



# **A CONNECTED WORLD**

**DESIGNING NEW METHODS, TOOLS AND SOLUTIONS  
TO LINK PEOPLE TOGETHER AND SAVE THE PLANET**

EDITED BY

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# A CONNECTED WORLD

## DESIGNING NEW METHODS, TOOLS AND SOLUTIONS TO LINK PEOPLE TOGETHER AND SAVE THE PLANET

This volume is the outcome of a discussion triggered by the 2022 World Information Architecture Day, the one-day a year event to encourage world-wide conversations about information architecture.

The 2022 topic was "A Connected World": *We connect with each other in digital, physical, and blended spaces. We connect with people, products, services, content, and the world in general. This connectedness can be wondrous and yet challenging.*

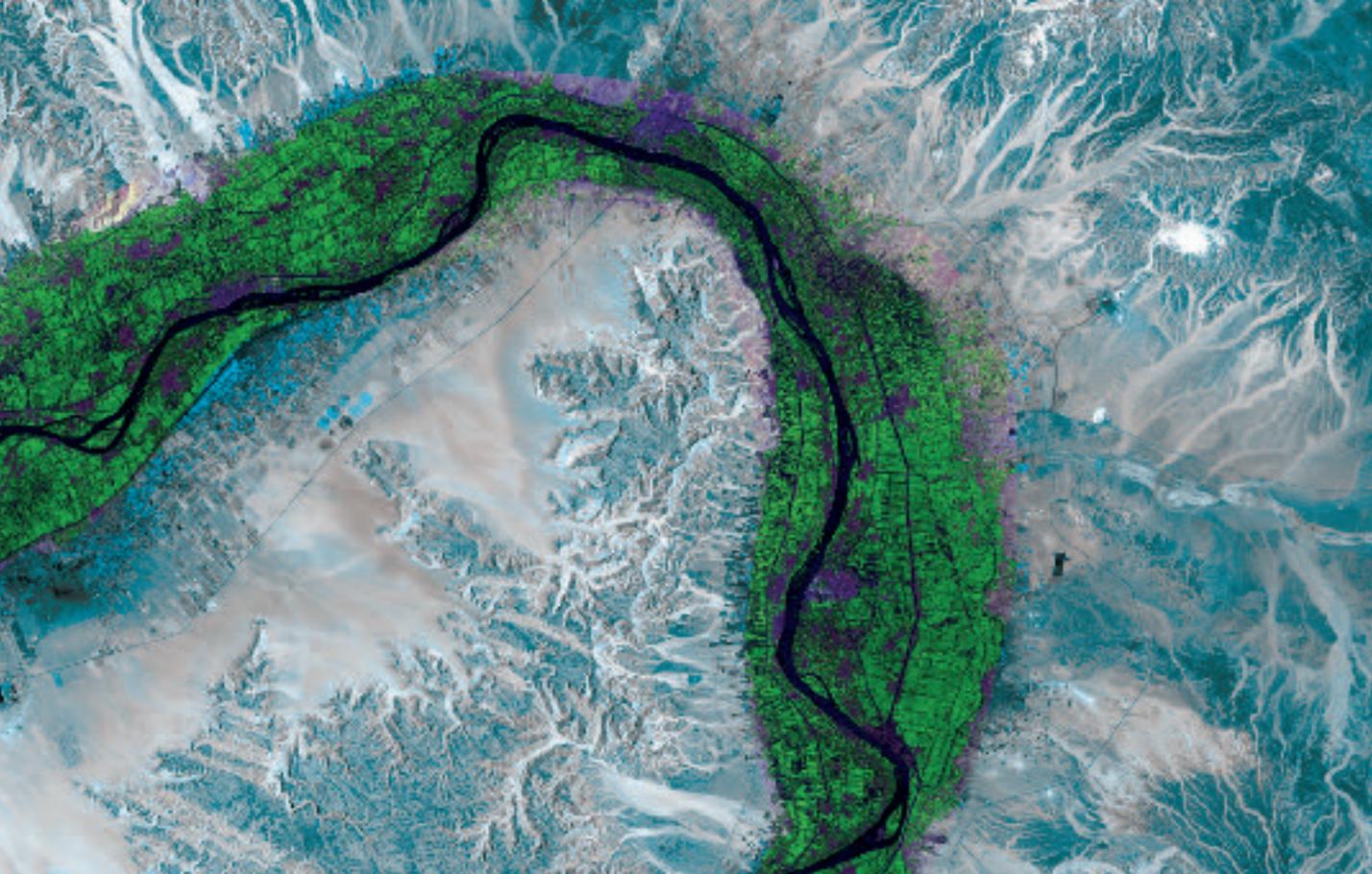
*Information architecture uncovers and creates new connections that we weren't aware of before. It can inspire us to make new discoveries*

*or reveal new relationships that may urge us to take constructive action, e.g. climate change, the global health crisis, or the supply chain disruption we have experienced during the pandemic. Information architecture contributes to making connections more relevant. It helps us understand which information is important and trustworthy. It provides guidance in a mess of information and helps fight against the disinformation of fake news. It allows us to steer better who and what we are connecting with. It creates places we enjoy being in where people and information meet.*

*In a world where we're connected yet distanced,*

*how do you facilitate connectedness? How do you help make sense of connections? What new connections have you made recently? How did you support others to discover new connections? In what ways do you think information and information architecture can be used to support, define, or create environments (digital, physical, virtual, or blended) to improve the lives and experiences of people in a connected world?*

The hybrid event organized on March 4th 2022 in Palermo by the University of Palermo, PUSH design lab and Arca, had the support of an international scientific



committee (Marika Aakesson, Cristian Campagnaro, Salvatore Di Dio, Nicola Morelli, Chiara Lorenza Remondino, Dario Russo, Paolo Tamborin) which selected blindly abstracts of scholars and professionals willing to contribute to the discussion.

Through the open call the scientific committee have selected abstracts from Luigi Farrauto, Danilo Costa, Roberto Anelli, Federica Ditta, Cristina Marino, Leonardo Moiso, Eleonora Fiore, Enrica Amplo, Andrea Arboleda, Antonio De Pasquale, Irene Fiesoli, Claudia Mastrantoni, Florian Myter, Caterina Bonora, Isabella Patti, Valeria Valeriano and Caterina Bonora.

The following conversation triggered by the event was therefore the starting point of a deeper discussion in the next month, and, thanks to the interest of Palermo University Press, curators of this volume invited all contributors to condense all further reflections in a fix peer-reviewed paper (David Kaplan, 2005 "How to Fix Peer Review", *The Scientist*, 19).

All contributions discussed in this essay focus on the potential of design and innovation to address important challenges facing humanity and the importance of inclusive design and sustainability in the digital age. The common characteristics

of the texts are that they all discuss design in relation to technology and innovation. They explore how design principles can be applied to various fields, such as education, public services, and sustainability, to create new solutions and opportunities. Authors also discuss the potential of using technology, such as data analysis and digital platforms, to improve design processes and outcomes. Additionally, the papers highlight the importance of inclusive and holistic approaches to design, and the need for collaboration and dialogue between different stakeholders in the design process.

# PAPER CITY, A CREATIVE FRAMEWORK BASED ON DESIGN THINKING TO ENCOURAGE AWARE CITIZENSHIP THROUGH DESIGN AND STEAM EDUCATION

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## **ABSTRACT**

We are living in the world of smart cities, intelligent technologies, and climate change. As a citizen, anyone deserves the chance to develop key skills and competencies to have a voice in times of transformation. *Paper City* is a framework that promotes aware, active, and creative citizenship through workshops and learning programmes focused on design and technology. *Paper City* is a real and metaphorical city map where anyone can meet and share ideas on how to build our city of the future, which we imagine to be more and more sustainable, inclusive, ethical, and equal. With this exploratory paper, we discuss how *Paper City* was used in both formal and non-formal education contexts to engage children and young students in STEAM education through cooperative learning. *Paper City* is designed on principles of creative learning and design thinking, and it represents an opportunity to develop 21st-century skills. We discuss the potential of a multidisciplinary framework like *Paper City* and suggest further developments potentially, as an outreach platform (theoretical and physical) able to connect different stakeholders (i.e. city councils, teachers, the general public, and children) and provide them opportunities for dialogue and reflection.

**SMART CITIES, CREATIVE LEARNING, ENGAGEMENT, STEAM EDUCATION, AWARE CITIZENSHIP, DESIGN, DESIGN THINKING**

We would like to thank **Paola D'Elia** researcher in digital learning at Università degli Studi "G. d'Annunzio" Chieti Pescara, **Silvia D'Ambrosio** researcher in city and community design at Politecnico di Milano and **Martina Gerosa** architect-urbanist and accessibility specialist, for their thoughtful revision of this article.

# 1. INTRODUCTION

Smart Cities are at the center of design and research debates, defined as innovative cities where the innovation covers fields i.e. technology, mobility, education, and environment [12]. Smart cities represent a multidisciplinary framework for reflection on aspects related to citizen's life e.g. accessibility, inclusion, and the aware use of technology [12]. Studies on the concept of the "ideal" cities date back to the ancient Greeks, and recent ones focused on understanding how cities represent places where citizens grow a sense of belonging, have rights, and learn [5]. On the other hand, the city concept itself can be used as a framework in education and learning to promote 21st Century skills for aware future citizens. Research illustrates how smart city design can be a playground to develop 21st Century Skills e.g. creativity and critical thinking through collaboration [13]. Approaches used for the purpose range from design to STEAM (Science, Technology, Engineering, Art, and Mathematics) education and making. During workshops or activities based on these approaches, students are engaged in the design process to find solutions to real-world problems while using technology (such as programmable electronics or coding) as a tool to develop prototypes or share ideas [9].

STEAM education, in fact, aims to create learning opportunities for students to develop 21st Century skills while learning about technology creatively, collaboratively, and by doing [1].

The combination of the city concept with technology is used in educational workshops and as education kits and products all around the world. We saw many tinkering and technical creative workshops and kits born in the last few years. Some kits and workshops use conductive ink or tape and LEDs to light up a city made out of paper [2]. While other kits are, for example, focused on renewable energy and use the city as a background [10]. As a material, paper is one of the first materials that each of us as learners is used to working with, from kindergarten to schoolbooks and notebooks. Paper is a very ancient material and today it is one of the most widespread and used, at the same time, the exploitation of natural resources used for its production cannot be ignored

and recycling and upcycling are more and more encouraged [11].

*Paper City* was born in 2017 from a multidisciplinary team of designers (paper and book designer Giulia Poli, artist and designer Fabio Prestini and Mechatronic Engineer and STEAM education specialist Enrica Amplo, (Figure 1). *Paper City* is a dynamic framework based on design thinking that ranges from the format of a workshop for a non-formal context (Figure 2) to a learning programme for K-12 students (Figure 8). From a kit to a collector of data and insights to ignite citizens-cities dialogue. *Paper City* promotes aware citizenship through creativity, technology, and design.



**Figure 1.** *Paper City* team, from the left Fabio Prestini, Giulia Poli, Enrica Amplo



**Figure 2.** *Paper City* in non-formal context during a family-friendly event. With buildings lighted up and robots

## 2. PAPER CITY METHODOLOGY

*Paper City* focus is the modern city concept: today cities can ensure a rich cultural offer and several public engagement events, but are these the citizens' real needs? The services available are many, however, are they useful and efficient? These are just a few of the questions that ground *Paper City* project. Therefore, *Paper City* aims to give citizens an active tool that enables them to express themselves, highlighting their needs and how they would like their city to be. Our core audience is children and young people because they can represent the most creative and "free from structures" voice out of the society (while they are often the least to be heard).

*Paper City*, is based on Design Thinking: an innovative approach that focuses on the users and avail of design and technology tools to tackle users' needs [7]. We re-design *Paper City* each time in an attempt to adapt it as better as possible to our stakeholders (users, founders, and the public) needs. We design *Paper City* with our users in mind while managing constraints and objectives from the clients with the aim to create a meaningful and creative experience for the participants.

When feasible we experiment also with co-design. Co-design is a new branch of design that believes in users as the

best designer of a product or a service [3]. We involve participants in the creation of the whole *Paper City* from scratch or we use *Paper City* as a think-tank to promote co-design and dialogue between citizens and estate companies or governance.

Designers are key figures in *Paper City* framework. Thanks to their background and skills designers can create a felicitous environment for ideas to be shared and listened to and act as facilitators and mentors to support and lead the activities. *Paper City* is both a theoretical and physical framework. It represents a space where participants are involved in the discussion, reflection, and co-creation around themes such as sustainability, design, and technology. We designed *Paper City* as an integrated multidisciplinary platform that it could be represented as a sum of three layers (Figure 3).

The first layer is the map. The map can be painted on wood or printed on paper or thick cardboard. The map design is based on real cities and simplified to be more readable. Moreover, simplification is key to encouraging creativity: the

less the map is recognizable, the more we saw participants expressing themselves in creating a new city concept. Paper buildings are the second layer of *Paper City*. Buildings are available in five different models. They are designed to be easily assembled and they can be fully customized by the user. The reason behind this choice was to avoid redundant or useless features that could result in an impediment to users' creativity. Building designs consist of 2D shapes printed on white paper (Figure 4). Buildings have measures in common both to guarantee a harmonious aesthetic and to ease the combination and connection of more buildings together (Figure 4). Buildings have just one detail: a rectangular hole that facilitates assembly and that can be interpreted as a door. One of the *Paper City* workshop activities is to assemble the buildings. Participants can do so by first cutting along the outer edges, secondly folding along the inner edges, and then using a glue stick to fix the flaps. After the assembly participants customize the buildings according to their own ideas; the results are always interesting and unexpected (Figure 4).

Furthermore, during the assembly of *Paper City* buildings participants train skills i.e. fine motor skills and motor coordination.

Paper was chosen as a material because of its availability and



Figure 3. *Paper City* layers: Map, Buildings, and Interactions (Technology)



**Figure 4.** *Paper City during Milan Digital Week with a secondary school age group*

children are used to using it in their day-to-day life. Paper is recyclable and as a material allows us to talk about sustainability, recycling, and upcycling during our activities. Buildings are then completed with a simple electronic circuit that can be built by participants. It consists of a small LED light, and a 3V battery connected with copper tape. We adopted and adapted a paper holder for the battery that can be used as a switch to turn on and off the LED light [4]. The adoption of a switch resulted from field feedback. Several young participants asked to have a way to turn off the LED and save energy.

The third layer of *Paper City* consists of technological interactions. Technology is creatively integrated into the map in different ways. One of the first interactions designed was based on the use of a programmable electronic board that plays sounds if "touched". We connected the board to the streets on the map through black conductive ink. To activate the sounds users could directly touch streets on the map using their hands or using buildings. Buildings

in this case were painted with a strip of conductive ink so participants could hold the building by hand and use it to touch the streets to activate sounds. Sounds were pre-set by us or recorded with the participants. Subsequently, we incorporate electronics building blocks (Figure 5) to create opportunities for users to understand how city energy infrastructure works. We introduce participants to concepts such as electric circuits, switches, and power supplies. Later, we decided to power these circuits with a renewable energy kit that uses a little solar panel or hand-dynamo. Lastly, in some iterations of the project, we

discussion and debate around autonomous and electrical mobility in smart cities. *Paper City* is iterative, and dynamic as based on design. Therefore, iteration after iteration we improved the framework and depending on the context in which the activity was carried out and stakeholders' objectives, we adapted it to create the most suitable format.

### 3. PAPER CITY IN SCHOOL

In 2019, *Paper City* was founded as a summer STEAM programme in a school in Emilia-Romagna. It was a week-long programme



**Figure 5.** *Paper City wood map with conductive black paths and electronic building blocks*

used small mobile robots that can be programmed with colors and can autonomously follow marker lines. These robots were chosen to encourage

for a group of primary and middle school students who voluntarily decided to participate. Throughout the programme students were



**Figure 6.** Students collaboratively working in designing their city map

supported by two mentors and a schoolteacher.

The programme was focused on city design. The first part of the programme consisted of a series of hands-on sessions on creative coding and 3D modeling. Students designed imaginative cities while exploring computational thinking and coding. Using easy-to-use CAD (Computer Aided Design) software they generated 3D models of creative buildings.

After this first phase, students were then led through the design cycle from brainstorming (**Figure 7**) to the

creation of a city in groups. Each group worked on a map. Students designed buildings and neighborhoods (**Figure 8**). They also designed streets with conductive ink that came alive through a programmable board that play sounds. The final phase of the



**Figure 7.** Brainstorming "What are the elements of a city?"

programme was focused on collaboration and co-creation. Students were asked to connect all the maps together to create one city together. To link all the parts of the city students worked together to modify details were needed (**Figure 8**). Students were then introduced to electrical autonomous transportation and its environmental impact using educational mobile robots. Robots worked as a way to engage students in a final design iteration on how to strategically add stops to the map. Both students and teachers were enthusiastic



**Figure 8.** Students working on connecting all the designed maps together. There are customised buildings, and black lines (streets) for the tiny mobile robots.

about the programme and the emphasis was given to soft skills and the collaborative ideation process rather than only on the final outcome.

#### 4. PAPER CITY IN NON-FORMAL CONTEXTS

*Paper City* was particularly successful in non-formal contexts i.e. private and public events, cultural events, and retail. During the launch event of the project for a new housing complex of a private company in Milan, we were invited with the aim of gathering opinions on the neighborhood life of their young citizens (primary school children). To collect data we developed a user-friendly tool printed on A4 paper. Instead of using a common survey form, we designed a matrix

that allows space for writing but also sketching (**Figure 9**) based on the concept that artistic creations (e.g. drawings, artistic objects) are used as a qualitative research method to collect meaningful data and insights, as they are a mean of expression as they provide a different space and perspective to participants [8].

The tool has a question in the centre: "What cannot be missing in your ideal city?" and some hints to prompt creative thinking for each quadrant "The scent of..." "The color of..." "The place for..." "The sound of...". Results were unexpected. Children focused their thought beyond material aspects of the city (i.e. buildings) writing thoughtful reflections such as "Peace" or "Green areas" (**Figure 9, Figure 10**).

During Milano Digital Week we

led *Paper City* for a group of secondary school students, at a local maker space. We decided to provide a few cases to work on: Accessibility, Sustainability, Culture and Technology. For this particular event, the map was printed on paper and laminated. Participants used wipeable markers to control the robots on the streets. They also built the buildings and customized them.

#### 5. PAPER CITY ONLINE

Due to the unprecedented times of Covid-19 world health emergency of 2020, *Paper City* format was designed to be run digitally. We conducted a few workshop online with a small group of participants on a platform for video calls using a collaborative digital canva. Furthermore, we designed free hands-on resources to encourage creativity and imagination in difficult times. Activities were available for free online on *Paper City* website in the form of video tutorials. This capsule project was called *Paper City* Creators. All the activities are focused on paper buildings symbols of *Paper City* as tools to explore coding, 3D modeling, and stop-motion. They are self-contained hands-on workshops with the aim to engage as many people as possible remotely. Activities need only simple materials and free software and apps. Examples of activities are "Build



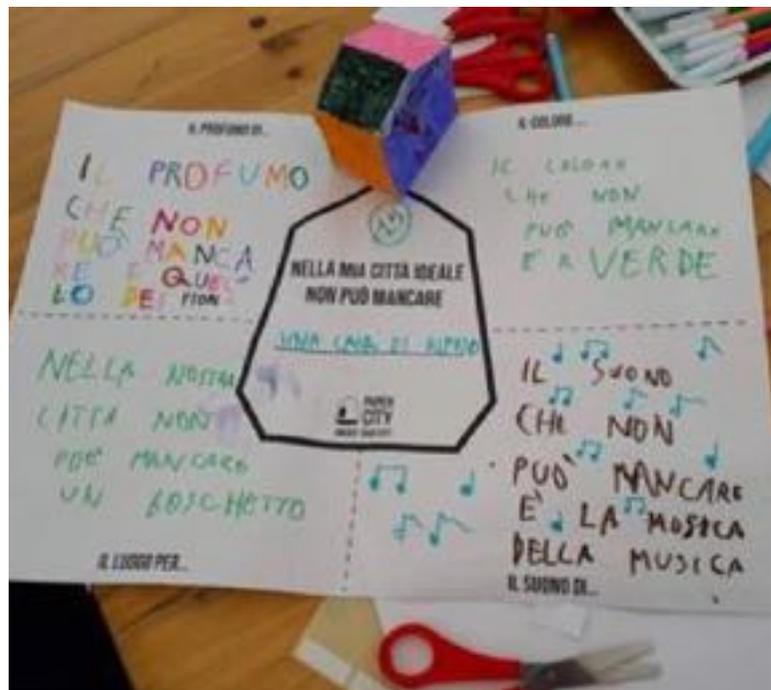
**Figure 9.** Creative matrix filled in by children. "Peace" is in the centre as the thing that cannot be missing in a city

your house in 3D", "City in Stop motion", "Bring your city to live with coding" [6].

