are experiencing a moment of profound transformation in which the role of visual communication in fashion goes from being fundamental in retail (Chan & Wong, 2012) to becoming indispensable for developing a work process in a sustainable direction (Cervellon & Wernerfelt, 2012).

2.2. Map Structure

Initial surveys have shown that the sustainable fashion landscape, despite being in a definition phase, is characterized by several research-action lines. From the technologies developed to launch low environmental impact production to the definition of new distribution chains, we can identify sustainable macro trends involving multiple sustainability actions.
The "trends" proposed in the map are divided into three strands involving feasible design and production aspects on the *brand philosophy, project approach* and *quantitative and qualitative valuation* of sustainability.
The three strands are described on the basis of three predominant factors identified in *values, actions* and *benefit*.
The first mega trend, which affects the company philosophy, is represented by two main approaches that characterize the

fashion industry in its core business and are the slow fashion philosophy and the ethical fashion philosophy.

For slow fashion, the value of time is highlighted as the main point of interest, which has a very complex and multifaceted role in the fashion industry. In fact, we talk about time in the seasonality and in the releases of the collections, production time and duration of the product. The concept of slow fashion, introduced by Kate Fletcher (2008) is and the basic principle around which to rethink the fashion industry, reflecting on the slowness of production, sales and consumption. The theme of ethical fashion is distinguished by the value placed on people. The action that makes a company ethically correct focuses on the willingness offered to people to work in good conditions and with a fair salary. The main impact is internal, both for employees and stakeholders. The benefits are also clearly reflected in the company itself, which improves the quality of its employees' work and increases their performance, initiating a virtuous circuit that leads to an improvement in product and service and therefore in revenue.

To the extent that it is absurd to claim that companies serve society better by simply ignoring all profits except corporate profits (Greenfield, 2005), the logic of ethical fashion in addition to corporate welfare also has a very important impact on the economy of people and countries, particularly the poorest ones. Companies that implement ethical fashion policies also raise their brand reputation.

The second strand focuses on *design methodologies* that are mainly aimed at reducing environmental impact. The line is declined in two design possibilities: upcycled and circular fashion.

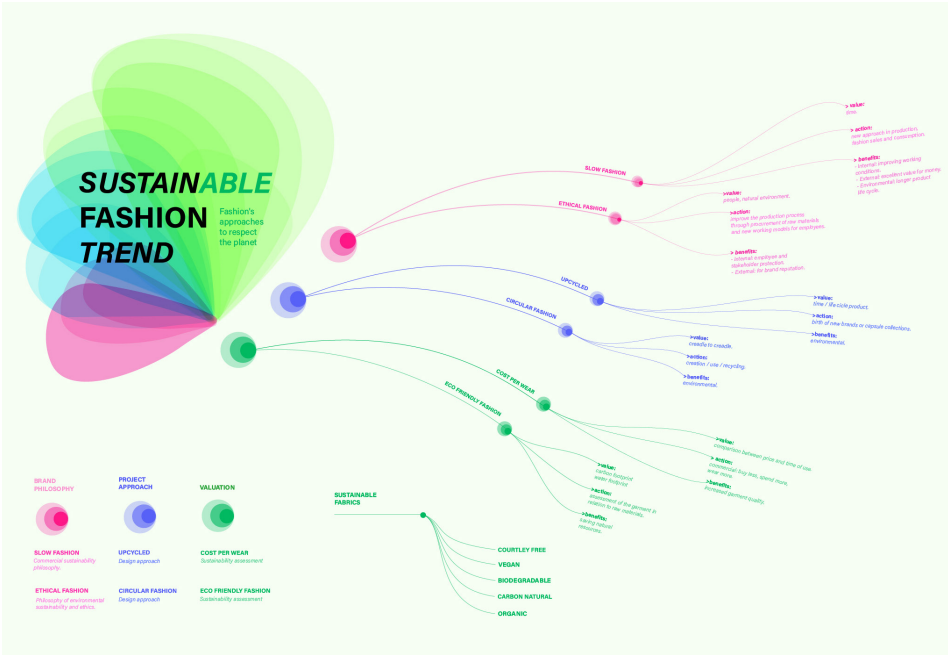

Figure 4. G. Scalera. *Sustainable fashion trend. Fashion's approaches to respect the planet*. Infographic collecting the main sustainable trends in fashion.

Upcycled also acts on the value of time, extending the life of the product by combining creativity with the concept of recovering products that have remained unsold or fallen into disuse. The fallout is environmental, considering the recovery of products that would otherwise end up in landfill. Big brands such as Prada, with the Prada Re-nylon project or Levis with Re-done, are some of the best examples that show the action to be activated in this sense. That is, the creation of capsule collections or new brands that spread the sustainable soul of zero impact fashion.

Circular Fashion, on the other hand, provides for the re-foundation of the fashion supply chain; its fundamental value is therefore the *cradle-to-cradle* principle. The principle lies in

the ability to preserve and enhance the ecosystems and biological cycles of nature, while maintaining production cycles. The action acts through a holistic model in which the industrial, social and economic dimensions cooperate compatibly with the environment. In fact, the latter is the object of the benefit of circular fashion.

The third strand deals with issues related to *sustainability assessment* analyzed through the emerging phenomenon of Cost per Wear and Eco-Friendly Fashion.

The first tool also has time as its value, but in this case, it lies in the relationship between the cost of the garment and the time of use. The main action acts on a commercial basis and in this particular case communication campaigns are of fundamental importance. The direct impact of this commitment is in environmental terms, but this trend also pushes companies to improve the quality of their products.

Eco Friendly Fashion is the last aspect presented in the map, the value in this case is the environmental impact expressed through two main nodes, the carbon footprint and the water footprint. The action to be implemented, considered by companies to be even the most difficult, is the production of products by considerably reducing the use and pollution of natural, environmental and landscape resources. The fallout is clearly aimed at protecting and safeguarding the environment.

In addition to the three strands, the mapping puts the entire supply chain on a level that involves sustainable fabrics for their ability to involve many sectors.

The proliferation of sustainable actions in fashion make Sustainable Fashion Trend mapping an open and constantly evolving system. Its shape changes and is enriched by the

evolution of the sector which, woven from multiple aspects, requires fashion companies to be increasingly able to intercept and follow the trend of sustainability.

3. Conclusion

Analyses carried out to date show that there is a need to organise design research into tools and methods capable of converting fashion companies into sustainable businesses. The entire fashion supply chain urgently needs a concrete and measurable conversion of the system, and in this emergency design, with all its fields of investigation, from strategy to communication, from planning to production, as well as playing a central role in the redesign of the system, has a social and ethical responsibility towards the planet and the people who work in the fashion industry.

The Sustainable Fashion Trend map is in fact an action of "responsible communication" (initiated within the framework of a Research Grant from the University of Campania Luigi Vanvitelli) aimed at contributing to the public dissemination of methods and strategies capable of converting fashion companies into sustainable realities. From this point of view, the aim is also to bring the world of research closer to that of companies, which have always been divided between theory and practice. But at a time of great change, accentuated by a global pandemic, a time when fashion must necessarily restart according to new logics, research, which seemed to open up distant scenarios, now seems closer than ever, concrete and supporting activities to reemerge from the global crisis in which we still find ourselves.

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Sustainable Fashion
From Material to Immaterial Through Biodesign

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Keywords
Slow Consumption, Fast Fashion, Biodesign, Bio-Textiles, Bio-Processes.

Abstract
The current consciousness about the environmental impact of fashion request an urgent need for intervention on both the technological production and the processing plants in the textile sector; but these are not the only aspects to be considered. Focusing on an approach based only on the sustainability of materials and processes, and not considering the gears that move the fashion system, would lead to a *symptom based* solution that does not involve the roots of the problem. The intangible, social and symbolic aspects that invest the fashion sector have significant repercussions on material production and stimulate the phenomenon of *fast-fashion*.
The purpose of this contribution is to individuate a further approach which looks at recent technological advances in the field of sustainability, not only as alternatives to production and processing in the textile sector, but aims to investigate its potential in aesthetic and semantic terms, to establish new correlations between material and immaterial aspects. Specifically, reference will be made to the field of *biodesign*, which considers the collaboration with living organisms as a design tool that, if applied to the textile sector, will allow energy efficiency savings and to reduce environmental impact, but also generate new ways of interaction, use and customization of clothing.

1. Clothing is Material Production; Fashion is Symbolic Production (Fletcher, 2007)

To address the theme of sustainability in the field of Fashion it is appropriate to keep in mind the aforementioned distinction. The intangible, social and symbolic aspects that invest the fashion sector have significant repercussions on material production and stimulate the phenomenon of *fast-fashion* (Bhardwaj & Fairhurst, 2010). A constant demand for novelty, fuelled by a constant reformulation of identity, leads to a consumerist approach that pushes to buy garments at very low prices that are destined to become waste in a very short time (Fletcher, 2012). In order to better understand the theme, it is appropriate to define the dynamics behind the transformation of a product from being a good to a became a waste, which is generally considered as something to be discarded since is no longer able to meet requirements that justify its use. However, what are these requirements?

Obsolescence is a condition that doesn't concern only the need to replace a product when its use is compromised, but it occurs even when products or services are still usable but replaced by newer and/or fancier products and services (Woolley, 2003).This is the case of *relative* obsolescence and it's related to some psychological aspects connected with the perception of products in terms of aesthetic, stylish or social identification (Rees, 1961) (Burns, 2010).

Fashion field lives on the production of relative obsolescence. It is in fact very rare that garments are discarded because they are no longer able to perform their useful functions, but rather they are dismissed because their symbols and meanings have lost value and aroused a lack of interest that no longer moti-

vates the use. This phenomenon is clear when considering the increasing practice of "Second life" pursued by manufacturers and associations in the clothing sector; through a collection system the garments, still intact or not worn, are reintroduced in the market and revived for new uses (Cadioli, 2006).
In relation to the use of fashion products, we are therefore faced with a dualism between material and immaterial characteristics in a field in which the latter have a much greater impact for production, purchase, use and disposal of clothing. In the fashion sector is appropriate to refer to *aesthetic markets* (Bovone, 2016), since the value of products is not determined by functional aspects, related to materials, technological processes, production, but whose value is determined by the symbolic, formal and aesthetic characteristics that represent the very meaning of the object. Fashion sells an idea, an image, a symbol; the issue is that the fashion market aims at a continuous renewal of these symbols and images.
If we look at the fashion system from this point of view, it is clear that an urgent change in technological production and processing plants is needed in the textile sector that can conduce to the decrease of environmental impacts. But it is also true that relying on an approach focused only on the sustainable aspects of materials and processes, without considering the gears that drive the system, would result in a "symptom based" solution that does not consider the root problem (McDonough & Braungart, 2002).

2. Material and Immaterial

Designers, stylists and artists are facing the current production needs through incisive practices that engage the dualism

between the material and immaterial dimension through different approaches, but for which often, the aspects related to the material temporary, are opposed to those linked to the emotional and symbolic durability of the products.

2.1. Designed to Disappear

In the field of clothing the cyclical proposal is more formalized than that of other sectors; in fact it is possible to refer to fashion not only in the singular form but as *fashions*: a multitude of trends, often cultural, related to contexts and seasonality, bringing the consumers to as many directions, often even in contradiction with each other (Bovone, 2009). This system has increased a ravenous market based on the continuous purchase and early disposal of clothing. In response to this "hunger for newness" different experimentation researches are looking for solutions that look at the use of natural materials and fabrics, biodegradable, compostable or completely recyclable matter. We can define this category as "designed to disappear" garments (Goldsworthy, 2018): products characterized by a limited temporality, designed for seasonal use. In addition to the rediscovery of natural fibres, a series of materials are emerging from disparate derivations, drawing from the plants and organic dimension, from the reuse of residues of the agro-food chain, as yarn obtained from orange peel to skin made with grapes, from the use of algae and grass. It's the case of *Algiknit*, a thread made by Seaweed by Aleksandra Gosiewski, realized not only to be biodegradable but even to release healthy substances to the ground (Fig. 1); or *Flora Fur*, from Isabella Bruski and Noah Silva, a sustainable, biodegradable, fauna-free fur made from milkweed.

Figure 1. Aleksandra Gosiewski, AlgiKnit. Biodegradable yarn realized with seawwed, winner of the biodesign Challenge.

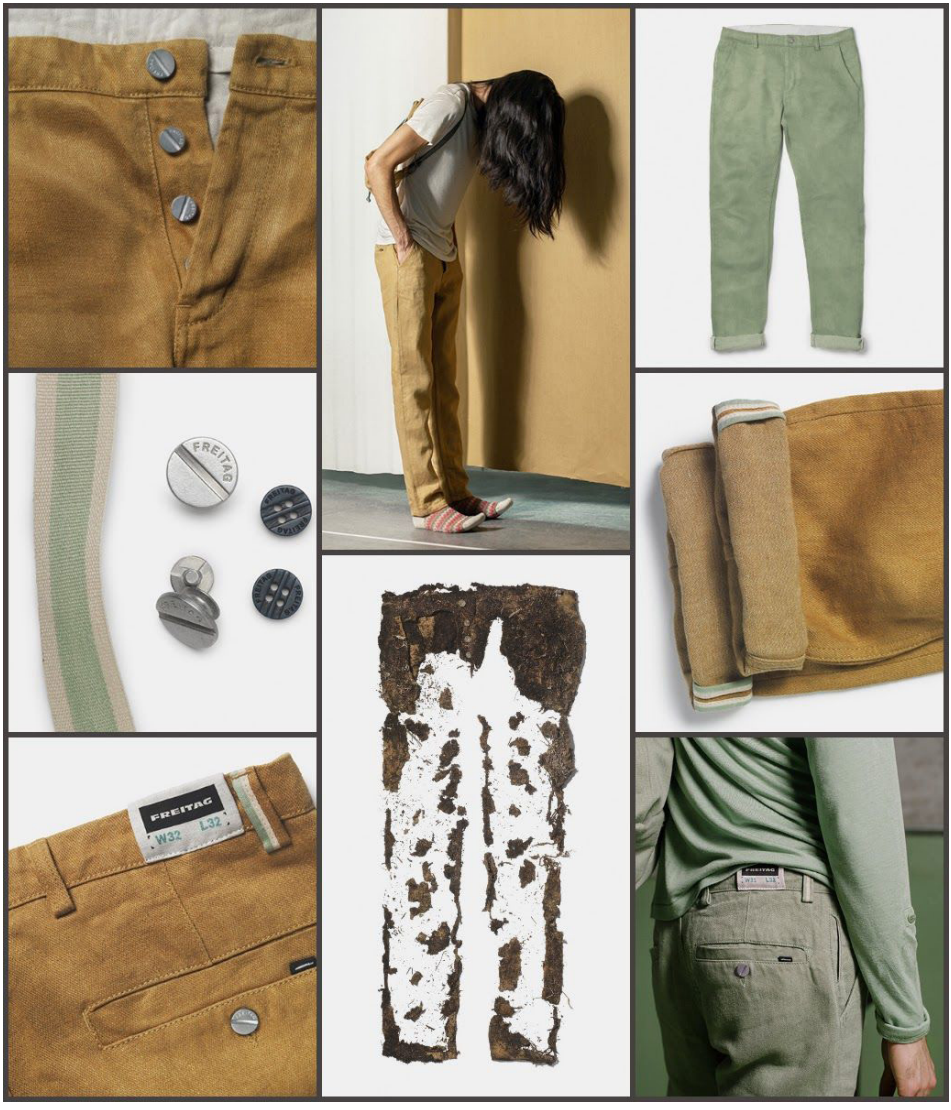

Figure 2. F-ABRIC, Compostable Jeans, FREITAG Lab.

The issue of disposal in these examples becomes as central as that of production. Users can take part in this closed loop system of production, disposal and regeneration or composting. This is the case of the projects Short Life by Kay Politowicz and Sandy Maclennan, a collection of disposable garments for single or very limited use, based on an innovative material developed in the paper industries that can be recovered many times in a recycling loop. Or the project *F-abric* from Freitag, a collection made of cellulosic fibres obtained from plants (Fig. 2). The products are realized without toxic treatments or bleach, in this way they can rot into the ground and became fertile soil for new raw material.

An emerging strand related to this category is known as *bio-fabrication*: in these processes, not only the materials and fibres are completely natural, but their production has an impact almost equal to zero since they are *literally manufactured* by living organisms.

Figure 3. Suzanne Lee, Biocouture, Biofabricated garments, Central Saint Martin.

Figure 4. Laura Luchtman and Ilfa Siebenhaar, Living Colors, natural occurring bacteria that produce pigments are used in alternative of the synthetic dying process, PUMA.

An example is the iconic *biocouture* of the designer Suzanne Lee (Fig. 3), which exploit the process of fermentation of bacteria and yeast to produce a material similar to leather, used to create garments, jacket and shoes. The vegetative apparatus of fungi, *mycelium*, is the subject for other experimentations with fabrics such as *Mycotex*, made by a white and softy material which is already quite diffused for applications in several fields of product design, including fashion. The collaboration with the living organisms, as well as for the fabrication, has been pushed to replace the traditional techniques of working, in particular the dyeing processes that are known to be the most toxic in the sector.
In this field the examples have gone beyond the experimental phase, entering to all intents and purposes in the market: is the case of the line of *Puma*. *Living colours* (Fig. 4). The project uses purple pigments resulting from the growth process of some bacteria, to dye fabrics for a sport collection, replacing the traditional chemical dyeing processes that are the most polluting in clothing production.

2.2. Designed for Emotional Longevity

If the strands described meet the needs related to the material aspects of fashion production – in particular raw materials and processes – another approach is opposed to the ephemeral and ravenous character of the fashion system. This last encourages the production of durable garments that are able to counteract not only technical obsolescence but also *psychological obsolescence*, aiming at what Chapman calls *emotional durability* (Chapman, 2005), and Normann *thoughtful behaviour* (Norman, 2004).

These concepts start from the assumption that we "consume experiences, more than objects, feelings more than stuff" (Chapman, 2012). The things we own become mere vehicles' or carriers' of meaning. Garments in particular can be considered as a second skin, with which it is possible to create a really intimate relationship. Long lasting garments can become a repository of memories; they are worn and moulded by the experience of use, they are sculpted and personified over time and they can map events of our life. The concept of *Evolving Narrative* by Puma is based on these themes. The use of the shoes and their consumption are part of its pattern and decoration, becoming so a sort of customization. The possibility to participate, in part, in the designing process, to obtain something unique and personal is a solution individuated for the durability of products and garments. The fashion software company *Unmade* bases its activity and success on this aspect. The company works with brands to offer an accurate customization of garments and products. Consumers feel involved and engaged in the experience and therefore feel more involved and engaged too with the product itself. This process leads not only to a major appreciation of the product, because it responds to the specific request of the user, but create a strong connection with him/her because he/she participated in its creation.

This type of relation and attraction, which Normann defines *reflective*, is characterized by a more lasting temporality; it is not dictated by a momentary interest or attraction, but concerns long-term relations, includes the interaction between the product and cultural identity. "Through reflection we can recall the past and contemplate the future" (Norman, 2004).

3. Bio, Alive and Interactive Garments

The two categories described in the previous paragraph represent two ways of approaching the theme of sustainability. In the following steps we intend to investigate a further approach able to integrate the founding elements of the two strands; this approach looks at recent technological advances in the field of sustainability and bio-fabrication not only as alternatives to production and processes in the textile sector, but also to investigate its potential in terms of aesthetics and semantics, with the aim of establishing new correlations between material and immaterial aspects. *Biodesign* is a design practice, at the intersection with science, in which new collaborations are created between man and nature (Mayers & Antonelli, 2018) and its applications in the field of fashion are able to create a high level of innovation at different scales. Through the analysis of some case studies, divided under some *key concepts* previously identified by Chapman (2005), we want to show how the use of natural, sustainable, alive processes and materials could actually affect the market and patterns of consumption of clothing, not only as a guarantee of a lower environmental impact in terms of production and disposal but also because they can stimulate new ways of perception, use and interaction with clothing. In this way these will be able to arouse a sense of attachment that is free from the trends of the moment.

Narration: garments are able to tell something about themselves, where they come from, how they were produced.
In the case of *Made by rain* by Dutch artist Aliki van der Kruijs, the designer defines her textile an *elemental concept*, that imprints the experience of rain on a silk fabric (Fig. 5).

Figure 5. Aliki van Der Kruijs Award, Made by rain, pluvigraphy process to texturize through rain drops.

Through her patented *pluvigraphy* technique, the woman literally paints with rain through a water-sensitive film. The result is a collection of unique "prints", different depending on the climate of the place where the fabric was made, that is able to restore a sort of territorial connotation to the product. This characterization makes the fabric singular, assigns it a story, a lived experience, a personality that deter the dismissing pattern or replace it. The uniqueness and a strong narrative nature are also the characteristics of the project *Dancing Bacteria*, the *biodesign* project from dutch designers Laura Luchtman and Ilfa Siebenhaar; a particular typology of bacteria that react to sound frequencies is used for dying textile and create different patterns. The frequencies in fact influence the mode of aggregations during growth that then are shown in the form of dye as a result of the metabolic process; in this way they are able to create patterned fabrics rather than random one, that can be customized. The process, in this case, as well as constituting a completely natural and non-toxic dyeing technique, give an added value to the textile. The product tells part of its history making and this not only gives it peculiarity, but makes its owners more aware of what lies behind our daily products.

Graceful aging: the product ages, changes pleasantly, triggering a tangible characterization process during use.
In establishing an emotional relationship with products, the ageing process can play a fundamental role. The semiologist Fontanille refers to the state of aging with the concept of *patina*, the superficial alteration that the time and the use bring to the objects (Fontanille, 2002). The signs on the *patina* become statements that acquire the role of characterizing and imprint-

ing in a personal experience of use on the product, not only related to actions but also to environmental contexts. Natural tissues in particular, if not subjected to chemical and polluting treatments, are subject to bio deterioration processes by organisms such as bacteria or fungi that change their appearance. The fashion designer Martin Margiela in this regard has carried out an interesting experiment. Working in collaboration with a Dutch microbiologist, Margiela exhibited in 1997 a collection of clothes deliberately subjected to biodegradation processes (Fig. 6). The purpose of the exhibition was to show that aspect from a different point of view; the result was unexpected: the clothes showed charming, pleasant and desirable colours, patterns and shades.

Figure 6. Martin Margiela, decay exposition, a collection of clothes aged with biodeterioration process from bacteria and yeasts.

