POLITECNICO DI TORINO
Repository ISTITUZIONALE

Data, Fashion Systems and Systemic Design approach: an information flow strategy to enhance sustainability

Original
Data, Fashion Systems and Systemic Design approach: an information flow strategy to enhance sustainability / Tamborrini, PAOLO MARCO; Remondino, CHIARA LORENZA; Marino, Cristina. - ELETTRONICO. - The book of the RSD7 working papers:(2019), pp. 161-172. (Intervento presentato al convegno 7th Relating Systems Thinking and Design Symposium (RSD7) tenutosi a Turin (IT) nel 24th-26th October 2018).

Availability:
This version is available at: 11583/2729947 since: 2019-07-02T11:15:08Z

Publisher:
Systemic Design Association

Published
DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

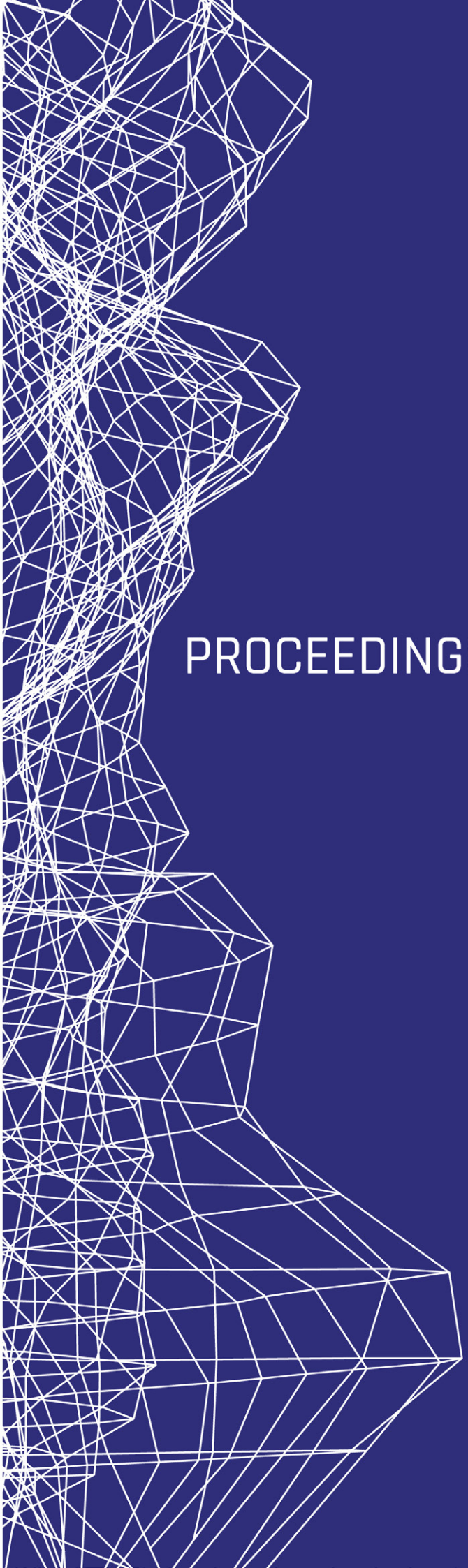
(Article begins on next page)

12 October 2024

RSD7 2018

RELATING SYSTEMS THINKING AND DESIGN 7th SYMPOSIUM

CHALLENGING COMPLEXITY BY SYSTEMIC DESIGN TOWARDS SUSTAINABILITY



PROCEEDINGS

TURIN
23-28.10.2018

Organised by:

POLITECNICO DI TORINO
Department of Architecture and Design

SYSTEMIC DESIGN RESEARCH NETWORK

Scientific partnership:

cumulus
creative linking

SID Società Italiana di Design

LENS

Sponsor by:

CONSIGLIO REGIONALE DEL PIEMONTE

CAMERA DI COMMERCIO INDUSTRIA ARTIGIANATO E AGRICOLTURA DI TORINO

Proceedings of Relating Systems Thinking and Design (RSD7) 2018 Symposium
Published by the Systemic Design Association in March 2019
Editor: Silvia Barbero
ISSN 2371-8404

Please, cite as:
Author (2018). Article title. In *Proceedings of Relating Systems Thinking and Design (RSD7) 2018 Symposium* (pp. xx-xx). Turin, Italy, October 24-26, 2018.