## 6. DISCUSSION

*Paper City* showed to have great potential as a creative framework to engage children and young people. The most appreciated features from stakeholders are its versatility and adaptability. Iterations highlighted its suitability for Schools, Public and Not-For-Profit Organizations. We had the chance to present *Paper City* to very different institutions, from one side it was a playground from the other side was quite challenging in

finding a compromise between stakeholders' expectations, resources, and learning objectives. Undoubtedly, *Paper City* flexibility represents strength from a design point of view, however, from a marketing and sales perspective, such a variety of possibilities could be hard to communicate. *Paper City* itself is based on design thinking which makes it a very powerful framework, however, including design thinking as part of the activities is challenging and still under development. It worked particularly well for the week-long programme in school but still required investigation for us in understanding how to use it in fairs or public events where attendants come and go



**Figure 10.** Matrix filled in by children. "The colour that city needs is green", "The place that cannot be missing is a little wood" and "The sound of music"

and expect a different kind of engagement. On the contrary, fairs and big public events could be a resource of data. Data collection can feed and ignite dialogue among different stakeholders but could also create the base for the development of a *Paper City* app. The concept of the app is still a work in progress (Figure 11), however, with an ad hoc system of rewards, missions, and levels, we believe it could be a game-changing app both for citizens and governance. With a Gamification approach, in fact, we believe it could actively involve the citizens in the re-design of their city.

## 7. CONCLUSION

*Paper City* is a versatile creative framework that promotes aware citizenship through workshops and learning programmes focused on design and STEAM education, that could represent an innovative playground to develop 21st century skills for children and young people. *Paper City* is both a real and metaphorical framework where diverse stakeholders could converge to meet and share ideas or to collect data and insights. We designed it as a think-tank to encourage reflection and action around themes such as sustainability, inclusion, and the aware use of technology, which we hope to be more and more discussed for better future smart cities.

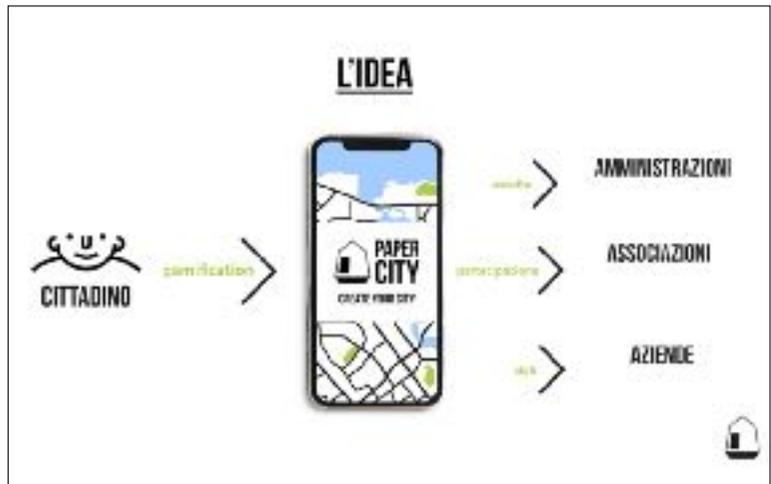


Figure 11. Figure 11. Paper City app concept. On the left hand side the Citizen, on the right (to listen to, to participate, data) governance, not-for-profit organizations and companies

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# PUBLIC PROGRAMS IN PORTUGAL FOR THE ASSISTANCE AND PROTECTION OF THE ELDERLY POPULATION

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## ABSTRACT

The increase in the average age of the population in developed countries has led to the creation of new programs and support centers for the aging population led by International Organizations such as the European Union. However, countries such as Portugal still have difficulty creating politics that are efficient and there still exist gaps in the application of programs that could be improved through a social, political, geographical, and cultural analysis where the elderly population is located.

**ELDERLY POPULATION, PORTUGAL, PUBLIC POLICIES, LONG-TERM CARE**

*This paper was reviewed by **Susana Sampaio Oliveira**, Professor of the University of Porto, area of Health Economics and Management in the Faculty of Economics.*

## 1. INTRODUCTION

From 1961 to 2019, the population aging index in Portugal has multiplied by 6. That means about 27 people over 65 for every 100 individuals of working age six decades ago. However, now we have that for every 100 people of productive age, we have 165 older people. This increase has resulted in Portugal being one of the countries with the highest aging rate in the entire European Union at this time. Additionally, the average number of children that each Portuguese family has reduced. These two factors, more older adults and fewer births resulted in the population pyramid being inverted.

On the other side, the life expectancy of the Portuguese has also increased. In 1960 the average life expectancy between men and women was 64 years, and in 2018 that number rose to 81 years. This increase in life expectancy resulted from the direct impact of various social and economic policies on the population's education levels, living conditions, and health programs. Nonetheless, people's physical and cognitive capacities and functionalities begin to decrease and worse and worse after the age of 65, making them more dependent on other individuals and the public health system in general.

In summary, more people of non-productive ages who have, or are at risk of developing, chronic and degenerative diseases live much

longer with conditions that affect their life quality and generate a tremendous financial burden on the country's health and pension system. These factors have created a significant population imbalance that has had direct consequences on the social and economic policies of the country. This document will be a guide that will help the reader to understand that population aging in Portugal has triggered a series of economic problems for the elderly care centers that public and private entities need to solve collaboratively.

## 2. THE PROBLEM

Life expectancy is increasing, and the number of new births does not compensate for the number of people who are over 65 years old. That means that, on average, the age of the population is growing. The reasons why families are less and less numerous in developed countries and that people who come to live longer have to do with a whole system of political, social, economic, and environmental factors that have resulted in this phenomenon. However, what matters to us now is to see the direct consequences that more and more people who are over 65 create in the health and political management systems related to this topic.

There is a fundamental problem that governments and internal organizations have already identified the risks of

the exaggerated increase in the elderly population. First, considering the low production that an increase in this age group means for economic and administrative systems. When most of the population is over 65, assuming that most of these people are retired, that means that they are not productive and have already developed natural pathologies due to age. These factors together mean that governments have higher populations of people who, first, no longer provide the same amount of money on public contributions and, second, which are now being an operational cost for public and private entities. In other words, now governments must return the money in pensions and assume new costs for health services to cover these people, who typically would suffer from at least one chronic disease and require government assistance to cover their medications and treatments. Therefore, public entities have proposed several alternatives to help mitigate the negative impact that the care of the elderly population is having on the economy.

Some of these proposals include improving the work conditions of nurses and other type of formal and informal caregivers to prevent complications and higher healthcare costs. Also, encouraging retired people to continue to work, proposing more flexible migratory policies to increase birth rates, among others. However, even though the aging of the population

is a transversal problem in developed nations, there are fundamental differences that affect the way to administer these proposals and policies applied to help better serve the elderly and at the same time reduce its related costs. Policymakers need to consider that the costs associated with the care and maintenance of the elders of Japan will not be the same as in Portugal, for example. Despite these two developed nations suffering from the same problem, there may be differences in management details that will make the development of an operational efficiency system vary. Since each country assumes costs linked to connectivity, technological development, geographical, cultural, and human capital differences, the solutions proposed have to be adapted to the realities of each country.

### 3. RECOMMENDATIONS FROM THE EUROPEAN UNION

The EU is crucial international organization to intervene and promote policies for the care of the elderly. The EU has overseen and given more specific recommendations on how to help the Member States to face the social and economic consequences of the aging of their populations. The European Union publishes several studies, reports, and recommendations to help member states deal with the problem of aging

populations. For instance, the EU Program for Employment and Social Innovation (EaSI), which in 2021 became part of the European Social Fund Plus (ESF+), focuses on social programs that contribute to different causes of social protection of individuals. One of the objectives is to promote social protection in communities, especially the most vulnerable, such as women, children, and the elderly. The European Union bases its programs on economic incentives and financial benefits for entities that help promote this type of solution at the local level. At the EaSI conference that took place on March 2021, different interest groups agreed that technological innovation and training people to use these new tools was essential to support new social projects that helped, among others, the vulnerable elderly populations. Specifically, the EU expects to promote and encourage the creation and application of solutions that help maintain people's health and physical and cognitive skills as they get older through different specific sub-divisions. For instance, the Social Protection Committee (SPC), an advisory policy commitment to the Ministers in the Employment and Social Affairs Council (EPSCO), oversees the application of social policies concerning Long-Term Care and measures the results of these solutions. Additionally, the United Nations Economic Commission for Europe (UNECE) and the European Commission's

Directorate General for Employment, Social Affairs and Inclusion (DG EMPL) developed the Active Aging Index (AAI). This index weighs different aspects under four domains:

- Employment
- Participation in society
- Independent, healthy, and secure living
- Capacity and enabling environment for active aging

### 4. MEASURES IMPLEMENTED BY THE PORTUGUESE GOVERNMENT

The following list of services is complete and helps to offer a better quality of life to the elderly in a holistic way. They do not simply consider help for medical or health issues but rather try to ensure that the elderly maintain an active, social lifestyle and away from the risk of suffering isolation or feelings of loneliness, which negatively impacts their general state of health. All these services are provided exclusively to people over 65 years of age, in addition to the basic pension and health services that cover all of them. However, through these programs, the Government tries to protect the most vulnerable older adults who do not have very high pensions or who, for different reasons, end up in situations of physical or emotional risk and must be removed from these places and

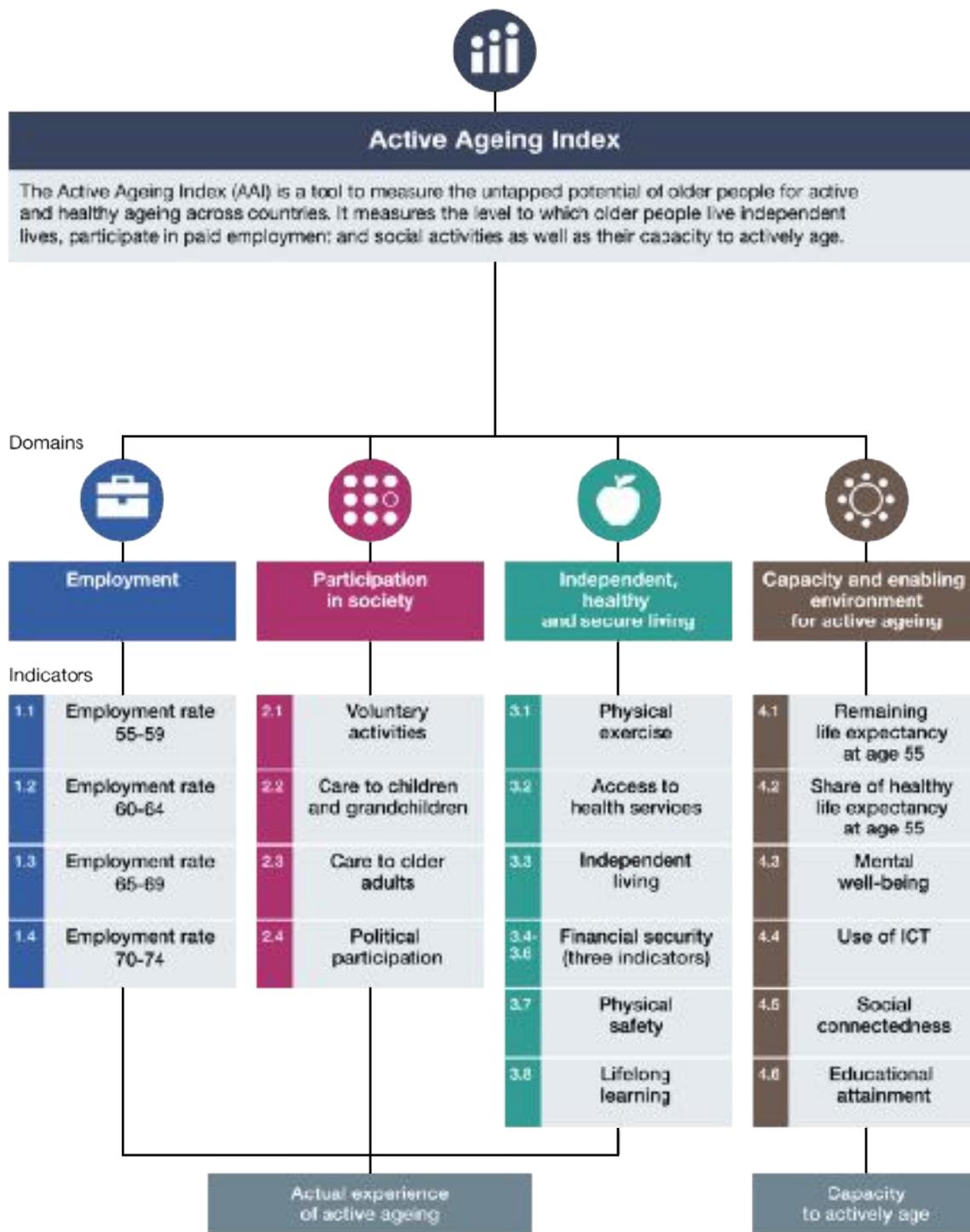


Figure 1. Active Aging Index Domains. EC Europa EU.

taken in by public institutions.

### **Adaptar+ Social Program**

A program launched in 2020 to reinforce the acquisition of medical equipment and training of support personnel in medical centers. It helped the testing of the elderly in nursing homes.

### **Complemento Social para Idosos**

Monthly check sent to people above 65 to help them financially.

### **Serviço de Apoio domiciliár**

Provided through the Social Security service to people who do not reside in nursing homes and require special assistance for basic activities (physically and mentally). This service goes to the person's house to help them with a specific task such as bringing food, socializing, taking them to other places, etc.

### **Estruturas Residenciais**

Nursing homes where older adults can go sporadically or live there. They complement the essential services with activities to stimulate the elderly and make it easy for their families to support the costs compared to private nursing homes.

### **Acolhimento Familiar**

Linking families willing to take care of vulnerable elderly to prevent them from the residential structures through a more familiar environment.

### **Centro de Convívio**

Group activities for the elderly

in specific communities to promote social activities and prevent depression and other related conditions due to isolation.

### **Centro de Dia**

Community centers where people of 65+ can go every day and spend the mornings and the afternoons. They will have activities and support groups to prevent isolation and help their families or independent caregivers do other activities.

### **Centro de Noite**

Intended for adults who do not have any physical or mental dependency but need to be accompanied at night for safety or isolation reasons.

### **Centro de Férias e Lazer**

Designed to promote group activities for the elderly, it seeks to make special outings so that the elderly can integrate into a different space than the regular one.

### **Apoio Social a Emigrantes Idosos Carenciados**

Portuguese elderly living abroad and in a condition of risk or vulnerability can ask the Portuguese Government for help. According to the country of residence, the aid given is specific and is carried out in collaboration between the two governments.

### **Visita a Portugal para idosos carenciados residents no estrangeiro**

If a Portuguese citizen over

65 years of age who has lived outside the European Union for more than 20 years wishes to return to the country for short-term stays, the citizen can ask the Government for help with travel and accommodation during those days.

## **5. IDENTIFIED PROBLEMS WITH THE CURRENT SYSTEM**

Together with the EU, the Portuguese Government seeks to finance proposals that promote the digitization and training of Long-Term Care (LTC) workers. However, there is no reference on what type of solutions and education programs are the most efficient to reinforce and replicate

### **Standardization**

There is no standard model or plan that explains to public or private entities the operational and logistical model they should consider when implementing a hybrid LTC care service in Portugal to prevent, control, and treat diseases for the elderly.

### **Gender differences**

According to various publications, women have a higher life expectancy, being the primary users of LTC services, which results in the present and future considerations. On the one hand, due to the limitations in the labor field, women receive on average lower pensions

than men, thus having less purchasing power to spend on appropriate care outside the public health system. On the other hand, even though women have been fighting inequality and can now access more significant labor and education, closing the gender pay gap, a large part of the informal labor market is still dominated by activities carried out by women. For that reason, LTC systems must help prevent, treat, and control diseases that affect mainly, or exclusively, women.

### **Dental Health Services**

Under the National Programme for Oral Health Promotion, the Portuguese Government reviews and provide support to the elderly who cannot afford regular dental check-ups.

## **9. CONCLUSIONS**

A wide range of services and technological services in Portugal in the health area that private institutions or the Government are not applying to their total capacity. Therefore, the space for improvement is considerable. Public and private entities must provide R&D resources that aims to create an operational management model in the elderly care, and which can be replicable on a large scale. Private companies and other Non-Governmental Organizations are effectively developing new

strategies and mechanisms for treating persons remotely or hybridlike during the pandemic. Even though many are still in the consolidation process, governments must consent to these new tools to complement attention services. However, these alternatives must be realistic, replicable, and culturally accepted in the society where they will be implemented them. For that reason, in order to develop an effective model, policymakers need to consider four main factors: 1) Patient categorization: considering the level of need for medical assistance is essential for developing a support plan for elderly residents of homes; 2) Technical tools: Elderly centers must examine the requirements of technological, tangible and non-tangible, tools needed to carry out their day-to-day activities; 3) Evaluation metrics: Entities must identify the Key Performance Indicators that they are going to assess to understand if the model proposed has a direct impact on the improvement of the management of centers for elderly patients and on the quality of life of these patients; 4) Local management: There might be differences in the operating systems of health services at local or regional levels that may significantly impact the solutions, which is why local authorities must find points in common and solutions that cover the majority of possible scenarios.

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# RECONNECT. EMPATHY MAPPING IN THE ERA OF COVID-19

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## ABSTRACT

In this paper we present an exploratory study conducted during the first-year product design course at the University of Palermo aimed at developing a new version of the empathy map (Empathy Map 5 Senses - EM5S) after the COVID-19 outbreak.

The research had two main goals: focus freshmen students' attention towards senses that have been temporarily excluded because of social distancing and masks, and collect data about the importance of every single sense and how their presence changes the quality of familiar experiences such as commuting to work, working, having lunches and dinners, having fun and taking care of themselves.

From a first sample of 210 EM5S, data shows the different roles of the five senses and interesting patterns emerged in particular according to sight, touch and smell senses.

The research is still ongoing to process another 600 EM5S, and it's open to contributions from other scholars working in the human-centered design field.

## EMPATHY MAP, HUMAN-CENTERED DESIGN, COVID-19, WORKSHOP

*The contribution is the result of a joint reflection of the Authors. Notwithstanding, the paper was written by Salvatore Di Dio and reviewed by Luigi Vella, data entry was done by Luigi Vella.*

*The authors acknowledge the University of Palermo 2021/2022 Product Design and Communication Workshop teaching assistants: Bruna Alamia Sabbadini Schillaci, Marco Cuera, Caterina Filingeri, Luciano La Rocca, Sara Pollicino.*

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## 1. INTRODUCTION

Empathy is a multidimensional construct that requires the ability to perceive and understand others' perspectives, as well as feel their emotional state. It is an intellectual skill to be learned and represents one of the domains of emotional intelligence. [1]

The impact of COVID-19 social distancing restrictions on adolescents' emotional development is at the center of many studies all around the world [2, 3].

For many, social distancing meant being isolated, and the precautions to avoid the transmission of the virus implied the raising of anxiety of touching and breathing even in previously familiar contexts [4]. "Learning how to navigate the inner webs of relationships happens in high school," said Dr. Jessi Gold, a psychiatrist at Washington University in St. Louis. "When you retreat behind a computer, you lose some of those social skills."<sup>1</sup>

The struggle in developing empathic skills will challenge an entire generation in building meaningful and lasting relationships [5], and it may disadvantage the next generation of designers in understanding people's real needs.

In this scenario, during the first design workshop run in presence in 2021/2022, a new tool designed with the aim of

easing the development of empathy skills was developed and tested together with 50 freshmen design students.

## 2. EMPATHY MAPS AND 2021 FRESHMEN DESIGN STUDENTS

As described by Dave Grey in his book "Gamestorming" [6], although creating an Empathy Map (EM) is not the rigorous and research based process that is required for developing personas, it can quickly get a group to focus on the most important element: people, and become more aware of their real needs.

EMs are often developed after the research phase on users before processing personas or in the absence or inability to research users in order to process shared profiles.

As stated by his creator Scott Matthews, EM is pervasive tool that helps people step inside the heads of their audiences, putting a human-centered framework around co-creating a better picture of who we're talking to when we design products, services, and experiences for people.

As shown in **Figure 1**, the EM allows to annotate in a synoptic canvas and then discuss in the team some specific characteristics of the persona's goals, feelings (what he/she thinks and feels), actions (what he/she does say and do) and, of course, perceptions (what he/

she does see, hear).

In this format, it does not allow us to take into consideration other senses (touch, smell and taste) probably because, at the time when EM was initially designed, these senses didn't seem to have the power to influence the debate on the personas.

But after almost two years of the COVID-19 outbreak, the senses of touch and smell seemed, on the contrary, to have ruled the way we face our surroundings and, by doing so, the way we embody the world and we train our empathy skills [7].

A new updated version of the EM (**Figure 2**) has been designed by the authors and the workshop's teaching assistants to spot freshmen students' attention on all five senses with the goal of measuring if the senses of touch, smell, and taste have an impact in empathy mapping effectively.

As shown in **Figure 2**, the Empathy Map 5 Senses (EM5S) has a scale where students can quantify (from 0 to 5) how much the specific sense has an impact on the experience and a circle where they can qualify that sense' experience (positive, negative) by drafting a happy or sad face (**Figure 3**).

## 3. METHOD

During the first-year Product Design and Communication

# Empathy Map Worksheet

## 1. WHO are we empathizing with?

- Who is the person we want to understand?
- What is the situation they are in?
- What is their role in the situation?