Margiela's experiment may be the key to a reconsideration of the decay process and a first step towards the acceptance of the mutability of matter; to depart from the desire of the new, intact and immaculate and instead welcome the ephemeral aspects of things. In nature nothing is static, everything evolves, transmutes to the point of decomposition; in order to achieve the equilibrium of natural systems, which do not foresee the concept of rejection, it is also essential to begin to familiarize ourselves with changeability in the field of human production. The design, collaborating with other disciplines can therefore intervene to make this process pleasant and graceful.

Living: the garment is perceived as alive, as something to take care of.
Relating to a product as a living organism leads not only to greater attention and care, then to establish a personal link with that product, but also a greater awareness about it. The collection of *Jacket Biogarment*, by Canadian-Iranian designer Roya Aghighi, was born from the vision of a new type of interaction with products that aims to encourage care and awareness of its needs; this approach can lead to a transformation of values and could help reduce waste by changing our perception of Textiles (Fig. 7). The jacket is made with living algae that photosynthesize the air. The habits around the use of the garment are completely different. There is no necessity to wash it but the algae need to be regenerated through a periodic immersion into water. Behind the realization of *Biogarmentry* more than the intention to perform a particular function, which in this case is purifying air around you, there is the intent of forming a more intimate relationship between

Figure 7. Roya Aghighi, Biogarmentry, textile realized with alive algae.

owners and their clothing, and to transform patterns of *buy, use and dispose* into *buy, care for and compost*. The user in this case is actively involved in the "survival" of the leader that becomes his responsibility.

Enchanting: users undergo a fascination given by the lack of complete understanding of the product that leads to the curiosity to discover it.
Imagine to own an object that changes its appearance in an unpredictable way and which is perceived as possessing its

own autonomy; the interest aroused in the product pushes the user to consider it more than just a tool. Piero D'Angelo, a fashion designer from Central Saint Martin in London, through his experiments at the intersection with biology, created a collection of living garments that grows during the use. The designer use lichens and mushrooms, the slime in particular, to texturize his fabrics (Fig.9). The Kit *Grow Your Own* allows the user to grow some lichens on a garment that will have the function to purify air around you. More than the function what is interesting in this work is that the lichens continue growing during all the time of use of the garments; this means that it will change its aspect day by day, creating expectations and a constant interest and novelty (Fig. 8).

The examples analysed show us a design strategy that is not limited to aspects related to eco-efficiency, but goes to consider the intermediate step, between production and disposal, related to use experiences; focused on tracing the usage of products with reference to product careers and biographies. The green growth and the environmental benefits to which an eco-efficient production system would lead, would be offset by increased consumption through the rebound effect (Binswanger, 2001). It would be necessary to start an approach nearer to the concept of "Slow Consumption" that implicate as well as a sustainable production, a *sustainable consumption*, that means to have not only informed consumers but even more informed designers about consumers (Cooper, 2008). Designers, in fact, are no longer bound and involved to the mere designing principles and processes, but they manage even relations and consequences proper to the discipline.

The surface of products, fabrics and Textiles in this case, acting as a filter between user and relating to the sensory perception sphere, that is responsible of the emotional involvement, reveal still themselves as a vehicle of meanings and lead us into new ways of interaction with objects that will customize the individual user experiences.
Design historically, through design, responds to the needs of the society in which it lives, dealing with the methods and technologies of the time; born with the Industrial Revolution it changes its character in a constant and consistent manner to technological advances, generating innovations.

The mobile end evolving world we live in is reflected into the new materiality that is imagined as able to self-transforming, to adapt, to fold, to respond to stimulus and able to interact with the environment, through collaboration with living organisms and *biodesign*. The new languages, the aesthetics and the interactions, if studied and exploited, can lead to a radical change in the fruition of the products. The approach to *biodesign* has to go beyond only considering it as problem solving but can be the basis to rebuild the design process and to rethink some aspects of the fruition of products, like the decay, the temporality, the customization and the disposal. The main goal is to avoid the comparison between this new typology of materiality and Synthetic-traditional materials, but consider them as something completely new, still unexplored but with a high potential. This become particularly true in the fashion system, which follows very rooted dynamics but actually can provide germs of innovation both in terms of functions and aesthetics.

Figure 8. Piero D'Angelo, Grow your own couture, Growing lichens on garment, Central Saint Martin, Lvmh Prize.

Figure 9. Piero D'Angelo, Dye with slime, Biodesign Here Now', London Design Festival.

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New Advanced Clothes

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Keywords
Interactions, Advanced Materials, New Body Functionalities, Bio-Design, Bio-Technology.

Abstract
The Textile-Fashion System was investigating its impact on the environment, moving towards sustainable innovation solutions. The Covid-19 gave an acceleration to this reflection, agreeing on sustainable ways but also relying on technology through wearable devices, virtual reality, 3D printing, robotics, artificial intelligence, extending the vision of fashion to a place of research, beauty, and experimentation. Fibers are being selected and modified, new goals are being defined by interpreting research through the creation of textiles made specifically for humans. Progress with textile fibers that have been developed for the fashion industry has been remarkable, it will continue with smart, high-performance textile fibers, conductive inks, and nanometer electronics applied to garments for every need. Fashion companies are collaborating with industries specializing in technology, sustainability, biomedical, healthcare, cosmetics, electronics justifying examples such as fitbits, smartwatches or other devices designed to collect and monitor data on users personal health and physical activity, which help engage with their health, which help fight bacteria and viruses, regulate body temperature, heal skin and which also contribute to a responsible culture that makes textile design a distinctive and exclusive mode of socio-cultural inquiry from which tangible results are obtained. New body relationships therefore will lead to the creation of *new homes* by promoting healthy lifestyles.

1. Past/Post Pandemic

The Textile-Fashion System was investigating its impact on the environment, moving towards sustainable innovation solutions. COVID-19 has accelerated the ongoing reflection by agreeing on sustainable paths between production and distribution: it is said that every major crisis shapes the course of history and that difficulties can also have positive impacts, quickly bringing alternatives to the status quo, revealing new opportunities and also revealing the resilience of the parts that have resisted. In the aftermath of a sudden global disruption, for months the only way we could connect with others was digitally, underscoring that only technology allows us to restart our lives with tools that will still help us respect the rules of social distance, as well as write a possible future in different areas. Thinking about wearables, for example, it is exemplary how design integrating with technological innovation is activating new dynamics useful to improve the quality of life of both humans and the environment, offering opportunities to collect and share information, emotions, experiences, contributing to social awareness as well as generating new interactions with the body. Sustainable companies today, according to Francesca Romana Rinaldi (2020), professor at Bocconi University and author of *Fashion Industry 2030*, are those that manage to integrate ethics and aesthetics in the supply chain and in the single activities of the value chain, with repercussions on consumption models, on new economies and on the world of needs. As mentioned in a *Lifegate* article, the road to 2030 includes transparent value chains, greater consumer focus and involvement by fashion companies, data collection and analysis, and a gradual shift from product to service. Innovation, using tech-

nology, is going to define new scenarios through experimental materials, blockchain technology, virtual reality, 3D printing, robotics, artificial intelligence, machine learning, configured in *ad-hoc* wearables for a *sophisticated body* that responds to new functionalities and using design as a distinctive and unique mode of socio/cultural inquiry, to materialize and experiment. The pandemic, disrupting the fashion industry, has forced us to reconsider the role of clothing in our lives and everything will change in view of the continuous evolution that both humans and the Planet itself will undergo. In search of new and right configurations, wearables today are advancing with smart textile fibers, bio-fabricates, conductive inks, nano-metric electronics for e-textiles, with advanced materials and new functionalities.

2. Wearable Concept Between Past and Actuality

World of wearables in a combination with design and technological innovation, activates new dynamics useful to improve the quality of life of both man and the environment, offering opportunities to collect and share information, emotions, experiences, also contributing to social awareness as well as generating new interactions with the body promoting a progressive liberation from the limits determined by the body through processes of *hybridization* (De Biase, 2016). In search of new and fair configurations, wearables today make progress with intelligent textile fibers, bio-fabricated, conductive inks, nano-metric electronics for e-textiles, with advanced materials and new functionalities. Aesthetics/Economy/Ecology, in the current scenario are pushing Fashion System companies to establish collaborations

with industries specialized in technology, sustainability, biomedical, health-care, cosmetics, soft electronics, expanding the boundaries of *Wearable Technologies* (WT) compared to the original ones for which they were born: with WT, according to the most recent definitions, refers to those intelligent, electronic and technologically sophisticated devices, to any type of machine with computational capacity that can be used by man and that interacts directly with his body with which he must be in contact. These technologies, configured in devices can be connected to other devices such as smartphones, through the wireless network system or through Bluetooth technology allowing the detection, storage and exchange of data in an immediate way and without the need for human intervention. Their main function is to capture any type of data, display it, make it understandable and share or communicate it (Rajan, Garofalo & Chiolerio, 2018). Bringing it to its current state, the reference to wearables outlines configurations that, fruit of technological evolution, aim at the well-being of man and Planet in a cycle also of sustainability. It can in fact be said that their history has advanced over time thanks to the transition from analog to digital, to critical points that hard electronics has shown, which was followed by an accurate analysis in order to minimize the difficulties related to excessive energy consumption compared to the capacity and size of batteries, to doubts related to the difficult interpretation of a regulatory framework between data, privacy and harmfulness of electromagnetic waves, or even the use of new materials more sustainable making these products easy to wear and transform normal clothing into *Advanced Clothes*: in a market that promotes healthy lifestyles (Tsao, 2020) along with new aesthetic possibilities, the concept

of wearable is in fact understood as an *integral structure* with which man lives in a complex environment; man who, by not adapting, revolutionizes the ways of living – called behaviors – in a continuous relationship and internal/external interaction that improves the processes of functionality and which respond to advanced materials specifically created. Reflection reinforced by the slogan that Rudofsky (1947) uses for architecture, confirming the integral open work, namely that *we also wear a second dress*: the second dress follows, hosts and facilitates – in an almost natural way – the affirmation of ways of living in a changing space, which interacts with the body; the first dress instead because in close relationship with the inhabitant is the result of the very re-design of the naturalness of the body. Therefore, living is fundamental, inducing us to assume habits that develop in our reciprocity with space, between intelligence and matter, between idea and things, within a complex system that is both functional and symbolic, a process in which body/habit/environment are called to advance.

3. New Body Relationships

Every time a living being in the during its lifetime is faced with new conditions, problems, unknown and often not easily adjustable, it is forced to "adapt" in order to survive physically and/or psychologically. Adaptation is a change of self, of the structures and of the means at one's disposal to deal with the novelties that arrive from the environment, generating a system of relationships that is never constant. All humans coexist with other living beings, living connected but through not connected relationships and above all live in a social, human and speciesism dimension (Morton, 2019). It is a process

as complex as frequent, but above all of fundamental importance for the maintenance of an essential balance for humans. The Human being is one of the living beings that can adapt most successfully to environmental conditions, certainly not for its potential and biological-physical characteristics, but rather for the enormous variety of behavioral responses that can put in place and for the high plasticity that characterizes them. Adaptation in everyday life, therefore, where relationships, situations and problems are always new and evoke behaviors and responses that are just as changeable; but adaptation also in the most unusual, difficult, extreme situations, related to the physical environment but also to the psycho-social conditions that are created.

Thanks to the progress of scientific research and technology, human life is made possible even in very hostile environments, even in those situations that push humans to the limit. If we tried to analyze the entire front of progress compared to past eras, it would be evident that the human body itself has undergone an evolution, that it has adapted to change through the centuries until today it has become a dynamic entity that interacts by responding to complex stimuli together with a highly sophisticated body integrated in the design of a structure and in a system of tangible and intangible relationships that make specific operations possible (Iori, 2010).

The human body is part of a system that places it at the center among structures configured typologically to respond to specific functionalities and materials that interact in a system that helps it fully meet its every need, whether physical or cognitive. There are many artifacts configured for humans that are not intelligent but then become so only through the integration

of a small chip. Conventional fibers, classic cotton, pure wool, used in the production of textiles, for example, have undergone a process of evolution that has seen them once respond to the unique need to keep warm the body configured in classic pattern, then in basic structures to accommodate innovative materials, finally still become fibers in intelligent fabrics, e-textiles, with performance coatings, which have enabled them to respond to some specific human need.
At the center of technological and material progress, the human body is therefore a determining factor in new evolutionary processes and theories for a future in which unnatural risks such as environmental pollution, radiation, widespread disease, will condition the design for humans - the pandemic Covid-19 emergency being an example; technology playing a dual role, both in cause and cure, will support designers in identifying the best solutions through behavioral analysis of user characteristics, with different bodies, different needs, functional analysis with respect to the physical environment of use – including environmental and human health criticalities (Langenhove, 2007); it will involve appropriate manufacturing technologies such as rapid prototyping and additive printing, it will involve the choice of more efficient and manufactured materials in order to produce new homes in a new relational system human body interacting with the outside world. To date, wearable devices, high-performance and intelligent fabrics dress a human body altered because placed in a relational dialogue with the contexts of life, with solutions outside the conventional schemes, relationships established as a result of the changing world and in which the body is exposed to constant danger, integrating various design propos-

als that sometimes combine innovative materials compatible, recyclable and/or compostable in a perspective of circular economy and sustainable applications of wearable electronics, prosthetic solutions to extend human performance.

4. From Materials to Advanced Clothes

In a fast-growing market, there is a rising demand for more functional and eco-sustainable garments where innovation and research are pushing for an interconnected system, driven by players – including designers – who are increasingly attentive to external factors, including socio-cultural ones. If the first ten years of wearable technology emphasized research into the engineering of sensors and wearable systems configured into electronic objects and components, now wearable futures are investigating ever softer sustainable alternatives, directed at improving the quality of life and pursuing the creation of homes tailored for humans. Examples outlining this advancement with challenges related to the body, the environment, go beyond 3D printing and housing to house electronics, fabricating the materials, advanced for specific configurations, a scenery from which it emerges a fundamental role for materials, both as enabling a variety of solutions and as key tools to reach them (Moretti et al., 2019).

Since 2006, the Canadian company Hexoskin and the German company Ambiotex have focused on advanced wearable technology or rather biometric clothing, poured into soft models and not the classic gadgets, working alongside designers and researchers in the medical field: a light and breathable fabric becomes smart by means of a microcontroller – Hexoskin

Figure 1. Hexoskin: *Health Sensors Ai*, Hexoskin Pro Shirt for Men and Women, 2019. www.innovationsoftheworld.com.

mounts it on the hip (Fig. 1), Ambiotex under the sternum – to be removed at the time of washing the garment with ECG sensors (measures the peaks of electricity generated by heart and muscles), accelerometer and respiratory rate that allow continuous monitoring of the human body with data collection, a function so adopted by the classic smartwatches (Moriarty, 2018); a research process for *Advanced clothes* also looks at the possibility of fibers to become high-performance for humans thanks to synthesized processes in the laboratory that explore the technological innovation of the original material in the manufacture of real advanced clothes: from the regeneration of agricultural waste exemplary is the case of fibers born from the waste of Sicilian oranges of the company Fashion Tech Orange Fiber

Figure 2. *Orange fiber*, from orange waste to orange fiber and fabric, 2017. www.orangefiber.it.

that has conquered the collections of Ferragamo (Fig. 2) with alternatives to synthetic jersey also supporting the environment; still the synthetic fibers of the Californian start up Bolt Threads example of fibers created at a textile pharmaceutical laboratory that reproduces in an innovative way the silk starting from the cultivation of microorganisms, modification of DNA with synthesis genes in order to obtain proteins then transformed into threads recalling specifically the silk woven by spiders (Fig. 3); also, solutions that allow the cultivation of fabrics using biomasses from the mixture with glycerol, water and gelatin as the case of researchers in the *Valley zone*, who have explored alternative solutions and human-friendly, implementing the *kombucha* in a process from which you get a material comfortable to skin contact, durable and easy to shape (Fig. 4).

Today, mushrooms are emerging as a promising candidate for the production of sustainable textiles programmed for use as environmentally friendly bio-wearable.

Across all boundaries of biology, organic electronics and bioelectronics with living substrates this category of materials lend themselves to a variety of functionalities including sensing and information processing capabilities of natural systems for future wearable devices, as the research work led by Andrew Adamatzky, future developments in the field of fungal wearables may be along several directions, from fungal colony that implement a range of Boolean function to fungal cultures, which are apparently preferred for the production of sturdy fungal skins, such as fungal leather or mycoleather (Fig. 5); or direction would be to culture fungi directly onto the pieces of clothing to achieving full response cloths and garments (Adamatzky et al., 2021).

Figure 3. *Microsilk: vegan silk inspired by spider silk*, Bolt Threads factory, where synthetic spider silk and mushroom root-derived leather materials are produced for the fashion industry, 2018. www.businessinsider.com.

Figure 4. Lillian Donahue/Cronkite News, *Kombucha couture*, Focus on kombucha, fermented tea drink that can be used to make a sustainable leather-like textile, 2018. www.cronkitenews.azpbs.org.

Figure 5. Andrew Adamatzky et al., *FUNGAR H2020 Building with mycelium-based technologies*, Reactive fungal wearable, 2020. www.researchgate.net/publication/344245263_Reactive_fungal_wearable.

Another direction in the development of fungal wearables could be in using fungal hyphae as wires and programmable (with e.g. light) resistor or electrically activated resistive switching devices in hybrid architectures incorporating conventional flexible electronics and live fungi. Routing the direction of the fungal wires can be done by arranging sources of attractants and repellents. Isolation of fungal wires, as well as localized connections when ordered arrays like the crossbar array arrangement are required, could be done using inorganic materials, such as metal oxides of the proper work function deposited by means of atomic layer deposition or digitally printed over a large scale, also in case of uneven. Still, prominent among the innovations is the development of yarns that are functional because they are flexible, electro-chemically and electro-mechanically active. Most attempts to transform textiles into wearable technology have always used rigid metallic fibers that alter the texture and physical behavior of the fabric or still prompt environmental concerns and fail to meet performance requirements.

A group of U.S. researchers at Drexel University has developed an innovative method for creating textiles with technological properties using MXene (Fig. 6), a carbon-based conductive material, to create conductive yarns that can be processed on industrial looms, are resistant to washing and everyday wear, and have the same comfort as natural ones, to produce clothing with the highest level of electrical performance (Zhang et al., 2019); or again, in a research project of the team of designers of the University of Campania Luigi Vanvitelli developed at Officina Vanvitelli, in which exploiting the ability of titanium carbide MXene to be processed in various sizes (flakes of

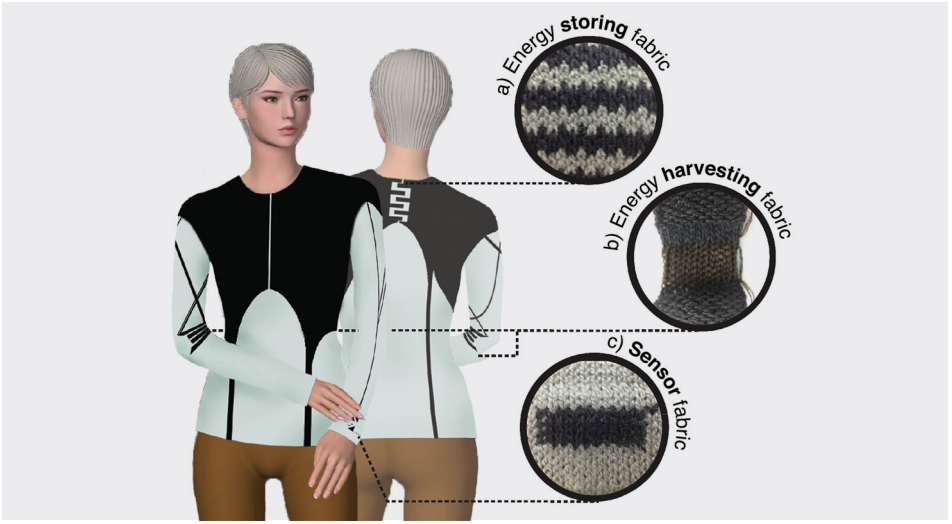

Figure 6. Simge Uzun et al., *Multifunctional MXene Coated yarn*, illustration about application of MXene for conductive yarns for wearable devices that are both functional and fashionable, 2019. www.onlinelibrary.wiley.com.

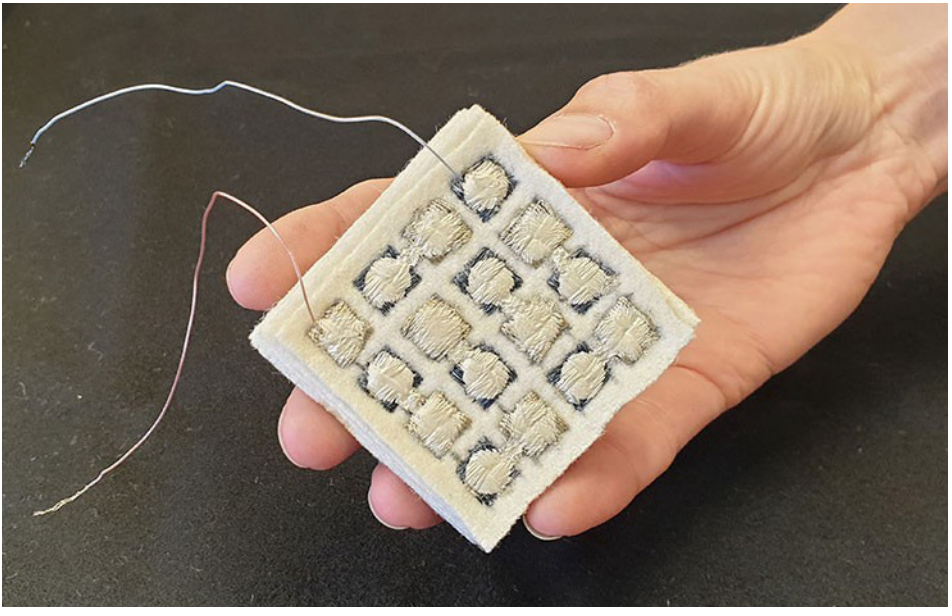

Figure 7. Anja Lund, *ThermoTex application*, this silk embroidered thermoelectric generator could power wearables through body heat, 2020. www.horizon-magazine.eu.

the thickness of a few atoms to more important thicknesses), it would come to consider the yarn Ti3C2MXene, treated in a blend with bio-compatible polymers, allowing to have a yarn treated in a 3D printing process for the manufacture of e-textiles, i.e. textiles that have electronic components and interconnections woven into them, presenting physical flexibility and typical dimensions that cannot be obtained with other existing electronic manufacturing techniques; the latter in the form of MXene combining aims to overcome any compromise in terms of flexibility, ergonomics, low power consumption, integration and possibly autonomy: it would be configured for an advanced wearable for PPE (personal protective equipment) that falls under medical use and can inherently act as a pressure sensor – through a knitting sample – or power external sensors, thus covering functions for monitoring human vital parameters (Fig. 7).