RSD7 PROCEEDINGS | CONTENTS

1 | POLICY DESIGN AND DECISION-MAKING

7 | **Bellefontaine T., Soliman M.** - Integrating Systems Design and Behavioral Science to Address a Public Sector Challenges from Within

19 | **Faiz, K., Woodcock A., McDonagh D., Faiz P., Adha Binti Nordin N., Binti Shamsul Harumain Y. A., Iqbal S.** - Permeating the barriers between the individual and policy designers in Pakistan: applying systemic design to gender transport poverty

40 | **Feast L.** - A Systemic Design Investigation of New Zealand's Democratic System

49 | **Muirhead L., Mosse R.** - Integration of Art of Hosting methodologies and principles into the Social Innovation Lab practice: A case study from a Social and Public Innovation Lab in New Brunswick, Canada

60 | **Peter K.** - Alternative Narratives on Economic Growth: Prototyping Change at the System Level

79 | **Stamatopoulou A.** - Design logics for relations: A methodology of mapping-and-designing (in) the city as open complex system

2 | INDUSTRIAL PROCESSES AND AGRI-FOOD SYSTEMS

100 | **Darzentas J., Darzentas J., de Bruin A., Power M., Prado P., Carmien S., Hobbs E.**- Systemic Design in Food Security and Resilience: Building A Holon

111 | **Giordano R., Montacchini E., Tedesco S.** - Building the fashion's future. How turn textiles' wastes into ecological building products

121 | **Savio L., Bosia D., Manni V., Pennacchio R., Thiebat F., Patruccio A. -** Natural fibers insulation panels: an adaptive production

3 | SOCIO-TECHNICAL SYSTEMS IN THE DIGITAL AGE

134 | **Fiore E.** - New strategies for the refrigerator in the transition towards a circular economy

149 | **Germak C., Abbate L., Giuliano L., Gabbatore S.** - Cleaning & Facility. A co-design process to create systemic relations from services to products.

161 | **Marino C., Remondino C.L., Tamborrini P.** - Data, Fashion Systems and Systemic Design approach: an information flow strategy to enhance sustainability

173 | **Valpreda F., Cataffo M.** - Beyond Participatory Design for Service Robotics

4 | TERRITORIAL METABOLISM AND FLOURISHING ECONOMIES

183 | **Battistoni C., Barbero S.** - Systemic design for sustainable territorial development: ecosystem definition to support autopoietic local economies

206 | **Bofylatos S., Kampasi I., Spyrou T.** - Designing resilient creative communities through biomimetic service design

220 | **Bozzola M., De Giorgi C.** - Packaging reconditioned household appliances

236 | **Cattozzo L., Marotta L.** - Landscapes and systemic design: Po river Delta (Italy) case

243 | **Giraldo Nohra C., Barbero S.** - Post-industrial areas on the lens of Systemic Design towards flourishing urban resilience

260 | **Lemos Oliveira Mendonça R.M., Ribeiro de Mello E.M., de Oliveira Nery S., Romeiro Filho E.** - Systemic network around education and community gardens

274 | **Schaus M.** - Narrative and value: Authoring our preferred values into the money we exchange

5 | SOCIAL CARE AND HEALTH SYSTEMS FOR SUSTAINABLE LIVING

289 | **Di Prima N., Campagnaro C., Ceraolo S.** - Systemic and participatory design processes in care systems

300 | **Landa-Avila I. C., Jun G.T., Cain R., Escobar-Tello C.** - Holistic outcome-based visualisations for defining the purpose of healthcare system.

315 | **Savina A., Peruccio P.P., Vrenna M., Menzardi P.** - The impact of food production on public health: systemic strategies for a diffused and transversal prevention plan

6 | MODELS AND PROCESSES OF SYSTEMIC DESIGN

332 | **Besplemennova Y., Tassi R.** - Systems Thinking for Service Design: more-than-human-centered tools

347 | **Boehnert J.** - The Visual Representation of Complexity: Sixteen Key Characteristics of Complex Systems

364 | **Chung-Sh Y., Renaux J., Chikermane V.** - Co-Designing a Social Innovation Model for Changemakers

376 | **Darzentas J., Darzentas J.** - Perspectives on Systemic Design: examining heterogeneous relevant literature to provide a historical and 'systemically inspired' review

387 | **Davidová M.** - Trans-Co-Design in Systemic Approach to Architectural Performance: The Multi-Layered Media and Agency in Creative Design and Its Processes

408 | **Jones P.** - Evolutionary Stakeholder Discovery: Requisite System Sampling for Co-Creation