## 2. What do we want them to DO?

- What do they need to do differently?
- What job(s) do they want or need to get done?
- What decision(s) do they need to make?
- How will we know they were successful?

## 3. What do they SEE?

- What do they see in the marketplace?
- What do they see in their immediate environment?
- What do they see others saying?
- What do they see others doing?
- What are they watching and reading?

## 4. What are they SAYING?

- What have we heard them say?
- What can we imagine them saying?

## 5. What do they DO?

- What do they do today?
- What behavior have we observed?
- What can we imagine them doing?

## 6. What do they HEAR?

- What are they hearing others say?
- What are they hearing from friends?
- What are they hearing from colleagues?
- What are they hearing second-hand?

## 7. What do they THINK & FEEL?

### AINS

What are their fears, frustrations, and anxieties?

### AINS

What are their wants, needs, hopes and dreams?

Designed for:

1. WHO are we

6. What do they HEAR

XPLANE®

Figure 1. Empathy Map from xplane ©

Designed by:

Date:

Version:

empathizing with?

GOAL

2. What do we want them to DO?

7. What do they THINK & FEEL?

PAINS

GAINS

3. What do they SEE?

4. What do they SAY?

What other thoughts & feelings might motivate their behavior?

5. What do they DO?

Workshop of the University of Palermo, 50 students were asked to interview local Artisans, Artists, Teachers, Retirees, Restaurateurs, and Students according to some specific activities such as commuting to work (move in Table 1), working (work in Table 1), having lunches and dinners (eat in Table 1), having fun (fun in Table 1), taking care of themselves (care in Table 1). Each student has interviewed at least 20 different people, and more than 800 empathy maps have been drafted. A first sub-sample of 210 of them has been fully analyzed and reported here.

## 4. PRELIMINARY RESULTS

**Table 1** shows the overall average results recorded regarding how much a specific sense influences the different experiences (column rate) and if the experience was positive or negative (column  $\theta$ ). Green color highlights results over the rate of 3,5 and over 5%; red color highlights results lower than the rate of 2,5 and lower than -5%.

It's immediately visible how students reported the impact of sight for its positive predominant role during all the experiences mapped.

The sense of hearing seems particularly relevant during working and entertaining activities, while its quality depends dramatically on

USER PICTURE

USER NAME

**WHAT DOES/DO HE/SHE/THEY SEE?**



5  
4  
3  
2  
1

Write down what they see.

In a scale from 1 to 5, how dominant is this sense in the experience the user has just lived?

Sketch an emoji that represents their status.

**WHAT DOES/DO HE/SHE/THEY TOUCH?**



5  
4  
3  
2  
1

Write down what they touch.

In a scale from 1 to 5, how dominant is this sense in the experience the user has just lived?

Sketch an emoji that represents their status.

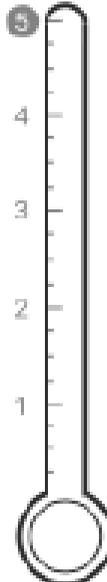
**THINK & FEEL** 

What really counts  
Major preoccupation  
Worries & aspirations

Figure 2. Empathy Map 5 senses.

**USER  
AGE**
**USER  
PROFESSION**
**SCENARIO**

**WHAT DOES/DO HE/SHE/THEY HEAR?**

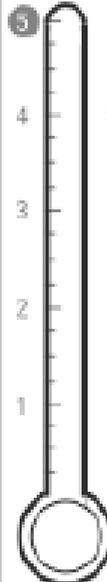


Write down what they hear.

In a scale from 1 to 5, how dominant is this sense in the experience the user has just lived?

Sketch an emoji that represents their status.

**WHAT DOES/DO HE/SHE/THEY SMELL?**

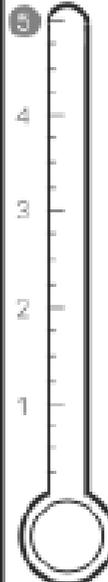


Write down what they smell.

In a scale from 1 to 5, how dominant is this sense in the experience the user has just lived?

Sketch an emoji that represents their status.

**WHAT DOES/DO HE/SHE/THEY TASTE?**



Write down what they taste.

In a scale from 1 to 5, how dominant is this sense in the experience the user has just lived?

Sketch an emoji that represents their status.

**SAY & DO** 

Attitude in public  
Appearance  
Behavior towards others

**GAIN** 

Wants/needs  
Measures of success  
Obstacles

**PAIN** 

Fears  
Frustrations  
Obstacles

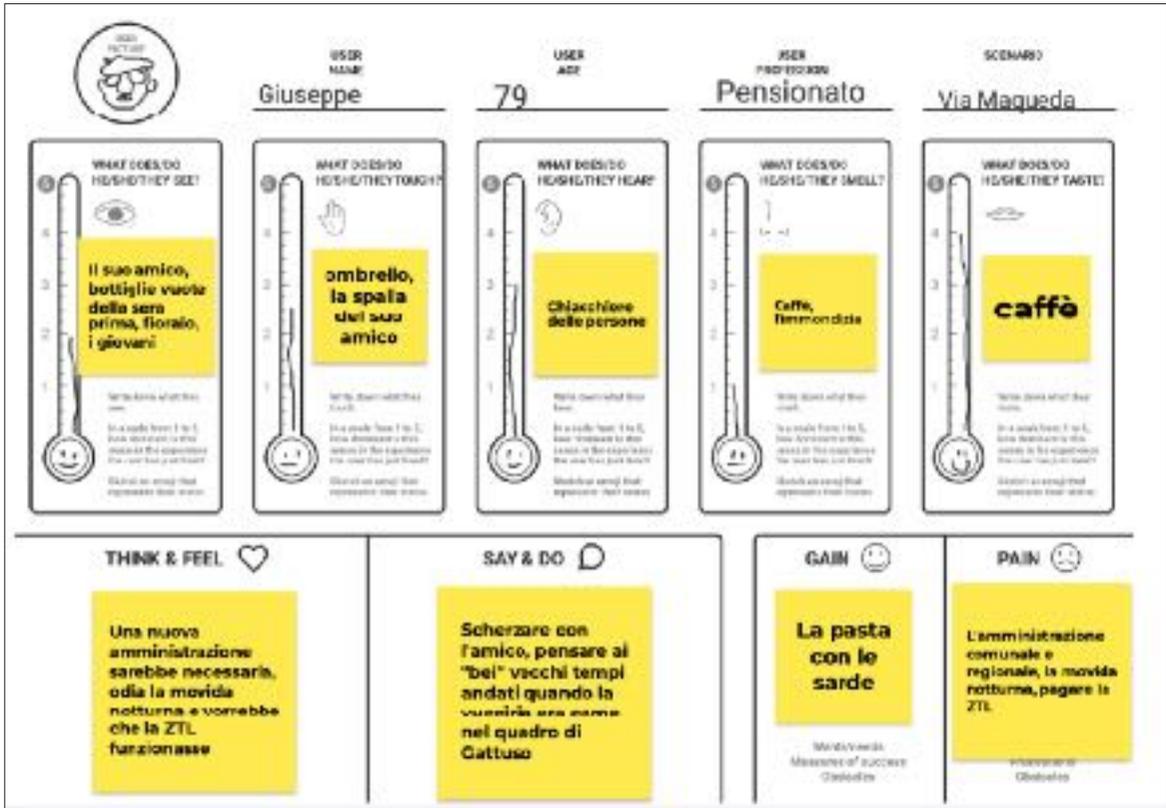


Figure 3. Empathy Map 5 senses filled up by a student.

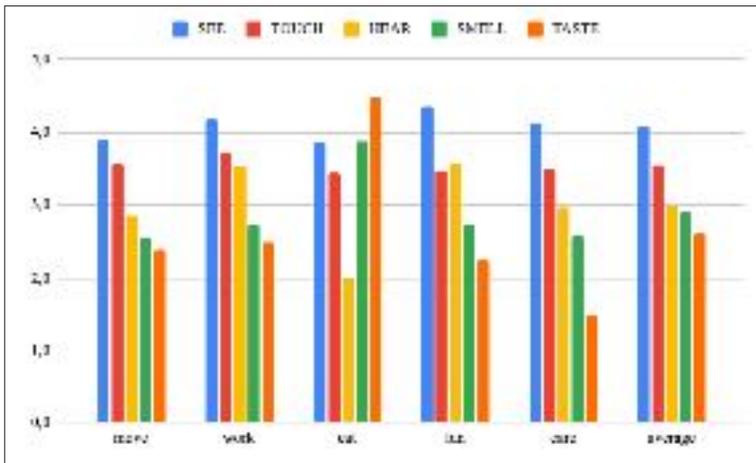


Figure 4. Average rates of the impact of senses on users' experiences.

different environments. These two senses already mapped in the EM play a significant role in empathizing with users, but, as visible in

Figures 4 and 5, the impact of the other senses is far from irrelevant.

Table 1 and Figure 4 show clearly how the sense of touch,

in particular, plays a similar role to sight, except for the quality of the experience (Figure 5) which reports a positive trend only in the case of fun and care. From the analysis of the sample of the EM5S, the sense of smell behaves very closely to the sense of hearing; this is clear in the average results reported in Figures 4 and 5, but with evident distinctions in eating and fun experiences.

Lastly, the sense of taste, besides not being involved in most of the experiences, is one of the five with overall good performance for the quality of the experience.

## 5. CONCLUSION

These preliminary results allow us to affirm that students (asked to empathize with people with the goal of drafting personas) report essential roles of at least four out of five senses.

In particular, it's the opinion of the authors that this analysis might also show a different way of perceiving the world after COVID-19.

The sense of sight is predominant from both perspectives adopted in the EM5S, this underlines how much "visual" is how we interact with the world.

The results reported for the senses of touch and smell are negative during those experiences that need the most social interactions, like commuting to work (move) and working (work).

Once all the EM5S reported by the University of Palermo Workshop students, further studies will be conducted in order to 1) study emerging patterns, 2) describe comparisons and analogies among the six different users' categories, 3) understand if the way students empathize is or not influenced by the use of this map, 4) if this research is done in a different city it produces the same results.

Moreover, the EM5S is accessible through this book (in open access) in creative commons to collect direct feedback from scholars worldwide.

	SEE		TOUCH		HEAR		SMELL		TASTE	
	rate	%	rate	%	rate	%	rate	%	rate	%
move	3,9	23%	3,6	3%	2,8	-18%	2,6	-16%	2,4	10%
work	4,2	26%	3,7	1%	3,5	-4%	2,7	-12%	2,5	1%
eat	3,9	32%	3,4	2%	2,0	-11%	3,9	14%	4,5	32%
fun	4,5	36%	3,5	9%	3,6	27%	2,7	4%	2,2	13%
care	4,1	37%	3,5	12%	3,0	16%	2,6	20%	1,5	-8%

Table 1. Average rates of the impact of senses and quality of the experience.

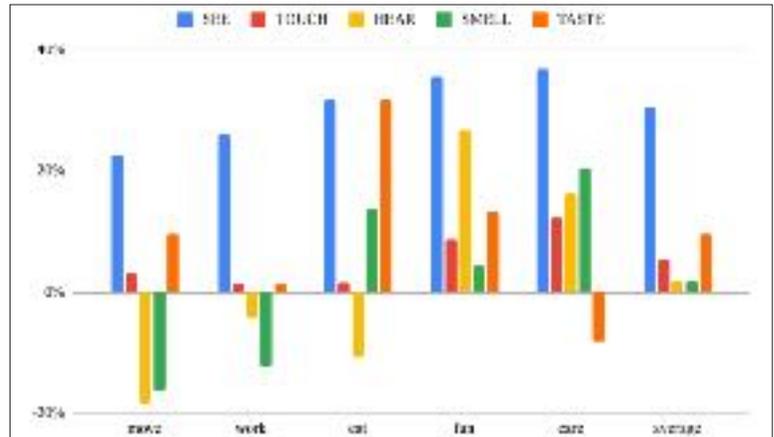


Figure 5. Average rates of the quality of the experience.

## NOTES

- 1 <https://www.nytimes.com/2020/11/12/health/covid-teenagers-mental-health.html>

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# COLUX. A NEW CREATIVE CONNECTION: FROM LOCAL TERRITORIES TO GLOBAL DIFFUSION

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## ABSTRACT

The increasingly technological world keeps us connected to each other by removing physical and geographical barriers. Although this is effectively one of the main current innovation propositions, how can design exploit the digital transformation to create new professional connections? In other words, how can we switch from local knowledge to global collaboration?

The article questions the mentioned issues, and it proposes an innovative collaboration design project COLUX which allows the real-time connection between different professionals through the creation of virtual spaces for products/living space co-design thanks to the support of the pioneering technologies such as AR and VR.

The results of the project as well as the methodology used in the case study have been reported by highlighting the concern and the strategic role of the design in linking professionals (and more) in an increasingly connected but outdistance world, by pre-emptying users' needs thanks to its ability to observe and, above all, to predict demands.

As such, in this applicative framework, the paper aims to identify the project's potential to be replicated at different scales and contexts, by bringing great impact both in the scientific and in the territorial networking.

**STRATEGIC DESIGN, CO-DESIGN, TERRITORIAL NETWORKING, COLLABORATIVE PLATFORM, VIRTUAL EXPERIENCE,  
SMART WORKING, NEW PROFESSIONAL CHAINS**

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## 1. INTRODUCTION

The emergency situation generated by the SARS-CoV-2 coronavirus pandemic has had and will continue to have significant repercussions on consumption and the production system, both at a global and local level. In recent years we have witnessed a slight, but progressive, drop in the production of goods and in the last period we have also seen a drastic reduction in demand itself. These negative impacts are mainly determined by the logistical difficulties in moving goods, with particularly serious repercussions in the import-export sector, with 84% of companies declaring that they are suffering in ordinary management, also due to a general drop in orders **[1]**. Finally, among the most relevant phenomena of a transversal nature is the increasingly complex functioning of supply chains, due to the increase in production costs, the reduction in work capacity, the greater difficulty in supplying raw materials and delivering products, and the new smart working methods that were not immediately possible to activate and that still show some gaps.

The severe lesson learned from this dramatic event must, however, lead us to carry out a careful analysis of the various criticalities caused by certain production models

- which have progressively become dominant - and by unforeseeable distortions of behavior, which in recent years have dangerously increased their incisiveness.

The crisis generated by the pandemic must therefore be a stimulus to reduce the use of overly intensive models of work - which lead to loss of sociality, reduction in life quality, consumption of resources, and high emissions of greenhouse gases - and increase the spread of principles and practices typical of the green economy, able to improve welfare and social equity in the long term and increase the ecological quality of territories. The consolidation of these practices represents an opportunity to enhance and protect the typicality and national excellence also in terms of traditional knowledge bringing skills more and more on the verge of extinction, providing national companies with useful elements to strengthen their competitiveness in international markets.

How to do that? Certainly, starting with a change of mentality that must lead the world of design and production to a radical rethinking of the paradigms that have governed contemporary society until now. As architects and researchers from an ethical point of view, we must take responsibility for the implications of these considerations and be aware that - as Fabio Tucci explains **[1]** - we are faced with an epochal

basic question: can we think that all this - even and above all if we are explicitly positioned in a perspective of environmental design and green city approach - does not have repercussions on the way we conceive the spaces that host this changed way of living and thinking, the objects that populate it, the means that connect its parts? And doesn't this change, probably and potentially profound, have an indissoluble interface with the themes of design, also in the hope that these renewed modalities can significantly provide answers to future problems?

In this sense, technologies clearly emerge as one of the positive aspects of the pandemic, as they have succeeded in the difficulty of allowing us to carry on a sort of working and social normality that has allowed us, perhaps, not to sink completely into a global crisis. The technological world, therefore, has effectively kept us connected to one another by eliminating physical and geographical barriers, albeit with some limitations. In this space in between the problems highlighted by the pandemic and the possibilities offered by the relentless progress of new technologies, designers, thanks to their ability to see, show, predict **[2]**, and plan for the future, have the duty and the opportunity to help meet the challenges posed by this moment of evolution and change; almost trying to "force" people to

experience and rediscover a different dimension of their time, suddenly opening a window on new ways of living, working and managing the resources at the basis of life. This was the starting point from which the COLUX project was born, in which a collaborative platform of virtual co-design is developed, which thanks to the support of AR and VR allows the creation of virtual spaces for the co-design of products and living spaces. The project starts from the desire to facilitate the working practices "at a distance", redesigning the workspaces - especially related to the world of design and production - in virtual mode, creating a metaverse in which to develop all phases of the creative process in real-time with the various actors involved, thus optimizing time and costs. In this search for answers and alternatives, we must be aware that we may be "forced" to make definitive changes due to the continuation or cyclical return of the virus problem in the future, considering that the world even before the pandemic was already moving towards fluid borders and globalized frontiers. In any case, we could live this incredible period of forced collective experimentation as an opportunity to be seized to produce new forms and new design spaces, better for the community, fairer and more inclusive, and more in line with the objectives of what Tucci calls "green city approach"

**[1].** The range of potential implications is enormous but it is our task as designers, scholars, and researchers to try to think about it and formulate our own - even provocative - proposals. The article offers an innovative approach to transform the limits that the pandemic has placed in front of us, such as distance and separation from work as well as social, into design opportunities, through which we can also try to redesign practices that are now obsolete and harmful to our environment, related to the production chain, its waste and the production of huge amounts of data that pollute the network, creating a dramatic parallelism between the virtual world and the real ecosystem.

## 2. A CRITICAL APPROACH TO THE RESEARCH CONTEXT

The research context stems from the intention to respond to the current challenges of increasing digitization and the resulting antinomian problem of connection-detachment. Through the adoption of a critical approach, the paper moves from the desire to understand how design, and specifically the proposed project, can play the role of catalyst and contribute to "make the connections more relevant, focusing on who and what we are connecting with", strengthening not only

the territorial networking but also acting as a stimulator of relationships reproducible at different scales and replicable in different contexts. For this reason, the starting point of the reflection was firstly the analysis of the stimulating ideas proposed in the call and, secondly, the attempt to answer these questions through the virtuosity of the COLUX research project. This section of the paper is therefore structured by alternating these open questions with their simultaneous attempt to answer them.

### How do you facilitate connection?

The health emergency that has involved us in the last two years has highlighted how the problem of distancing - sometimes obligatory as in the case of the recent pandemic crisis - can be overcome through increasing digitalization that has presented unexpected opportunities **[2]**. Although in this sense technology has been a fundamental element in guaranteeing a connection that would otherwise not be feasible, the theme of the relationship between it and the strengthening of networking is different. This aspect was then dropped in the specificity of the proposed project trying to understand how to connect macro-areas, mostly disconnected, within a given territorial context. In this regard, the project started from the specificity and characterization

of the territorial realities of interest trying to define their know-how and acting on several levels, conducting a careful analysis that involved: companies, innovation scenarios of Industry 4.0, ICT, marketing, and communication up to include the science of psychology as a prevalent methodology of investigation. Consequently, the answer to the initial question - "how to facilitate the connection" in such a scenario? - was through design. In fact, design has played a key role in ensuring the relationships and interrelationships between different knowledge by becoming the catalyst: it has given rise not only to a tangible development of the project through the analysis and the methodology of investigation used but has also played a fundamental role through the definition of the output of the project itself. In this research context, design plays the role of both Facilitator and Mediator [3], able to analyze the territorial connections and increase their networking.

#### **How do you help give meaning to connections?**

Internet and technological advances have transformed the way people communicate and interact with each other [4]. According to Rheingold [5], these virtual interactions could lead to many social consequences, including the formation of new communities and expressions of online

identities. In this perspective, the research project plays a strong innovative role: compared to the platforms currently developed and released in the market, Colux creates a collaborative and interdisciplinary platform model with a non-hierarchical structure, in which each member is part of a community dedicated to design. Each user is strongly involved and has direct responsibilities in some aspects of the system through the equalization of the standard roles of manager and user. Specifically, COLUX is aimed at the application of AR/VR solutions within the furniture production chain and the interior design macro sector; with the objective of bringing benefits along the entire Product/Process/Factory lifecycle: from conception, design, production, to sales and after-sales, ensuring added value both for the user companies (cost/time reduction and quality improvement) and for the end-user who receives value-added services on the product.

#### **What connections have you established?**

Regarding the type of connections established, they fell within the territorial reference framework with the specific goal of developing an efficient network that would move from local to global [6]. This can be deduced from the ecosystem map of the actors involved where there

are 4 macro areas: production chain, training and research, promoters, and builders. In parallel, the actors involved were included in a map that would tell the level of influence and the level of interest for each of them. This was fundamental in order to analyze the players on the basis of their involvement, information, management, and ability to anticipate with the aim of satisfying the end-users' needs, showing - and herein lies the strength - also their limits and future needs.

#### **How do you create digital and virtual environments to enhance the experience in a connected world?**

Finally, how do you create digital and virtual environments that are enriching tools to enhance the user experience [7]? From this perspective, the project acts on two main levels. The first one is related to the removal of geographical and temporal barriers that allow users to participate in the various stages of design involving them regardless of where they are and their time zone. The second level concerns the reduction of problems related to the type of language used by professionals from different disciplines, such as the simplification of language between designers and engineers. At a macroscopic level, the simplification of the technical language is also reflected in the collaboration between

designer and end-user, a necessary aspect considering the collaborative and intuitive nature of the platform.