In fact, many researchers are focusing on the best way to power sustainable wearable devices by exploiting, for example, the same heat produced by the human body that would functionally power soft electronics: known for almost 200 years, the thermoelectric effect, according to prof. Christian Müller (Chalmers University of Technology in Sweden), would make it possible to convert thermal energy into electrical energy when there is a temperature difference, such as the difference between a person's skin and the outside temperature - the electrical potential would be the result of electrons moving from the warmer part of a material to the cooler one, generating a movement of charge. Another project, *ThermoTex* (2020) is extending the functionality of humans in the design of polymers thanks to a special dopant that would make thermoe-

lectric effects perform; the team has published a paper in Nature Materials showing that combining polymers with a low ionization energy – the energy required to release an electron – and a dopant (a molecule added to the polymer) with a high electronic affinity, it was possible to double the efficiency of doping. In early applied experiments, they used commercial polymer formulations to coat the silk, and although these coatings were not efficient, they allowed the project team to begin making textiles and conduction devices using the doped silk to power body monitoring sensors. Highly scientific projects that show the importance of collaboration with the textile industry to initiate innovative processes.

Another front investigates the implementation of passive actuated materials: protecting the body from ultraviolet radiation from the sun is a project part of Noumena Design Research Education S.L, on smart materials and their applications, in which the advanced is in the wearable that becomes an active and additional skin that in protecting the human body extends its functions such as greater freedom of movement and breathing (Sollazzo, 2018). The design, custom configured, allows the smart material to detect and exchange data with the environment by passively activating a system that regulates the relationship between the body and the surrounding environment while maintaining balance. This is a wearable technology that addresses the elimination of hard electronics, leading to reactive wearables with zero energy consumption (Fig. 8), investigating alternatives of photo protection due to the presence of direct sunlight; a similar theory is explicated in Wearpure.Tech (https://wearpure.tech), an environmentally friendly

garment made by combining fabrics and 3d printed elements with properties capable of capturing CO2 from the atmosphere (Fig. 9): by designing and digitally producing a garment, partially composed of fabrics and partially of 3d printed elements, the challenge of Wearpure, by the company Noumena.io (https://noumena.io/) based in Barcelona, aims at expanding the boundaries of fashion precisely through the use of 3D printing methods on fabric but with materials (like Wearpure) that, by transforming CO2 into non-harmful minerals, would reduce the contaminated air in our daily space, transforming a classic piece of clothing into a multifunctional garment, active for the well-being of human and the Planet.

5. Discussions

It is obvious from the above cases and theoretical/reflexive notions that biology, advanced manufacturing, robotics, materials technology and computational design are some of the disciplines that can create an alternative solution for both a more sustainable future and a future where human well-being is at the center of everything; we have the opportunity to reformulate the way we generate, manipulate and program the raw materials of this industrial process: technologies can point us in a new direction for more sustainable, efficient, customizable, and durable management; the very design of innovative solutions will address contemporary trends in pollution, safeguard the Planet by offering human-comforting treatments from technologies and materials; sustainable thinking and human-centered design will complement design by monitoring human-environment interactions. The Fashion System will require new homes for the body, no longer

equipped with classic fabrics but more and more performing as the needs of the human body change and determine new conditions of adaptation.
These are the result of programmed and intelligent materials that intervene by offering solutions to face common human problems (generic respiratory problems, harmful body postures, disabilities, stress) or that react with the environment by reducing air and water pollution.
The New Advanced Clothes, therefore, will refer to dress/behavior/environment, designed on the antinomic adaptation of the human body to the space, immersed in a dimension of life itself to be re-designed. Therefore, from this process, innovation will mainly concern materials, configured in new artifacts, through advanced technologies, in relation with a human body able to react and absorb changes.

Therefore, although structured in a real process, the new advanced clothes will be the result of a design methodology, of prototyping that integrates digital production technologies, that supports sustainability; they will push the fashion system to reflect on the potential of materials because the human body evolves as well as its needs; from the materials now reused/composted/programmed experimental approaches and innovative strategies will arise that in relation to the body determine new functionalities.

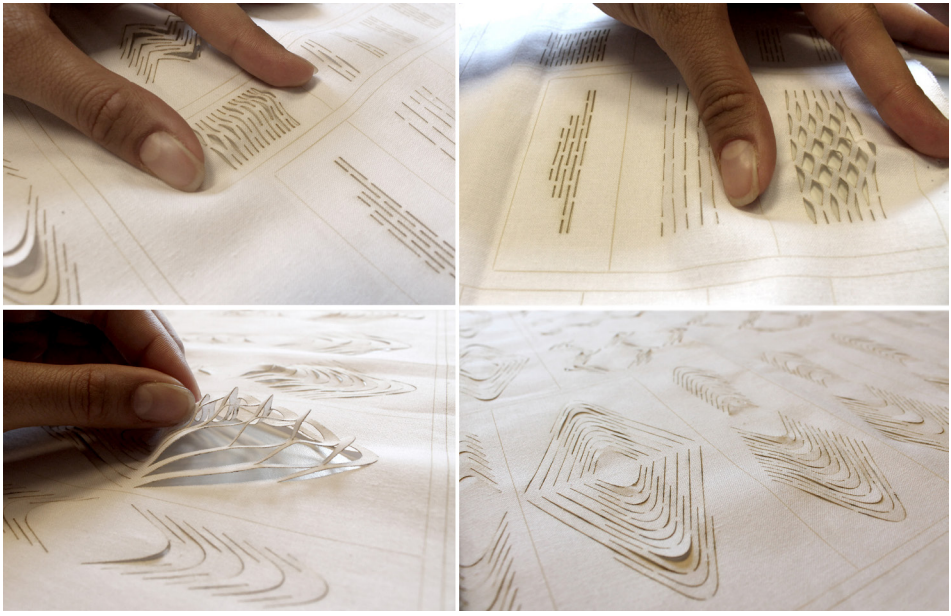

Figure 8. Efilena Baseta et al., *Photoreactive wearable: A computer generated garment with embedded material knowledge*, Physical test and deformation of computer programmed material. Material Studies - Methodologies – Vol. 2 - eCAADe 35 | 323, 2017.

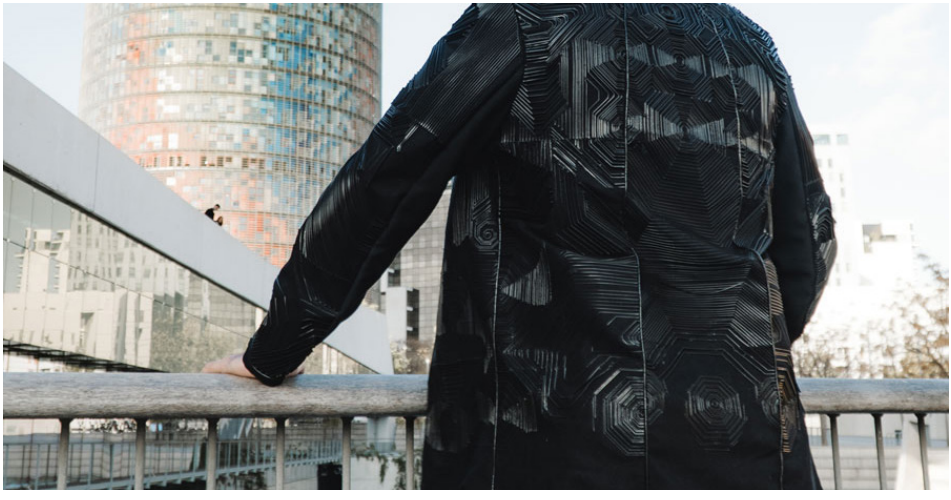

Figure 9. Noumena.io, *Wear pure: an environmentally-respectful garment*, this product is the result of new material capable of capturing Co2 from the atmosphere (Co2pure mineral powder + 3D biodegradable polymer) and 3D printed elements combinated with textile, 2018. www.wearpure.tech.

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III

PRACTICES & TOOLS

Can Sustainability Be Unsustainable?

Paradoxes and Contradictions of a Necessary Evolution

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Keywords
Sustainable Fashion, Sustainable Consumption, Consumption Models, Fashion and Sustainability Paradox, Fashion Revolution.

Abstract
This contribution aims to discuss "the paradox of sustainability" in the fashion system since it often represents exclusively a communication tool, which transmits more than has been done in the implementation of real programs towards social, environmental and economical sustainability. Juxtaposing the terms "fashion" and "sustainability" perpetuates a contradiction that "makes the expression sustainable fashion an oxymoron rather than a credible tool" (Ricchetti, 2009), or the current emergency condition, raising unresolved questions, places us in front of a total redesign of the system?

1. Is Sustainable Fashion Possible?

In recent years, there has been growing attention to the issue of fashion sustainability due to the increasingly alarming data regarding the overall impact of the system along the entire supply chain and, not least, in the product life cycle. Over the years, many studies have investigated the environmental impact of the clothing industry (Niinimäki et al., 2021; Haseeb et al., 2020; Claudio, 2007; Birtwistle & Moore, 2007) showing that the polluting elements are multiple and not exclusively linked to the production of raw materials, but to a series of intertwined factors ranging from the treatment of raw materials to production processes, to the disposal of products at the end of their very rapid life cycle, all powered by a consumption model recognized as no longer sustainable for some time (Fletcher & Grose, 2012).

Despite the analysis of global trends showing an increase in purchasing sensitivity of consumers - defined today as "conscious" (Angus, Westbrook, 2019) -, the pre-pandemic fashion system seemed to retain an inability to act sustainably. This inability probably lies in the intrinsic obsolescence and the consumption inherent in the fast model which fails, perhaps precisely because of its characteristics and structures, to pay concrete attention to the ethics or sustainability of the actions performed (Gazzola & Panova, 2019; Black & Eckert, 2010). Over the years, the fashion sector has undergone profound transformations, which can be summarized in a different consumption model due to a social change and a decline in the economic conditions of consumers. Moreover, the production relocation together with transports for products and semi-finished products have a considerable polluting impact.

On the other hand, the COVID-19 pandemic and the resulting health emergency have caused further intense transformations of the system (Amed et al, 2020) such as to bring out the pre-existing problems exacerbated, one above all the unsustainability of chains globalized distribution. All of this has suddenly become so evident that it can no longer be ignored, giving rise to the need to trigger and accelerate processes of change that are now considered necessary. With the pandemic, therefore, the awareness of the need for change seems to have consolidated and spread as the urgency to find new development paths for humanity.

The health and humanitarian crisis seem to corroborate the need for change further, but at the same time highlights the enormous forces of resistance it encounters, also highlighting the diversity - and sometimes irreconcilability - of the ideas and proposals that should favour it.

Observing the necessary evolution of fashion towards an ethical and sustainable dimension, two distinct polarities emerge: the first is based on the belief that the crisis of the dominant model can be faced by introducing technological innovation in production processes, in smart textiles, in the processes of traceability or scientific data processing. It is, therefore, an adaptation to the new needs that have emerged, through a correct - and preferably ethical - use of the new emerging digital technologies (Gwilt, 2020). On the other hand, we find an idea based on the overall critique of the dominant development model which questions not only the results that can be observed today but the same assumptions. In this perspective, the current structural crisis is configured not as a hiccup, but as an unsustainable trajectory that needs to be oriented in

entirely different directions. This contribution aims to discuss these two polarities regarding ethical and sustainable fashion since in some cases it manifests itself exclusively in communicative and facade tools (e.g. greenwashing) that transmit more than has actually been done in the implementation of real programs towards social, environmental and economic sustainability. In other cases, however, experiences can be identified as good practices are significant, innovative and consistent with the reference value system, but circumscribed and limited in terms of impact on business models, on the ability to root, disseminate and disseminate the results achieved. We, therefore, intend to discuss "the paradox of sustainability" in the fashion system since juxtaposing the terms "Fashion" and "sustainability" seems to perpetuate a contradiction that "makes the expression sustainable fashion an oxymoron rather than a credible tool" (Ricchetti, 2009). Or does the emergency situation, by raising unresolved questions, place us in front of a total redesign of the system?

2. Fashion and Sustainability Paradox

The issue of sustainability has been going through the fashion system for some time now. Since the first decade of the 2000s, some dramatic events such as the Rana Plaza collapse in 2013 in Bangladesh, have caused consumers to increase individual awareness of the environmental and human impact of an excessive purchase of clothing (Jacobs et al., 2018; Kim et al., 2013).

Every day we are held as witnesses to the impact of our consumption (Castells, 2014) and therefore, faced with the inherent unsustainability of infinite growth within a world made

up of limited resources, the fashion industry today assumes concretely the need to undertake the path of sustainability both in products and in production processes (Gazzola et al, 2018, 2019). Sustainability is a vast and complex topic as the very definition of the term has evolved from a vision centered on purely ecological aspects to a more global meaning that takes into account how the social and economic dimension of a sector or a production chain impact on the territory. Precisely due to its broad meaning, the term "sustainability" could at times be ambiguous, because it can concern the project, the product, the company, the store, the packaging, the supply chain both in reaction to the proximity of the actors and traceability, raw materials, disposal. However, at its most basic definition, sustainability is characterized as the ability to maintain (Elliot, 2019) specific values and resources for future generations.

Sustainability, therefore, still has a vague nature of its own and is subject to numerous interpretations: sometimes an interpretative philosophy, sometimes an exceptional marketing tool (Mcdonald & Oates, 2006) since its function largely depends on a local context (Newtown & Freyfogle, 2005). Already in 2011, Francesco Morace wrote: "over the next 20 years being 'sustainable' will be a necessary feature that every product will have to incorporate to enter the market" (2011). This statement is even more concrete today according to the pre and post COVID-19 fashion trends which seem to suggest a future of fashion only possible in the direction of sustainability.

Moreover, the attention to sustainability, was concrete even long before the pandemic from Covid-19, wherein a world

threatened by climate change, the demand of growing populations, and shrinking natural resources, the concept of sustainability has emerged as a silver bullet (Kumar, Rahman, Kazmi & Goyal, 2012). Given these considerations, the purest intent of all activism in the direction of ethical and sustainable fashion has the primary purpose of fighting what the market has promoted for decades with the creation of superfluous and ever-new needs. This contradiction in terms of the fashion system would seem to collide with the increasingly fast phenomenon of recent years.

Hence, sustainability is not a declaration of intent to be included in a company profile, but a business philosophy that crosses the entire structure of processes and products in a profound and transversal way. It is mainly a cultural change of the consumption model as underlined by Lisa McNeill and Rebecca Moore (2015) "changing consumer attitudes to apparel consumption, [...] has led to a culture of impulse buying in the fashion industry, where new styles of clothing are available to the average consumer every week".

Thus, the current consumption model has triggered a vicious circle in which products last longer than fashion itself. Therefore, on the one hand, consumer demand for fast-fashion has prompted brands to accentuate the speed, quantity and size of the production (Remy, Speelman & Swartz, 2016); on the other, "the need to continuously buy new garments is fostered by mass media and business speculations" (Campagna et al., 2017).

Speed, consumerism, obsolescence have been critical words on which fashion in recent years has based its choices in terms of design, supply, production and distribution. The suc-

cess that this business model has had, and the resulting global economic importance, has somehow legitimized a model that has made waste its strong point. Recently sustainable fashion production and consumption have gained more attention (Yang, Song & Tong, 2017; Vennstrom, 2012), in fact, it is acknowledged that fashion has a significant impact on the environment and society (Bick, Halsey & Ekenga, 2018). However, it is argued that sustainable fashion can be paradoxical by its very nature (Bly, Gwozdz & Reish, 2015; McNeill & Moore, 2015). In this regard, some scholars have defined this phenomenon as the "fashion paradox" (Blake, 2008; Ricchetti, 2009), to underline how the intrinsic obsolescence and waste of the fashion model is paradoxically justified and above all culturally accepted (Dissanayakea & Sinhab, 2015) without too much attention to the ethics or sustainability of the actions carried out in this sector.

3. A Multi-Level Problem

As Fletcher & Grose (2012) write, turning the industrial dimension of fashion towards sustainability requires substantial changes at different levels: in the fashion product (materials, production processes, timing, distribution and disposal), in the functioning of the system (life cycle, impact, needs, speed, globalization) and not least in the practice of fashion design which should conceive durable products, with less obsolescence and possibly disassembled.

The change required of the entire sector also concerns a total, overall sustainability that embraces the term in its various meanings of environmental, social and cultural, and not least economic, sustainability. Sustainability understood in its

transversal, and systemic dimension, therefore, goes through as many steps as those of the supply chains. From the cultivation of fibres, through packaging and sales practices, each phase is exposed to significant risks in terms of impact. This impact is configured at different levels and concerns the risks of damaging the environment, the health and well-being of workers, but also the production of intangible contents such as the obsolescence of garments and trends, the perception of typical beauty, health and success of western fashion (Mora, Rocamora & Volonté, 2014).

The pre-pandemic fashion industry is therefore configured as a concrete and tangible example of transversal unsustainability when reference is made to the increasingly shorter production and delivery times, to the proposal of continuous changes in trends that favour the obsolescence of products, thus encouraging purchases more and more frequent by consumers. The fast fashion industry players have also been criticized for highly polluting and unsafe production as well as for working conditions, effectively embodying a highly unsustainable business from an environmental point of view, but above all social. All these considerations suggest the need for systemic changes and therefore fueled by a considerable complexity in actually taking place.

From the analysis it emerges therefore that sustainability in fashion is difficult to achieve due to the complexity of the system in all its phases and not only, but it also concerns both the production of material goods and intangible contents (Mora, Rocamora & Volonté, 2014) making the sustainability a multi-level problem or, as in the words of Kate Fletcher stratified (Fletcher, 2010).

In 2018, during the Copenhagen Fashion Summit, Eva Kruse highlighted five priorities regarding the challenges of sustainability in the current fashion system.

Challenges were:

- traceability of the production chain the efficient use of energy resources,
- the safety of the workplace,
- innovation in the choice and production of materials,
- the implementation of recycling practices,
- a fair wage system closely linked to the impact that the fourth industrial revolution will have on production processes in the future.

It is therefore clear that the issues are not only numerous but intertwined, making the path towards sustainability in the fashion system not only stratified but also multidisciplinary (Fletcher, 2010). It is, therefore, a complex reality, made up of elements that interact and influence each other in a continuous cycle. What is complex cannot be broken down or unraveled but needs to be understood and considered globally aware that "neither the analysis nor the decomposition of the parts into independent units can constitute valid methods" (Pizzocaro, 2004). Every complex system is characterized by interdependencies and therefore also fashion regarding sustainability inevitably has multiple repercussions in differentiated areas such as company and labour policies, production systems, consumption and consumers.

This reflection makes it significant to direct collective thinking not only towards precise actions but towards a total redesign of the system that can therefore include technical and technological problems but also the results of industrial fashion in the market, society and supply chain management policies.
Therefore, even if the terms fashion and sustainability have long been considered an oxymoron (Ricchetti, 2009; Blake, 2008), reviewing products, services and managerial processes in the direction of sustainable development, as well as designing new socially responsible business models are today perceptible as urgent and represent key dimensions to create value for both companies and society. According to these recent perspectives, however, the path is certainly not simple: it becomes central for companies to select suppliers through objective and transparent criteria, as well as the traceability of products and production processes (Campana, Carluccio & Cimatti, 2017).
The areas of intervention that can lead to the sustainability of the fashion system concern and intervene on all stages of the value chain: from the procurement of raw materials to their processing; to production; they involve technologies in the traceability and optimization of processes; they concern aspects of transport and packaging logistics; promotion and communication; and finally - but not least - the cultural model of consumption.

4. Business and Consumers Towards a 'Fashion Revolution'

In recent years, the scenario would seem to have substantially changed and further consolidated in the change that occurred with the global COVID-19 pandemic.

In fact, for some years already, it was possible to record important activism by NGOs first, but then also by consumer associations. Activism toward sustainable fashion requires companies to have greater transparency of practices and production processes and also to make considerable efforts towards environmental and social sustainability. This kind of campaign joins the now overt trend confirmed by the Giga and megatrends recorded by monitoring agencies such as Euromonitor, Mc Kinsey.
Those researches demonstrate that the most attentive consumers are guiding the behaviour of companies in favour of the sustainable action of the fashion system. From these surveys, it emerges that consumption habits will be subject to substantial changes due to the growing sensitivity found in consumers and the coronavirus has done nothing but accelerate a process already underway (Amed et al., 2020), which sees sustainability - certainly environmental, but also social and economic - in the centre of attention.

The fashion consumer nowadays is demanding, connoisseur, selective and his/her buying habits are based on personal evaluation of the product. We are genuinely facing a considerable revolution that is affecting the consumer of the fashion world, desecrating previous systems as well as semantic stereotypes.
However, there is still a “knowledge-to-action” –gap both in company policies and in the consumer behaviour on sustainable environmental consumption. Thus, if consumers have been given the role and responsibility of leading the market towards sustainable development (Schaefer & Crane, 2005;

Christensen et al. 2007; Autio et al. 2009; Peattie and Collins 2009) in these years there have been no real changes in people's consumption patterns (Gazzola, Panova, 2019).

Therefore, if contemporary consumers do not show significant attention to sustainability in purchasing behaviour, probably also due to miseducation and disinformation, this changes considerably when observing the preferences of consumers in the near future: in fact, in 2016 only 7% of people declared to buy natural or sustainable clothing, this year the figure has grown to 16% (Amed et al., 2020). Leading this change are the younger generations, as evidenced by the report The State of Fashion, prepared by McKinsey and the magazine The business of Fashion, according to which 31% of consumers born after 1996, the so-called generation Z, declare that they are willing to pay more for products with the lowest environmental impact. The report shows that the younger the consumers are, the more sensitive they are to sustainability issues and demonstrate preferences in purchasing ethical, durable and quality products, even at the cost of buying less.
Hence, if proposal is generally driven by demand, it is essential to underline that in this case, it will probably be a halfway joint since companies are also beginning to interpret sustainability no longer just as a marketing tool but as competitive factor. The coronavirus has accelerated an already fermenting process of change in which many fashion brands were already implementing substantial transformations aimed at sustainability in policies and processes.