418 | **Lockton D.** - Exploring R.D. Laing's Knots in Systemic Design

432 | **Marines Hernández L.E.** - Mapping disciplinary mobility for tackling complex problems

443 | **Matic G., Matic A.** - Design for Emergence – Enabling Stakeholder Liminal Transitions and Innovation Value Pivoting through Complex Systemic Transformations

458 | **Murphy R.** - Finding the *emic* in systemic design: Towards systemic ethnography

473 | **Murphy R., Jones P.** - Leverage analysis in systemic design: Using centrality and structural analysis to understand complexity

488 | **Passia Y., Roupas P.** - De-coding the possibilities of spatial assemblages: a design methodology of topologizing architectural morphology

505 | **Perera D.** - Wicked Problems, Wicked Humor: *Fun machines* as a Method

516 | **Sevaldson B.** - Beyond User Centric Design

526 | **Silverman H., Rome C.J.** - Analogies and Distinctions: Mapping Social System Identity

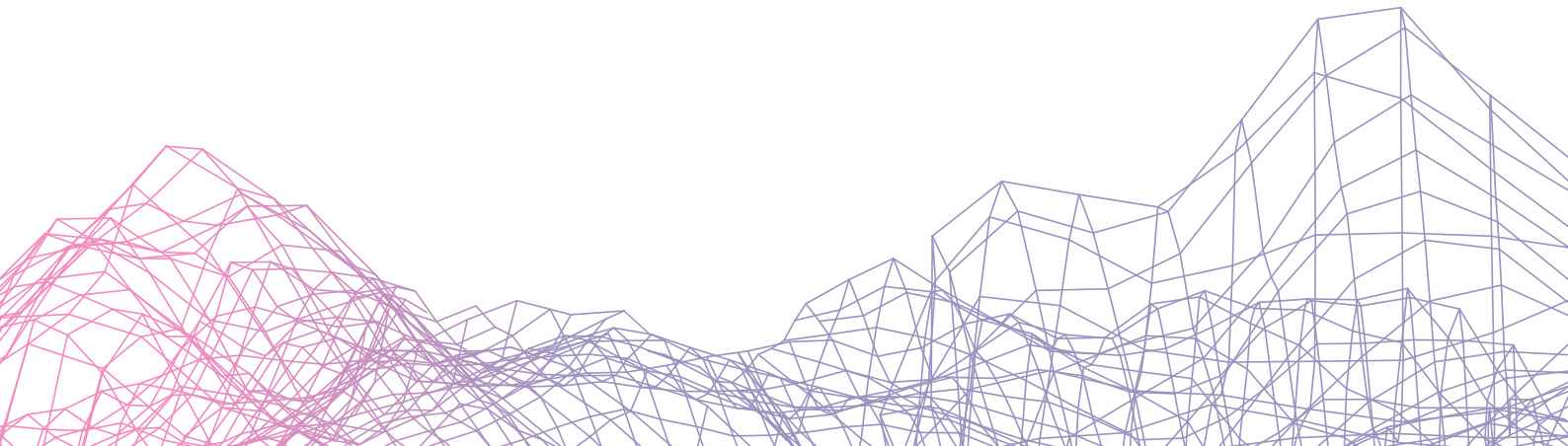
544 | **Snow T.** - Regenerative Value Systems – Models illustrating flows and transformations of value within production systems

563 | **Sweeting B.** - Radically constructing 'place'

571 | **Van Alstyne G., Skelton C., Nan Cheng S.** - Systemic Design and Its Discontents: Designing for Emergence & Accountability

585 | **Vezzoli C., Basbolat C.** - Sustainable Product Service System Design applied to Distributed Economies: a New Sustainable System Design Approach

3 | SOCIO-TECHNICAL SYSTEMS IN THE DIGITAL AGE



Data, Fashion Systems and Systemic Design approach: an information flow strategy to enhance sustainability

Cristina Marino*[a], Chiara L. Remondino[a], Paolo Tamborrini[a]

[a] Politecnico di Torino

* Corresponding author e-mail: cristina.marino@polito.it

Abstract Nowadays, the role played by fashion industry in contributing to degradation of natural systems is increasingly acknowledged. Acting in terms of information flow from a systemic perspective does not represent a parametric adjustment, nor a reinforcement or a weakening of an existing cycle. It is the generation of a new cycle, that of information, in a place where it was not previously given, therefore inducing a different behavior in people. The structure of information flows can be an effective leverage point in the fashion system, if information is delivered where it was not before, causing people to change behavior. Adding or restoring information, in a fashion system where the information circulating is sometimes not linked to an ethical and social value, can therefore represent a powerful intervention, usually easier and cheaper than reconstructing physical infrastructures. The ambition of this paper is to offer a perspective that faces this complexity and align fashion with sustainability values through insights gained from data.