### 3. METHODOLOGY AND RESEARCH OBJECTIVES

The project *COLUX - CO-design platform with the use of MixedReality for the LUXury interiors sector* (Project funded in the context of the Second Call POR FESR 2014-2020, Region of Tuscany) - as also mentioned in the previous chapters - aims at the creation and development of an innovative digital platform that, through the use of interactive AR and VR technologies, leads to the creation of virtual spaces for the co-design of products and living environments. The overall system of this project works by connecting different professionals in real-time in a shared virtual workspace; a direct and fast channel that can exchange information about the development of the design project in a consistent way. The methodology used as the basis of design development was that of co-design, now recognized as a necessary methodology to create shared and functional results, within the processes of definition and development of products and services. The involvement of designers, clients, and a wide range of stakeholders in addition to the project partners themselves, has demonstrated

that it can offer new paths of meaning compared to traditional problem-solving methods. The active collaboration between the various actors requires an adequate level of communication and, consequently, tools capable of supporting these interaction procedures: for these reasons it was necessary to employ and explore the potential of new technologies, applied to the practice of participatory design. Therefore, the functionalities made available by COLUX allow, precisely from the perspective of co-design, to support the growth of manufacturing companies in the Made in Italy sector, improving or solving the critical issues that drive production and sales in terms of:

- high quality to be maintained;
- need to increase the added value of the product through the development of complex service systems (design, sales, related after-sales processes);
- increasing company proactivity in the contract design process;
- increasing the level of visibility;
- increasing the companies' innovation capacity;
- increasing the loyalty of intermediaries.

Based on what has been outlined above, we hypothesize an iterative process involving the following phases:

- Engagement phase, related to sending the various stakeholders an invitation to participate in the co-design session;
- Linkage phase to the Colux design service and creation of the waiting room;
- Beginning experience phase, where there is the actual virtual presence of all stakeholders within the virtual design environment;
- Phase of interaction and co-design among the actors to define the project, identify the eventual problems, and define the useful solutions to resolve the emerged ones.
- Phase of saving progress for revision and/or continuing the co-design phase.
- Review phase, in which you have the opportunity to review, in single mode, the progress of the project, make changes, and provide suggestions.

The clear advantage of the solution proposed by COLUX compared to the current design process lies in the possibility of having more

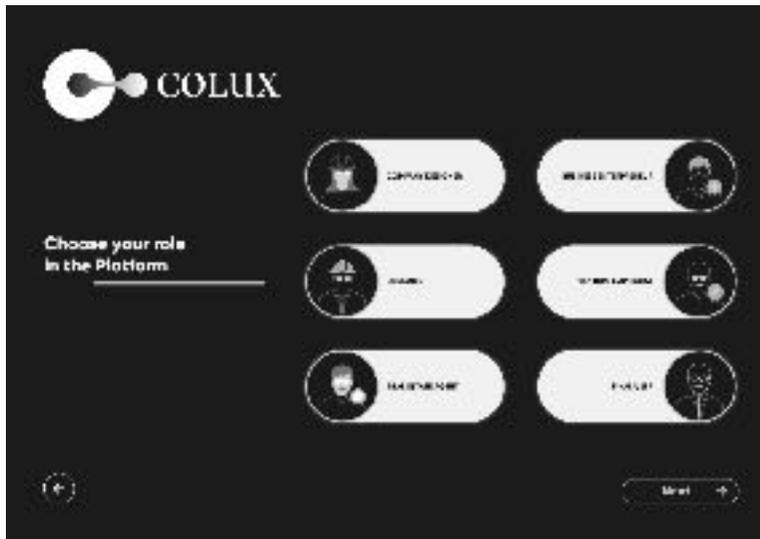


Figure 1. Platform's users, equivalent to Personas.

moments of confrontation with the different actors, reducing uncertainties and problems related to communication and data exchange through intermediaries (mail, photos, reports), the ability to see in real-time the different solutions proposed and analyze any problems related to a choice, all this without the need to physically go to a real place. Just the user will be able to view in VR the designed space and interact with it by leaving comments or making small changes in setting, positioning, and verification, which will allow him to better understand the problems of the project and see the details in a preliminary phase compared to the executive realization.

Starting from this level of development, the COLUX project expands and aims to develop a truly integrated

system for which the co-design between the various actors involved and the management of uploaded content is actually accessible to a user without "skills". In fact, COLUX will allow the involvement of both internal and external designers; it will also allow the involvement of different departments that are not directly linked to design but that affect sales (e.g. marketing department, public relations, etc.). Finally, it will allow the buyer to be involved from the first design phases and to collaborate with designers and companies in the realization of the requested product. The activity, directed to define the users of the system, moves from these initial reflections and is developed following a phase-gate process:

- The first was characterized by meetings with the project partner companies

to understand their main desiderata;

- The second research phase led to a first draft of the user analysis report, starting from the elements that emerged from the meetings in the company and from research carried out by the researchers of the development team;
- The third phase was characterized by the carrying out of semi-structured interviews in order to better investigate aspects related to the project to be concretely developed for the COLUX project and to fully understand the needs and expectations of functionality that companies expected from the system;
- The fourth phase was useful to define the personas, generated from the groupings of users made in parallel with the first part of the technical development of the system and defined the types of users of the COLUX platform (D1.2).

The final personas represent the types of users of the platform and are internal designer, external designer, vendor, entrepreneur, investor, and end-user.

Once the users and their roles within the digital system of the

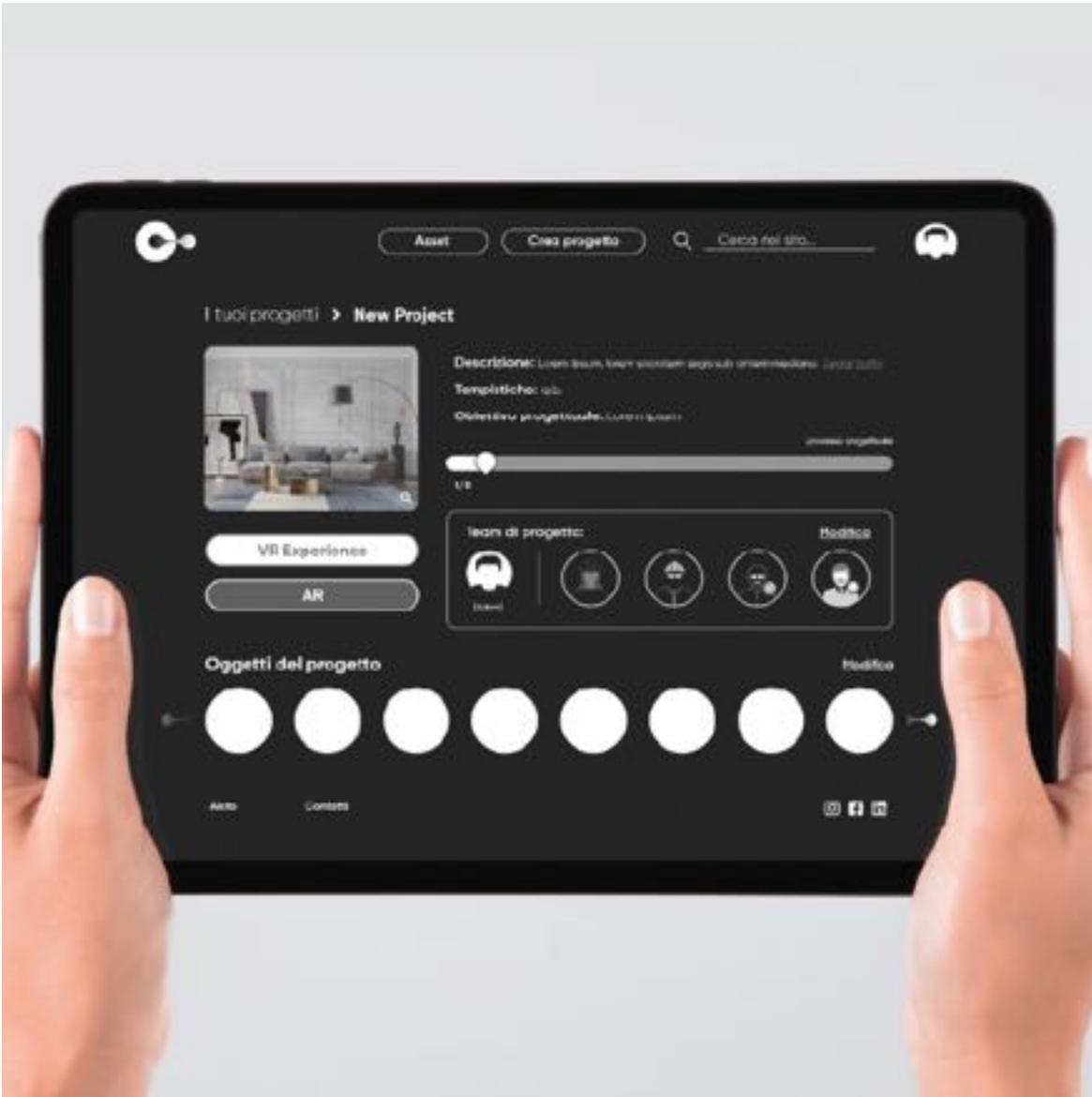


Figure 2. Project page with AR/VR enabled features.

platform were defined, it was also important to understand and define how the various technological and IT tools interacted with each other.

In fact, COLUX makes it possible to create a web platform that facilitates the

visualization of the created products, generating a virtual catalog to which the community of the project can access and which can be used in experimental and innovative ways for the development of unpredictable as well as innovative processes.

## 4. PLATFORM STRUCTURE

Summarizing what has emerged from a technological point of view, the COLUX system aims to implement various technological and strategic solutions:



Figure 3. Phase of asset placement (object) in virtual space.

- A Beta version of a complete, working, and integrated platform with UX and UI (Design) of both the website and related service modules.
- Activation of all system management features
- with multi-user and multi-platform mode.
- Study of a new business model (Innovation management).
- Creation of a collaborative virtual laboratory, which
- involves the creation of a virtual environment in which different designers can collaborate on the project in 3D simultaneously.
- The proposed system should allow users to participate in the



**Figure 4.** Phase of asset customization before VR experience.

same co-design process by sharing a unique design space that turns into a collaborative virtual lab through the application and immersive visualization, allowing the creation of a common augmented perspective of work.

In the field of industrial production and planning/design, objects were usually presented to end-users through technical drawings, sketches, renderings, and prototypes. Today, however, new interactive and highly innovative modalities are gaining ground, among

which those already present on the market - but still to be explored in terms of their potential use - are certainly augmented reality and virtual reality. They allow to instantly verify the answer of the project, bringing out, contextually, research directions that better frame the role of designers and the indispensable acquaintances to support these new creative and planning procedures. For these reasons, they still appear today as the main enabling technologies useful to achieve the goal set by the

project.

As it has been widely demonstrated in literature, immersive virtual reality is closely connected with sight, hearing, and touch, that is, with perceptual/sensory mechanisms, able to directly indicate the guidelines of the design of objects dedicated to end-users.

Therefore, the digitization of the artifact, together with the possible user experience connected to variable application scenarios, can put the users themselves in a position to quickly evaluate

both positive and negative aspects, from an aesthetic, ergonomic, and functional point of view.

The application of such innovative technologies, directed towards a collaborative approach allows the effective management of the feedback process, thus becoming a tool not only to realize new scenarios but also to innovate existing ones or to adapt to the changing needs of users and create a dense design network. For these reasons, collaborative design in virtual environments is based on the idea that consumers/customers are active players, co-creators of value, and co-developers of their own personalized experiences.

## 5. CONCLUSIONS

The project was born in response to the current local challenges related to increasing digitization. Specifically, the research solicits debate on the importance of developing territorial and extraterritorial connections through the adoption of a scalar and replicable design approach. The urgency to develop and test a methodology of co-design able to involve - and consequently - connect different territorial actors is declined through the design of a collaborative platform ensuring social innovation,

territorial development, and technological innovation. The presented project solicits the debate on the importance of the role of design as a catalyst capable of joining territories - physical and virtual - companies, professionals, end-users, and other stakeholders. This result is guaranteed through the activation of dialogues able to combine traditional knowledge and digital innovation. From this, derives a fundamental social, strategic, and innovative development to build a system of interactions that moves from micro to macro, stimulating local and global connections. The element of design innovation lies in the collaborative ability to communicate and connect

different territorial actors through the simplicity of language used. Faced with the current issues of digital transition, the project fits into the framework of territorial innovation by developing a double level of networking: digital and physical. The impact on the scientific community is, therefore, to be understood in reference to the theoretical and applicative influence replicable in different areas and scales of implementation. The methodology used in the case study linked to the practicality derived from real needs and easily implemented, as well as the resolution of the arisen problems, represent the core of an innovation reproducible in the international scientific context.

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# FROM CONNECTIVITY TO CONNECTEDNESS: INCLUSIVE DESIGN FOR DIGITAL PUBLIC SERVICES

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## ABSTRACT

Designing public services means ensuring the full exercise of citizenship rights for millions of people. Ensuring that they are accessible, equitable, and inclusive is, therefore, a moral duty before it is a professional one.

But what happens when a public service goes digital? How can the principles of equal treatment and universality be guaranteed in the face of a digital divide that is still distinctly widespread? Low digital skills on the one hand and unintuitive interfaces on the other combine to make it unrealistic to ensure sufficient and adequate equity in the use of digital public services, as well as the absence of discrimination based on age, level of schooling, health status - physical and mental - religious, sexual or political orientation.

Applying Inclusive Design principles can help narrow the current gap by preparing today's and tomorrow's designers to meet the challenges of emerging technologies while maintaining an ethical, holistic and systemic vision.

**INCLUSIVE DESIGN, PUBLIC DIGITAL SERVICES, ACCESSIBILITY**

*This paper was reviewed by **Salvatore Di Dio** and **Domenico Schillaci** from University of Palermo.*

## 1. INTRODUCTION: DIGITAL RIGHTS AND CITIZENSHIP

Article 2 (Right of Access) of the “*Declaration of Internet Rights*”, drafted in 2015 by the Committee on Internet Rights and Duties of the Italian Parliament, states that “*Access to the Internet is a fundamental right of the person and a condition for his or her full individual and social development*”, and adds that “*Public institutions shall guarantee the necessary interventions to overcome all forms of digital divide including those determined by gender, economic conditions as well as situations of personal vulnerability and disability*”.

The article highlights in a few words the main issues related to today’s digital divide that complement and expand the concept’s original meaning, which was mainly associated with the possession of at least one device and the availability of adequate connectivity. Even the United Nations, in its 2012 Human Rights Council resolution<sup>1</sup>, recognized the importance of protecting the free flow of information online as an inalienable civil right.

The democratization of information and the broad dampening of the barriers of access to the web by large sections of society recorded in recent decades have led to the need for a revisiting and revision of the concept of a different digital divide, more oriented to the difference in skills in the use of the web, rather than that of physical access to it. This aspect has also recently been confirmed by the latest *Digital Economy and Society*

*Index* (DESI) report, published by the European Commission in July 2022, which shows that while Italy performs well with respect to connectivity (higher than the European average), thanks to numerous advances in terms of the diffusion of broadband services and network deployment, it registers one of the worst results with respect to human capital instead. More than half of its citizens do not even have basic digital skills. Concerning public services, DESI shows for Italy a severe disconnect between delivery and use. Despite considerable growth recorded in the last two years (with an increase of 10 percentage points), only 40% of internet users use the country’s digital public services (compared to an EU average of 65%). This figure can generate different interpretations: while it certainly confirms a level of basic digital skills in the country that is significantly lower than the European average, it also casts doubt on the actual level of accessibility, usability, and inclusiveness of the services provided, which are probably not sufficiently adapted to the target population. In fact, from this point of view, a special pilot research conducted by the Lisbon Council<sup>2</sup> on the issue of usability of public services showed that on a sample of three EU member states, including Italy, considering criteria such as clarity of language, consistency and ease of use, speed and performance, and assistance and support, the average score obtained was more than 35 percentage points

lower than the European average recorded by the *e-Government Benchmark*.

Usability of services and the level of digital competence of users are certainly two factors that influence each other; for this reason, especially in the Italian case, it is a priority to work contextually on both fronts: on the one hand, by reinforcing the basic skills of the population with formal and nonformal training and education policies and activities, and on the other hand by ensuring a level of accessibility, usability, and inclusiveness suited to the specific needs of Italian society.

## 2. DIGITAL PUBLIC SERVICES: BETWEEN UNIVERSAL AND INCLUSIVE DESIGN

The discipline of service design, since the earliest studies in the field of marketing [1], oriented toward the complementation of physical products within the broader domain of industrial design, has always prioritized, among the main elements to be taken into account at the design stage, the target group of reference users. In the commercial field, this criterion has become fundamental to study market niches and carve out services to the needs of their users, based on increasingly timely user research and with the help of increasingly targeted and massive feedback tools. At the same time, however, the Design-For-All philosophy and the Universal Design approach have opened up within the

scientific debate a new sensitivity to issues of accessibility and usability to counter any possible discrimination generated by interfaces that are not very inclusive or intuitive and products that are not ergonomic or exclusive. Even within the public sector, there has gradually been a paradigm shift, overcoming the top-down *one size fits all* approach in favor of a more collaborative and adaptive vision, able to better respond to the evolving needs of an increasingly dynamic and diverse society [2].

The target audience of public services often consists of the totality of people residing in a country or falling within specific target categories with special requirements. Public services are everyone's - by their very nature - since they represent an inalienable right guaranteed by the Constitution. Public services are subject to the principles of equal treatment - all citizens have an equal right to access services and obtain services of equal quality - and universality - all public services must be guaranteed regardless of people's income, location and social group -. But what do these principles entail in the process of digital transformation? How can equality and universality be ensured by abandoning the human-human relationship and replacing it with the human-machine one?

Here the variable of digital competence, that is, the ability of each individual to *"use information society technologies (IST) for work, leisure and communication with familiarity and a critical spirit"* [3],

immediately emerges clearly. The appropriate, correct, and right use of digital thus depends on numerous factors, not exclusively related to the subject's degree of knowledge and e-skills. Web use, in fact, is also strongly influenced and affected by a set of psychological, physical, and social factors related to each individual. The *International Classification of Functioning, Disability, and Health standard* (ICF), approved in 2001 by the *World Health Organization* (WHO) as a revision of the 1980 *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH), adds to biomedical and pathological factors also those related to the individual's social interaction. This review effectively expands the view of disability to include biological, personal, and social aspects, considering bodily functions and structures, environmental factors, activity, and participation.

Conditions such as autism, specific learning disorders, dyspraxia, apraxia, Tourette's syndrome, intellectual disability, or attention deficit hyperactivity disorder, now considered neurodivergences, or neuroatypical conditions, profoundly affect the relationship of individuals with the Internet and thus with public digital services. Hence, it becomes imperative for those involved in design to take into account the primary needs of individuals with such conditions to ensure their full and proper enjoyment of online rights. The Deloitte agency estimates that, although with varying proportions for types of

neurodiversity, age, and nationality, about 15% of the world's population can be considered neurodivergent [4]. Inclusively designing digital services, therefore, means today adopting a multi-perspective approach that can take into account all possible factors of discrimination such as age, level of schooling, economic status, level of skill and competence, physical and mental health, religious orientation, origin and ethnicity, gender identity and sexual orientation of each individual. Ensuring equal treatment for each person means respecting and considering each of these aspects. Considering diversity turns into an unexpected opportunity for the designer to develop innovative and creative solutions, a way to contribute to the advancement of society in a meaningful way [3].

### 3. DESIGNING INCLUSIVE DIGITAL PUBLIC SERVICES

The Covid-19 pandemic has resulted in an unprecedented acceleration of service digitization worldwide. Restrictive measures taken in all countries around the world have forced global society to move almost all services, where possible, to digital mode, through massive use of telepresence, online messaging, and communication services. The restrictions have primarily affected the worlds of work and education, adapting with much difficulty to remote activities and

then gradually to hybrid ones. The speed with which this transition took place varied considerably in different contexts. The better-prepared states, which already registered a fair level of digital skills among their citizens, reacted better to the new condition imposed by the pandemic; the less prepared ones, on the other hand, suffered more heavily from the effects of the restrictions. Within individual societies, the digital divide reappeared very sharply, showing how older generations, in particular, felt the impact of the change more strongly than younger ones. Countering the pandemic phenomenon has been a critical test case for the ability of public digital services to ensure equitable access and fruition for all citizens, unfortunately often showing significant failure in the face of disadvantaged and most vulnerable minority segments. The metaphor describing the Internet, and social networks in particular, as "public squares", has gradually generated a widespread but false belief that private digital spaces, devoted more or less avowedly to profit, could act instead as truly public spaces, devoted to the common good to uphold fundamental democratic demands [4].<sup>5</sup> This perception has resulted in a de facto gradual substitution of public space for private space, generating severe confusion about the real boundaries between the two domains.

Lack of digital skills, often combined with distrust and fear of technology due to increasingly pressing online privacy and security issues, engenders tiring,

fragmented, and frustrating digital experiences. Those elements can undermine the enjoyment of public services and people's rights.