5. Will the "New Normal" Bring New Production and Consumption Models?

To address the complexity of the "layered" problem (Fletcher, 2010) companies try to shift their attention from selling products to offering services by implementing product-service systems such as leasing and repair. Certainly, it will be necessary to implement a more transparent and traceable supply chain, which can provide the possibility for the brands themselves and consumers to be aware of all the processing phases. Above all, the transition from a linear to a circular economy will be necessary, which reuses materials extending their duration over time. The fashion system has demonstrated the need to readjust to a slower pace and to seize the opportunities of digitalization in remodelling systems and services. Design plays a fundamental role in a more rational use of resources in the development of new products (Thorpe, 2007; Fletcher & Grose, 2012; Fletcher & Tham, 2014). Here, the designer can exert a substantial influence that enhances the centrality of the creative process rather than the product. Sustainability begins with how the products are conceived in the design phase, to reduce the use of resources, to disassemble, to reuse, recondition or recycle. In this essential role assumed by design, the creative directors show iron will to reduce the pace, and this is already considered significant. The letter from the Belgian designer Dries van Noten, then signed by 250 brands asking "the fashion system" for radical changes.

Moreover, trend forecasting, as a "mass-market fashion engine" (Tham, 2008), can also be an essential agent of change. Why, how much more sustainable production methods can

count if the garments still have a short-term appeal and consumption remains the same? (Kornberg & Svensson, 2018). Although traditional economic literature interprets economic and social objectives as being in contrast with each other (Friedman, 1970; Higgins 2013), in recent decades the belief has become widespread that both objectives can coexist and that social objectives can become a source of competitive advantage (Kim, Choo & Yoon, 2013), year and therefore companies begin to invest in a more responsible type of innovation. Concerning ethical consumption, on the other hand, the discussions have increased in both academia and industry, research suggests that while many consumers have strong convictions toward the consumption of sustainable goods, these convictions do not always translate into action (Gazzola, Sepashvili & Pezzetti, 2018). The pandemic, however, has upset the balance, violently emphasizing the direct link between the environment and health, and so, in a moment of great uncertainty, the fashion sector is seeking its new dimension by planning times and ways of producing and communicating. The path of fashion towards sustainability is, therefore, made up of various factors, as numerous as the steps in the supply chains. But first of all, the operational practices aimed at implementing processes that allow a production system attentive to people and the environment, making an entire sector sustainable, the need to recognize the urgency and importance of the issue.

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Coworkings as Focal Points for the Development of New Models for a Sustainable Fashion
Discourse and Practice

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Coworking, Sustainable Fashion, Focal Points.

Abstract
This research explores the theme of social innovation in fashion industry through coworking spaces as focal points to deal with the challenges the fashion industry faces to. Based on a case study, the paper demonstrates that coworkings can act as spaces of convergence, where people who do not know each other can meet and, from there, work together to create new models. The case studied was a fashion coworking space with a focus on sustainable fashion companies called Malha (2017). The results shows that coworkings face practical challenges for their consolidation as focal points, mainly in relation to the construction of a truly collaborative and transparent culture and the financial sustainability of the enterprise itself. The discussion demonstrates that coworkings are more than spaces for sharing resources, they involve values and a culture of their own that, if not reinforced on a daily basis practice, weakens the credibility of the space, making it impossible to act as a focal point. Finally, the article explores the strategic principles for coworking spaces to act as focal points, reducing the ambivalences between the concept and the practice.

1. Social Innovation and Sustainability in the Fashion Industry

In the last 30 years, since the publication of the report "Our Common Future" (WCED, 1987), and especially after the Sustainable Development Goals were established by the United Nations in 2015, the issue of sustainability became an important topic in any discussion regarding product development and the future of the industries. The fashion industry was not left out of the discussion and actually became a hot topic, as we understand that the business model of fashion, as it currently is designed, is inherently unsustainable.

In this context, the slow fashion movement gained strength advocating for "a new set of attitudes and values that can minimize the impacts on society, both with regard to environmental as well as social and economic issues" (Morelli, 2010, p. 2). With the movement, many new brands more aligned with the sustainable goals were created, big part of them being small/medium business.

According to ABIT (Brazilian Association of the Textile and Clothing Industry), in 2015 the Brazilian Textile and Clothing Industry had a turnover of US$ 39.3 billion and a production of 6.7 billion pieces (clothing, socks, accessories, bed, table and bath). The industry generates 1.5 million direct jobs, and 8 million if we add the indirect jobs and income effect, thus being the second industry that employs the most in Brazil, second only to the food and drinks sector (together). According to data from SEBRAE (2015), a considerable part of the fashion industry in Brazil is of Individual Micro Entrepreneurs (MEI). In 2015 the turnover of this segment corresponded to around 3,5% of the Brazilian gross internal product.

This data shows how important the fashion industry is for the Brazilian economy, just as it is the case in other countries. Therefore, any issue related to it has a major impact on the generation of jobs and income in the country. So, when we discuss sustainability in the fashion industry it is important not to lose sight of the economic dimension, as referred also in the sustainability triple bottom line: environmental, social and economic.

Regarding sustainability, Manzini (2008, p. 2) argues that there is a need for a systemic discontinuity, a break with the current production, consumption and lifestyle patterns, in favor of sustainable thinking. According to the author, sustainability should be a "meta-objective" for everyone, and not a specific area of thought. So, not only from a production perspective but also from the point of the business model itself, of competition, fast consumption and disposal, on which the fashion industry is founded, everything should be re-evaluated and re-designed.

In order to investigate how systemic discontinuities, unfold in practice, this paper chose the case study method. The method starts from a real-life situation to understand and explain complex phenomena (Andrade Martins, 2008, p. 11), as is the phenomena of social innovation towards sustainability that question established paradigms in order to create new models. Also, the information collected can support new research, projects and theories, as we will suggest further in this article.

During the course of the research, we conducted interviews with five people related to the space, both managers and coworkers; analyzed documents available, as websites, me-

dia articles and social media; and observed the routine of the space in two different occasions.

Malha was created in this context of questioning that fashion industry was (and still is) going through. The intention was for it to be a community and a space for small/medium fashion entrepreneurs that shared the ideals of sustainability to work from and to develop their own business and the sustainable fashion industry as a whole in the country.

The ambitious concept called the attention of the media and of many entrepreneurs who wanted to be part of the space and of the movement it was trying to lead. The organization quickly became a reference on the niche of sustainable fashion, and also developed partnerships with big fashion brands that wanted to be connected to these values.

Although the concept was highly accepted and embraced, the practice proved to be challenging and after a series of problems, varying from physical structure issues to accusations of greenwashing, the coworking space was closed. But not before bringing sustainable fashion to the mass media and creating opportunities for collaborations to happen and sustainable brands to solidify their space.

The case of Malha shows that working with sustainable fashion is still a big challenge, and that we have important cultural and economic aspects that must be faced in order for real and viable changes to take place. It is still too common to see nice discourses that don't leave up to the expectations they create themselves, this may be prejudicial to the industry as a whole as it weakens the trust of entrepreneurs and consumers on the possibility of a different system to be created.

However, the case also demonstrates that coworkings have the potential to be a focal point for new solutions to be developed if they adopt a transparent and committed approach in tune with the challenges and eventual limitations they may have.

2. What is a Coworking?

Before being physical spaces, coworkings are a movement. They emerged through a gradual process initiated in the 1990s and in 2005 the first "official" space of its kind was opened. The intention was to create a "third form" of work, which involved "physical proximity and social cooperation in a shared space outside the limits of shared formal employment" (Waters-Lynch et al., 2016, p. 08). The Coworking.org (n.d.) portal explains coworking spaces as follows: "Coworking spaces are about community-building and sustainability. Participants agree to uphold the values set forth by the movement's founders, as well as interact and share with one another."

The portal goes on to say that coworkings should have four characteristics: openness, community, collaboration and accessibility. According to Morais (2018), these characteristics can be defined as:

- Openness: system accessibility to interact with other systems and the environment. In the scope of coworkings it is about transparency and ease for exchanges and internal and external interactions.
- Community: it is about the people and relationships that are formed within that space.

- Collaboration: process where all actors are co-producers of the final result and work actively together to create solutions and generate benefits.
- Accessibility: this starts from the idea that who works in a coworking space does it by choice, and that the selection of who should or should not stay in that space must be natural, and not mediated by a process or by individual preconceptions.

Waters-Lynch et al. (2016) differentiate coworkings from the "shared offices" that have existed since the 1960s. Although both operate within a similar business model, renting space at more affordable rates, they present three important distinctions: the profile of the founders of the place (profession, objectives with space, etc.), the centrality in the relationship between residents (information exchanged, they only share the space for financial reasons, etc.) and the very aesthetics of the space (layout of the work environment, incentive to coexistence and exchanges, etc.).

As the coworking space is perceived and respected by the market niche in which it operates, it also gains the public trust to validate the companies and professionals that are part of it, making other professionals more confident in residents and thus facilitating an approach (Waters-Lynch & Potts, 2016). As a result, coworkings become much more than a space for sharing the physical environment and expenses, they act as platforms that connect not only residents, but also external actors that identify with the values upheld by that particular space.

So, we can define coworkings as spaces where you connect with other people, resources and skills in order to generate

value. In this sense, Waters-Lynch and Potts (2016) approach coworkings through the lenses of game theory to say they can act as focal points (Schelling Points), that is, "a solution to a problem of coordination between different parties in the absence of communication".

In order to be consider a focal point, Waters-Lynch and Potts (2016) establish four criteria:

1. Have a defined and recognized niche, so that interested parties understand what kind of professionals / solutions can be found in that space;
2. Be a type of club, with defined rules, and a series of common resources;
3. To be a space where partnerships, contracts, new ventures, etc. are created, which, once they are better developed, will leave that space to act alone;
4. Have a cost and some level of exclusivity, to generate value, and also differentiate / select the professionals and companies that will be part of the space – this point can be questioned, as the concept of coworking includes the idea of accessibility, as mentioned before.

When the coworking act as a focal point, it brings together business and people with shared values and work as a platform that connect them towards a common objective. The aim of the practice of the coworking as a focal point is not to have always the same residents in the space, but to be a transitional space, where they'll build partnerships and the necessary structure to grow towards their objective.

Thus, it becomes a fertile space for innovation by giving access to resources and validating small initiatives, thus creating the trust necessary to form partnerships that would not be possible, or at least likely, if the space was not there to facilitate this connection between the different, and unknown, actors. Manzini (2008) states that the transition to a new, more sustainable social and economic model will occur through a process of continuous learning and systemic discontinuities. Such systemic discontinuities are cases of social innovation, which disrupt paradigms to create new, more sustainable models. Crozier & Friedberg (1993, p. 19 *apud* Edwards-Schachter & Wallace, 2017, p. 12) define social innovation as "a process of collective creation in which the members of a certain collective unit learn, invent and lay out new rules for the social game of collaboration and of conflict or, in a word, a new social practice".

Having this in sight and considering Waters-Lynch and Potts (2016) vision on coworkings as focal points, it is possible to see them as a fertile space for new ideas and models for a more sustainable fashion industry. So, the coworking is not the innovation on itself, but the space that creates the conditions and provides the resources for them to be developed. As previously mentioned, both the coworkings and social innovations have collaboration as one of their main characteristics. According to Cipolla *et al*. (2015, p. 130), collaboration occurs as all participants become "active co-producers of benefits recognized by all". The authors also state that collaboration can evolve into relational services, where actors not only have an active role, but also relate and interact in a personal

way, this type of case involves higher levels of trust and intimacy (Cipolla *et al*. 2015; Cipolla & Manzini, 2009). Therefore, collaboration differs from sharing to the extent that there is active participation and exchange of those involved. Furthermore, collaboration can take place vertically, from an organization (or service provider) with the user, and horizontally, between users or between organizations (Cipolla et al. 2015).

As the conceptual basis that guides this paper is defined, we can go on to the analysis of the object of the study.

3. The History of Malha

Malha was defined as a "movement for a fair, sustainable, collaborative, inclusive, local and independent fashion". On its website, the organization presented itself as follows:

> Malha is a platform for the fashion ecosystem that connects creators, entrepreneurs, producers, suppliers and consumers by building sustainable, collaborative, local and independent fashion. For this we provide the means of production and encourage the exchange and creation of knowledge. We are both a coworking and cosewing space, a community, a school and an experimentation laboratory. Here we develop new customer experiences, incubate projects and design the future of fashion (MALHA - Home, 2017).

Malha was located in São Cristóvão neighborhood, in Rio de Janeiro. There was located Malha's warehouse, "a collaborative space for production, creation, experimentation, and a growth platform for entrepreneurs" (MALHA - Home, 2017). The intention was to create a space that could house and fo-

ment new projects and ideas towards a more sustainable fashion industry – and with that become a focal point, as defined by Schelling (Waters-Lynch & Potts, 2016) for companies and people that shared the same ideals.

When the warehouse first opened its doors the media coverage was significative, and many stated that the space was "an alternative for the future of fashion industry" (Monteiro, 2019).

On an effort to promote collaboration between people/companies that had their spaces at Malha, the architecture of the place was designed to privilege common spaces. It was also common for events (both for residents only and open to the public) to take place there and residents could vote on some proposals on how to manage the space.

But the space faced challenges to translate their ambitious concept into real practices. Even though it was designed to promote collaboration, the warehouse was empty for most of the time. The structure was big and had a high maintenance cost, so the rent prices were not accessible for small/medium companies. Other structural problems were mentioned during the interviews, like the lack of proper air conditioning and unstable Wi-Fi connection.

On top of the structural issues, complaints of lack of transparency and incoherent practices started to appear. One had an especially big repercussion on social media and said that relationships at Malha were not truly collaborative or equal – as the organization would be privileging their own agenda and even creating an in-house brand (AHLMA) that would compete with the entrepreneurs of the space.

In April of 2018, after less than two years Malha's warehouse was closed. The organization tried to continue in a digital

format, as a community and also as popup stores in shopping centers, but the last project that was advertised by the organization was in November of 2018.

4. Malha as a Focal Point

Going back to the criteria defined by Waters-Lynch and Potts (2016) to characterize a coworking as a focal point, we have four main characteristics: having a niche, a set of defined rules, being a space where partnerships are formed and having a cost or some kind of exclusivity.

Malha had a well-defined and recognized niche. The space focused on the fashion industry, specifically on sustainable brands. This could be perceived from the selection of resident brands, events and the discourse on social networks. For the theory of focal points, this identification is essential to make it clear what can be found in that space.

One aspect that may be questioned in this sense is that, if sustainability should be a meta objective, it should not be seen as a differentiation criteria or a sales argument.

Malha had a set of defined rules, although not so strict. The management was carried out by a dedicated team, and in some moments the coworkers were called to be part of the decision-making process. Like clubs, there were several spaces of common use, such as the kitchen, co-sewing, the photography laboratory and living spaces. Although they are considered a positive thing for the focal point's concept, these things also added to the high maintenance cost – something that goes against the purpose of coworkings and, at the same time, limit the possibility of innovation as it becomes inaccessible to smaller brands with less resources.

However, from the perspective of the focal points in the way proposed by Watters-Lynch and Potts (2016), this exclusivity is positive, as it creates differentiation and value for those who can be part of the space. Also, it creates a feeling of trust for those who seek the services of these companies and professionals, since they are validated by the organization itself as they are allowed to be members of it.

One point in common among the residents was the desire to create something from a higher life purpose (they would emphasize that profit was not their main goal), from coworkers to management it was possible to see that there was a very strong ideological component among everyone who was part of the space. Although it sounds noble, this vision can be problematic if we analyze that one of the issues Malha faced was the high maintenance cost, which translated into rent prices that were not affordable to small business (that were the intended users of the space).

This is in itself one of the contradictions that the fashion industry has to deal with in the path to sustainability. While the discourse tries to separate sustainable fashion from the traditional idea of profit, the economical aspect is still essential for any company to stay in business. So, in some way, both things must coexist while, as Manzini (2008) states, a whole new system is designed.

On top of all previously mentioned, the great media coverage that followed the opening of the space also asserted Malha as a leader space for the development of a sustainable fashion industry in Brazil. At the same time that all this attention made the organization a reference for the niche, it also generated great expectations for coworkers and the society which, add-

ed to alleged lack of transparency, made it very susceptible to complains of greenwashing on the first signs of problems. Last, focal points are spaces where partnerships are formed and, in the same way, coworkings imply the existence of a community. Although some specific partnerships were formed there, the lack of movement in the space and distrust caused by the noise between discourse and practice made the early stage community to break away.

5. Theory X Practice – The Challenges for Change

As discussed, the focus on collaboration and sustainability in fashion were the most prominent aspects in the initial phase of the project. That led part of the market to perceive the space as a *salvation*, a place that would provide answers to the problems that the fashion industry faces in recent years (environmental impacts, reports of slave labor, excessive consumption, etc.). As was widely stated in interviews, and reinforced by the materials surveyed, the concept of Malha was inspiring, but the reality proved more challenging then expected.

Although Malha could be considered a focal point as defined by Waters-Lynch and Potts (2016), the organization failed to fulfill some basic aspects of a coworking (a proper workspace, for example) and to build real trust between the resident companies and also residents and the space – greenwashing accusations and the creation of an in-house brand perceived as a competitor reinforced that. The expectations created by the discourse that Malha proposed proved to be too ambitious and not backed by real actions, which is one of the big emergencies for sustainability: how to materialize inspiring concepts into real actions and viable solutions?

Figures 1-2. Giulia Bolzan de Morais, Coworkings as Focal Points for the Development of New Models for a Sustainable Fashion: Challenges and Opportunities, November, 30th, 2020.

This gap between the expectation that both coworkers and the overall society had regarding Malha caused for a big frustration already in the first indications of problems. Analyzing this case is possible to notice how important it is for a coworking to have transparency on their processes and challenges, so the reality is not clouded by overrated expectations that may backlash at any moment.
Transparency is not about choosing the information that is the most beautiful version to tell. Either the whole game opens or better assume that transparency is not a priority. By omitting the side that points to the need for improvement, it gives the impression that everything is fine when it is not (Re-Roupa, 2017).

A key aspect of a coworking is the physical space and structure offered to the coworkers. As other aspects, the location itself of Malha was interesting as a concept, in the middle of traditionally industrial area of the city connecting north and south parts of the city, but the logistic aspect was not good. The access with public transport was hard, the region can be dangerous and there is not much parking space. This difficulty to access was not only a problem for the coworkers, but also made it hard for visitors to go there.
The lack of good working conditions, like lack of proper air conditioning and unstable WIFI, added to the difficult access were disincentives for coworkers to actually go to the space – which in consequence made it harder for stronger partnerships to form.
This brings us to one of the four key characteristics ranked by Waters-Lynch and Potts: the ability that the coworking must

have to become a space that foments collaboration. Here, we go back to Cipolla *et* all (2015, p. 130) to state that collaboration requires for participants to be co-producers of something that has benefits recognized by all.
This calls the attention to the importance of understanding the drivers and incentives for people to collaborate. Other than a nice word or a positive value, collaboration is an action, the co-production of benefits, and as it was possible to see in the case of Malha, it requires a good level of trust.

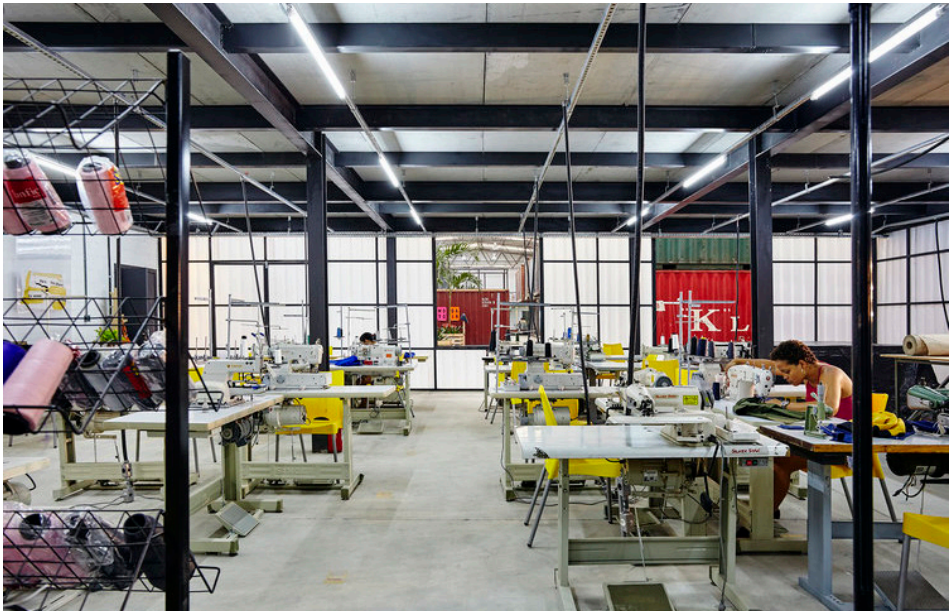
6. Final Remarks

The case study of Malha is valuable to demonstrate one of the great contradictions of sustainable fashion: the empty space between concept and practical reality.
In Malha we see the story of an idea that was able to gather many companies and draw the attention of the national media. However, behind the scenes, the practice was not living up to the concept and weakened the organization.
By the mobilization Malha was able to create in the beginning it is possible to still state that coworkings can act as focal points to foster collaboration towards social innovation and sustainability. However, it is important to carefully design the conditions for that to happen. Some aspects identified in this research are:

- High levels of transparency regarding both the values of the space and eventual challenges – discourse must be backed by practical actions or viable plans. With that they avoid the creation of expectations that cannot be met at that point and create a feeling of mutual trust, as everyone is aware of the real situation;

- Proper work conditions and easy access location. In order for partnerships to be formed inside the coworking, the coworkers must be at the space on a frequent basis. For that to happen it is important to be attentive to the easiness of access to the location, comfortable working conditions and availability of necessary technical assets;
- Accessibility – although Watters-Lynch and Potts (2016) add exclusivity as an aspect that helps to build trust, coworkings, as understood in this paper, are spaces designed especially for freelancers and small business and must consider that (particularly towards pricing).