Keywords: Data, Systemic Design, Information Flow, Sustainable Fashion, System Thinking

1. Introduction

Nowadays, the role played by fashion industry in contributing to degradation of natural systems is increasingly acknowledged. The impacts on the environment are mainly linked to the use of non-renewable raw materials, water pollution and waste generated. In addition to these socio-cultural implications deriving from the use of cheap labour and undignified working conditions resulted from 'fast' fashion business model, where economies of scale deliver standardized fashion at high volume and low price. Overlaps to all this a significant lack of information and communication between stakeholders make the interpolations of the system difficult to enodate.
In this context therefore characterized by complexity, intricate interdependencies and flux, and a wide span, geographically, epistemologically and in term of disciplines and discourses it draws together since was first introduced to the realm of fashion (Fletcher, 2008) system and design thinking, has provided a helpful viewpoint on the area.
A preliminary literature review reveals in fact that acting in terms of information flow from a systemic perspective does not represent a parametric adjustment, nor a reinforcement or a weakening of an existing cycle. It is the generation of a new cycle, that of information, in a place where it was not previously given, therefore inducing a different behavior in people. According to Meadows the structure of information flows can be an effective leverage point in the fashion system, if information is delivered where it was not before, causing people to change behavior. Adding or restoring information, in a fashion system where the information circulating is sometimes not linked to an ethical and social value, can therefore represent a powerful intervention, usually easier and cheaper than reconstructing physical infrastructures.
The ambition of this paper is to offer a perspective that faces this complexity and align fashion with sustainability values through insights gained from data.

2. Fashion as a complex system

Fashion is a powerful cultural lever, capable of influencing the consumerist economic model based on mass production that characterises us today.
The fashion system is "composed of interconnected elements that produce their own pattern of behavior over time". (Meadows, 2009, p.2)
In her latest book, published for the first time in Italian, Fletcher not only defines it as a system rich in complexity but also associates in a precise way the adjectives *stratified* and *multidimensional* as well as multidisciplinary.
The papers analysed during the research in the literature review phase highlight the coexistence and the indissoluble integrity of four areas when we talk about fashion and sustainability - the technical, the political, the aesthetic and finally the psychological and behavioural.
In fact, looking at sustainability is impossible if you do not keep in mind technical problems related to the traceability of the production chain; the efficient use of energy sources, water and chemicals; if you do not ensure the safety of the working environment; if you do not care about innovation in the choice and production of materials, if you do not improve recycling practices; if a fair wage system related to the future impact that the fourth industrial revolution will have in automated production processes.
Similarly, sustainability issues cannot include solutions that do not take into account institutional policies that are national or international or that do not affect the business choices of individual brands. Fashion implies and is conditioned by systems of control and power at the highest levels of modern society and which in turn frames a system where the free choices of citizens sometimes do not change the games of big names.
Addressing in a correct way any phenomenon related to fashion can no longer be done ignoring the challenges to sustainability that the aesthetic variable brings with it: the fashion industry, more than any other, has perfected the cycle of invention, acceptance and rejection of a series, aligning itself with the ever-changing but constant ways of exhibiting its image, almost definitively releasing a cycle of change that was inspired by physical necessity with a series of variations dictated only by the aesthetic function.
Looking at the fashion system as a complex system means being able to direct the outcome effectiveness of a series of changes and approaches in a broader perspective that make the designer ready to predict and prevent objectives, time frames and scales of application.
Each of these areas, like every complex system, is then regulated by strict rules or flexible interdependencies with direct or indirect repercussions on consumers and ecosystems from the smallest to the largest scale.
In the same way, a sustainable fashion system that is as complex as the non-sustainable one remains an interconnected flexible process that does not stop taking into consideration any of the four areas, giving it equal weight and importance in undertaking strategies aimed at change.

3. Data as a strategic tool for sustainability

The intersection of fashion and new technologies is a rich and expansive space that capture simultaneously elusive aspects of being human and fashion experience, the purpose for this approaches that use data with an holistic point of view, is not just about describing businesses and brands how to include big data into their daily practices, but to help every stakeholder to add this resources to their toolkits to increase sustainable policies.