When a data request form is very long, contains unspoken technical/bureaucratic jargon or acronyms, does not define how long on average it takes to fill it out, or does not give practical, contextual, and simple suggestions on how to fill it out, it will then deter average competent users, with attention deficit or generalized anxiety disorder, from filling it out, or, in any case, just make their experience strongly unpleasant and challenging, most likely undermining any future requests they may make. A dashboard that displays graphics with open public data, but does not take into account the minimum color contrasts of the elements and texts, or that does not define alternative descriptions for the images, will impair the enjoyment of that data for individuals who are blind or suffer from forms of color blindness (protanopia - deuteranopia - tritanopia). Depression, although it is a psychological condition, can also cause physical effects such as reduced perception of contrasts in vision so that sufferers would be affected by the adverse effects caused by poor or negligent design.

The use of animated images, if recurrent and particularly present within the information architecture of a service, can severely disturb even potentially seizure-prone individuals. From an Inclusive Design perspective,

animated images or autoplay videos should be used only when essential and instrumental, not solely for aesthetic or composition purposes. Those who design an app intended for all citizens that uses Qr-code technology as the sole data input, for example, must be aware that a portion of the population will probably not have devices capable of handling



**Figure 1.** *The British government-provided NHS COVID-19 infection-tracking app requires users to scan a Qr-code in every place they frequent to record the location. (photo by John Cameron via Unsplash)*

such technology and will thus be excluded from using the service. Moreover, dwelling even on language issues alone, there are many instances where a designer must take special care not to put any user in an uncomfortable or offending condition. Within a form addressed to a parent or prospective parent, for example, answering a generic question such as "Is this your first child?" could create difficulty for the respondents if, for example, they were engaged in a same-sex

relationship and their partner had already given birth to a child, making both of them previous parents.

Considering all possible scenarios and use cases upstream in the design process, always trying to represent as many users with different personal characteristics and conditions as possible, helps to make sure that no citizen is likely to be offended by the language or tone used, and also helps to address the needs of multiple target groups simultaneously. Creating a website that provides a simple and clear layout and does not have heavy digital objects that slow down its loading helps and benefits those who own old devices or poor connectivity and those who suffer from vision-related impediments. Simplifying interfaces always helps reduce the cognitive load required and increases the performance characteristics of services in terms of speed of computation and content processing.

## 4. CONCLUSIONS

For a long time, digital technologies and the Web have been predominantly portrayed as neutral or even inherently positive for the development of societies. History, however, has starkly demonstrated how, in the absence of appropriate human control and ethical foundations, even profound negative impacts on society can be engendered. Discrimination is undoubtedly one of the most

significant social risks associated with artificial intelligence today. It is an absolute priority to spend every available resource in terms of research and development to ensure that technologies, instead of helping generate prosperity and democracy, do not contribute, to the contrary, to perpetrating inequality and injustice. For this reason, it is first necessary to better define what "diversity" means.

One of the basic paradigms of Inclusive Design is that "*it is normal to be different*" [5], so to the now obsolete meaning of "diversity," which contemplated almost exclusively the perspective related to differences in ability, it is now essential to associate a broader meaning that contemplates any diversity related to personal real-life contexts, lifestyles, aspirations, gender identities and past experiences. Inclusive Design, unlike Universal Design, does not suggest that it is always possible (and appropriate) to design a solution, product, service, or system capable of responding to the need of each person. Still, it recommends instead responding

to diversity, possibly through the design and development of families and ecosystems of services and products capable of covering in a diversified way the most comprehensive number of scenarios, iteratively increasing the number of potentially enabled subjects over time. Adopting an intersectional approach would improve performance in addressing structural and systemic inequalities [6].

When designing digital services, especially if they are public, the designer must remember not to design exclusively for "happy people" [7] because part of the users will inevitably not be in this condition. On the contrary, many users will present a state of anxiety, frustration, or depression, suffering its effects in the navigation and use of services. Maintaining a holistic approach and a systemic view that contemplates the global experience (total experience) that sees the user interacting with different touchpoints, people, and systems, is necessary. A consistent cross-platform experience restores confidence in the user,



**Figure 2.** At the Seoul Smart City Leaders Forum 2021, Oh Se Hoon, mayor of the city of Seoul, held an immersive virtual conference to announce through his avatar a new concept of digital public services housed within a new city in the metaverse. (image by Seoul City Government)

inspiring trust in the service and its provider, ensuring the protection of their rights online.

In the field of public services, it is essential to avoid requesting data from the user that is not strictly necessary or redundant (according to the “*Once Only*” principle), to simplify the overall experience and avoid denial or alienation scenarios. An efficient Public Administration should be proactive and inform the citizens before or without their request. An efficient Public Administration proactively informs parents of the incentives and bonuses they can access and tells workers the tax breaks they can benefit from. Shortly, as technologies continue to advance, it seems plausible that dialogue interfaces between citizens and the Public Administration may no longer be exclusively physical or text-based but also enabled by voice or even haptic systems within fully immersive environments. It is imperative to be prepared for this eventuality, ensuring that any advance promoted by emerging technologies has equally distributed effects on the entire population without harming or discriminating against specific groups of users.

Unfortunately, good intentions are not enough to produce good actions; designers must always test and validate their assumptions. The “Digital First” principle can undoubtedly be fair, equitable, and sustainable in the future if it is applied progressively as the population’s digital skills increase. However, it mustn’t gradually become the “Digital

Only” principle. The autonomy of citizens and their complete control over the channels must always be guaranteed, in full compliance with the regulations of digital citizenship, as well as their own permanent, temporary or situational personal conditions

and needs. The logic of simplifying processes and bureaucracy, intimately linked to the digital transition, must take place with full respect for transparency and civic participation to truly turn technical connectivity into social connectedness.

## NOTES

- 1 The resolution “*Promotion, Protection and Enjoyment of Human Rights on the Internet*” published by the UN Human Rights Council on July 5, 2012 was formally implemented by the European Parliament on December 11, 2012 through the resolution “*Digital Freedom Strategy in EU Foreign Policy*”.
- 2 “*eGovernment benchmark usability pilots*,” report published by the European Commission in December 2021: <https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-usability-pilots>.
- 3 “Digital competence” is one of the 8 key competencies for lifelong learning outlined in the Recommendation of the European Parliament and Council of December 2006: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:it:PD>.
- 4 figure is extracted from the article “*A rising tide lifts all boats: Creating a better work environment for all by embracing neurodiversity*” di M. Mahto, S.K. Hogan, S. Hatfield, B. Sniderman, 2021: <https://www2.deloitte.com/us/en/insights/topics/talent/neurodiversity-in-the-workplace.html>
- 5 On the perception of digital public space, see the research and dissemination work sponsored by Eli Pariser as part of the initiative *New\_ Public: For Better Digital Public Spaces* ([newpublic.org](http://newpublic.org))
- 6 This assumption is the basis for the work of The *PNRR Civic Observatory*, which includes some of Italy’s leading national organizations with experience in transparency and accountability. The observatory was created with the aim of monitoring the quality and inclusiveness of the decision-making process for the construction of the *National Recovery and Resilience Plan* (PNRR), following step by step the implementation of the various funded projects.

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# INFORMATION ARCHITECTURE FOR FOSTERING SUSTAINABILITY IN NEW DESIGN SOLUTIONS. A METHODOLOGY.

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## ABSTRACT

An emerging perspective in terms of sustainability comprises both digital and technological directions for sustainability. This paper investigates the role of information and its architecture to foster the sustainability of new products / services or product service systems (PSS), value chains or business models. It proposes a methodology for guiding the designer in considering complex contexts and environments that significantly impact resource consumption. The methodology is based on four blocks of research methods (situation & problem definition; desk research; field data collection and validation) declined on four research factors (environments, people, processes and objects), which results in design guidelines for new projects.

DESIGN METHODOLOGY, DIGITAL TECHNOLOGIES, DIGITALIZATION, SUSTAINABILITY, PRODUCT DESIGN

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## 1. INTRODUCTION

An emerging perspective in terms of sustainability comprises both digital and technological directions for sustainability. Consequently, the role of information becomes of strategic importance in defining new products, product-service systems (PSS), value chains and business models [1,2]. The same attention to environmental impacts that has led to design approaches based on the life cycle of products such as Design for X [3,4], which relied mainly on end-of-life scenarios, it is now looking for alternative methods to improve the characteristics of the products in terms of use of resources, obsolescence and extension of the useful life of objects or their parts through new circular business models. Digital technologies have become means to support designers in designing radically new PSS, especially in the field of environmental sustainability [5,6,7,8,9,1]. The home environment with its household appliances offers a field of experimentation in this sense, because it represents a system made up of real and virtual connections since digital technologies are increasingly carving out their role in this context. In this perspective, objects are attributed to the sentient capacity to respond in real-

time to changes in external conditions such as climatic and environmental but also social and behavioural conditions, up to internal conditions pertaining to the objects (things-to-things perspective). However, systems lack an intelligible way of entering and managing information, inputs, needs and requirements so that the designed objects can adapt and respond by processing information also through a form of intelligence. If digital technologies can support the implementation of Circular Economy strategies by enabling the redesign of products, business models, consumption patterns, and value chains [2], it is unclear how they can do it.

## 2. METHODOLOGY

As a researcher in Systemic Design, I have often wondered about the role of the connections that exist between products intended as objects or artefacts and the environment intended as a context of use, the people who interact with those objects and the tasks or activities that objects allow, therefore the processes on which we are involved. I am convinced that any design process should start from these four aspects. With this premise, the focus of this work consists of a methodology

for innovative designing that foresees the use of technological means (sensors and other digital means) to reduce the impacts generated by man and beyond.

It is a data-driven investigation and design methodology for complex systems such as the domestic system that includes objects appropriately equipped with sensors to conduct exploratory research. The methodology includes desk research, field research and data collection from sensors, and a form of artificial intelligence to process information and provide contextual answers.

It aims to guide the designer in considering complex contexts and environments that significantly impact resource consumption, thus helping to gain a broad knowledge of processes, context, stakeholders and products by combining it with smart enabling technologies that provide data and quantified knowledge.

The proposed methodology adapts to any other design methodology that follows the general research steps (empathise, definition, conception, development and testing and verification), placing itself in the first part of the design process. It refers to the pre-design phase, also known as research or fuzzy front-end according to Sanders and Stappers [10], or holistic diagnosis according to the Systemic Design (SD) [11].

It prepares the designer to work in trans-disciplinary research projects, with the final goal of designing meaningful and relevant products for the user, with extra attention towards environmental sustainability. In this work, I tried to answer the following two research questions:

- Which analytic guidance SD approach combined with data-driven design can provide designers?
- What is the designer's role in planning data collection in the early design stage to design meaningful products?

This methodology is based on the principles of SD and it is intended for massively under-constrained problems that were difficult for traditional engineering approaches to address. Many situations are currently in dire need to be considered and handled as systems, rather than attempting to convey the elements into a unique perspective (and solution). It is characterised by four blocks of research methods which cross four pillars listed below as 'research factors' with common transversal activities that include various methods:

### 1. **Situation/problem definition**

It includes structured

methods of defining and framing the current scenario and state of the art, such as context mapping, customer journey map, cultural probes, collages, card sorting, photo studies, and cognitive mapping.

### 2. **Desk research**

It includes secondary research methods such as literature review, databases, case studies and best practices analyses.

### 3. **Field data collection**

It includes primary research methods for design ethnography, such as observations, surveys, interviews, direct storytelling, contextual inquiry, exploratory research, diary studies, focus groups. However, it also focuses on objects intended as artefacts, such as research through design, list of requirements, artefact analysis, task analysis, touchstone tours, personal inventories, etc

### 4. **Validation**

It includes testing and verification methods such as interviews, focus groups, participatory design, role-playing, flexible modelling, creative toolkit, weighted matrix and so forth [12].

### **Situation and problem definition**

The context gives us the starting point of the analysis. It can be an environment, a territory, or a situation, and it can include a problem of significant interest for (some) stakeholders. We do not intend design as a form of problem-solving, but as the process of framing problems in terms of intentional actions that lead to a desirable and appropriate state of reality. Asking questions is the effort of intelligence that designers are required to provide, as well as framing the research, understanding where we want to go and how to reach a specific goal. In the analysis of a system, we could identify critical issues.

During the process, we need to understand how to address them. In this process, problem definition and problem solution evolve together in a never-ending 'problem reframing'.

The effort required to find and define problems is often underestimated. The outcome is a structured description of the problem, with a clear description of the desired final situation (objectives) and possibly the design direction. Questions: what's the problem? Who owns it? What are relevant contextual factors? What are the objectives? What are the side effects to avoid? What actions are eligible? It is suggested

to create a problem hierarchy [12].

### Desk research

The desk research can be performed as ethnographic research with the methods preferred by the designer. It can integrate qualitative or quantitative data retrieved from different sources, including web data, open data, books, reports, blogs, journals, records and statistics, or any other archive.

Desk research – also known as secondary research or empirical research – establishes what has been done and what has not, identifying opportunity gaps to help define a research direction and methods to be employed, complementing primary research conducted in the field [12]. The research may include previous projects, documented products or case studies, photographs, maps, diagrams and other recordings on visual media. It is usually summarised in a systematic literature review with citations and sources.

In the field of design, it could be displayed in visual schematisation (infographics), thematic networks, cognitive maps or blogs for shared viewing, sorting, synthesis and creation of narratives [12].

### Field research

As for the desk research, the field research can be

performed with the most various tools (data recording, surveys, interviews, prototyping, co-design participatory sessions as mentioned above). This paper proposes new technologies and communication tools, and new forms of 'knowledge' (i.e. IoT data and artificial intelligence).

We promote their use as tools for field research. IoT data for design purposes provides us with the means necessary for grounding the decision-making on reliable information. There are potential benefits of using IoT indicators to collect missing information about the product, its use, the dynamics around it and the environment surrounding it to understand how to fill the gap perceived by the user between needs and solutions. Planning the data collection is part of the designer's task, which begins by identifying which parameters the designer can investigate, and the data that he/she needs. In a way, he/she can translate them into design features.

Then, setting the questions is a relevant activity for this methodology. Instrumenting products in the field research aims to investigate:

- the current scenario
- the environmental impact of the product
- the use of materials related to the product

- the product operation
- the usage dynamics
- the relationship with the user
- the relationship between the product and other objects

However, one promising investigation approach in terms of reliability of results is combining those IoT data with direct feedback from the user, gained through other research methods such as observations, diary studies, focus groups, and cultural probes.

### Validation

Insights gained from users will be combined with the experience gained through the field research (about context, application domain and so forth) to develop future scenarios. Then we need to validate what we found. The designer that follows this methodology should step back to earlier phases to re-evaluate previous decisions. After both desk and field research has been performed, the designer should have collected a vast amount of data, and now it is time to structure it to obtain relevant information.

Suppose the process has been conducted in a structured way. In that case, the field data collection should have already

been done based on desk research, and, therefore, data processing should be sufficient to validate or discard the initial hypotheses. However, while collecting data, we may encounter inconsistencies or critical points that require further evaluation to disambiguate them. We can ask our users how they behave in relation to critical issues highlighted through the desk research. In this step, the design

team should investigate the user behaviour related to different aspects of the product through focus groups, interviews, surveys, games or other methods. In addition to participatory methods, other forms of direct observation can be used. We suggest designers should collect insights on:

- needs and requirements
- attachment dynamics and

how users would like to extend product lifetime

- purchases dynamics
- how they deal with repairing objects what do they do in case of product failures
- how they dispose of products.

The new assumptions formulated should be

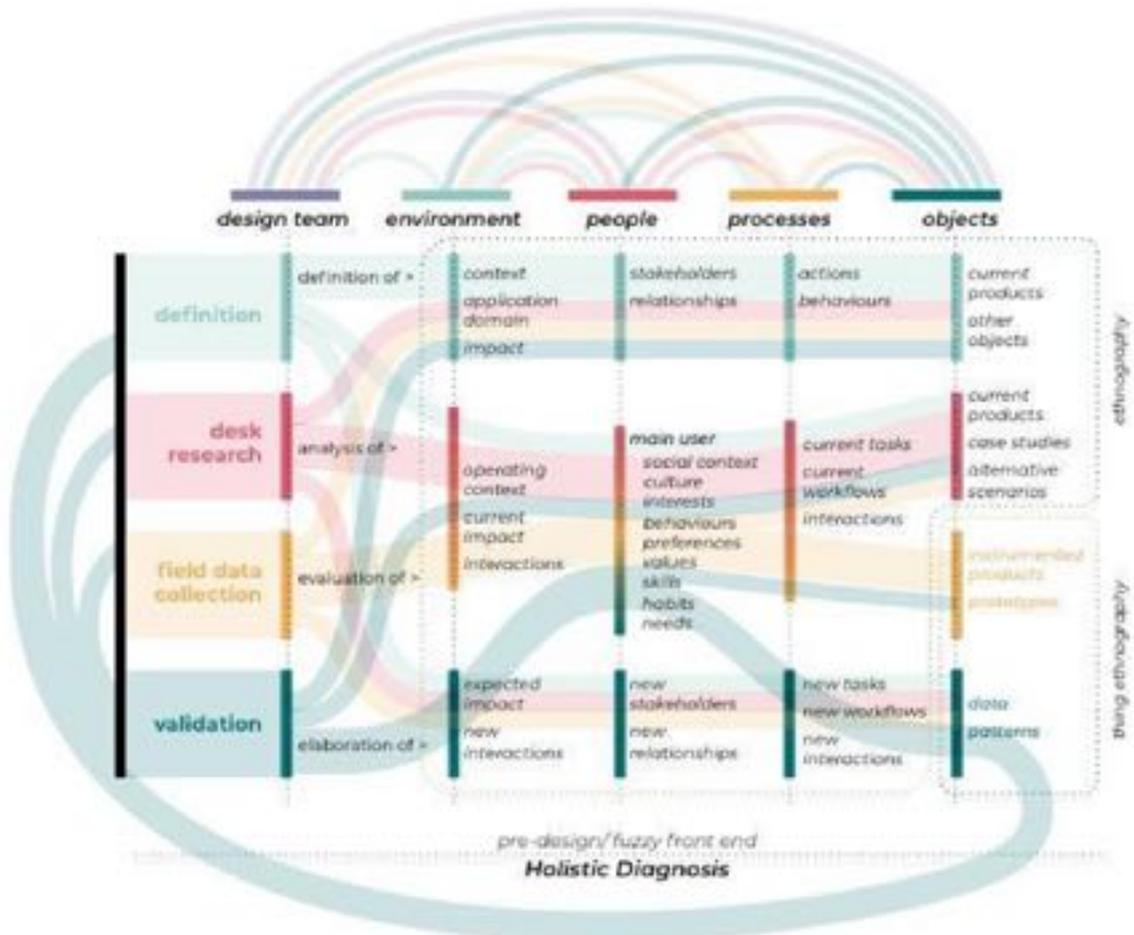


Figure 1. The methodological framework

		Environments	People	Processes	Objects
situation/ problem definition	definition of >	context application domain impact	stakeholders relationships	actions behaviours	current products other objects
desk research	analysis of >	operating context current impact interactions	social context culture interests behaviours preferences values skills habits needs	current tasks current workflows interactions	current products case studies alternative scenarios
field data collection	evaluation of >				instrumental products prototypes
validation	elaboration of >	expected impact new interactions	new stakeholders' definition new relationships	new tasks new workflows new interactions	Data patterns

**Table 1.** Detail of the intersection between research methods and research facts

validated with relevant users (through interviews, focus groups or similar) to assess whether the patterns discovered are coincidental or can be highlighted as a design potential.

### 3. RESEARCH FACTORS

Whether we are design practitioners or academics, before starting to deal with complex systems, we should ensure we have the right expertise on board and that our team can cover most of the issues we may face. Furthermore, we should not be afraid to integrate team members along the way, as the different steps of the analysis become more defined. These kinds of systems, in

fact, should be addressed in interdisciplinary or transdisciplinary teams. For example, natural sciences experts could help us address the issues related to the environment; social scientists help us understand people, their needs, behaviours, etc. Information technology experts help the design team collect, manage and process data.

Finally, several experts in the various facets of design hold the process and keep the pieces together while designing new product features. Therefore, the design process starts from a multidisciplinary design team with a certain abstract knowledge of the subject, reaching insights on four other types of knowledge: local, tacit,

practical and situated, which will be analysed using the methodology to complete the background.

Those forms of knowledge correspond to four pillars of analysis (research factors) which partly follow those of the AEIOU Method for Observational Research [12], namely:

#### 1. Environments

It includes the context(s) in which the activities occur (e.g. natural environment, context, operating environment, social environment, territory, town, region, country).

2. **People** or users but also other extended stakeholders. They are the people we need to investigate behaviours,

preferences, and needs, including their roles and relationships. They include direct and indirect stakeholders of the system.

3. **Processes**, i.e. the activities. They are a set of actions linked to objectives/paths that people take towards the things they want to achieve, including tasks and workflows in the operating environment concerning the object of the analysis. Interactions such as routines and exchanges between people and between people and objects in the environment are included in this category.
4. **Objects** are the key elements of the environment. Sometimes they are used for complex or even unintentional uses. Artefacts are the means on/through which the analysis is performed.

At the crossroads of these rows and columns, we have the detail shown in **Figure 1** and **Table 1**, which are better discussed in the next section.