As proposed by Manzini (2008), the path to sustainability is one of systematic discontinuities, Malha was one of them and opened the path for new spaces to follow. Regardless of its short life Malha's contribution to the spread of the discussion about sustainable fashion and collaboration in the industry is undeniable.



Figures 3-4. Giulia Bolzan de Morais, Coworkings as Focal Points for the Development of New Models for a Sustainable Fashion: Challenges and Opportunities, November, 30th, 2020.

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Acting Responsibly
Design as a Sustainable Practice for Society

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Hybridization of Skills, Ways of Doing, New Media, Advanced Manufacturing, Online Community.

Abstract
The rapid rise of emerging issues, often linked to the absence of sustainable action, exposes society to unexpected and unwanted risks. Today, more than in the past, this condition of fragility places at the center of the design debate the need to build a critical point of view, concerning some production actions that still accept the inevitability of environmental damage, whose resolution is postponed to pursue economic growth.
Only through responsible action will it be possible to predict the effects and design the remedies useful for reconciling the relationship between human beings and the ecosystem.
In this perspective, it is the convergence between different disciplinary skills that offers a sustainable and effective response to urgency, shortening the supply chain that goes from creation to production of the artifact and reducing the gap between market and consumer. Thanks to the methods of Ethical communication and the techniques of digital manufacturing and prototyping machines, fashion, and more generally the textile sector, could lead to the creation of valuable products considered as communication tools useful for the common good of society, not only in socio-cultural terms but also in terms of sustainability and circularity.

1. Introduction[1]

In recent years, a portion of the world has become increasingly concerned about pollution, climate change, and other *permanent* and widespread emergencies that threaten society (Piscitelli, 2019). The growing number of disastrous events, often linked to the neglect of the environment, and which are generating, for example, desertification, melting of Arctic and Antarctic ice, water pollution, fires, as well as the spread of epidemics, are just a few catastrophic events that impose a great challenge for contemporary society, both in socio-cultural terms and linked to the combination of economic development / public health system, in an attempt to manage emergencies (Hu, Zeng & Zhao, 2009).

The great disasters are accompanied by the dustier ones, linked to everyday life and the impact that simple gestures can have on ecosystems.

The worsening of the conditions linked to ecological changes, often due to factors related to the acceleration of economic development that acts indifferently in the stages of the first, second and third world, supported and implemented by poor practices and invasive cultures (Konatè, 2019), highlights the need to adopt radical measures to solve the environmental crisis and reconcile the relationship between human beings and the ecosystem. As Abdoulaye Konatè states "Man must be

1 This article was discussed and agreed by the two authors and was written having shared the bibliography, readings, researches and reflections. Gabriele Pontillo is responsible for the in-depth study of the paragraphs: "Digital technologies for a more sustainable fashion supply chain", "Advantages, disadvantages and potential of 3D printing applied to the fashion supply chain" and "The challenge for the near future: emergency and sustainability management". Roberta Angari is responsible for the in-depth study of the Introduction and Conclusion, and the paragraph "Between innovation of the supply chain and dissemination of knowledge: ethical communication as a strategic choice".

able to live in harmony with his environment and this is the only hope for life to be made of happiness and prosperity" (Konatè, 2019, p. 14).

As a reflective discipline, design cannot fail to think on the different aspects of the *great changes* "often sudden, violent and frightening, but also regenerative" (Langella, 2020, p. 31). The starting point consists in the delineation of a globally shared intervention, also based on the greater integration between the artificial and the natural world (Ranzo, 2007): to outline new ways of doing and acting through design, to reverse the production structures and more generally the economy, starting innovative processes and determining identities and values useful for restoring centrality to people and communities, as well as the relationship they have with the surrounding environment (Trapani, 2013).

The recovery of an ethical sense behind the project, which becomes its promoter, can be an opportunity for an economic, social, individual, and collective rebirth, especially if we are confronted with one of the most incisive phenomena of the transformation of every day, based on widespread digitization, on digital manufacturing, on the *Internet of Things* (IoT), on open source and on online communities, which not only constitute the field of experimentation in which the new generations of designers and innovators express themselves, but above all have represented, and still represent, the evolutionary force that is reformulating interpersonal relationships and intangible assets, "recoding the DNA of contemporary objects" (Langella, 2020, p. 32).

The proposal of the contribution explained below is to start from the need to find contact points between the development of advanced technologies and the world of experience, in an attempt to identify a way to be able to integrate the slow times of the earth and those dynamics imposed by progress (Ranzo, 2007). To do this, thanks to the analysis of the logic of consumption that has characterized the last few years, it was possible to identify the orientation of the contemporary production scenario from which to start to trigger possible vectors of change towards future scenarios.

The choice of proposing a methodology based on the convergence between visual communication, and more specifically ethical communication, and the *materiality of doing* (Mari, 2011, p. 112) close to digital manufacturing and rapid prototyping, as well as communities made up of Makers, stems from the understanding of how this relationship can affect not only the quality of the products, shortening the supply chain that goes from the creation to the production of the artifact, but also the relationship that individuals establish with the artifact itself and with the environmental system, demonstrating the need for a less ephemeral and more *anthropological* dimension (Branzi, Linke & Rabottini, 2013) of the project, which moves towards an ecological but efficient reconversion of production systems, attentive to the social production of goods and services responding to new demands and capable of guaranteeing social cohesion, as well as territorial eco-development programs, which favor the sustainable use of local resources and promote the potential of networks (Manzini, 2009, p. 19).

In this perspective, design, thanks to digital - understood as an environment and design technology - and to methods more intrinsically linked to sustainable practices and social innovation, has not only the ability to generate new forms but above all the responsibility to support more promising innovations and direct them towards favorable outcomes, promoting new dynamics of sustainable change, coherent with the new contexts in which it operates.

The definition of Eco-Design, outlined by De Benedetti, Baldo, Foschia, and Rossi (2009, p. 29), and due to the introduction of environmental variables in the product design phase, sees its methodological boundaries expand thanks to the evolution of design thinking and of the entire supply chain, which through new technologies, digital simulation environments, identification of new materials or application of alternative materials, as well as the implementation of communication practices designed to make motivations linked to the production context more accessible to users, determine a significant transformation of the impact on the environment and society of the production of goods and services.

2. Digital Technologies for a More Sustainable Fashion Supply Chain

One of the endemic condition of contemporaneity, is the omnipresent diffusion of digital. What characterize the production system in recent years, it is precisely the ability of digital tools to insinuate themselves into every activity of the production system and daily life. Nonetheless, this drive towards dematerialization is counterbalanced by production possibilities that are expanded in the analog dimension thanks to new

processes and manufacturing methods which for the world of design constitute a vast panorama of possibilities and stimuli. Digital manufacturing through 3D printing, as well as robotics, artificial intelligence, digital co-design platforms, raise the expressive and executive possibilities with which design can respond to daily needs (Langella, 2020).
The same technologies also find application in the fashion sector, in which numerous brands and designers use additive technologies to create prototypes, customized products, and artistic pieces. On the runway, high fashion designers displayed intricate 3D printed clothing and accessories, as evidenced by the collaboration between Stratasys, Francis Bitonti, and Michael Schmidt Studios, whose dress worn by Dita Von Teese was one of the most iconic of 2013 New York Fashion Week (Binns, 2015; Bodhani, 2014; Kurutz, 2013; Reilly, 2014). Other examples are brands such as Continuum that offers customizable 3D printed products, such as jewelry, shoes, and swimwear, Timberland and Nike, that use 3D printers to compare three-dimensional prototypes with CAD drawings (Hindman, 2013).

From this point of view, additive technologies seem to be mainly used to push the frontier of fashion design towards product and system innovation, which thanks also to design software, allow the development of complicated geometries, often sculptural, easily customizable based on requests and measurements of the body of each individual through the use of a 3D body scanner (Zolfagharifard, 2013).
Despite the potential offered by such technologies, seems to be missing the pretext full of meaning useful to reconnect the

consumer with the ecosystem through innovative products and sustainable market dynamics.
In this perspective, the role of designers becomes central to the structuring of possible innovative supply chains that effect a paradigm shift from the classic dynamics of the fashion industry, exploring and applying approaches that create new hybrid skills between traditional designers - eg. creative designer and product development - and maker - eg. mechanical, electrical and computer engineers - predicting what it will be like and how it will live in the near future.

Methods such as automated digital production and distributed production lead to rapid changes in the traditional supply chain, favoring shorter development times, and increasingly intimate interactions with consumers (Amed et al., 2017). This means that the traditional, fragmented and articulated supply chain, as it is based on a complex network consisting of various distinct functions and roles divided between the individual industries involved in the creation of a product, is replaced by a new supply chain becoming the key to allow a reduction in the complexity of the networks, through the identification of a more local production model that guides reshoring opportunities (World Economic Forum, 2017).
The overseas approach which involved the hiring of industries for the development of components or the transformation of materials and substances of components, in other countries, such as China and Vietnam, mainly due to the reduction of labor costs (Sun & Zhao, 2018), gives way to a *local-for-local* approach, in which through the integration of different digital technologies, it would be possible to optimize direct labor,

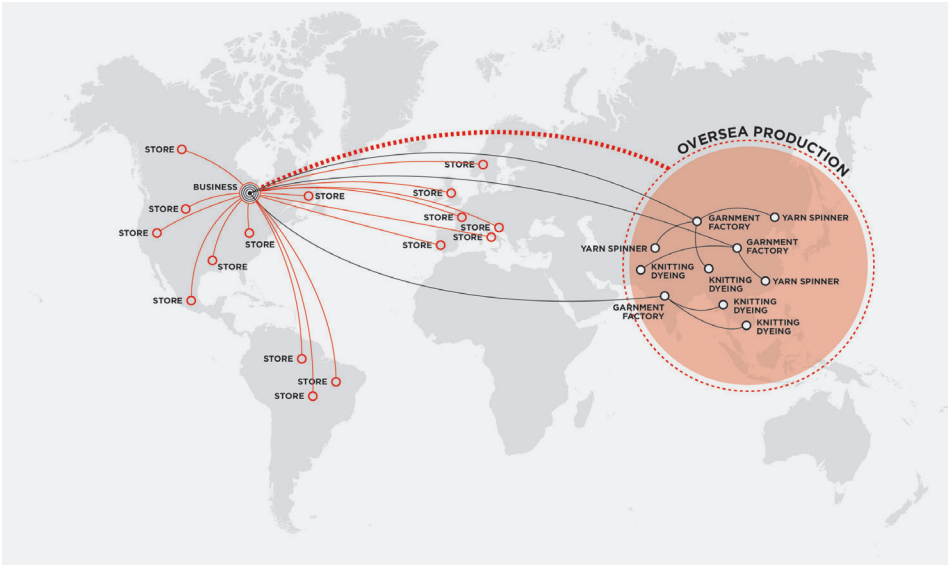

Figure 1. Self-production, Data visualization of overseas approach. 2020.

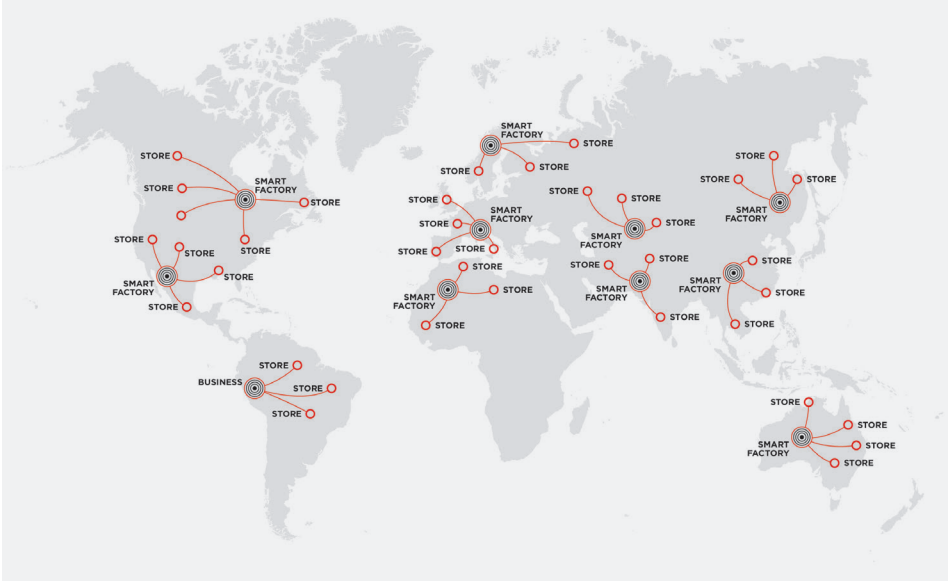

Figure 2. Self-production, Data visualization of local-for-local approach. 2020.

local resources, and adopt a renewed set of procurement strategies of renewable energy, for a more sustainable, agile, and versatile supply chain. In this way, 3D printing moves production closer to the final consumer and redefines the roles of designers, producers, and users (Sun & Zhao, 2018).

2.1. Advantages, Disadvantages, and Potential of 3D Printing Applied to the Fashion Supply Chain

The fashion retail industry has experienced a tumultuous period in recent years, supported by rapidly evolving technology. Through additive manufacturing, robotics, artificial intelligence, augmented and virtual reality, and other emerging digital tools, fashion is radically transforming, changing the production chain, and getting closer to consumers, who are offered complimentary services and experiences that go beyond individual products (Sun & Zhao, 2018).
While the fashion capitals become digital, we wonder how digital technologies can have a sustainable impact on the production chain, starting from the location of production outlined above, and more generally what are the advantages, disadvantages, and potentials offered by 3D printing applied to the fashion industry.

The analysis of the relevant scientific literature highlights how clothing made with the aid of 3D printers are more sustainable than normal clothing (Vanderploeg, Lee & Mamp, 2016) for some reasons, including: 1) reduction of waste raw materials, since cutting the fabric leads to residual pieces (Mau, 2013; Parker, 2016); 2) 3D printing is not only sustainable because it requires fewer resources, but also for the entire

life cycle of the product, it requires less energy expenditure during production, it also triggers changes in the structure of the production chain, shortening it, thanks to more digital and localized supplies (Gebler, Schoot Uiterkamp, & Visser, 2014); 3) some projects, thanks to the material used, can be completely recycled and used again for printing other objects thanks to recycling processes which have little impact in terms of environmental sustainability.

Nonetheless, there are some doubts regarding 3D printed materials, as they may not be comfortable and flexible enough for everyday use (Yap & Yeong, 2014), while optimal materials, such as textile fibers, are still under development (Rosenau & Wilson, 2014).

In this regard, the qualitative study conducted by Perry (2017) precisely on the advantages, disadvantages, and potential of the application of 3D printing to the fashion industry, highlights how there are discordant theories between the target identified for the administration of the survey for data collection. In particular, the findings of the survey highlight that users are more willing to accept 3D printed accessories rather than clothing.

Despite these criticalities, it is the process of creating a product using 3D printing that constitutes the real strength of this technology: the speed in managing and verifying the designed product through prototyping, subsequent modification and rectification, as well as the recyclability of the prototype, and at the same time, the customization of the geometries based on the needs of the end-user are just some of the characteristics of the additive technologies that are useful to the emergence of a scenario that is more attentive to environmental sustainability.

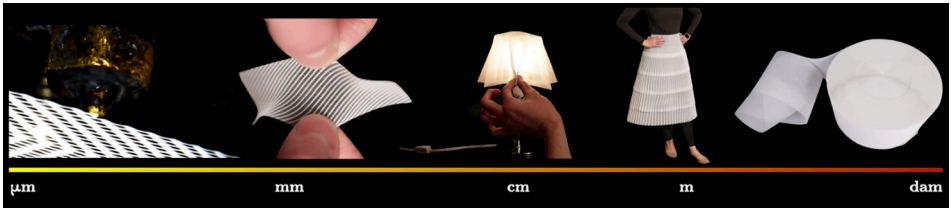

Figure 3. Jack Forman, DefeXtile, different applications of printing technique applied to furniture and fashion design. 2020.

Figure 4. Jack Forman, DefeXtile, a full-sized DefeXtiles skirt produced in 36 hours in a single print. The skirt was expanded like a telescope to reach its full height. 2020.

3. The Challenge for the Near Future: Emergency and Sustainability Management

Based on contemporary scenarios, the academic world highlights two key trends that are focused once on eco-fashion, the other on techno-fashion, which rather than diverge, should have symbiotic relationships (Choi, 2018). In this regard, Scaturro (2008) suggested the concept of eco-tech fashion, which is based on ecological practices applied through new technologies, developing a line of recycled prêt-à-porter clothing aimed at promoting the upcycling process to potential users.

Many experiences conducted in the field of fashion design, and beyond, increasingly consider design practices that are environmentally friendly, ecological, and ethical, integrating these issues into academic design curricula at both national and international levels (Pasricha & Kadolph, 2009).

This is aligned with the fact that already in the early 2000s, the UN had declared the period 2005-2014 as the decade for Education for Sustainable Development, a program in line with the survey on social responsibility in clothing and textiles education conducted in 2002, which reported that 78.2% of educators felt it was important to address environmental degradation, including product disposal and recycling (Dickson & Eckman, 2006). The development and design of sustainable products was therefore already a central issue, and yet today we still find ourselves anachronistically thinking about the same issues, which shows that more needs to be done. Added to this is the fact that not only sustainability but also urgencies and emergencies, place the attention of de-

signers on *responsible action* as a necessary and necessarily shared mode of intervention, as it is capable of overcoming those difficulties that characterize contemporaneity.
For this reason, although conventionally the textile and clothing sector has followed a business-centered model, based on innovation, target market and profit, and study of trends, it is necessary to change the model and include global citizenship skills to counter the global challenges (LeHew & Meyer, 2005). The need to align curricula in design with sustainable education is felt all over the world, as is the social and economic sustainability that should increasingly be intersected in design study courses and design practice, to trigger a systemic change focused on responsibility.

4. Between Innovation of the Supply Chain and Dissemination of Knowledge: Ethical Communication as a Strategic Choice

When the dialogue on sustainability began in the 1970s, the focus was mainly on solving the problems of waste caused by industrial production. In recent years, however, *environmental thinking* has been dealing with the search for a balance between the sustainable use of economic, social, and environmental resources, while paying attention not to destroy the ability of future generations to meet their needs in a sustainable way (Niinimäki, 2013). The notion of sustainability, therefore, is enriched with ethical thinking based on values, in an attempt to solve *concrete* problems related, for example, to overproduction, to the consumption of non-renewable energy sources, to environmental pollution, also through new design methods and creative solutions (Thomas, 2008), innovative

technologies, as well as through the involvement of consumers in sustainable transformation processes.

In this perspective, visual communication, and in particular ethical communication, provides the paradigm from which to start, for a clearer and more complete transmission of knowledge. As Jacobs and Karpova state, knowledge is represented by the awareness and/or understanding that individuals can acquire through direct experience or the study of a phenomenon (2019), and for this reason, it is closely linked to "know-how and know-why" (Gurteen, 1998, p. 5).
Knowledge can be explicit and tacit (Pellegrino & Hilton, 2012), in the sense that it is possible to choose the most suitable means for their transmission. Explicit knowledge is formally structured, therefore returned through easily accessible dissemination tools such as platforms and digital media, which return more complete mappings for information, both through data visualizations and various types of media content - eg. images and videos. Tacit knowledge, on the other hand, is deeply linked to the experiences of the single individual, it is defined as *subjective intuition* (Nonaka, Toyama & Konno, 2000, p. 7); it is not easily formalized nor can be shared or communicated, but if acquired in a specific context, through observation and practice, rather than through strategic tools, it can be much more internalized by the individual user, as the metabolization of direct experience makes more conscious use possible (Olson, 2000).

In this perspective, knowing a product influences how it is seen by observers see and how they interact with it (Walker,

2009), therefore, feeding new knowledge through the experience linked to innovative fashion products both for the supply chain and for technologies, allows facilitating the user in rethinking and reevaluating the aesthetic qualities of a sustainable product (Brady, 2002), detaching himself from the *fast-fashion* model, which in recent years, although it has had the positive effect of democratizing fashion through the supply of low-cost garments inspired by or simply copied from the latest trends, on the other hand, it has undermined the value of intellectual property belonging to fashion designers, greatly expanded the environmental impact through the use of non-renewable energy sources, and promoted a culture of waste (Brewer, 2019).

Through communication and the transmission of knowledge, it is therefore believed that it is possible to put users in a position to evaluate a product based on certain information: its environmental impact during production, logistics, use, and disposal, also evaluating how the product is manufactured, i.e. in what working conditions and where, and if the company has the production based on sustainability.
In this perspective, ethical communication offers a new way to align industrial production with the transmission of knowledge, intending to allow the understanding of material culture and its consequences, as well as cultivating consumer preferences according to sustainability values (Niinimäki, 2013).

5. Conclusion

The culture of the project is now more than ever faced with urgent and emerging issues, increasingly linked to the man-

agement of production chains and the impact they have on ecosystems.
In particular, the global fashion industry must face a series of challenges in terms of sustainability and social responsibility (Chan, 2018), closely linked to overcoming the fast fashion model that generates a series of social and environmental concerns. Intending to outline a new ideology through which to deal with production, it is important to improve business logic, increasing the ethical and social responsibility of companies, also through sustainability initiatives linked to technological innovation, which can help in overcoming inequalities as well as in the improvement of production and conduct standards in the production sector in general and in fashion in particular, on the one hand by shortening the supply chains, on the other by increasing the awareness and participation of consumers starting from the creative process.

The principles of the European Commission related to environmental design (Commission of the European Communities, 2009), would therefore finally find confirmation in a more sustainable fashion supply chain that takes into account the life cycle of the product during all phases: design, production, logistics, retail, use, and disposal. Using new technologies, ecological materials, would lead to a reduction in the use of resources in the creation of more durable, sustainable, multifunctional, customizable artifacts, or even responding in a timely and immediate manner to the needs of users.
Despite the versatility and advantages of these tools in the academic and experimental environments of research centers, again, as highlighted in the previous paragraphs, there is

still a distrust towards 3D printing, motivated mainly by the aesthetic and functional quality of the objects, often still too limited. It is true that the technological advancement, and at the same time of new materials and more performing processes, is rapid and inexorable and soon digital productions will become more and more refined, allowing to produce in an increasingly sustainable and rapid way instant solutions for emerging needs (Langella, 2020).