Fashion, therefore, introduces a complex system made up of different components and actors that interact with each other in countless possible ways, and its overall behaviour is not given by the pure definition of behaviours but by the objectives of individuals and their interactions. The ability to understand such a system with the aim of leading it towards a more sustainable fashion system is not limited to strategies oriented to the knowledge of the individual parts, but above all to the ability to recognise and structure a vision of sustainability able to relate the various long term procedures.

The Systemic Design approach defined and tested in different fields of design such as the food supply chains focuses on the design of relationships between people, activities and contextual characteristics to improve the knowledge of complex systems.

The use of data together with a systemic approach aims to generate a unified understanding of sustainability strategies in the system and to disseminate all the information that can produce a significant change influencing the behaviour of the system.

Also, using data aimed at holistic relief guides the designer in a deep understanding of the issue, outlining the real role of all actors involved in their field of application, their development and their relationships in their operational context.

As far as data, fashion and sustainability, on a broader discourse, are part of the potential already mentioned above, such as transparency and traceability of the supply chain, in-depth knowledge of territorial dynamics and last but not least, the creation of a direct relationship between the company and consumers based on real needs rather than on trend forecasting guided by consumerism and profit.

Data represent a quantitative input that analysed, understood and used in a systemic perspective produces a qualitative output of high value in terms of awareness for companies and consumers.

4. Systemic Innovation Design methodology applied to fashion data

Specifically using systemic design as a catalyst of change, this research looks through data generated inside fashion system in a holistic way, defining all the process, service and actor as a dynamic whole and not as a fragmented sum of its part.
Contrary to what happens with the sustainability strategies currently in use, that are focused on symptoms, and endorse methods that try to solve single problems not caring about existing relationships, systemic design approach can be an effective tool to restore the lack of information that concern the whole process and all actor.
This approach, which looks at the larger picture, focuses on the transition from a linear vision, where individual environmental issues are addressed, to a systemic approach, where an improvement of the individual components, if put in relation, corresponds to improvements for the whole industry.
Through the systemic use of information, however, fashion can act constructively to stimulate positive practices and quality development in the direction of sustainability.
Data can be involved with an innovative approach in the phases of fashion creation and at the same time can implement processes and applications in a more sustainable direction.

4.1 Methodology

Complex systems are inherently unpredictable because we can not explain a high percentage of variance that affects results. Under these circumstances, Editd's chief executive Geoff Watts observes that "minor disturbances in one part of the system can be amplified to produce larger effects somewhere else." Moreover, this is precisely what happens in the fashion system: where the purchase of a garment in a highly fragmented chain with high social impact causes devastating consequences for the environment and the entire system.

The multitude of social and economic activities that are understood and constitute the fashion system is therefore necessarily complex.

To navigate the complexity of a system so strongly interconnected and based on an apparent win-win model that hides its real inability to be transparent and communicative is necessary for our work applies an information flow strategy, based on data and all of that technological tools which could reveal any information.

Starting from the analysis and the recognition of fashion as a complex system the research aims to identify the relationship between components and different elements. Integrating data become possible to inspect and understand in detail not only business and organisational needs but also human being and behaviour pattern of choice, use and consume the fashion product.

From an operational point of view, the research is based on the intention to highlight the capacity of interconnecting people, process, and environment with fashion: we apply the Systemic Innovation Design Methodology to enhance knowledge and understanding about the system, to produce functions, objects, and process for the wellbeing both the individual and the collectivity. With this approach that combines systems thinking skills with design thinking in order to address fashion system complexity a collection of data become useful for generating new awareness and identify patterns of behaviour.

Data are no longer considered a static asset whose use ends when the purpose for which they were collected has been accomplished; hence a raw material, a vital input, used to create new forms of value as well as a source of innovation and new services (Gaiardo, Tamborrini, 2015).

This kind of study starts with a holistic analysis of the current situation, clearly outlining all the life cycle step of garment production and all the actor and the actions undertaken or undergone by the context in question.

Since fashion is more than the materials that garments are made of, data give us the opportunities to go beyond the lack of information that concerns the whole process and all the actors involved.

A technology-enabled sustainable fashion system operates similarly to an ecosystem where there is a conscious evaluation of the impact and both inputs and outputs, how they depend upon and influence one another, and the environment as well as the economic cost of each decision.

The outcome of this research aims to give to a million data collected a sort of structure capable of capture context underlying connection, drive insight through design and organisation and last but not less critical create value identifying and defining sustainable strategies.

4.2 Stages of research

The need for a systemic change dictated by the environmental crisis means that different choices will be made by consumers and companies, related not only to material supplies but also to the habits in our lives and the way we express ourselves through fashion.