## 4. RESULTS

Below, results are treated vertically under the topic of

the research factor.

### Environment

Analysing the application domain consists of defining which context the project is designed, where it is intended to work, for which environment and with which characteristics. It includes which stakeholders are involved and how they interact with that environment, what they take, what they leave, what they change and for what purpose, which stakeholders indirectly influence that application domain and how.

Indeed, the application domain or operating context can be described and observed by humans and sensed by objects. Studying the operating environment means analysing which resources, materials and flows are involved. The desk research can be performed with different methods, integrating qualitative or quantitative data. The field research should be directed towards measuring environmental impacts (resource consumption and waste generated), the materials used, and the relationships established in the context.

These data could be measured and collected and could reveal insights about the environment and the relationship with the users. During the validation phase, we can validate if the field

research also supports the data collected through the desk research and if the process leads to discovering new interactions that we had not considered before. It is essential to understand the current operating context of the product. Collect data about the social, cultural, economic and political context is part of this analysis.

### People

When we analyse complex systems, we also deal with human factors, and we implicitly consider that they derive from 'different stakeholders'. For this reason, every project has its own stakeholder network.

Complexity reflects the segmentation of knowledge to tackle a specific system node. Setting up the dialogue creatively and effectively combining expertise is difficult

**[13]**. The first step consists of identifying the relevant stakeholders and the system's direct and indirect actors. The stakeholders are peculiar to the system we are considering. They cannot be generalised, and their correct identification allows us to proceed with the analysis. Designers must empathise with the users, "considering their needs and desires from an external observer's perspective and working to embody the people they made things" for Zimmerman and colleagues **[14]**. Needs and requirements

are assumed through a well-defined process described in other works [1, 15, and 16]. Finally, we consider identifying, prioritising and managing requirements to express the system's values. This pillar focuses on investigating social contexts, culture, interests, behaviours, values, skills, and habits of the relevant users. This task could partly overlap with the analysis of the environment. Specifying requirements is part of the field research. It consists of three stages:

- Modelling requirements, i.e. creating abstracted representations (models) of the worlds (application domain) that lead to requirements specification and description, defining lexicon, structures and rules to understand the problem (on the one hand, system boundaries and constraints, on the other hand, assumptions, dynamics, relationships and behaviours).
- Prioritisation through co-design activities [1], i.e. mediating between stakeholders' conflicting requirements, values, roles and goals while keeping the system's overview. The goal is to find a common view of the issue. We consider co-design methods such as games that can also be performed on strategic

cases to extract different points of view and mediate opinions. These participatory sessions should result in a possible mediation on specific needs and increase knowledge.

- Validate and verify requirements. To validate the abstracted requirements that come from the aforementioned processes, the design team should first understand if the needs individuated reflect the real needs of the relevant stakeholders. This can be done in different ways, e.g. by interviewing them individually. In addition, social contexts, culture, interests, behaviours, values, skills, and habits can be verified in the same way, or they can be verified through experiments.

#### Processes

If we want to address real problems, we should understand the actions and behaviour related to a certain product or operation. Therefore, focusing on actions and tasks, simplifying them, and recognising them in complex patterns could be considered a way to improve the system's sustainability. So, we start identifying (i) current tasks, (ii) current

workflow and (iii) current interactions.

The field research could be performed through prototypes instrumented with IoT technology that may help the design team to:

- address critical aspects in the following design stage
- investigate requirements related to tasks
- extending products' lifetime.

The selection of participants must take place through questionnaires and games that could highlight if the user shows the attitude necessary to be a co-designer. We ask people to do some tasks during field research, recording their operations, habits, postures, and way of doing things. This observation could be made with traditional methods (camera recording, audio recording) or through objects/prototypes instrumented ad hoc to collect qualitative or quantitative data. Moreover, this first step could be performed in an environment set up for experimenting or by bringing instrumentation into the contexts in which that operation usually takes place (e.g. domestic environment). Observation can last from a few minutes up to require monitoring for long periods. In the second case, the means of observation should be placed

in the real operating context. A second part of the observation aims to make the users aware of their performed tasks and could be performed by asking questions while they are acting. In this way, the designer can stimulate users to reflect on how they perform those tasks to highlight which critical aspects they find while operating, what could help them, and how the work could be more straightforward. Even in this case, the performance could be done remotely by asking questions with the help of tools (apps, web portals or other platforms). First, however, a face-to-face discussion between the user and the design team is necessary. After the user is asked to notice how he/she is performing tasks, he/she becomes aware of the purposes of the study, and the design team must be available to answer all the questions. At the end of this session, the team should introduce the next co-design practice. A third part involves participants stimulating their creativity and providing views and tools for encouraging ideation, expression and visualisation. As the design team acquires insights into the real use of products and into dynamics experienced by the users while performing some tasks, it must start making hypotheses, which the user should validate. These

hypotheses will be presented to the user as concepts, prototypes, visualisation of data or scenarios, storytelling, etc.

### Objects

According to Zimmerman et al. [14], we could analyse artefacts to discover patterns. Research can be performed with prototypes or current products instrumented with sensors for a specific purpose. The material objects' perspective adds a new viewpoint to the investigation of patterns, interactions, places, and contexts. The potential of using 'thing ethnography' as a tool for designers is gaining appeal among researchers in the design field: Things' perspective gives a different standpoint about things' use and movements, understanding relationships among people, objects and use practices that would be difficult to elicit through traditional observations and interviews alone [17]. In this first step, we should understand which products are used to perform a certain task and which classes of products we want to address to detail only one category of products. Then, there may be other complementary products that deserve to be identified and analysed to understand the dynamics around the "product-focus". Since products are the

current solution to specific tasks, issues and contexts, current products contain "knowledge" because they have been considered (in a particular time) functional to respond to a specific need. This knowledge – which is a mix of situated and practical knowledge – can be obtained backwards through the decomposition of the object. In this way, designers can study the individual pieces, how they are connected, how they work together to perform a certain function, what materials are used and why. Disassembly methods such as reverse engineering and design by components [3] could provide designers with a helpful guide on how to perform product disassembly, accessibility analysis, reduce the product into functional groups, and understand which functions the product analysed was asked to perform. Background information, history of product development, context, functions, alternatives, market and purchase dynamics, and impacts along the lifecycle are among the data designers should collect, together with trends analyses, the features of the most recent and premium products. The final goal of this analysis could be:

1. Extending the product lifetime;

## 2. Work on attachment dynamics.

In the desk research, a case study selection aims to investigate either conservative or disruptive scenarios (from the redesign of the current solution up to promote new scenarios and paradigm shifts). We perform this task through the analysis of the case studies. Some of them could be deliberately chosen to investigate alternative scenarios (e.g. without energy or with a completely different form, breaking down the different functions into individual components, etc.). The choice of case studies is fundamental and should be led to formulate some 'preliminary guidelines'. Case studies research should be repeated throughout the design process to refine the research as insights are acquired from other analyses.

The product instrumented with sensors is placed in a lab environment for experiments or directly in its operating context in the field research. Instrumenting current objects or creating prototypes that contain sensors requires careful planning of which data the designer needs, according to the final goal of the study. This part does not focus on the technology itself but on the results, performances, functionalities, and tasks it allows. Dynamic data are those data which vary over

time, deriving from the context of use and interaction with users, which can be acquired by investigating the object in its everyday environment, combining:

- quantitative data acquisition (sensors) by monitoring and accessing more precise knowledge of products and stakeholders useful for design purposes
- qualitative tools (feedback, questionnaires, interviews).

We see the 'potential' in new technologies and the data they make available to be leveraged in the design process, overcoming our computational brain limits and thus playing a role in amplifying human capacity. This phase has the primary goal of discovering patterns in using those objects. Insights derived from data should be used to develop innovative and meaningful products. Considering objects as part of systems dynamics leads to potential innovation at three levels:

- redesigning the product;
- foresee systems able to learn and adapt and evolve over time;
- discover implications for product durability and circular business models (e.g. product evolution,

adaptability and reduced ownership);

Maybe the result is not only related to the object but it involves:

- redesigning the dynamics around the product;
- redesigning part of the system;
- readdressing users' motivations in its purchase, use and disposal.

Lastly, the benefits towards sustainability lie in four strategies that could be identified in:

- Ensuring more accurate repairs
- Providing connections to other services
- Saving time and money
- Reducing resource use

## 5. CONCLUSIONS

In 1980 User-Centred Design codified a way for designers to conceive of their relationships with people that will use their designs, structuring the role of the user (or 'human') that matters in design processes, whose understanding of needs, abilities and perspectives should improve

the effectiveness of a design. Now we need an inclusive design approach to deal with the new smart objects able to sense and experience the world and collect information from environments and contexts [18]. How can we design for this complex system of people and things? Understanding how designers adapt their design practice to deal with the IoT is insufficient. Throughout this work, we addressed the question 'What is the designer's role in planning data collection in the early design stage to design meaningful products?'. We have seen which efforts are required of designers, their role in mediation processes between stakeholders and within the team and how they should relate to the objects they analyse. Design research probably needs new platforms for performing future design practice [19], able to provide the necessary fluidity to address both uncertainty, evolving requirements and things perspectives. It can be noticed that many design researchers consider design tools and methods insufficient to deal with the complexity of systems, evolving requirements and the new challenges of smart technologies. This work has certain limitations. The methodology proposed requires that the design team guides the process, as designers must gather the necessary insights to design

new products suitable for complex systems. It is not intended to be universal or decisive. It only applies to certain situations, and it clarifies which characteristics the problem to deal with should have, as well as the characteristics of the work team, before starting to apply the methodology. It has a suitable application in trans-disciplinary research projects in which the manufacturer/ research group wants to

explore messy, problematic situations characterised by conflicting perspectives of the stakeholders, which cannot be accurately modelled and cannot be addressed using other design approaches. This methodology is unsuitable for well-formed problems, characterised by explicit assumptions, well-defined dynamics and actors. In this case, it may result in complicating the standard design process.

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# PUBLIC INTERIORS AS INFRASTRUCTURES OF CONTINUITY AMONGST PEOPLE, SPACES AND SERVICES

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## **ABSTRACT**

Growing cities have transformed their relationship with public spaces, also dealing with the digitization of services that has emptied the spaces they once occupied, leaving behind a spatial heritage that has to be reallocated. Indeed, few public areas now meet the requirements that enable them to be perceived as "public" with new ways of communicating, socializing and interacting. Therefore, we should generate new narratives for the cities' Public Interior spaces as scenarios to display ideas directed toward the public. Continuity and accessibility are considered positive elements for the users, linking proximities to live in our cities with a new generation of public services, multimodal and shared services, re-inventing Urban Commons, also incrementing flows of people inside and outside surpassing the "boundaries" of the constructed environment. As well the Information Architecture designers create user flow of information, as Spatial and Service designers must enrich the capacity to offer and experience the most fluid and relevant experiences to the users within the spaces, enabling roots and programs into the environments defining components of this Infrastructure of Continuity within Public Interiors.

**PUBLIC INTERIOR, S+S DESIGN, PROXIMITY, HYBRID SPACES, HALL OF THE FUTURE, CONTINUITY**

## 1. INTRODUCTION

Today, design discipline represents a holistic perspective [1], navigating between formerly distinct areas of action which have become progressively blurred. Design evolves from specialist expertise to a more broad and interdisciplinary profession that includes social settings, products, services, systems, and branding [2; 3].

Interactions are common in fields like Space and Service design, which is why, within a multidisciplinary vision, combining the two disciplines to envisage future alternative developments seems a natural consequence.

S+S (Spatial + Service) Design is applied to "urban planning, in the design of workplaces, retail settings, private interior spaces, public services and infrastructures.

In this range of settings, spaces host relational entities and vice versa, services take place in physical environments and determine tangible outcomes" [4].

This paper attempts to define the Spatial and Service approach related to Information Architecture, answering the question: what role does, or could, Information Architecture (IA) play in the design process? To comprehend the effect that IA could have on S+S design by making it easier for users to

locate essential information, we will first attempt to describe the current trends inherent to the design of public spaces and public services that S+S is concerned with. Then we will determine the position occupied by Information Architecture within this field of study in order to understand why we should put them in relation. After analyzing the intersection of digital and physical space in the public environment and the effect of Public Administration's digital transition on the physical space, we will mention a public interior renewal project that highlighting this connection.

## 2. HOW CAN PUBLIC INTERIORS BE TRANSFORMED INTO INFRASTRUCTURES OF CONTINUITY?

### Public Interiors

This multidimensional design approach identified in the S+S Design, should be able to generate new narratives for cities' Public Interior spaces as transformative scenarios. Public interiors are public spaces in a constructed environment, primarily described as "spatially contained environments inside civic buildings (government buildings) and institutions (e.g. for education, healthcare, culture etc.)" [5]. This essay suggests continuity and accessibility as basic components of Public Interior proximity, related to the flows

of people both inside and outside the built environment, transcending its "boundaries".

Starting from these premises, we can explore some of the key terms which define the boundaries of the infrastructure of continuity topic:

### Proximity

The condition of being physically close in space is known as proximity. It is also the sensation that arises from the awareness of sharing something with someone. "Proximity is the quality of a system whose elements can easily enter into direct contact" [6].

It became a keyword in today's urban planning. A city of proximity, often known as a "15-minute city," is one in which everything people need for daily living is just a few minutes away by foot or by bicycle from where they live [7].

Closer proximity is meant to increase people's quality of life, strengthen communities, and promote environmental, social, and economic sustainability [8].

Despite being based in the physical world, according to Manzini [7] proximity has also become increasingly digital, and it could no longer exist without it. Into this hyperconnected era of Digital transitions, we communicate in digital, physical, and hybrid contexts.

## Hybrid Spaces

De Souza and Silva [9] affirm that "hybrid spaces arise when virtual communities (chats, multiuser domains, and massively multiplayer online role-playing games), previously enacted in what was conceptualized as cyberspace, migrate to physical spaces because of the use of mobile technologies as interfaces. They merge the physical and the digital in a social environment created by the mobility of users connected via mobile technology devices". According to them "hybrid spaces are conceptualized according to three distinct but overlapping trends: hybrid spaces as connected spaces, as mobile spaces, and as social spaces". The space of flows, according to Castells [10], is the main spatial logic of the network society. Paraphrasing Castells [10], Stalder (2001) affirmed that "the space of flows is created by the real-time interaction of distributed social actors. The space is comprised of interactions and the material infrastructure that makes these interactions possible." From this definition, we know that the space of flows is intrinsically a social space; according to Castells, space is the expression of society (p. 440). However, in the space of flows, the material infrastructure that makes these social interactions possible is in part composed of digital technologies and a physical network" [9].

## Information Architecture

The increasing digitization of services is making services more efficient and quick, and it is shifting the primacy of physical presence, that is why the discipline (IA) that focuses on the organization of information within digital products improving their user friendliness is gaining more and more ground.

"A world of digital information will always need people to architect spaces for sharing, collecting, and organizing documents and resources. [...] The dynamic structuring of information in response to user activity is likely to offer increasing challenges for research to understand how people construct meaning and navigate through fluid information environments." [11]. Information Architecture designers create user flows of information and they bring "principles of design and

architecture to the digital landscape" [11]. IA is defined by Dillon [12] as "the process of designing, implementing, and evaluating information spaces that are humanly and socially acceptable to their intended stakeholders".

IA design connects the users with the content and the context. People visit websites for content. Producing good content is crucial, but so is making it easily accessible to users [13].

## Continuity

Overlapping all these topics into a positioning map (Figure 1) composed by the disciplines of Spatial Design and Service Design (first axis) operating between digital and physical space (second axis), IA can be connected to public Interiors and generate Continuity, passing through S+S, which takes place at the center of the two axes. Hybrid spaces and Proximity play a prominent role

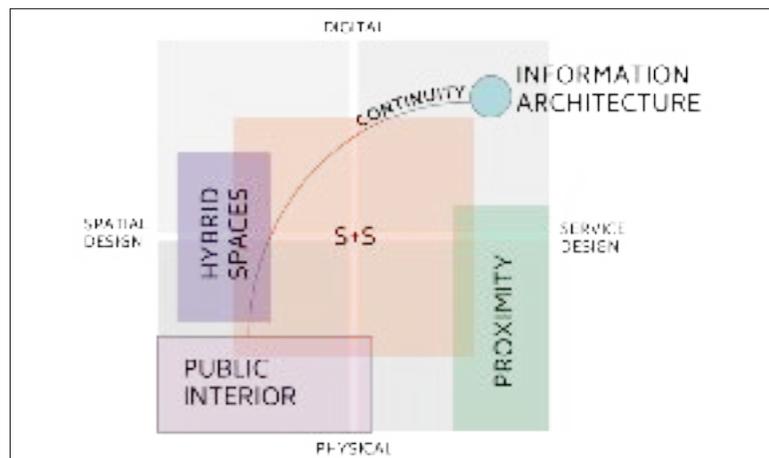


Figure 1. Positioning map

in this context as the places within which Continuity occurs.

According to this theory Spatial and Service designers must enrich the capacity to offer and experience the most fluid and relevant experiences to the users within the spaces, enabling roots and programs into the environments defining components of this Infrastructure of Continuity within Public Interiors.

### 3. DIGITAL TRANSITION'S IMPACT IN PHYSICAL (PUBLIC) ENVIRONMENTS RENOVATION

The decrease in usage of public interiors is the consequence of a mix of variables, the most important of which is service digitalization. The digital transformation of public administrations, underway in many countries including Italy, which established a special Department for Digital Transformation in 2019, aims to use information technology to make access to public services easier, faster, and more efficient [14].

Language, methods, and processes differ greatly between Information Architecture and public administration. The majority of studies on public agency communication have been conducted from the perspective of communication science, public relations and

political marketing. Even the few texts that have addressed the contribution of design have done so by emphasizing its graphic-visual skills rather than its strategic contribution [15]. Two turning points of this "non-strategy" have been: the definition of *design guidelines for PA website*<sup>1</sup> and the development of the *Designers Italia*<sup>2</sup> platform, the first reference point for the design of digital public services.

This digital transition is also having an impact on public interiors, which are experiencing considerable changes. The dematerialization of papers, the development in digital and computerized document and process management, is a fundamental driver of this transformation which has a massive impact on spatial fruition and people behavior.

Italian public administrations, despite its slowness, have been at the forefront of remarkable digital innovations aimed at developing structures that promote effectiveness and efficiency. That is, substantial computerization of both national and local public administrations, resulting in e-Government [16].

This digital transition will be increasingly growing thanks also to the Italian PNRR (National Recovery and Resilience Plan) and the European Next Generation EU program, which allocate substantial resources to this

aspect.

PNRR has the potential to provide a long-term investment and reform plan for effective twin transitions (sustainable and digital) while maintaining social and territorial cohesion [17].

### 4. HALL OF THE FUTURE CASE STUDY

Dematerialization brought about by this transition represents an important theme in the physical public environment renovation. An example is the case of registry offices renovation of the *Chamber of Commerce of Milan, Monza Brianza and Lodi* conceived by a research team of the Design Department of Politecnico di Milano. The Chamber of Commerce is shifting to online services, decreasing the need for physical space. The progressive digitization of its services allowed it to reduce costs, optimize and simplify processes, and improve service quality. The registry office public interior renovation project, aimed at reducing the distance between the public service and the citizens, presented an opportunity to interact with this transitioning phenomenon. From the applied co-design process emerged three guidelines to be followed:

"Flexibility (workstations and exhibition areas must be able to adapt dynamically to the provision of more services

and activities); Continuity (the Chamber of Commerce must continue to be the point of reference in terms of offering services dedicated to the growth of businesses, and gradually integrating some innovations); Innovation (the space will gain a modern look, offer brand new services, and also adopt new forms of technology)" [18].

The program was aimed to rethink and transform both users' and Chamber of Commerce operators' spatial experiences. To achieve this result, the project was designed as a strategic scenario, leaving the physical project open to changes in social, technological, and work paradigms. Moreover, the project strives to broaden its temporal scope while remaining current. Gained outcomes have been the increasing of the continuity, the permeability, new spaces and new services.

The concept of "accessibility," defined as the possibility to enter a space without effort [19], can be used to differentiate between public spaces and public interiors since access to a public interior, as the Chamber of Commerce, may be limited for evident reasons. The decrease of this limit is one of the functions that Information Architecture can do as part of the design process, enabling a system of connection and proximity that is not located in physical space but rather in

digital space, by which enhance participation, accessibility and social inclusion.

## 5. CONCLUSIONS

In today's cities, public space is no longer created just by traditional typologies like squares, gardens, public and

private areas, but rather by the emergence of a variety of hybrid spaces and collaborative uses. These can include the realm of communication as well as virtual spaces. It is necessary for us to concentrate on systemic perspectives, a network space [20] which promotes functional and morphological continuity [21].



Figure 2. View of the design project



Figure 3. View of the realized project

The concept of continuity for the Public Administration Infrastructures is expressed in terms of a new generation of public services and linked to accessibility and permeability, including PA digital transition. Digitalization is an instrument to facilitate connection between people, goods, services, materials, and the wider context acting in public spaces. The new narration of public interiors should express public values and shaping the public sense through its users' behaviour. As with S+S Design, Information Architecture requires a users-centered strategy, which includes user research, determining what people need and want, conducting card sorting and tree testing sessions, as well as contextual questions and usability testing [13]. This approach aims to increase the quality of the user-product/space interaction and usability.