In light of what has been said, and of the dynamics that characterize the scenario in which converge the environmental threat, the economic crisis, the perception of widespread vulnerability, it is appropriate to ask ourselves how the innovation of processes and products aimed at everyday life, guided by design, from technological innovation, and the diffusion of knowledge through visual communication, can outline a new object scenario, whose peculiarity consists in responsible design action.

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The Human Touch

An Ethical Discussion on Sewing Technology in the Age of Digital Transformation

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Keywords
Sewing Technology, Convivial Technology, Garment Industry, Human Labour, Ethics of Production.

Abstract
While society is being transformed by information technology, contemporary sewing technology will continue to depend on sewing by human hands. Based on this, the production of clothing – and in particular the sewing process – must be assessed from an ethical perspective. The Matrix of Convivial Technology, which finds its origins in the Degrowth movement, is used as a guide to discuss the ethical features associated with sewing technology. Examining this technology across the spectrum of convivial values results in distinguishing it as a *social technology*. As such, it holds potential to fulfil basic needs, empower people through the ability to create, and build relationships. Under a commercialised motivation however, the human component shifts its position: Human labour becomes "inferior to the system" (Vetter, 2018, p. 3) and its inherent consumerism. Supported by the theoretical framework of the *Social Construction of Technology*, it becomes clear that the core question of how to design a more just future fashion industry is not – as initially thought – one of techno-optimism versus techno-pessimism: rather it is a question of social agency versus social passivity.

1. Introduction

Technological innovation and digitalisation play an important role in the globalised 21st century – accepted as part of everyday life or seen as a means for societal progress. "Some see our epoch as the golden age of technology […]" (Acemoglu & Robinson, 2019, p. 495). To avoid detrimental trajectories of this societal transformation and instead actively design desirable futures, it is important to examine the human-technology-relationship and the path it is taking.

The fashion and clothing industry forms an example *par excellence* of a complex and entangled system of stakeholders, processes, locations, dependencies, and conflicting interests – across social, environmental, technical, and economic spheres. One-third of the jobs worldwide are said to be linked to the textile sector in some way. Sixty million people work in the textile and clothing industry (Federal Ministry for Economic Cooperation and Development, 2020), of which thirty million people are directly employed in garment manufacturing (Global Fashion Agenda & The Boston Consulting Group, 2017, p. 15; House of Commons, 2019, p. 12). The industry faces undisputable issues, mainly around waste creation, environmentally harmful production practices, and exploitative labour conditions. Simultaneously, it is seen as an economic driver and accelerator, as a stepping-stone-industry for developing countries (German Development Institute, 2020, p. 8) and, not the least, as a source for the pleasures of consumerism and the possibilities of individual and cultural expression.

The size of the workforce further shows that "[…] the fashion industry has an opportunity to create large-scale social

change for millions" (Global Fashion Agenda & The Boston Consulting Group, 2017, p. 15). Hence, this paper aims to discuss sewing technology as a *social* technology. The focus is set on manufacturing as this area of the industry is showing the strongest juxtaposition of human labour and efforts towards digitalisation and full automation.
This article will begin by establishing the ongoing fundamental importance of the human component within garment manufacturing, before introducing the Matrix of Convivial Technology (MCT) (Vetter, 2018). The MCT will be used as a discussion guide for an examination of the human-technology-relationship of sewing technology in both large- and small-scale applications. The paper will conclude with a call for social agency in the design of future fashion technology and overall fashion industry.

2. Clothing Manufacturing: The Machine and the Human

In essence, the functionality of sewing by machine has not changed since its introduction in 1790 (Nayak & Padhye, 2018, p. 7)[1]. Many specialised sewing machines have emerged from the basic lockstitch, offering seams with specific properties. However, the stitch formation always relies on the element's thread system, thread tension regulation, thread interlocking elements (needle and hook), and fabric transport. Beyond this, the most crucial component of sewing technology is physical human agency (Fig. 1, 2).

1 Bonding/welding as well as knitting technology have intentionally been excluded from examination, as the underlying differences in technology and application would exceed the scope of this paper.

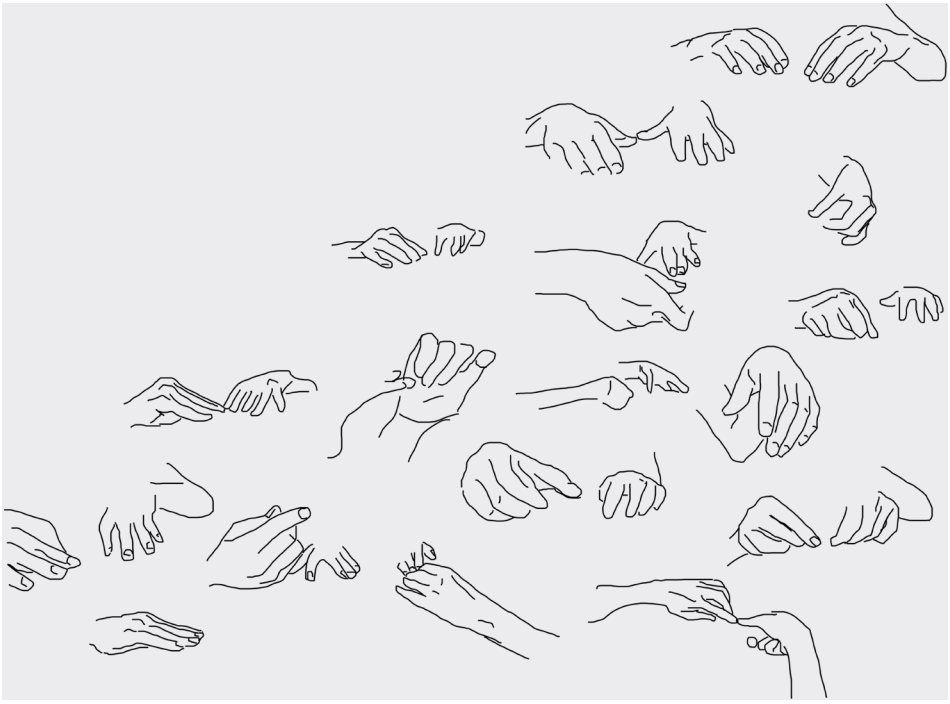

Figure 1. Juliet Seger. Illustration: Study of hands whilst sewing. Author's own, 2020.

Sewing technology draws on the complex capacities of the human brain and foremost the uniquely human dexterity. The whole process uses the human ability to handle floppy materials and manipulate them into different shapes as well as the skill to immediately adapt the pressure and position of hands to a variety of surfaces and react immediately to the way they form during the stitch formation. Individual sewing tasks may be automated or supported by ancillary functionalities, but the steps in between are directed and executed by humans.

Functional and financial obstacles prevent the digital transformation of clothing manufacturing, at least in a mid-term

Figure 2. Juliet Seger. Research through creative practice. Author's own, 2020.

perspective. In its recent discussion paper on "Automation versus Relocation in the Global Clothing Industry", the German Development Institute (German Development Institute, 2020) examines emerging technologies, but gauges that the maturity of technologies of full automation in sewing manufacturing is low. Though "the textile industry was the first to become mechanised, the clothing industry may be among the last to get fully digitally automated" (German Development Institute, 2020, p. 12). This statement can be interpreted as counter-intuitive to the narrative and supposed digital trajectory of the modern and future world. An examination of the options, scale and obstacles of a digital transformation in clothing manufacturing concludes in the ongoing and long-term importance of human labour in the fashion industry. The reliance on a human workforce and the potential impact future automation will have on it, necessitate a re-evaluation of sewing technology as a primarily social technology.

3. Manual Clothing Manufacturing under the Lens of MCT

As a discussion guide, this project consulted the Matrix of Convivial Technology (Vetter, 2018), which can be placed in the context of the Degrowth movement. The latter questions the dominant capitalist system with its inherent demand for and dependency on economic growth. It criticises the status quo as socially and environmentally exploitative while advocating a paradigm shift of societal values requiring "[…] radical redistribution, reduction in the material size of the global economy, and a shift in common values towards care, solidarity and autonomy" (Konzeptwerk Neue Oekonomie, n.d.). Andrea Vetter (2018) translates the values explored by

Ivan Illich in his work on *Tools for Conviviality* (1973) into the contemporary period: "[…] the need for decentralization and a certain autonomy of hierarchical infrastructures, scalability, and the necessity to look for technologies that are not harmful to the environment" (Vetter, 2018, p. 3).

MCT is a tool to examine technologies across the five dimensions: "relatedness, adaptability, accessibility, bio-interaction and appropriateness" (Vetter, 2018, p. 1) which are individually cross-referenced with the four levels of material, production, use, and infrastructure. "The dimensions of the MCT refer not to efficiency or economic performance but to conviviality, therefore it can change views about which technologies are desirable and which are not" (Vetter, 2018, p. 8). The application of MCT in the context of this paper differs from Vetter's intention, as the matrix was not filled in within a workshop context with relevant participants but by the researcher herself. The input was gathered through multiple sources: 1) secondary literature; 2) qualitative interviews with industry professionals from design and tailoring[2], as well as from the field of digital fashion business solutions[3]; 3) the creative practice of paint-sewing, wherein hands covered in paint visualise the human agency in clothing manufacturing (see Figs. 2, 5); and 4) the author's own industry experience as a tailor, clothing engineer and designer. The MCT helps to collect and structure "[…] data about underlying ethical assumptions and aspirations" (Vetter, 2018, p. 1).

2 The interviewees are former colleagues of the author and were chosen on the basis of their diverse and relevant work experience in manufacturing, design and fashion management.

3 The interviewee was contacted to share expertise on the impact and development of digitalisation and automation on the fashion business landscape.

As Vetter (2018, p. 8) mentions in her work, a difficulty in completing the MCT lies in the differentiation of assessing the current state of a given technology versus an ideal vision of such, including its potential for adaptation within a changing system. However, this only supports the necessity of an ethical discussion because it highlights the existence of space for positive change.

Immediately upon commencing the completion of the MCT, it becomes obvious that an assessment of sewing technology depends on the context in which it is applied. Because the core of sewing technology has been used in its more or less original form over centuries, it itself is the same in a household sewing machine in Germany, as in an industrial sewing machine in Vietnam. However, the system in which it is embedded heavily influences whether the technology can be assigned a convivial potential or not. For this reason, the MCT assessment of sewing technology has been conducted separately a) for a small-scale application, detached from considerations of earning a living; and b) for a larger scale application, where the output is commercialised and fed by a production system. In Figure 3, the results of each – a) and b) – are connected with a line; these lines are then layered on top of each other to visualise where sewing technology of a small-scale and large-scale application overlap or contrast when evaluated against their potential for conviviality.

3.1. Materials Level

Small- and large-scale perspectives on conviviality of sewing technology overlap the strongest along the *Materials* level, re-

garding fabrics and trims. In both categories, the procurement of raw and finished materials – from polymer or fibre production, thread production and weaving/knitting – is dependent on specialised processes, forming an entire industry of its own (textiles production). Hence, both small- and large-scale sewing technology are detached from the actual raw material harvesting and processing and the actors are usually merely linked to the traders in wholesale or retail[4]. Across all dimensions (relatedness, access, adaptability, bio-interaction and appropriateness), the *Materials* level of sewing technology leans further towards non-conviviality (Fig. 3) with the strongest tendency in the area of bio-interaction. This points towards one of the most crucial issues of the clothing industry: the ecologically unsustainable impact on natural resources.

An exception to the non-convivial character of sewing technology along the materials level can be found in the upcycling of textile material. Herein lies a necessity for active creative input into the material procurement, which, on a small-scale level, can foster a strong degree of conviviality as it necessitates engagement with a variety of sources and methods for sourcing: people, places, experiences. However, for large-scale production in the current system, this approach still lacks commercial feasibility and viability.

4 Note: The raw material for textile production is often dependent on its geographical provenance (e.g. habitat of silkworms for silk; flax plants for linen). Beyond this, textile production would be technically independent from special local conditions and possible anywhere where skills, processing machinery, and chemicals can be acquired. Spinning, weaving and machine knitting show a rather high threshold for autonomous and convivial use. Nevertheless, a localised production might be interesting to consider in the Degrowth context.

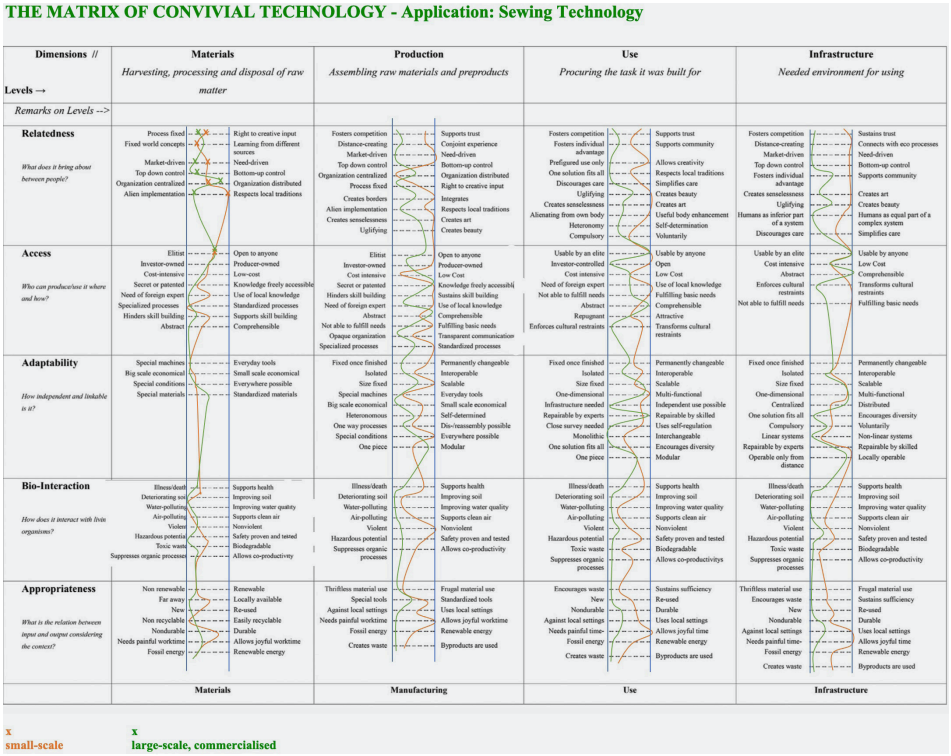

Figure 3. Juliet Seger. Matrix of Convivial Technology – Discussing sewing technology in small- and large-scale application. Author's own 2020, based on Vetter (2018, p.3).

3.2. Manufacturing Level

On the *Production* level – that is, in the direct application of sewing technology in its fundamental form of human-led machine sewing – the dimension of relatedness strongly highlights the context-sensitivity of the MCT assessment. The values assigned to a commercial and non-commercial context appear to be at a tangent to one another (Fig. 3).

Non-commercial sewing has the ability to create not only products but also community. The majority of interviewees

who had a technical connection to fashion described a convivial experience when asked about their introduction into sewing technology. These initial experiences were based on the passing on of knowledge between expert and laymen, for example between grandmother and grandchild or mother and daughter. An increase of skill then led to the exchange of expertise with likeminded people (e.g. in a school and university context or sewing workshop). In this, the "right to creative input" (Vetter, 2018, p.3) can transpose social hierarchies as the variety of technical solutions offers a variety of approaches to product development. The student might apply a different but equally valuable approach as the teacher. Discussing these different approaches is a common procedure in the sewing community and "integrates" (Vetter, 2018, p.3) the various different voices. Even more literally, sewing technology as a domestic technology has historically created a space for women to come together and communicate with one another as a community outside the social restrictions of their immediate family ("respects traditions" (Vetter, 2018, p.3) from an industrialised nation's point of view). Further, sewing technology is one fruitful way to bring together people of different languages, as the universal knowledge and physical nature transposes language barriers. The shared expertise has the potential to bridge a cultural gap without establishing a hierarchy of "known" versus "unknown" (Vetter, 2018, p.3) language. Finally, sewing technology on a non-commercial scale *is* "need-" rather than "market-driven" (Vetter, 2018, p.3). The definition of "need" (Vetter, 2018, p.3) can certainly be subjective and in line with this, the sewing operator creates what she regards necessary or desirable, hence demonstrating the

nature of "bottom-up control" (Vetter, 2018, p.3) of non-commercial sewing technology. The combination of community experience, individual agency, and need-driven execution foster the creation of useful or beautiful objects, resulting in potential for creating convivial value between people.

Within a *commercial large-scale system*, the values associated with sewing technology are interpreted quite contrary to the small-scale perspective. Here, the technology is subject to a high level of competition created through the fluctuation and fast pace of fashion trends. The resulting fragility of businesses creates the exact opposite of trust. Driven by the market, sewing technology is often subject to top-down decision-making by financial leaders within the company or external investors. The global dispersion of the individual processes of the value chain detaches the decision-making entity from the executing entity. This is especially characteristic of fashion brands who subcontract their manufacturing and, through this, interpose multiple middlemen (or -women). The "verticalization" of companies, i.e. performing the entire value chain from development to production (Schroeder, 2020), merges the process responsibility and execution within one company but still adheres to top-down control. Within a growth-oriented economic model, these decisions are informed by economic considerations of profits and margins that subsequently underlie the economics of quantities, supply and suggested demand. Driven by the market, clothing on an industrial scale is often produced in "senseless" (Vetter, 2018, p.3) quantities (Cobbing & Vicaire, 2016) and adheres to specifically organised processes, eliminating any "right to

creative input" by the sewing personnel. Organized through a division of labour in which each sewing operator executes one sewing task of a garment (e.g. only close the shoulder seams and side seams of a shirt or only insert buttonholes) the human input in large-scale production is characterized as "low-skilled" (German Development Institute, 2020, p. 8). In the context of convivial technology this can be seen as an asset, as it opens job opportunities for people of low educational background ("integrates", Vetter, 2018). However, this can also foster precarious and exploitative working conditions if the demand for the said jobs – and thus the pressure to maintain the job – is high.

The severity of existing precarious working conditions manifests itself in the assigned values of the bio-interactive dimension of the MCT. Similar to the materials, use and infrastructure levels, the manufacturing sphere of sewing technology often has a negative impact on the surrounding living organisms. The systemic pressure prioritizes productivity over environmental concerns. Important factors are the recycling of production waste such as the offcuts of synthetic textiles or the recycling of respective fibres that settle as microplastic in air, water and soil. As a very physical occupation, sewing carries many potential health hazards for the sewer when carried out without ergonomic precautions (e.g. appropriate seating, adjustable table height, appropriate lighting, ventilation) and socially appropriate working conditions (e.g. living wage, regular breaks, access to toilet facilities). In line with this, large-scale sewing technology has the potential to "need painful work time" (Vetter, 2018, p.3), unlike a small-scale application, where

the sewing operators are autonomous in the decisions to create the work environment to their desirability and comfort.

3.3. Use Level

At the *production* level, sewing technology is interpreted in its functionality as a productive technology, hence in relation to the *action* of sewing. At the *Use* level, sewing technology is placed in relation to the outcome it creates: Clothing. The two columns (Fig. 3) show similar tendencies towards or against convivial values. The use level of *small-scale sewing technology* is linked closely to the characteristic of "need-driven" creation that serves a purpose and can fulfil "basic needs" (Vetter, 2018, p.3). It offers "multi-functionality" (Vetter, 2018, p.3) in its output as there are no restrictions to the garments that can be created on the basis of human application of sewing technology. A small-scale approach systemically offers a connection between the creator and the consumer (e.g. through direct contact, through an informal brand identity, or if the creator is the consumer). By manufacturing the entire garment, the creator reacts towards a "basic need". This attention remains inherent in each garment and, through this, transposes a sense of trust and community.

In *large-scale application of sewing technology*, the connection to the human creator (sewing operator) is invisible. The division of labour assigns the sewing operator the functionality of a machine. It is "usable by anyone" (Vetter, 2018, p.3), which in a convivial outlook would be desirable. Practically applied in the clothing industry, however, it is ambiguous: while "usable by anyone" allows low-skilled labour – and hence

accessibility to employment and development "stepping-stone industry" (German Development Institute, 2020, p. 8) – it also provides a platform for exploitation as the competition for employment is high and the workers have no leverage (i.e. no special skills) in the fight for better working conditions.

3.4. Infrastructure Level

The *Infrastructure* level of the MCT summarizes the tendency towards or against conviviality, as indicated through the assigned values of each the commercial and non-commercial scale of sewing technology. Zoomed-in, sewing technology offers high potential to be beneficial (convivial) to the individual and to society; it is the infrastructure – the surrounding system – that manifests the convivial or non-convivial character of sewing technology. The values assigned to the infrastructure level follow similar reasoning as the levels previously examined. Beyond this, it presents a value that is considered the most striking across this MCT assessment: "human as equal part of a complex system" versus "human as inferior part of a system"[5] (Vetter, 2018, p.3). While other values leave room for interpretation and subjective nuances, these two claims express the fundamental contradiction of sewing technology: The technology itself is wholly dependent on human agency, but on a commercialised large scale, these humans are nevertheless treated as inferior components of the system. The nature of this inferiority results in massive social issues that accompany contemporary garment manufacturing.

5 It is not clear, whether the word "complex" is purposely added to the side of convivial values and withheld on the opposite, or if this is a layout mistake within this version of the MCT.

Figure 4. Juliet Seger. Hands covered in paint to trace the human touch in garment manufacturing. Author's own, 2020.

Figure 5. Juliet Seger. Research samples: Showing the repetitive patterns of handling during sewing. Author's own, 2020.

Figure 6. Juliet Seger. "The Human Touch" Shirt, visualising the human agency of garment manufacturing. Author's own, 2020.

4. Synthesis from MCT-Assessment: Social Agency in the Design of Future Technologies

The differing classifications of each – the commercial and non-commercial scale of sewing technology – which the MCT assessment has highlighted, show that it is the system in which it is embedded that designates the technology's convivial or non-convivial character. "In convivialist conceptions people are seen as inherently interwoven in social networks and relations and driven by complex motivations […]" (Vetter, 2018, p. 4). Hence, maintaining and expanding the use of convivial aspects of sewing technology while dismantling its non-convivial character is a question of social agency. Internalising this argument is an important feature in the design of future socio-technological systems.