For this reason, can only be necessary a series of structured activities that manage the collaborative and participatory processes that are developed above the data.

Within this contribution are illustrated the preliminary phases of the research before the information collection, nevertheless for the comprehensiveness of the purpose are listed the following stages, which are expected to develop in the future according to the methodology of systemic innovation design.

4.2.1 Mapping the current fashion system and identify the information gap

The first stages of the research consist in mapping and analysing every step of the customer journey in order to find any information gaps and selecting on the context-rich, real-time and *in situ* pool of data that will be collected in the following steps. This preliminary focus on the customer experience takes from the customer's perspective right from the start and aims to understand a customer's behaviour, feelings, motivations and attitudes before, during and after the shopping experience. The customer journey includes all activities and events and in this emotional and physical journey are included all the activities between the customer and his garments in order to examine the relationship in between.

This step is essential also to identify the other actors involved, the nature of their relationship, the knowledge and the technologies that are available and which can be useful in the subsequent collection and analysis phases.

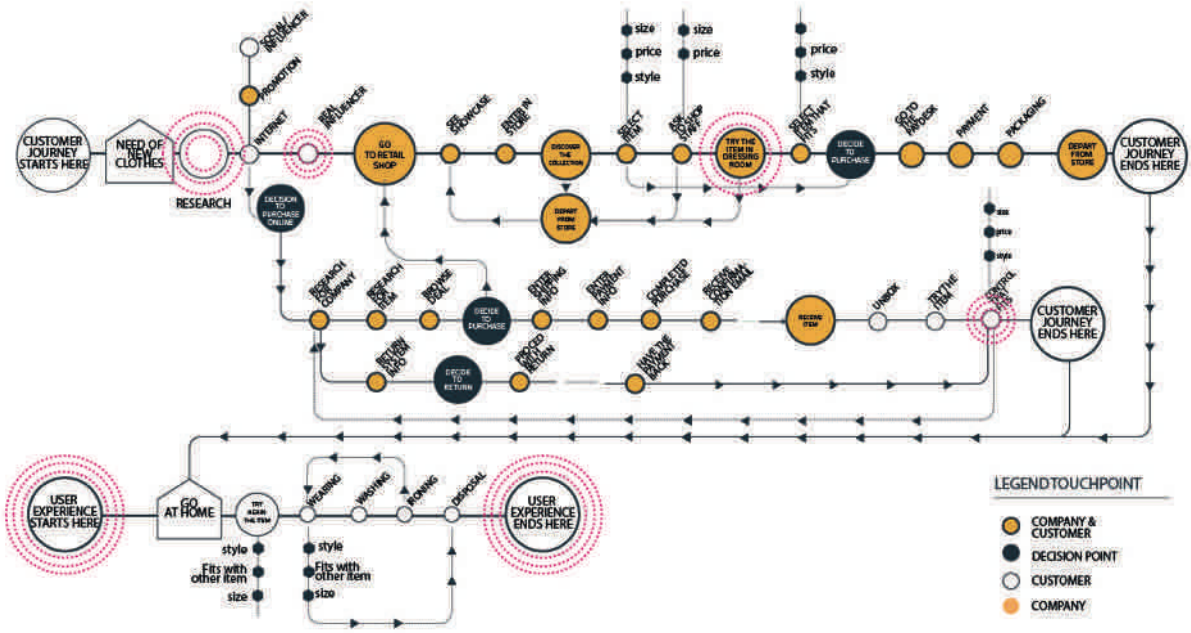


Fig. 1_Customer journey map – information gap

4.2.2 Planning data collection

The result of the first step is the quite clear overall picture of the system from the customer point of view: after that is crucial to structure the data collection in detail. The transformation from data into useful information at all levels of the design process requires a continuous process in which data are collected, classified and appropriately contextualised in a specific analysis context.

In this phase, the structuring of the collectable dataset involves the evaluation of qualitative and quantitative data that will be integrated into the research in order to understand many aspects as possible.

In this phase, three datasets have been identified: (1) customer information, (2) product information, and (3) the information flow.

The nature of the customer-based data set is not intended to draft consumer needs to produce perfect deals for companies, which would have nothing to do with sustainability goals, but instead have the final objective to generate an even more close relationship between consumer and product in order to lengthen its life cycle.