Therefore, as a consequence of digitalization, physical spaces need to be redesigned enhancing their level of continuity, so of easier fruition. The knowledge gap of the future impact of today's transformation still has to be filled.

S+S Design action should focus on the process of physical and digital renovation aiming at a new sense of connection and developing a continuity strategy for spatial and service implications.

## NOTES

- 1 <https://www.agid.gov.it/it/design-servizi>.
- 2 <https://designers.italia.it/>

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# CONNECTION BETWEEN DESIGN AND NATURE REFLECTIONS AND PROJECTS FOR THE FUTURE OF THE PLANET

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## ABSTRACT

Humanity's delayed reaction to the consequences of the climate crisis is the result of multiple interests and strategies caused by denialist policies and piloted information. It is also true, however, that there is a strictly cultural responsibility, in the form of a lack of dialogue between sources of knowledge. Restoring the balance between humanity and nature is the most important issue that contemporary design must address. Design has the task of highlighting objects and strategies in re-establishing the relationship between Man and the context in which he lives by re-integrating the social and natural ecosystems. In this context, thanks to the evolution of natural sciences and technology, it is possible to create fertile ground for the emergence of new relationships between design and nature, capable of offering new ways of both interpreting nature and configuring new scenarios.

**ECOSYSTEM, SHARING, TRANSITION, SUSTAINABILITY, CONNECTION, INCLUSION, ECOLOGY**

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## 1. INTRODUCTION

Over the past half-century, the voices of scientists would probably have resounded more loudly if they had been received not only by their colleagues from other technical-scientific disciplines, but by humanists, philosophers, sociologists and anthropologists capable of assessing the impact of the ecological crisis on human beings and their forms of organisation. We might say with certainty that Man's action regarding nature is changing, for the worse, both Man and nature itself. The answers lie in the frontiers between anthropology, philosophy and sociology. Science and culture became separated in the course of the second half of the twentieth century, but without the work of the human sciences it is not possible to grasp the essence of our society; science has rapidly changed into technology and culture into a kind of sociology of the inessential. The two branches of science need to be brought together again (Latour, 2020).

While we think of technology as a tool at our disposal, this technology has become the environment that surrounds us and organises our existence in accordance with those rules of rationality that, respecting only the criteria of functionality and efficiency, subordinate Man's needs to the demands of technical apparatus. We are moving unconsciously with the

typical characteristics of pre-technological man, who used to act through ideas and feelings in which he recognised himself, in putsui of goals etched in a horizon of significance. By contrast, technology does not tend towards a purpose, it does not promote meaning, it does not open up scenarios of salvation, it does not redeem nor unveil truths: technology functions (Galimberti, 2016, pp.35). The issues surrounding climate change are forcing everything that had been socially distanced for many decades to converge, and we have to ask ourselves whether it is geological and natural change or human action that is responsible for the current instability. Reality invites caution. In fact, it is difficult to believe that it has been Man alone who has upset everything, also because the dating of the presumed end of the Holocene<sup>1</sup> and the beginning of what is known as Anthropocene<sup>2</sup> is very close to our time: it is the last two hundred years of the life of Man, a period which substantially coincides with the first industrial revolution.

## 2. HUMAN-NATURE RELATIONSHIP

"The Anthropocene is about human beings [...] and, at the same time, about agents such as cows, factories and thoughts, agents that cannot be reduced to their purely

human use or exchange value [...]. Becoming a geophysical force on a planetary scale means that, regardless of what you may think, regardless of whether you are aware of it or not, here you are, you are it [...]. You cannot be over-smug about your heartbeat or your nervous system." (T. Morton, *Ecologia Oscura*, 2021, p. 67). Human activity has come into conflict with the action of nature. Man and nature are a unity and share the same destiny, so we are part of nature (Morton, 2020); the contradiction is not between two subjects, but is the apparent conflict within a given and closed ecosystem. In order to understand the truth behind climate change, we need to side with science; we need to reflect on the investigative and communicative errors of this very science, which has been left alone and defenceless in representing the field of criticism (Levantesi, 2021). Man's behaviour, especially over the last two centuries, has conditioned his relationship with nature. It has conditioned him by allowing him to subjugate, in many cases, the logic of nature. Man is living longer and longer and also preserving his species at the expense of the environment; but this conditioning seems to have exceeded the physiological carrying capacity of the ecosystem. Man's actions, carried out in contradiction to those of nature, and on which he depends, have thus generated the so-called

Anthropocene, imposing their rules on everything else. Man's evolutionary action has imposed a model of development that has affected Man's living environment in increasingly profligate forms. This appears to be an inevitable phase of transition towards industrialised modernity and by no means related solely to the problem of pollution (Latour, 2020). The solution inevitably lies in the reconciliation between social sciences and natural sciences, between culture and scientific research. Nature and society will need to come closer together, just as science and politics will need to intertwine their paths. In the past, we were very careful to distinguish between scientific ecology and political ecology: the former only had to deal with the natural world and the latter with the moral, ideological and political consequences of the former. Ecology can only be a radical, anti-capitalist political position; capitalism can hardly be the model that can resolve the ecological contradiction. A system founded on the continuous consumption of land, soil, living beings and natural resources cannot dispose itself to control this same consumption, on pain of its destruction. The solution will not come from de-growth prophecies of de-growth, or from improbable, pre-modern, backward leaps, but will need to pass through renewed anti-capitalist reflection, overcoming all the limits that political movements have not been

able to resolve; although we should have acted at least forty years ago, it is still possible to cultivate some hope because it is not, as yet, too late to do something (Latour, 2020).

### 3. NATURE AS A SOURCE OF INSPIRATION

Today we know perfectly well that the environmental impact of the products, services and infrastructures that surround us is determined, by up to eighty per cent, at the design stage. The choices made at this stage shape the processes behind the products we use, the materials and energy required to make them, the different ways in which they are used on a daily basis and what happens to them when we no longer need them (Thackara, 2008).

Restoring the balance between mankind and nature is one of the great issues facing contemporary design. It is a relationship that is played out on different levels: from microorganisms to the cosmos, from oceans to insects, and including human communities. This relationship is not only about natural resources and the environment, but also involves the sphere of ethics and politics. Designers are called upon to restore and create new connections between people and disciplines.

Over the years, the bonds that link humans to the natural environment have been

deeply compromised and in many cases destroyed. Reconstructive design has the task of highlighting objects and strategies to reinterpret the relationship between human beings and the context in which they live, by favouring the inclusion of social and natural ecosystems. With critical tools capable of looking to the future with a modified awareness, we need to redesign and rebuild for the survival of the planet (Antonelli, 2018). In order to promote a new design culture and to develop truly sustainable design models, there is a need for the continuous support of research, experimentation, and sharing and exchange of interdisciplinary knowledge. Design has always had a team design approach, geared towards the creation of groups that deal with the most pressing issues. It has always had a social and political intent at its core. The real paradigm shift today lies in bringing together social issues and biology, and in broadening the field of action from human to microorganism communities. From this perspective, one of the areas of scientific research, which seems to have particular relevance within the debate on environmental sustainability and sustainable design, is the contribution of 'Biomimesis' or 'Biomimicry', which is defined as follows by biologist Janine Benyus<sup>3</sup> "science that studies natural biological systems by emulating their forms, processes, mechanisms of

action, strategies, to resolve everyday challenges, to find the most sustainable solutions to human design and technological problems, to replicate designs and processes within new technological solutions for industry and research". Man has always been inspired by nature in the design of his artefacts in order to find efficient solutions by imitating structures, shapes, proportions and functions from biological organisms. Today, we need to consider the biomimetic design approach from a new angle, going beyond the morphological-structural analogies long-established in design culture. In fact, thanks to the development of new scientific knowledge and new technological tools, we are able to analyse and reproduce processes from nature that have never been tried before, such as nanoscience and nanotechnology: nano-metric dimensions make it possible to develop processes and products in many fields of application, also making nature a source of inspiration for strategic, organisational, behavioural and process models. Today, through the experiences of bio-mimesis, designers can copy all the solutions that natural evolution has perfected over millions of years, following the model of minimum investment for maximum yield. Designers can draw invaluable suggestions from nature for the construction of numerous

artefacts while respecting the principles of waste reduction, production of refuse and use of the minimum amount of energy. Emblematic is the work carried out in recent years by Neri Oxman<sup>4</sup>; in his model for a *Krebs Cycle of Creativity*<sup>5</sup>, in fact, design, art and material engineering coexist in harmony with biology. His field of research, called *Material Ecology*, has as its main objective the unification of modern technology with nature: two distinct disciplines that, through merging, could revolutionise the world of design with the introduction of totally natural materials: we are no longer dealing with assembled products but with real living organisms. One of the materials used by Neri Oxman, chitin, might represent a possible substitute for plastic. Chitin is the second most abundant biopolymer on the planet (after cellulose) and is produced naturally by organisms such as shrimps, crabs and butterflies. Neri Oxman succeeded in using this totally biodegradable material in the construction of design works and architectural structures. By modifying the chemical and structural properties of chitin, Oxman and his team have been able to play with colour and size, wherever necessary, without disregarding the environment and sustainability. In fact, chitin, by actually going back into circulation, provides the earth with nourishment.

*Aguahoja* (**Figure 1**) is an emblematic design work and perfectly embodies the concept of *Material Ecology*. The structure recalls the shape of a leaf; biocompatible and naturally renewable materials, such as the aforementioned chitin, pectin, cellulose and calcium carbonate, were used in making *Aguahoja*. These materials, 3D-printed in a continuous manner and without needing to be assembled, have varying degrees of flexibility, opacity and rigidity. At the end of its life cycle, the artefact can be dissolved in water without polluting, thus releasing nutrients back into the ecosystem. Other projects developed by Oxman move in the same direction, such as the *Silk Pavilion* (**Figure 2**), which uses silkworms as if they were biological 3D printers, to create two-dimensional structures instead of three-dimensional cocoons, or the clothes from the collection *Wanderers, An Astrobiological Exploration*, created by crossing multi-material 3D printing and synthetic biology, enabling Man to derive nutrients and survival materials from his own clothing. Some, such as *Mushtari* items of clothing (**Figure 3**), enable light to be transformed into sugar and sugar converted into biofuel for humans, through the interaction of two types of bacteria; others enable light to be created via fluorescence for dark environments, and still others bio-mineralise<sup>6</sup> in order to strengthen and increase

the density of human bones. Neri Oxman transforms natural behaviour into algorithms that become production and manufacturing methods. In their work, *Formafantasma* (A. Trimarchi, S. Rarresin) critically highlight the need to recover the relationship with nature by linking ecology and manual skills: in their designs they combine refined forms and unusual materials, such as plant-based polymers, volcanic ash and waste from the electrical and electronics



**Figure 2.** *Silk Pavilion* is a structure composed of steel panels and woven threads completed by silkworms



**Figure 1.** *Aguahoja* is the project for natural artefacts made from biocomposites

sectors. In their research, they tackle issues relating to the roles of industry, globalisation and sustainability. In the *Botanica* collection (**Figure 4**), they display vases and lamps made from plant polymers, thus offering an alternative vision to consumer society and the role of design. The use of natural materials and pre-industrial techniques lead us in the direction of a democratic design approach and encourage self-production. Through the experimental use of materials they invite us to rethink the complex systems that influence world production by finding alternative solutions to those that have led to the current global ecological crisis.

## 4. CONCLUSION

Inter-disciplinarity and changing objectives in design will give rise to new skills. Designers



**Figure 3.** *Mushtari* are items of clothing that turn light into sugar and convert sugar into biofuel



**Figure 4.** *Botanica collection of vases and lamps made from plant polymers*

need to stimulate and educate the world in the direction of interdisciplinary activity; solutions to complex problems are, inevitably, complex. Ecology is an increasingly important issue and companies will need to embark on the difficult path towards sustainability; design has for a long time focused on desirable products whose function was to improve users' lives without, however, tackling any of the issues related to the ecological transition<sup>7</sup>. The role of the designer will be fundamental: he will be able to deal with new products but, above all, he will have to analyse and re-assess the complex systems that rule production world-wide. There are disciplines that can be better integrated with design, such as biology, the natural sciences and entomology, or the branch of computer science that deals with artificial intelligence. Biodesign<sup>8</sup> is a new field, not so much because design has never dealt with biology, but because biologists

have become an active part of experimentation. Thanks also to digital and artificial intelligence, design is now closer to understanding how nature designs and builds. The times and modes in which we are moving towards environmental sustainability are slow and inefficient, every year we consume 20 per cent more resources than nature is capable of generating. Therefore, in order to find the solution to energy and environmental problems it is not enough to develop clean technology and more sustainable processes and products, but there is a need for a radical change in the current system of production and consumption, the model of economic development and our lifestyles, which can only be pursued through radical innovation (Mascitti, 2019). In light of these considerations and the enormous developments in nanotechnology, the bio-inspired approach to design appears very promising; it will be necessary to effectively

integrate the principles and tools of Biomimicry with the more established methods and strategies of Design for Sustainability. In this way, the Biomimetic approach will be able to provide design culture with a truly strategic contribution to the development of sustainable, innovative and future-capable design solutions that are "ecologically responsible and socially responsive, revolutionary and radical in the truest sense of the terms" (Papanek, 1973). The transactional economic model that has thrived in the interconnected world economy has come to its terminus; hybrid approaches to innovation are needed, centred on people and place, on applied and empowering technology, and on design as a generator of connections; alternative ways are needed for communities to organise themselves, from the bottom up, in order to build an eco-sustainable future (Thackara, 2017).

## NOTES

- 1 The Holocene is the most recent epoch of the Neozoic Era, encompassing the 10,000-11,000 years following the last great ice-age; over its course, glaciers retreat, the Earth's surface remains in a condition almost identical to that of today, and the spread of organisms is very similar to that of today; the climate returns to normal, and humans develop and spread at an accelerated pace throughout the period.
- 2 The Anthropocene is the current geological epoch, in which the Earth's environment, in all its physical, chemical and biological features, is strongly influenced on both a local and global scale by the effects of human action, with particular reference to the increase in CO<sub>2</sub> and CH<sub>4</sub> concentrations in the atmosphere.
- 3 Janine Benyus, an American scientist known for her work on biomimicry, believes that the study and emulation of processes, patterns and systems that exist in nature can provide the answers to many technical and design problems.
- 4 Neri Oxman, an American-Israeli architect, designer and professor, is currently Associate Professor of Media Arts and Sciences at the MIT Media Lab. He founded and heads the research group 'Mediated Matter'. His projects are characterised by a combination of computational design, digital fabrication, material science and synthetic biology.
- 5 The Krebs Cycle of Creativity (the Krebs cycle, also known as the tricarboxylic acid cycle, citric acid cycle and oxaloacetate cycle) is a metabolic cycle of fundamental importance in all cells that utilise oxygen in the process of cellular respiration.
- 6 Bio-mineralisation is the process mediated by microorganisms that leads to the formation of various minerals.
- 7 The ecological transition is that process of technological innovation and environmental revolution which fosters economies that do not only consider economic profits, but also respect environmental sustainability.
- 8 Biodesign, is the intersection of biology and design; it is a movement comprising scientists, artists and designers, integrating organic processes and materials in the production of artefacts.

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# THE COURTSHIP BETWEEN FILOLOGIA AND MERCURIO HISTORICAL HERITAGE AND ARCHIVAL SOURCES IN DIGITAL CONTEXT

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## ABSTRACT

This contribution aims at investigating the theme of archives in relation to digital evolution. By facilitating direct access to often unpublished sources and allowing their comparison, digital archives can open new perspectives of study and research also for the history of the project disciplines. In doing so, historians and archivists are required to develop an effective operational methodology in their relationship with primary sources. This contribution aims to deal with the main aspects related to the use of sources in the work of the historian, with the objective of understanding and analyzing the role played by the digitization of archives in relation to the possibilities of direct accessibility of documents. At the same time, the aim is to reflect on the changes in methods of archival practices in relation to the diffusion of digitization processes. In order to verify these transformations, the case of a thesis work conducted at the Polytechnic University of Bari on the issues of digitization and organization of architecture and design archives in the Apulian territory is proposed. In particular, to the work on the preparation of digital supporting tools in the updating of archival documents related to the pavilions within the Fiera del Levante in Bari.

DIGITAL ARCHIVES, DIGITAL HUMANITIES, HISTORICAL RESEARCH, METHODOLOGICAL RESEARCH, PRIMARY SOURCES

*This paper was reviewed by Gian Paolo Consoli from the Polytechnic of Bari and Dario Russo from University of Palermo.*

# 1. INTRODUCTION

The paper aims to investigate the topic of digital archives and their evolution to draw new perspectives of study and research for the history of project disciplines. In particular, it is intended to examine the main aspects related to the operational methodology of historians and archivists in researching primary sources. The goal is to reflect on the role that digitization of archives plays, both with respect to accessibility of records and with respect to changes in method with respect to archival practices.

In the landscape of digital models, Jeffery Schnapp<sup>1</sup> U.S. designer and historian is a leading figure. In fact, since the early 2000s his research activity has focused on computer methods applied to art-historical and literary research, with a framing on design issues understood as a discipline that can give a scientific dimension and support to what is now called Digital Humanities. Building on the definition of "The Digital Humanities Manifesto 2.0", this field of study is «an umbrella under which to group both people and projects seeking to reshape and reinvigorate contemporary arts and humanities practices, and expand their boundaries». This is a central issue in the questions of research methodologies that have been

passed down for millennia into the twenty-first century and beyond. Within this debate, design can urge toward a redefinition of both skills and tools for transposing heritage resources within the more global system. In this sense, «design asserts itself as a model of knowledge production» because «design means shaping knowledge, structuring it, in-forming it» so «communication is an integral part of design» [1, p. 188]. Specifically, in the context of design are the « sharing platforms, storage and scheduling buildings [...] that are the logical corollary [...] toward the virtual world» [2, p. 67].

In 1949 jesuit Roberto Busa with the sponsorship of IBM<sup>2</sup> launched a very timely project: the indexing of the entire literary output of Thomas Aquinas in a system of lemmas<sup>3</sup>. The realization of this ambitious project coincided with the time when IBM was trying to develop more efficient computers and operating systems, in a context where digital dissemination was still in its infancy, this project led the way with the resources of the time. The project led over the course of 30 years to the creation of 11 million headwords in the 160 texts that make up the corpus of Thomas Aquinas's works, with a staff of 70 people<sup>4</sup>. An important milestone that paved the way on how the humanities tradition and computational methods

enter a system. Indeed, «entrepreneurial forms of research» insist within this system, hence the opportunity to apply a multidisciplinary approach with respect to skills «characteristic of disciplinary fields such as design, computer science, media studies, curatorship or archival science» [1, p. 187] to integrate and expand humanities disciplines with design disciplines in a network of information connections. In this panorama, in the attempt to unite Mercury and Venus – philology and the humanistic tradition of the Renaissance made of study and documents – emerges the attempt to use the network «as a privileged tool for the construction, access, consolidation and management of cultural heritage» [1, p. 11]. The philological problem then is solved through historiographic reconstruction in the sense that «if philology is, in the first place, the discipline that deals with certifying the veracity of sources, it is evident, in the specificity of the work in design archives, how the definition of the object of study is linked not only to the control on the veracity (or, more simply, on how much of the truth appears to us from the interrogation) of the documents, but also to the possibility of reconstruction of the relationships existing between the different materials pertaining to the object of study: it is the reconstruction of the relationships between documents that allows us

to understand a project, relationships that are often more important than the individual document». [3, p. 17].

Beginning in the 1970s of this century, a group of historians and researchers began to support and spread the idea that documents remain "dull" until the moment when historical insight renders them soulful, in a view in which the historian's craft allows for other meaning to be made through the interpretation of sources. Thus, it began to be seen how the role of the historian is a key to orienting research toward an open model in which these sources are able to be made accessible to a wider and wider audience, so that different interpretations of meaning can be compared. Therefore, from the historian's skills and the organization of the archive derive the advantages offered by direct access to documents: the spatial configuration of the archive translated into digital space offers the opportunity to retrieve relationships between documents and make new connections.

## 2. THE CASE STUDY "REFLEXIO MENMONICO"

If the archive is seen as a transitional stage through which the past becomes history [4], then the documents it contains can be seen as the traces of a preserved memory. Just as «by

turning over the idea itself of an archive as Power (Archive as "archeion"), the historiographic revolution of the school of Annales thereby highlighted the Power of the Archive and its incredible capacity to communicate and to safeguard (construct) the meaning of History» [5, p. 12].

"Reflexio Menmonico" is an encyclopedic lemma used to define the archival document. The document is the reflection of the memory of an event that has a document as its transposition, a written document or a drawing. So, the mnemonic reflection becomes the project that intends to digitize the system of the archiving of architecture and design projects so that consultation can move from the small-scale connection of archives to the global impact. This large network containing a mass of information can have on a global scale a decisive impact both in terms of the research activity of researchers within the project discipline and more generally that of all those who could, in a digital system, access documents much more easily. These are processes whose definition involves an act of interpretation «with an awareness of how these systems can reflect and return fundamental processes and pathways on different levels» [6, p. 41]. In a scenario of connected experiences, « networks connect us [as] social technologies» [1, p. 132].