The question of the desirability of a technology is not one of techno-optimism or techno-pessimism: rather it is one of activity versus passivity. A technologically deterministic view sees the invention and implementation of new technologies as the main driving force for societal developments (MacKenzie & Wajcman, 1999, pp. 2-6). This understanding assigns technologies an inherent, almost evolutionarily predetermined force for development; if the emergence of a technology is inevitable, it will succeed to appear. It interprets technology as being of "neutral" character or as incorporating a quality of "truth" and "correctness", including a natural enforcement of the "best" or "best-working" technology. Applied to the human-technology relationship in sewing, this would imply the characteristic of human inferiority in large-scale application to be a necessary consequence of the technology itself.

The results from the two MCT-assessments however, support the opposite theory: The *Social Construction of Technology* (SCOT). Overlapping with the convivialist approach[6], SCOT understands social dynamics and interactions as the main driving force for human development. Therefore, technological developments are socially situated. To understand the emergence or decline of technological artefacts, the technology must be interpreted within the social context it is embedded in – as a symptom of social interactions, rather than as their cause.

In an age in which digital technologies of communication and automation are omnipresent and through the COVID-19 pandemic expand to new spaces, it can seem intuitive to follow – or pessimistically phrased: "surrender to" – a trajectory of digital futures and digital solutions. When technology companies such as Google, Facebook, Amazon, Alibaba and their respective leaders influence the public debate and global decisions as they have done so far in the 21st century, it can seem suitable or inevitable to adhere to respective approaches in the design of the future social landscape. However, the concepts of conviviality and SCOT can give guidance to understanding *human agency* in this design process.

Tackling the clothing industry's social issues is not a question of the technical innovation of sewing technology, that is, not a question of digitally transforming the functionality of how

6 "The concepts of convivial tools and radical technology emphasize the importance of the social that constructs and is constructed by technology" (Vetter, 2018. p. 3).

clothing is manufactured. It is a question of re-configuring what is deemed acceptable by society, of reversing *the* "stabilization of the technological artefact" (Pinch & Bijker, 1984, p. 424) of sewing technology. A "closure of debate" (Pinch & Bijker, 1984, p. 424) has taken place in the rise of the Fast Fashion industry where its socially exploitative practices and mass production have become accepted in contemporary consumer culture.

Throughout this project, the component of human agency has been identified as a link between sewing technology and clothing consumption. However, this link seems to be invisible to the wider public eye, as sales continue to grow, despite potential human rights violations embodied within garments. This is even more apparent in spheres where digitalisation enforces a disconnection between designers and producers and producers and consumers. As Indonesian union representative, Andriko Otang, points out, the way to tackle the ongoing social issues is to actively change the status of the workers (FEMNET, 2020).

5. Concluding Considerations

Applying the MCT assessment to sewing technology can only provide a selectively composed framework to discuss the associated complex system. It does not deliver a concrete solution on how to move forward from the state of crisis. Artist Paula Dunlop points to the often-inherent motivation of Design Thinking to produce "the one" apt or functional result. She claims that this outcome-centric approach is built on the

> […] the premise […] that we can "design" our way out of ethical dilemmas by determining the correct rules or behaviours needed to reach a particular end. As such, it overlooks ethics as something perpetually lived, made and remade through ethos – our located experience of the world" (Felton, Zelenko & Vaughan, 2012, p. 193).

In order to design sustainable, functional solutions to the fashion crisis, the understanding of sewing technology as a *social* technology needs to be internalized within the industry. For this, the human component of clothing production must become visible beyond price calculations. The social impact needs to be treated as a performance indicator and *lived* in the strategic development and assessment of fashion businesses.

6. Further Reading

As explained in the preceding discourse, there is a dissonance between the labour put into clothing manufacturing and the actual awareness and respect brought towards it in the dominant production and consumption system. With the creative technique of paint-sewing, the author creates physical artefacts that make this issue tangible and literally visible. With hands covered in paint during the sewing process, the human touch of sewing technology becomes imprinted on the garment (Fig. 4-6). Thought of symbolic character, this creative output seeks to visualise the intangible and support the public debate towards a more just fashion industry. For more on this visit: www.paidvacation.de/project-the-human-touch/.

Acknowledgments

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Figure 7. Juliet Seger. "The Human Touch" Shirt on person. Author's own, 2021.

Figure 8. Juliet Seger. "The Human Touch" collection: T-Shirt. Author's own, 2021.

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Culture, Fashion and Communication Design in Times of Emergency

Communication and Design Strategies for the Sustainable Improvement of the Fashion and Textile Production in the Indian Subcontinent

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Keywords
Sustainability, Inclusion, Local Excellence, Branding, Fashion Design.

Abstract
Within the scenario of contemporary design, we daily observe experiments to redefine the meaning and value of products and give rise to renewed consumer attitudes, with a more ethical approach, according to the logic of circular economy and inclusive practices. The territory takes value from the tradition and the identity of the place, the so-called *genius loci*, and becomes a symbol for local values through the enhancement of traditional knowledge. In this proficient competition between territories, design becomes the element of dialogue between different societies and cultures. Today, the prevailing system of the fashion industry has created many environmental, social, and ethical issues behind the glamorous facade. How to reduce fabric waste during the design process has become an urgent requirement for fashion designers, specifically in countries with an outstanding industrial production as India. Even while the country progresses with power looms and modern designs, India still continues to protect its handloom legacy, traditions and culture to sustain the craft and keep it revived. The essay tackles the duality between branding and environmental sustainability for a fashion project developed at GD Goenka University on the theme of capsule collections between textile tradition and green experimentation.

1. The Listening Design Approach for an Indian Craft Project Between Tradition and Innovation[1]

Talking about sustainability in India turns out to be complex in a continent that today is one of the countries with the worst air quality in the world, with air pollution levels leading to 1.24 million deaths per year and with 14 of the 15 rivers most polluted in the world according to 2019 data from the World Health Organization. But it is essential to do this in a Country that has recently overtaken China in terms of population and which has one of the fastest rates of economic growth on a global scale. Some multinational companies are already doing this, like Starbucks, which has as its priority to take the path of sustainability, launching a ten-year plan to reduce the impact of the supply chain. The goal of the well-known brand is to reach 2030 with a significant reduction in its environmental impact, in terms of consumption and pollution. The entire supply chain will be affected by new measures which primarily envisage the reduction in the use of water for coffee production and the reduction of waste and CO2 emissions. Everything will start from the cultivation of coffee, which Starbucks wants to make as sustainable as possible, if not even organic, with particular attention to the use of water to impact as little as possible on resources and water basins. Just as the transformation of packaging will be the other key point, for a reduction in waste production, also through the adoption of recyclable, compostable and more natural materials. The listening design method is an approach that allows us to carry out innovative research in the most disparate sectors and that we will also apply to the case in

1 Authorship of the texts: chapters 1 and 2 Roberto Liberti; chapters 3 and 4 Rossana Gaddi.

question for an eco-sustainable design in the Indian sub-continent in the fashion sector.
Listening Design is an open, equal design methodology aiming at leading enterprises towards expressing the demand for innovation, defined from the design research group (Ranzo, Veneziano, Scalera & Rossi, 2013) and adopted in various research experiments in Italy and in different countries.
Recent research (Jenss, 2016) in the field of design shows that innovation does no longer originate from individual subjects but from *dialogic collaborations* based on the ability to bring together several competences. The aim of the methodology is to set up a creative ecosystem including designers, researchers, companies, users and local resources in order to connect competences which may, together, produce innovation.
The practices and tools of Listening Design include *collective* and *connective* intelligence in all the stages of the innovation process to guarantee a rich and complex interaction.

To spread empathy, it is necessary to listen carefully and to catch all the signals this listening provides us with. The next real innovation will lie in the ability of each and every one of us to listen and to collaborate *together*. Open listening is the central element of the methodology and it is crucial to identify the creative ecosystem which generates a framework of relations contributing to defining the information needed to construct the area in which the demand for innovation is shaped.
The listening design approach was used for the project hereinafter called INDIAXINDIA, connecting Indian companies, Italian and Indian researchers, teachers and students of GD Goenka University involved in the project itself.

Starting from the analysis of the textile manufacturing industry in the Gurugram area, in the northern Indian state of Haryana, the open listening approach analysed various textile and manufacturing districts that try to approach the issue of ethical sustainability which is particularly important in the textile and clothing sector and delicate from the point of view of environmental impact.
Recent research published by J. Safra Sarasin a multi-stakeholder initiative that works with clothing brands, factories, unions, NGOs and governments to improve working conditions in the clothing industry, shows that the Indian fashion supply chain is a sector that employs about 45 million people, and existing or potential abuses in the clothing industry in India are highlighted by analysing working conditions in the three major manufacturing hubs: Delhi in the north, and Bangalore and Tirupur in the south. From the research emerges the impressive data that from 2014 to mid-2019, 106 young girls committed suicide due to the stress and inhuman rhythms they are forced to work in Indian textile factories, those that produce the thread for sewing low-cost fashion clothes or T-shirts. The data collected return the image of factories in which labour rights are systematically trampled: young women, migrant workers and low castes work in inhumane conditions, to reach impossible targets, without rights or social guarantees, to produce for Western companies and very often for the fashion mass market.

Among the members of Fair Wear there are 130 medium-small European brands that produce in 160 factories spread across the subcontinent and support a different model of producing

Figure 1. Ecoloom factory, visit with GD Goenka students.

clothes, which does not necessarily involve the exploitation of workers in factories in India, China or Bangladesh.
In the listening design approach, we have therefore analysed companies of the Indian territory inserted in this modality of *ethical sustainability* of production and we have focused on two companies. In this first phase of listening to the territory we analysed Khadi India and the Khadi and Village Industries Commission (KVIC) which is a statutory body established by an act of parliament n. 61 of 1956, as amended by act n. 12 of 1987 and act n.10 of 2006.

The broad objectives of the KVIC, coming from Mahatma Gandhi ethical teachings, are:

- The social objective of providing employment.
- The economic objective of producing saleable articles.
- The wider objective of creating self-reliance amongst the poor and building up of a strong rural community spirit.

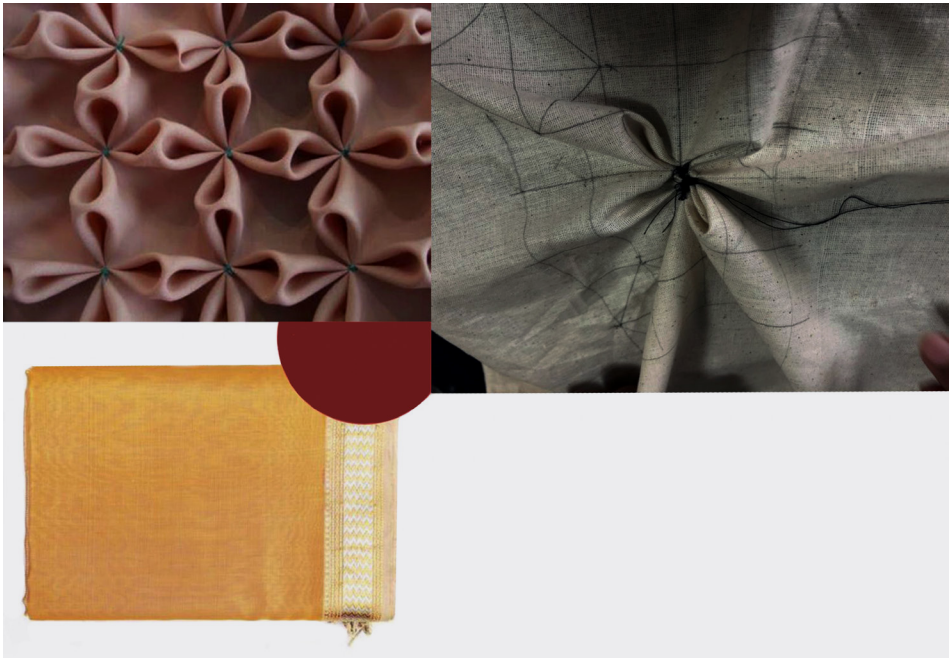

Figure 2. Experiments with Ecoloom Textiles, INDIAXINDIA project.

KVIC is charged with the planning, promotion, organisation and implementation of programs for the development of Khadi and other village industries in the rural areas in coordination with other agencies engaged in rural development wherever necessary.

Its functions also comprise building up of a reserve of raw materials and implements for supply to producers, creation of common service facilities for processing of raw materials as semi-finished goods and provisions of facilities for marketing of KVIC products apart from organisation of training of artisans engaged in these industries and encouragement of co-operative efforts amongst them.

Government of India introduced the scheme of Market Development Assistance (MDA) on Production in place of rebate after experimenting with several pilot schemes. The scheme has been given effect from 1st April 2010, to help Khadi institutions to reorient their activities extending adequate emphasis towards increasing artisans' earnings as well as ensuring quality of Khadi to customers. Under MDA scheme 25% of assistance is earmarked for payment among spinners and weavers as additional incentive through their bank/post office account.

From the analysis of this extraordinary emergency and ethical operation for Indian manufacturing production, Ecoloom, a company that produces respecting a slow dynamic that is the traditional one of Indian textile manufacturing has been analysed, starting from the Maheshwari textile weaving system and tradition.
Born along the banks of the Narmada River, the origin of the Maheshwari weave can be traced back to the early 18th century. During the reign of Devi Ahilya Bai Holkar, the quaint town of Maheshwar in Madhya Pradesh underwent major changes by reintroducing weaving practices and inviting weavers from all over the nation to retrieve Maheshwar handlooms.

From that point on, generations and generations of weavers have recreated and reinvented the ancient Indian textile practice.

Figure 3. The INDIAXINDIA final shooting, took in L'Al Gumbaz muslim tombs, in the suburb of Sohna, Haryana State – in this picture, some picture from the Spicee Project photo shooting.

2. An Eco-Sustainable Fashion Capsule Collection

Starting from the study of the textile company Ecoloom reported in the One look-Greta publication
the INDIAXINDIA project has consolidated starting from the timeless and light hand-woven Maheshwaris inspired by historic Indian fabrics, and who over time are experimenting with an entrepreneurial path towards a logic of increasing sustainability.
The philanthropic weaving line of Ecoloom delivers several hand-crafted yards that have been selected for the capsule collections created in the INDIAXINDIA project. Through Ecoloom training of old and new weavers, new techniques are being taught by exploring possibilities for development in hand weaving, working alongside master craftsmen and various Indian weaving centres. In the fibre analysis approach, the dyes of the selected yarns were verified as ecological and sustainable, given that the pollution of rivers and air is one of

the main impact factors in India (the Ganges is one of the 10 most polluted rivers in the world, largely due to the wastewater from the textile dyeing industry).

In the research path conducted with the GD Goenka University laboratory, reported in *One look Greta publication: slow fashion researches*, if on the one hand we have developed the design selection and verification with a company like Ecoloom, useful for the listening design approach in the practice of listening to the aspects related to the Indian eco-sustainable textile manufacturing, on the other hand, interesting spin-offs have emerged with the lab inside the Indian campus for the experimentation of new sustainable approaches to the design process of a capsule collection. The experiments basically concern two aspects: the first is related to a series of experiments on dyes starting from traditional Indian techniques, and the second which is connected to the very advanced Indian computer and multimedia diffusion now widespread. The first aspect analysed a series of traditional dyeing techniques such as batik used to dye the fabrics, and which was created on contemporary geometric graphics using natural vegetable dyes. The dyeing in GD Goenka laboratory was done using non-toxic and chemical-free mineral-based dyes, and the process was done by interviewing craftsmen who are experts in Indian batik manufacturing.

This technique has made possible to re-verify traditional dyes that today are still widespread in the Indian manufacturing territory, but which are increasingly escaping to the advantage of digital printing techniques and which do not

Figure 4. INDIAXINDIA manufacturing experiments with batik dyeing technique.

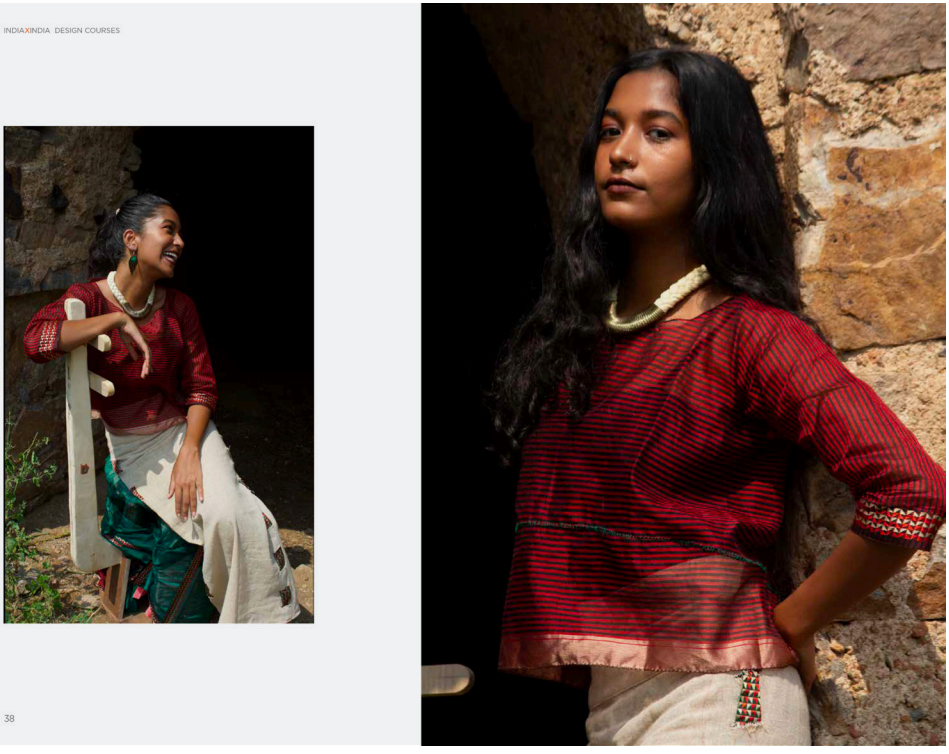

Figure 5. INDIAXINDIA final shooting. Gaash Project. Heritage Kasmir handcrafts like Pinjarakari were the starting point and fashion inspirations for this project.

always control the sustainable aspects of the production cycle of dyeing the garment. This technique and that of embroidery that replaces digital printing were both adopted for the INDIAXINDIA project as an analysis of the slow Indian fashion system, compared to the dynamics of fast fashion so widespread on a global level. The second aspect that has been highlighted in the research project was the analysis of the most advanced digital printing techniques that can now be adopted also in the creation of fast prototypes, verifying the timing of realization of a prototype of a dress on digital printing, made in the fashion laboratory of the campus and sent to the company that sends the finished garment in real time for a shooting then done on campus.

Figure 6. INDIAXINDIA final shooting. Intricacy Project, inspired by the intricate works of Kalamkari, ancient Andhra Pradesh hand painted, or block printed cotton fabric, where only natural dyes are used. The dying process involves twenty-three step.

3. Inclusive Branding for the Enhancement of Local Territories

The development of the communication project proposed here amplifies a method already verified and used in different academic and professional contexts, such as the Master Degree Course in Design for the Fashion System of the Politecnico di Milano and the Master in Brand & Communication Management of the inter-university Consortium Milano Fashion Institute (Bocconi University, Politecnico di Milano and Catholic University), the EDC Business School of Paris (Ecole des Dirigeants et des Créateurs d'entreprise), the Premium Design Management Master Course provided by the Poli. Design Consortium of Politecnico di Milano and the Business School of the International University of Monaco. This model was also verified in a non-university context, for the creation of the brand identity of a design hub in Yucatan, Mexico, facing professionals and stakeholders.

The training model proved to be particularly effective in a specific context such as fashion design, strongly linked to communication, relationship and identity.

The enucleation of visual elements representing all the aspects of the brand identity provided ideas for the design, showing graphic evidence where certain visual elements (as colours, pictograms, keywords, typographic families, ...) were repeated, giving particular relevance to the element itself and providing useful visual design suggestions for a coherent and adequate proposal to the contemporary communicative need.

Right from the concept phase, the INDIAXINDIA project envisaged communication with a declared inclusive approach, to create an exchange relationship between the market and the

final consumer, territory and excellence, and therefore between economy and local resources.
Where the fashion design project creates a strong link between production and manufacturing, as recommended by KVIC board to face the extraordinary ethical issue and productive emergency of Indian manufacturing system, in the same way this link was found in the communication and branding part.

3.1. Centrality of the Relational Value for Social Inclusion in Times of Emergency

The construction of the relationship with the customer has acquired absolute significance in the last twenty years. We talk about relational value, in addition to the use and exchange values, and which underlines the importance of the bond that a product is able to establish with the consumer through the introduction of a narrative that can stimulate a real relationship with the brand, and consequently the overcoming of the classic concept of use or exchange value.
The final consumer today has taken part in the production chain and returns, in an era that is technologically interconnected and increasingly real-time, feedback and information to the brand, and therefore to the brand itself. Companies speak a more human language because people expectations are evolving, in a new *social contract* that frees the consumer from a perspective of absolute passivity. These are the known effects of the digital revolution: democratization on the one hand, disintermediation on the other. In the era of social media and big data, everyone can access and produce content, bypassing the traditional distribution chain and directly

reaching potential buyers. From the traditional distinction between B2B and B2C we have moved on to a broader concept: H2H, "Human to Human" (Kotler, 2020).
Today the culture of the project is understood as an exercise capable of restoring a simple but indelible ability to interpret the needs and desires of the person, to transform them into products destined to improve their life and social relationships. Relational goods -as fashion products are- are never anonymous and independent from the subjects they relate to. The identity, also visual, of these assets, everything that makes them unique and unmistakable, is a fundamental ingredient capable of producing a unique and unrepeatable wealth. Design today no longer confronts itself only with the only artistic or engineering disciplines but places its focus also on meaning and value/s, opening up to social and strategic/economic disciplines.

In the era of convergent culture, where the power of media producers and that of consumers interact in unpredictable ways, the origin and destination (meaning and value) of a design product (both visual and physical) therefore develops a strong relationship with the consumer.
A relationship that must be understood and built, already in a meta-design phase. Considering the trend that design is assuming, less self-referenced, more multiverse and open to other disciplines (Manzini & Bertola, 2006) and to training projects aimed at society in the making, the question arose regarding the need to reformulate academic training linked to branding, considering the strong disciplinary interconnections it carries within itself.