For this reason, part of the information research aims to obtain the data related to the product. A recent report edited by the Fashion Revolution movement, in fact, dealt with understanding what information customers would like or should receive from brands about the environmental impact of their products and what kind of information influences the purchase of certain products. The results of the survey reveal that consumers would like to receive more information about the origin of raw materials, the impact on the environment and workers' rights, and not least the social and environmental conditions of their entire supply chain. With the same objectives, the research for information in the product dataset is structured.

Future research could concern developing the following step:

a. Collection of information

b. Information analysis

c. Validation of information

d. Detailed guidelines

e. Definition of concept

f. Experimentation and project development

4.3 Research outcomes

The content of this research returns four levels of results that complement each other to solve in a complex way the criticalities previously highlighted in the fashion system.

1. Research Level such as consumer behaviour, consumption as everyday practice, unconventional user behaviour, systems of use, measuring sustainable consumption e mapping ecological footprints etc…;

2. Service Level for both company and consumer with the aim of development strategies for increase consumers awareness and companies sustainable impact;

3. Product-level by which enhance product sustainability;

4. Organisational level in order to redefine the process and spread transparency and circular economy policies.

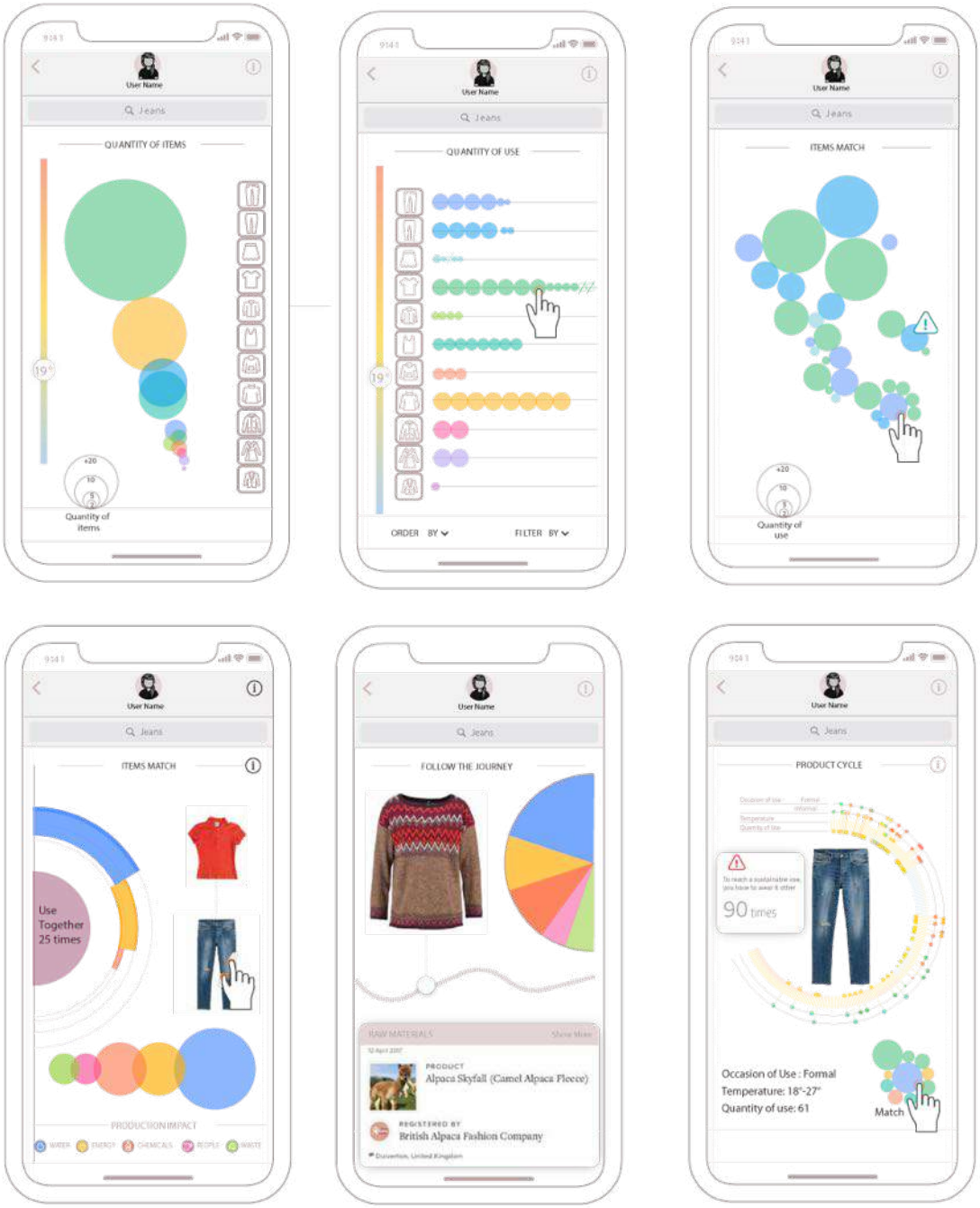
In conclusion, Big Data in fashion industry has the potentiality to unlock interesting areas for design disciplines such as consumer behavioural data or unconventional use behaviour capable to generate value within the system but also to make visible the intrinsic one becoming a fertile territory for the most indicated innovative intervention (the better decision).