Consumer expectations are increasingly focused on a personalized relationship with the brand, and this requires companies to deeply analyse the shopping experience through the appropriate study of contact points that can use data in order to become more personal.
To create real experiences and authentic emotional bridges with the customer it is necessary that the promises join to the reality, so that the reputation of the brand does not lose loyalty and therefore authenticity. An arduous task, although still possible, given the complexity of the era of social networks and the "religion of the positive" (Lovink, 2012) which, more than analysing and researching reality, often reconstructs the truth through an infinite series of clicks.

At the School of Fashion and Design of Indian university GD Goenka, within the synergistic project carried out with the students of communication design together with fashion and textile design, the explicit request was to design brand identity and collections radically linked to the Indian territory in an inclusive approach as recommended by the emergence that India (and the whole planet) is experiencing, so that the local culture could clearly emerge in a more sustainable way.
In this case it was possible to address an aspect that is still little explored: the symbolic and cultural value of graphic elements such as colours and typographies that have a completely different translation of meaning compared to Western models. In this context, the extraordinary importance of research with respect to the reference markets emerged, which are characterized as unique not only for aspects related to their culture, society and atmospheres, but for different and

sometimes conflicting meanings and interpretations of the same graphic elements.

3.2. Sharing Communication and Visual Languages

Communication design must take into account all the aspects that revolve around a brand: the relational aspect and the complexity of a contemporary brand are often not adequately considered in the creative process, especially in the educational field. The design act, at an academic level, risks losing coherence between the graphic sign and the meaning -also and above all relational- that it carries within itself.
The education of future generations of visual designers cannot fail to consider the relational aspect rooted in the contemporary design discipline as central. The social responsibility and the critical awareness of the visual project require a space that comes before the project. Already in the creative phase, communication must be structured in such a way that a brand takes into consideration not only itself, but its customers and the relationships that will be created between them.
In order for a project to be effectively inclusive, a sharing of languages must also take place at the design and meta-design level, which is necessary for brand values to be effectively oriented towards a clear objective.

In the current era, where emergency of global issues related to inclusion and sustainability continually pushes us to reflect on the legacy left to future generations, it is important to be able to find a common ground for exchange and sharing between market decisions and design guidelines, especially in territories such as the Indian subcontinent, where the emer-

gence of the uniqueness of the territory can be the reason for an inclusive development that can understand and consider as foundations the instances of such a complex, historicized and rooted culture.

The language of marketing and that of visual communication must be able to be shared, without excessive disciplinary overruns but giving the right importance to both approaches, which are often forgotten or underestimated alternately, depending on the disciplinary perspective with which the training is addressed, linked to the construction of the brand identity. In an era where the relationship between the business and the consumer is the key to a brand success, this is a risk that cannot be left to post-academic training.
The absence of this link with the perceptual aspects in the managerial field and the need for a greater focus on the complex relational aspects of a brand within the visual design of the brand, have provided the cue for an expansion of Kapferer analytical model, which could take into account the same elements but reread with a broader, more visual and therefore more pragmatic and design perspective. In fact, Kapferer's hexagon lends itself to contamination with the practice and practical-design models of visual design.
The analytical model studied by Jean Noel Kapferer in 2008 is certainly a useful tool for this purpose. According to him, the brand identity is made up of six elements, defined in a hexagonal scheme: the physical (the objective characteristics of the brand, what it offers); personality (the inner character of the brand); the relationship (the symbolic exchange of contents and meanings linked to the brand); culture (of which

the brand is an expression); the reflected image (the type of target that is associated with the brand); mentalization (how the target perceives itself).
These six elements offer an analytical model very suitable for understanding the complexity of a contemporary brand, because they take into consideration all the actors involved, and follow the sender/receiver transfer logic of communication. In addition, it returns those intangible and internal aspects related to the brand and its relations with the outside world. Aspects such as culture, for example, can speak of the country or more generally of the place of belonging, of a particular technology, of a certain way of being and of relating to life, or others such as mentalization (what one imagines reflecting by choosing the brand) or personality, understood as the emotional baggage that the brand carries with it.
The Kapferer model, which clearly returns the relationship between sender (business) and receiver (consumer), is used mainly in the marketing field for analysis, construction of the imaginary or repositioning on the market. However, it does not account of the graphic, visual and perceptive aspects that revolve around a brand, which make it an entity that is not only recognizable, but unique and personal. Only one of the six elements, the physical, takes into account visual aspects.

The design method of visual design requires that each type of visual communication bases its basic narrative on essential pillars as images, colours, typography and layout. They can be considered the fundamentals of visual language and the essential elements of any project, whether digital or not.

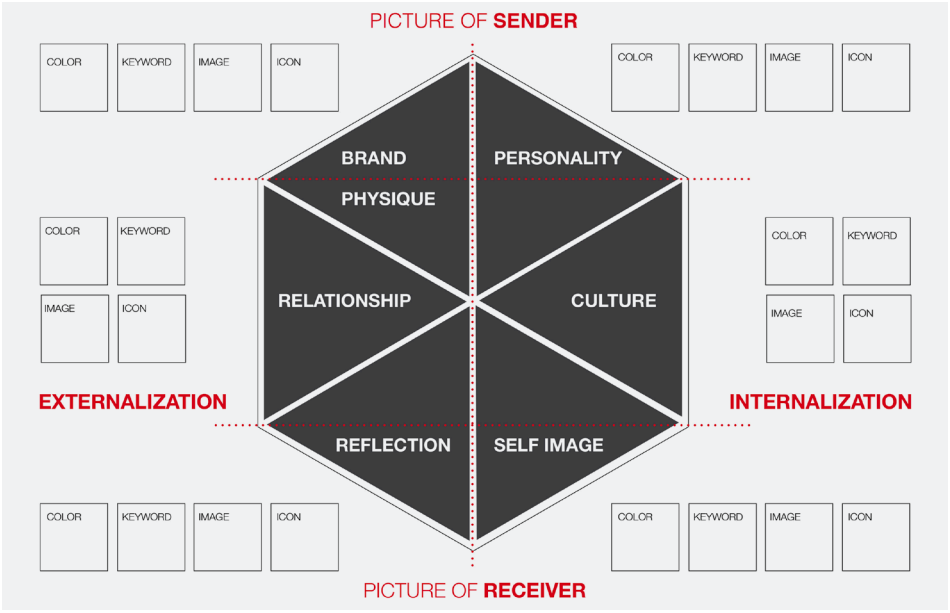

Figure 7. Scheme of the proposed methodological model: combination of the analytical variables of the Kapferer Exagon with the practical ones of visual design.

Each of these elements carries within itself the possibility of communicating contents, emotions, meanings, symbols. Often many of these elements go beyond the subjectivity of the recipient and his personal aesthetic taste, because they are pure perceptual elements therefore linked to the vision and not to the interpretation of the contents, or because they are objectively linked to a specific visual culture that immediately and without subjective mediations carries the eye in a specific and very well-defined dimension. Not only that, they tell through keywords and visual forms (graphic symbols, icons, glyphs, families and typographic forms, ...) specific values inherent in the brand and so they are relevant not only to the brand as issuer, but to the target as recipient, today always more active in the building process of any brand identity.

The use of the pillars of communication design to define and to tell through images, colours or chromatic contrasts, keywords and graphic signs each of the six elements of the brand identity defined by Kapferer, has given convincing results, because the definitions of the key to the DNA of a brand have been associated with simple and immediate visual elements, which often go beyond subjectivity and reach the consumer directly as a further confirmation of the coherence of a communication strategy.

Figure 8. Moodboard and application of the model for the development of a fashion brand, Dravida, inspired by Dravidian architecture (from South India and Sri Lanka).

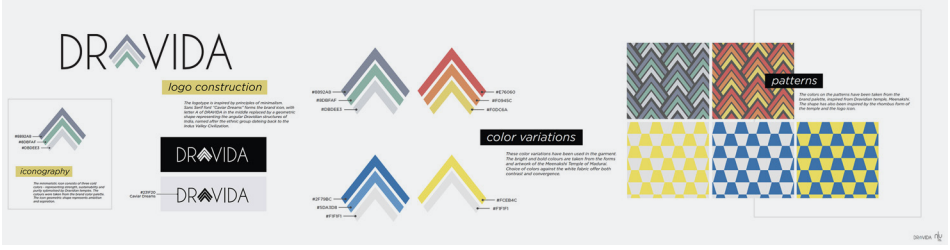

Figure 9. Dravida Project Brand Identity: logo construction, colour variations and patterns for the fashion collection.

Figure 10. Dravida Project: capsule collection, final garment and final shooting,

4. Conclusion

The mentioned model explores new teaching tools and methodologies, contaminating pure theory and practical design sectors, theoretical model and design practice of visual communication and fashion design.

This model seems to be valid both for academic purposes, for a real and better understanding of the values of a brand, and for planning purposes, for the creation of a brand from scratch or as a tool for investigating the actual adherence of brand values to contemporaneity. It is a possible and verifiable contamination with respect to the actual correspondence between brand values and the contemporary market.

Thus, disciplinary convergence opens up strategic sectors for the relaunch of the national economy, first of all the fashion sector in a highly complex country such as Indian subcontinent, one of the aspects on which universities can work to raise awareness of both public opinion and private companies on the green economy, social inclusion and sustainable approach to the production.

This approach has allowed a fertile convergence between fashion and communication, aimed at a necessary plurality of

thematic orientations in the context of the practice of design culture, which must today represent the contamination between pure theory and sectors of practice.
The contamination of languages and operational focuses of the two disciplines has allowed students to experience, already in the academic field, a less sectoral vision on their future profession, but more open to external disciplinary stimuli, in a more experimental, participatory and inclusive logic that contemporary logics requires to the design profession.

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IV

PROJECTS & DOCUMENTS

Interview to Moda Portugal

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Universidade de Lisboa

Maria Antonietta Sbordone
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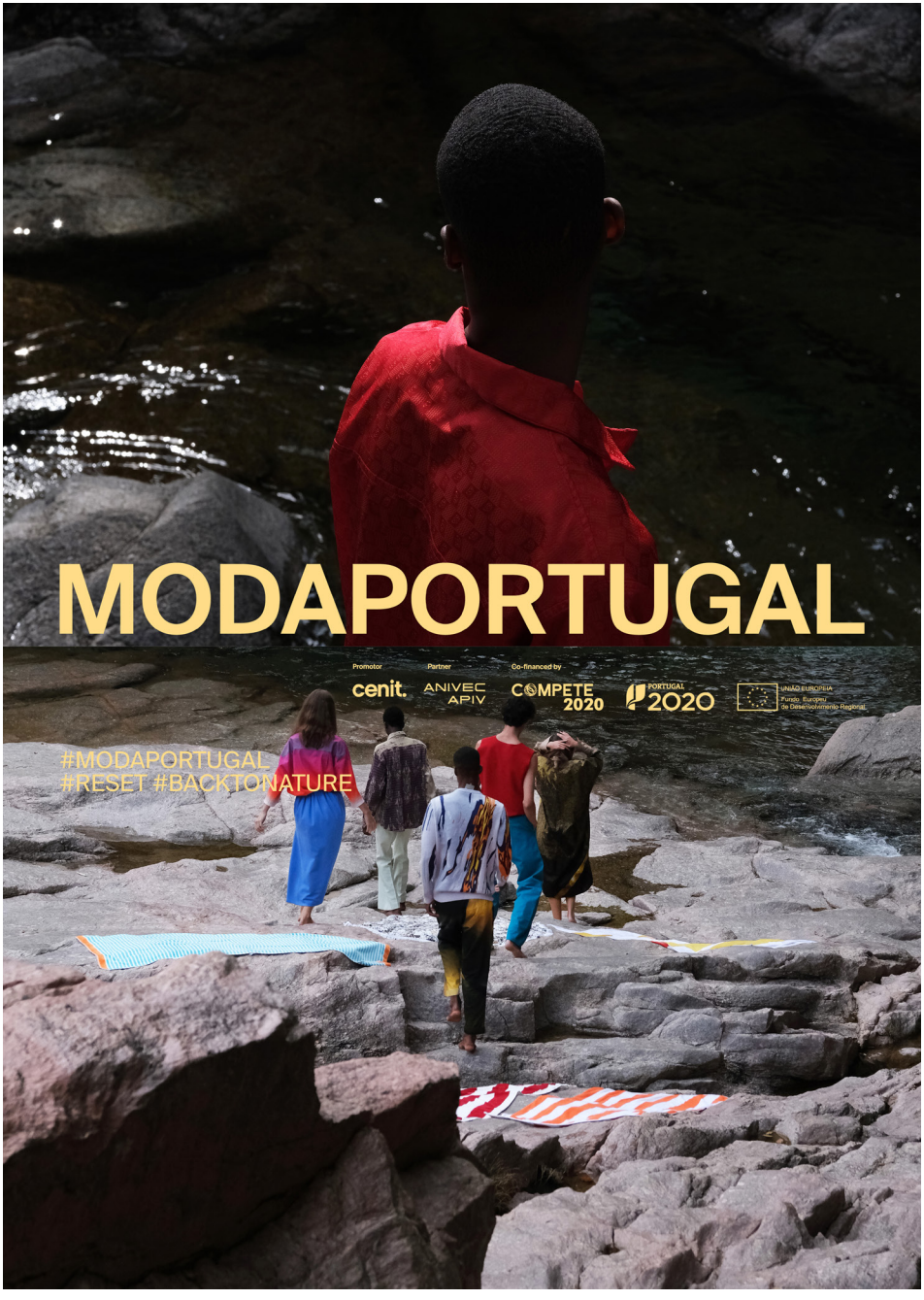
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MODAPORTUGAL

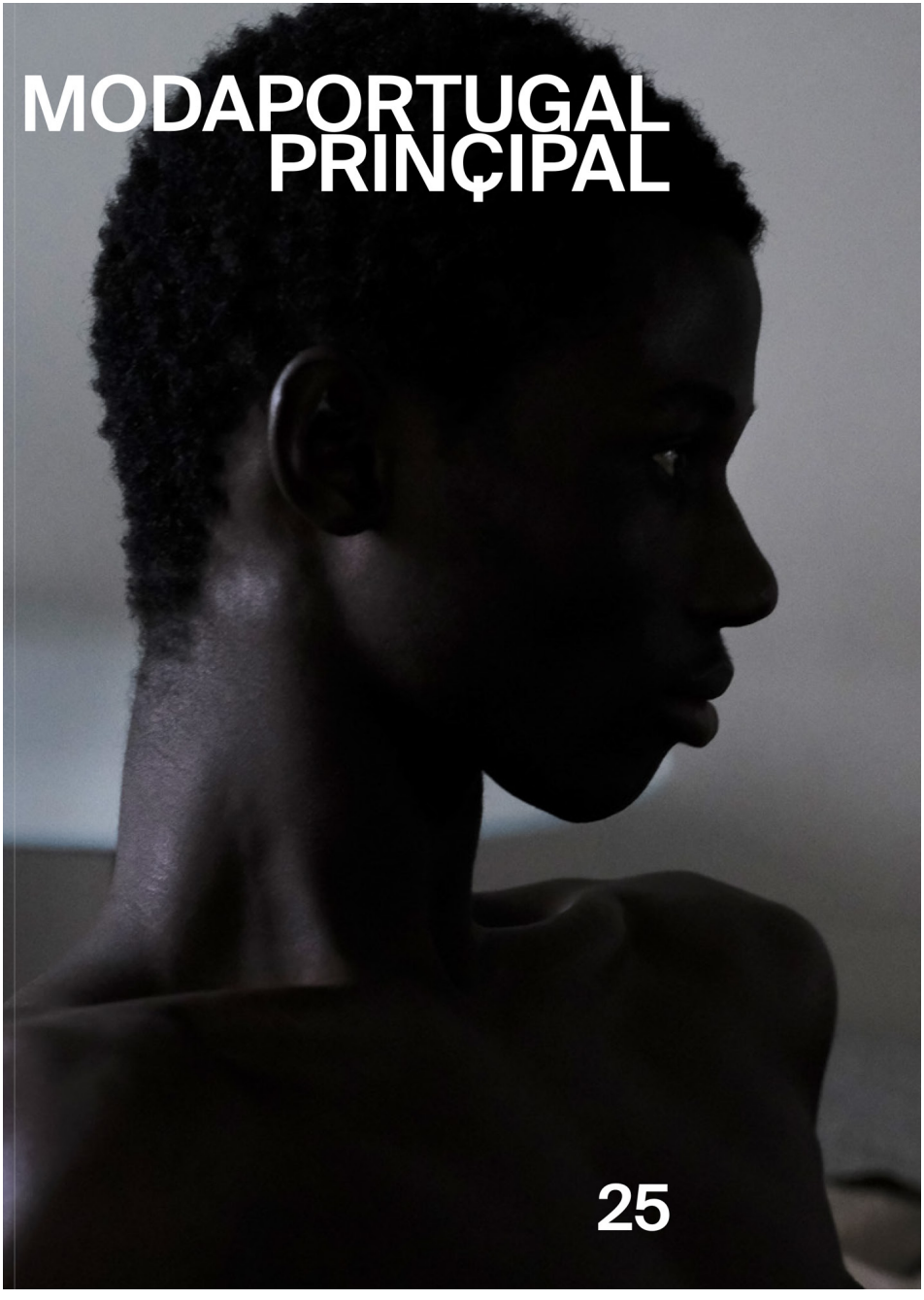
MODAPORTUGAL promotes the Portuguese fashion ecosystem. It showcases the several dimensions of the industry and conducts promotional events that highlight its key assets. From design to manufacturing, the initiative presents the traditional along with the most cutting-edge features of Portuguese companies as they embrace the future with a sustainable and planet-friendly approach.

Q: How as the Moda Portugal initiative born and why this need?

A: The strategy MODAPORTUGAL was created to promote the Portuguese textile and clothing sector as a whole in international markets. It aims to communicate that this sector is one of the best in Europe and, maybe worldwide, because it incorporates traditional know-how, allied with the best state of the art technology, the best R&D organizations and the continuous search for innovative and sustainable products and procedures.

Q: How is Moda Portugal organized?

A: MODAPORTUGAL is conducted by CENIT, which major partner is ANIVEC, the Portuguese Association of Clothing and Apparel Industry. CENIT designs and implements projects that are EU-subsidized. These projects help the Portuguese companies and designers to internationalize, by granting them support to participate in professional trade shows across the world dedicated to manufacturing and fashion. It also promotes several events in international markets that showcase the several dimensions of the industry and highlight its key assets.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From design to manufacturing, the initiative presents the traditional know-how along with the most cutting-edge features of Portuguese companies as they embrace the future with a sustainable and planet-friendly approach.
It also features a monthly newspaper, Jornal Têxtil, a website dedicated to the fashion and industry ecosystem, www.portugaltextil.pt and a quarterly magazine called MODAPORTUGAL Prinçipal.

Q: Taking into account the current challenges imposed by the emergence of Covid 19, how does Moda Portugal think it can help companies in their responses and what are the new chances for fashion?

A: During these pandemic times, MODAPORTUGAL has continued to support the Portuguese companies by issuing relevant information about the changes in legislation and governmental support measures for the daily day operations.
It has also provided help as far as discovering other ways to do business in the lack of international trade shows, by presenting marketplaces and other B2B platforms that have been the only way for companies to contact their usual clients and to find some new ones.

Q: What does the transparency of companies mean today as a factor for success and survival?

A: The consumer is increasingly more informed and demanding. It has driven companies to better assess its preferences and transparency is one of the key features that consumer

looks upon when engaging relationship with a brand or a company. The way a garment is made, from design to the moment it reaches the consumer, it is now scrutinized and how it's perceived by the consumer is vital for the buying decision. The storytelling of this process is paramount and it should be done with sincerity and transparency. The Portuguese companies and brands are quite aware of this and are making changes to the way they communicate, so they can meet this new and demanding consumer.

Q: Territorial production and its sustainability are among the greatest challenges for companies at the moment. Companies produce in national territories, use finite national resources such as energy resources and export the product exclusively abroad, leaving in the different territories waste to be recycled and polluted common resources, with little gain for the community. What is the current role of companies in the social, cultural and identity enrichment of their territorial geography?

A: Companies are now dealing with sustainability in their daily operations. Progress has been made, but everyone is aware that a lot is yet to be done. Consumption is changing and companies are responding to these new trends trying to keep up with them, but above all, maintaining their business alive and the work places viable. When a company ends its operations, the local community is considerably affected, so the balance between doing business in an environmentally and, at the same time, socially responsible is quite a difficult exercise but it is already undergoing throughout the industry.


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Q: What will be the future in the vision of Moda Portugal?

A: MODAPORTUGAL considers that the nearest future will be one of recovery. After this pandemic conjunctural times, the confidence felt by consumers will increase and fashion consumption will consequently rise. Companies and brands have taken some lessons from the past 12 months and we are convinced that they will efficiently know how to embrace digital, sustainability, new consumption trends and at the same time, combine it with the traditional and historic know-how deeply rooted in the Industry. We are optimistic and ready to help the Portuguese companies to thrive.

Credits

MODAPORTUGAL is a project promoted by CENIT (Portuguese Centre of Intelligence for the Textile Industry) and ANIVEC (Portuguese Association for Clothing and Apparel Industries). This initiative is co-funded by the European Regional Development Fund, through the Portugal 2020 Operational Programme for Competitiveness and Internationalisation.

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Miguel Flor is the contributing editor for the News section, Eliana Macedo and Mariana Matos are the contributing writers, and Alex Finkle is the native English revisor.

All photo credits must be attributed to: cenit/modaportugal.


SUSTAINABILITY

V

BIOGRAPHIES

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Since 2015 she has been teaching fashion and communication design courses at the Accademia delle Belle Arti di Napoli.
Since 2009 she has been working as a professional visual designer and in 2017 she is co-founder of the Pluff design studio specialized in visual communication projects of national and international importance.
Among the main projects are the visual identity of the Italian Pavilion at the Venice Biennale (2015) and the creative direction of Milano Book City.
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For several years she led sewing workshops for children and supported the student sewing lab at HAW Hamburg.
Her label PAID VACATION functions as creative platform for contemporary tailoring and made-to-order fashion design.
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Aiap CDPG, the *Graphic Design Documentation Centre*. Working to collect, catalogue, archive, enhance and promote any documents related to graphic design and visual communication. These documents (originals as well layouts of projects, books, posters, prints, catalogues, correspondence, photographs) help reconstruct the history of graphic design in Italy and support research and educational activities, as it is the CDGP's intention to make these documents widely available.

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