It is clear that big data will contribute to the optimization of the supply chain and to the development of sustainable product and service, but is important to evidentiate how it is possible to generate a unitary and coherent understanding of the whole system that allows a sustainable development also in all systems connected with the fashion one.

The combination of quantitative data and qualitative ones helps the system to understand where to focus and how providing meaningful insights to ensure that the weakness of one is balanced by the other.

The following figure shows an example study of how having access to personal information could vary the level of awareness of sustainability in choices related to clothing.
In the first screen, each circle corresponds to a category of clothing: the size of the individual circle communicates the amount of clothing owned for a given category.
The second screen displays the amount of garments used in the wardrobe: each circle corresponds to a single garment. The size of a single circle indicates the number of times the garment has been worn. Crossed-out circles identify garments owned but not used because of the chosen temperature. By selecting a certain circle with a click, it is possible to obtain the set of combinations that the user generally chooses to wear, in the third screen. The colour of each circle identifies the category of garments. The proximity of the circles identifies possible combinations; the distance of some circles highlights isolated combinations: the disintegration of the garments inside the wardrobe is an indication of poor sustainability.
The three final screens highlight the overall impact (production and use) of the wardrobe. The impact

is given for the number of garments owned and their life cycle. A small number of combinations within the wardrobe indicate poor sustainability.



5. Conclusion

Forecasting consumer demand for fashion is a complex subject. Big data will help to predict customer behaviour to steer fashion industry in the right direction, however having access to millions of data is not enough for a system like fashion to be more efficient to deal with the reality of biophysical limits and their incompatibility with the logic of growth.

This research wants to underline the importance of collecting interaction and relationship in a significant dataset. Systemic design could represent an approach that enables a holistic view of the whole fashion system, allowing a complete elaboration of the complexity of the users' behaviors and of that of the upstream processes, keeping in mind the centricity of the individual involved and the context within which sustainable projects can be developed; thus, generating a comprehensive view of the entire fashion system.

Innovation and change, combined thus with the enormous potential of data, can start, as we demonstrate, from any different stages of the supply chain and produce significant results for the environmental responsibility of fashion companies.

Future research will provide the collection of data and the holistic relief starting from companies and supplier perspective.

References

Bistagnino, L., (2011) Design Sistemico. Progettare la sostenibilità produttiva e ambientale, 2ª ed. Bra (Cn), Slow Food Editore

Chapman, J., (2005). Emotionally Durable Design: Objects, Experiences and Empathy. London: Earthscan.

Fletcher, K., (2018). Moda, design e sostenibilità - Postmedia Books, Milano

Fletcher, K. (2008) Sustainable Fashion and Textiles: Design Journeys. London, UK: Earthscan.

Fletcher, K. and Grose, L. (2012) Fashion & Sustainability: Design for Change. London, UK: Laurence King Publishing Ltd

Meadows, D.H. (2009). Thinking in Systems: A Primer. Chelsea Green Publishing, White River Junction, VT, pp. 222.

Gaiardo A., Tamborrini P., Bardone L. and Buriano L., (2013) Playing with Data: an Experience in Creative Infovis, In: Communicating Complexity, Edizioni Nuova Cultura

Rissanen, T. (2013) Zero-waste Fashion Design: A Study at the Intersection of Cloth, Fashion Design and Pattern Cutting. PhD thesis. Sydney, Australia: University of Technology

Siraj, D. (2014). The data store: on big data. Retrieved from https://www.theguardian.com/technology/2014/jan/30/fashion-data-tool-editd-helps-asos-push-revenues-up-37

Tamborrini, P., Remondino C. L., and Marino, C., (2018) Fashion Industry as a Big Data Enterprise for Sustainability. Curr Trends Fashion Technol Textile Eng; 3(4): 555616. DOI: 10.19080/CTFTTE.2018.03.555616