One result of this work is a three-year thesis from the Design degree program at Bari Polytechnic University, titled "Architetture effimere per Bari fascista. Il caso studio dei padiglioni per la Fiera del Levante a Bari: tra storia, architettura e design"<sup>5</sup>. With this research, an attempt was made to bring together the field of studies on digital analysis methodologies with the topic of architecture in the Fascist twenty-year period, in the idea of investigating a new phenomenology of showing archives [7]. In particular, the research focused on the idea of creating a digital archive of the projects of the "ephemeral" buildings that were built in Bari during Fascism. The interesting aspect lies in the fact that these buildings were destroyed due to a series of events mainly related to the condition for which these buildings were created as pavilions within the Fiera del Levante. The thesis project involved the case study of these pavilions that no longer exist but are to be considered as documents. Indeed, within the Central State Archives in Bari<sup>6</sup>, the original documents of the works examined are preserved. The goal of the thesis lies precisely in the idea of both reconstructing where the pavilions were located and tracing back information on how they were made, and more importantly, to represent a divulgative corpus, considering that most of these projects

were carried out by influential figures central to the history of our country's design discipline. Thus, the thesis included a structured historical research phase using traditional methodologies done with archival research. This phase led to a series of graphical visualizations of archival data, for temporary archival extrapolation [7], from the founding of the fair in the 1920s to the new course after World War II. The next phase then involved the reconstruction of the entire fair design, with typification of the areas managed by the entity, or rented to private individuals during the fairs, and finally a catalog of historical archival photos depicting the interiors and exteriors of these pavilions during the occasion of the fair, which is still held immediately after the end of summer, from mid-September for a month. Within this fairgrounds several pavilions were built as early as the 1930s, at the time of autarky, which the larger companies produced, such as Campari and Acquedotto Pugliese, in many different architectural styles. All photographic documentation of these pavilions, surveys and plans, newspaper propaganda documentation, and various films have been archived. Among these was identified as a case study the INA Pavilion designed by Franco Albini, an almost unknown work if it were not for the almost twin pavilion designed for Milan [8].

Very little is known about this project despite the fact that on the occasion of this research it was discovered that there is an extraordinary amount of documents in the archives that made it possible to reconstruct both the pavilion outside and all the events, materials but also the dates of construction and demolition.

So, it was done in a fairly traditional way, following the directions of the superintendencies on the listing of buildings to be bound. Consulting official documents, it was also assumed that this Albini pavilion is a building that, if it still existed, would be listed. Subsequently, a filing system was constructed by imagining that the work taken under consideration could also be an object that has its own graphic dimension, so that it would become not only a "bureaucratic" object, functional to what the legal standard requires, but also a "informative" object that would allow its history to be reconstructed. In this sense, a virtual archive of ephemeral architecture was constructed as a deployment of archival materials [7], imagining not only a physical paper record but also being able to virtually prefigure the presence of the pavilion in the exact spot where it stood. Thus, the central idea was to build a virtual archive of all the architecture within the fair that was lost. These were in fact pavilions that were designed so that they could be dismantled

at the end of the trade fair, or, as for example in the case of Campari, they were temporary designs of installations that had to be dismantled after three years. Specifically, a virtual representation system was created that carries a QR-code that is the same as the one on the board (**Figure 1**); it was imagined to place at the place where the building stood a lectern in which there is technical information, an image where a visitor to the fair can frame the code, and by framing the context of the fair the virtual model is placed as if the building were there. So, the visitor has the opportunity to see the pavilion as it was and where it was.

This is a project that has both a dissemination dimension related to the cognitive event but also a way for researchers to have at their disposal not only the documents with direct reference to archival records, but also all the redrawn and scanned drawings up to the three-dimensional model. The "Reflexio Menmonico" project will lead to the reconstruction of all the pavilions and has the ambition to expand to all archives related to similar issues, that is, all the architecture of fascism in the province and then in the region so as to organize a digital archive and database of ephemeral architecture projects. The ambition is to continue this work and extend it, through the organizations for culture, to the national level



Figure 1. The graphic design of the board.

considering every region that has similar issues.

In conclusion, the idea of this project was born precisely to celebrate these nuptials between Mercury, the digital dimension, with Philology, which in reality still has not in fact been implemented especially from the point of view of the institutions deputed to the preservation of these documents. The idea is that these projects enter a network in which it is possible to draw on tools that only a digital database can allow, bringing together resources that are physically dispersed, a condition that represents what is the difficulty of doing historical research.

### 3. CONCLUSIONS

«Perhaps one of the most singular peculiarities of the historical moment we are going through is that of its "considering itself historical" [...]. It is a situation that seems very different from that of an immediate yesterday, when it was instead the "archival" data, the deposited documents that came to decant themselves – in the slow flow of events – that interested the scholar more closely» [9, p. 13].

With this contribution, an attempt was made to propose some reflections to evaluate the effectiveness of digital work in the context of the disciplines of

historical research design and methodology. In particular, an attempt was made to describe through an application scenario the possible historiographical perspectives of historical and archival research with respect to the influence of digital humanities. Thus, an attempt has been made to propose an in-depth study

of the digitization of archives with respect to the work of the historian by contextualizing this topic in a perspective in which historical and archival research is not only concerned with the identification of sources but also and contextually with the construction of models and skills for their use and organization.

### NOTES

- 1 For more information see the web page <https://jeffreyschnapp.com> [May 2022].
- 2 International Business Machines Corporation, was the first U.S. company, still among the world's largest in the computer industry.
- 3 For more information see the web page [https://www.ibm.com/ibm/history/ibm100/it/it/stories/linguistica\\_computazionale.html](https://www.ibm.com/ibm/history/ibm100/it/it/stories/linguistica_computazionale.html) [May 2022].
- 4 cf. footnote 3.
- 5 "Architetture effimere per Bari fascista. Il caso studio dei padiglioni per la Fiera del Levante a Bari: tra storia, architettura e design" is the bachelor's thesis of de Feo Marta and Campana Angela. Supervisor A. Labalestra. The thesis took place during the 2020/2021 academic year.
- 6 For more information see the web page <https://archiviodistatodibari.cultura.gov.it/home> [May 2022].

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# SHAPING THE CONNECTED FUTURE OF SUSTAINABLE FASHION THROUGH DATA DESIGN

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## ABSTRACT

The availability, accessibility, and abundance of new information flow support and push numerous stakeholders in the fashion system towards a paradigm shift capable of understanding and guiding business decisions while informing consumers' individual behaviour and expectations.

The future scenario shaped by the spread of big data envisages that decision-making processes concerning the sustainability within companies, institutions and even individuals will be supported by management skills based on data analysis. That transforms the products we wear, our interaction with them, the processes leading to their development, and the resulting user behaviour. Thus, the design functions as an ideal connection point if positioned centrally within this process. Furthermore, if current strategies for sustainable design permit the designer to develop the product in terms of materials and services, empowering him in data science with this renewed knowledge may enable him to measure the impact of his choices within the whole system. The contribution highlights how experimenting with a systemic approach to data enhances the design process within the fashion industry to promote a radical sustainable transformation. The scenario will be presented through case studies and signs of innovation, and research trajectories within the system will be defined: starting from the corporate ones to the impact on the consumer.

**FASHION, SUSTAINABILITY, INFORMATION FLOW, SYSTEMIC DESIGN**

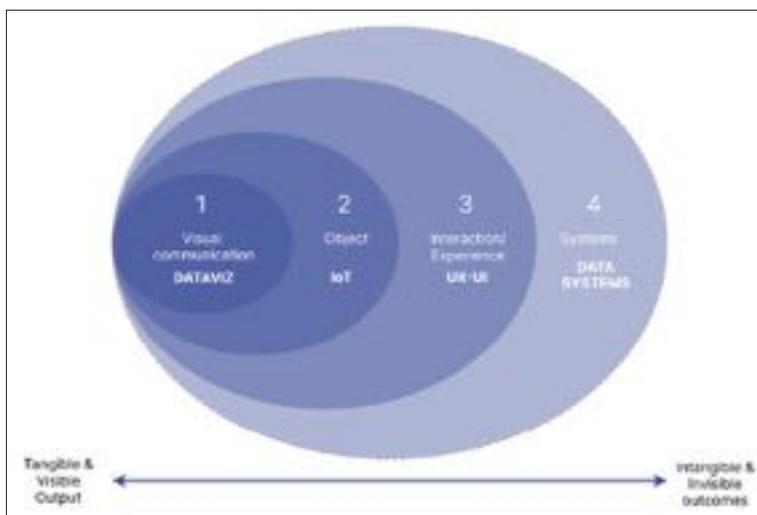
*I would like to thank **Ester Iacono** researcher in human centered design at Università degli Studi di Firenze and **Lorenza Abbate** PhD Candidate at Politecnico di Torino working on the field of human computer interaction, for their thoughtful revision of this article.*

# 1. DESIGN AND DATA PRACTICES

The discipline of design has undergone a profound expansion since the 1960s. Design has become embedded in the business, social and technological contexts, not only providing elasticity of thought, but also making significant changes in responding to the global challenges of sustainability. From the terms that are associated with it, design, with an incremental thrust, takes on new forms, competencies and planning each time. The same happens today when design relates in an increasingly evident way to the emerging culture of data. In the most obvious scenario through the visualisation of data, but then gradually opening up to the possibility of integration not only in the output but also in the results and processes

that are initiated by this contamination of disciplines. Over the preceding decade, the so-called data revolution has increasingly changed the way we live, work, think, and conduct business (Kitchin, 2014; Mayer-Schönberger & Cukier, 2013). Data, as an ontological and epistemological object of research (Schafer & Es, 2018), brings up a debate regarding the roles of tradition and innovation in design thinking. Datafication (Lycett, 2013), dataism (Brooks, 2013), the data revolution (Kitchin, 2014), dataveillance (Van Dijck, 2014), and the datafied society (Schafer & Es, 2018) are just some of the neologisms that have arisen to describe the emerging data culture as a totalising phenomenon that affects many aspects of human life, which in turn are becoming increasingly dependent on and driven by

big data infrastructures. Thus, the growing ubiquity of digital data is gradually increasing the number of variables that designers consider when interpreting complex problem domains. To understand the logic behind how data science has a progressive impact on design disciplines, it is necessary to consider how, over the preceding one hundred years, designers have found themselves facing complex problems related to the development of new technologies or in response to the modernity challenges. To analyse the indeterminacy of 'wicked problems in design thinking', Buchanan (1992) and later Buchanan and Margolin (1995) modelled the Four Orders of Design, namely the schematisation of a matrix for design thinking with problems to which design disciplines have been applied as solutions. The Four Orders of Design constitute a primordial evolution of the design profession, starting from communication with graphic design before moving on to industrial design and then interaction design and the integration of the design of systems, environments, and organisations. When attempting to outline the steps that led to the development of this matrix, we were forced to think back to the beginning of the 20th century, at which time, to respond to the challenges of mass communication design, the design industry entered the world of graphics to



**Figure 1.** Four-Order Model of Design (Source: Developed by the author, drawing on Buchanan, 2001)

generate text and images for the press. That development can be considered the beginning of the graphic design profession, which later expanded to encompass visual communication, communication design, and information design. In the current situation, data visualisation and data journalism could be incorporated into the world of design. At the same time, to solve the question of how to communicate large, inhomogeneous data sources, designers' must now possess the ability to create graphic representations of information through the use of visual elements—such as diagrams, graphs, and maps—in order to provide an accessible means of observing and understanding trends while identifying outliers and recurring patterns. In the historical scenario of the early 20th century, designers were called on to tackle problems of mass production by creating models, shapes, and mechanisms of physical artefacts that were being mass-produced in factories all over the world. Such mass production constituted the formal beginning of the industrial design and is often linked to the evolution of engineering and what we today refer to as product design, with its increasing emphasis on the close interrelationships between design, engineering, and marketing (Buchanan, 2015); all three of these professions are closely related to today's

data science. For example, Internet of Things (IoT) products equipped with sensors are able to collect and communicate data. Designers are then able to use this data for designs and to engage in the collection of valuable information in complex contexts—such as 3D printing, with its data-heavy technology, and developing marketing strategies based on data-driven approaches. Towards the end of the 20th century, design practices became linked to the term 'interaction' through the development and promotion of human-machine interfaces. An interaction that initially remains confined to the relationship between a digital device and its user gradually opens up to increasingly complex scenarios to address the design problems of a wide variety of interactions between humans and their surrounding environments. Having maintained the same multidimensional impetus since the 1990s, design has begun to deal with services, which constitute an evolved form of interactive design where the user's experience is at the centre of a design involving multiple design forms, including communication and processes. Furthermore, at some point in history, designers began to turn their attention to system design and the many complex interrelationships among component design and the ecosystems that host these components. Subsequently, the focus shifted from the design of individual products to that of

entire systems of relationships between these products and the systems they were intended to be part of; these systems need to be designed in the face of social and, more crucially, environmental constraints (Bistagnino, 2010). Thus, according to Buchanan (2015), while interaction design focused on actions, activities, and services, the new trend of systemic design focused on large ecosystems. As a result, design now integrates what lies behind complex systems—that is, the concepts or organising principles behind these systems, organisations, environments, and collective interactions. Similarly, today, designing a system of human–data interaction involves the joint construction of the increasingly pervasive collection of data to which our lives are subjected. A designer must first understand how this data interacts with most people, and after the data collection stage, it is then the task of the designer to develop guidelines for integrating and communicating this data in all of the many complex systems that influence human behaviour. Starting from a main area of investigation such as design praxeology or "the study of design processes and the development and application of techniques that assist the designer" (Cross 2007, p. 124) this research revolves around the development of a model capable of integrating data for design purposes to implement

the sustainability of the current fashion system. The paper expresses the need for a new research agenda to investigate how data can be integrated into the design process of the fashion industry: at what stages of design, with what outputs and what tools and skills will become necessary for the designer who constructs the interaction between data and the human being as a 'clothed' being. It does so by delineating the boundaries of a conceptual framework of enquiry for the integration of data into design practice along all its dimensions, emphasising the need for language and practice.

## 2. DESIGNER AND DATA RELATIONSHIPS IN FASHION SYSTEM

It is evident how associating different data entities, in different orders, with the discipline of design enables the creation of products (including information, artefacts, activities, services and policies, entrepreneurship, and systems and environments). Design once again proves to be a highly connective activity that integrates knowledge from many fields to impact how we live our lives.

The need to develop new competencies and relate to methods, tools and other professions for design such that new definitions of the boundaries of the discipline

are deemed necessary and came from the ability of design to integrate and integrate different knowledge. For the development of these skills and tools, this research examines the fashion industry based on a study of the literature which identifies it through specific characteristics:

- Fashion includes the same time a creative, a production and a management process. And all of this together impact on cultural and environmental aspect of our contemporary society.
- The fashion industry represents a complex and fragmented system consisting of multiple interconnected actors and supply chains.
- The industry has a strong responsibility toward environmental sustainability as it is the second most polluting industry globally.
- The information architecture within this system tends to hide the negative impacts that the industry has been perpetuating for some time.

Therefore, starting from the assumption that data integration in design cannot be a linear function in response to a single problem, this research, accepting the point of view of many researchers, intends to

promote in the fashion system a more conscious design strategy through data in any order of design.

For this reason, it is proposed that the *construction, integration, interaction and communication of data* as four interrelated and holistic perspectives from which to look at data practices through the lens of design in the fashion system. These four aspects represent the theoretical basis necessary for a "sustainable balance" between the potential of data and the discipline of design regardless of the field of application. For each of the following areas, case studies within the fashion system have been researched to support the hypothesis that it is possible to promote systemic change towards sustainability through data and its interconnection.

### Data and fashion connectivity

In light of the scenario described above, the need for a systemic approach to fashion connectivity through data that embraces the concept of digitisation on several fronts is evident. The term 'data construction' examines those case studies that create new data flows in the information architecture of the system. Smart products, IoT systems and wearables are capable of changing the information architecture by adding new data flows. In this case, data are useful to inform a design process by

revealing people's habits, or by validating design choices that have been made through downstream monitoring. A significant case study is that carried out by Levi's, which, in collaboration with Google, developed the Levi's® Commuter™ x Jacquard technology (Figure 2)



Figure 2. Levi's® Commuter™ x Jacquard technology

This wearable, modular device on a variety of products such as shoes, accessories, and clothing, has the avant-garde prerogative of providing the end-user with an experience that creates a lasting relationship between the consumer and the product (driving away its obsolescence) and increased trust between the consumer and the brand.

On the other hand, it is possible to consider smart labels as a data integration strategy. In this case, the information flows are nothing more than data that already exists in the system but is made available. Examples of this are smart labels that make a whole range of information accessible to the consumer, facilitating not only the

understanding of a garment's design, or its sustainability, but also enabling collateral processes.

This is the case of Samsøe Samsøe which simplifies future reselling, sewing an ad-generating QR code into garments. (Figure 3) To keep their products in

When a customer decides to clear that item out of their closet, it more or less sells itself. By introducing a solution that's both tech-driven and sewn-in, Samsøe Samsøe removes friction from the reselling process and actively prompts customers to extend a product's lifecycle.

Regarding "data interaction," on the other hand, case studies through which data generates interaction, not only with the product but also among users, are classified in this category. In this case, the wardrobe digitization process for example reinvents the way users interact and connect with each other in the shopping and consumption experience. Similar to Tinder in sentiment, the Loop (Figure 4) the case study has greatly simplified interactions in the fashion ecosystem and made it easy to find what you are looking for by automatically digitizing and connecting the

use, the Danish fashion brand is adding smart labels that simplify future resales. Sewn into each garment is a unique QRcode that's linked to its specific data set — fabric, colour, size and original price.



Figure 3. Samsøe & Samsøe reselling tag

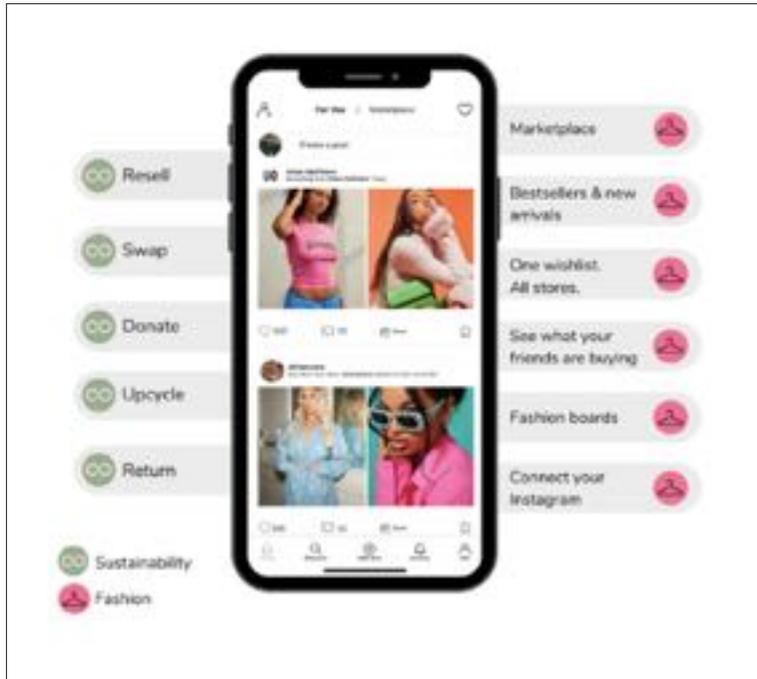


Figure 4. *The Loop app*

wardrobes of fashionistas and their friends.

Finally, case studies categorized as “data communication” include all those strategies in which data accessibility is not provided, but whose goal is to increase system transparency. For example, Haikure is using supply chain data to meet the demand of large retail buyers and customers for comprehensive and credible sustainability information. In partnership with Provenance, content is communicated in one place and disseminated consistently across multiple channels through the embeds of its brand ecosystem. In a competitive space, in this Haikure is able to stand out

to retailers and shoppers by providing clear information.

The case studies analyzed, therefore, identify an approach by design that must be holistic and must integrate not only different technologies, but also different users and goals. For this reason, a research agenda was defined as a guideline for action to address the issue of data and system connectivity.

### 3. GUIDELINES FOR INQUIRY

The formulation of the conceptual framework that follows is the result of research work aimed at integrating digital data into the design process

as a driver for sustainable (environmental, social, cultural and economic) prosperity in the fashion system.

This first analysis phase aimed to investigate existing models and methods in the fashion system to implement sustainability through information architecture. This preliminary phase involved a thematic literature search divided into three areas. The first, oriented towards the study of the pervasive nature of data culture in society; the second aimed at its intersection with design culture and specifically the use of data in undertaking sustainability strategies, and finally the use of data in the fashion system.

The results revealed that the notion of the term ‘Data’ associated with design disciplines is under-theorised and that there is a clear disproportion of literature towards the field of design engineering. However, these investigations provided extremely technocentric knowledge to aid designers in the integration of data into design work and an additional research framework was developed for this. Despite the wide variety of these examples and case studies identified that illustrate some of the most commonly considered variables, only a few articles, such as Feinberg’s (2017), are based on a data-as-boundary-object lens applicable to design. Specifically, the most common terminologies are

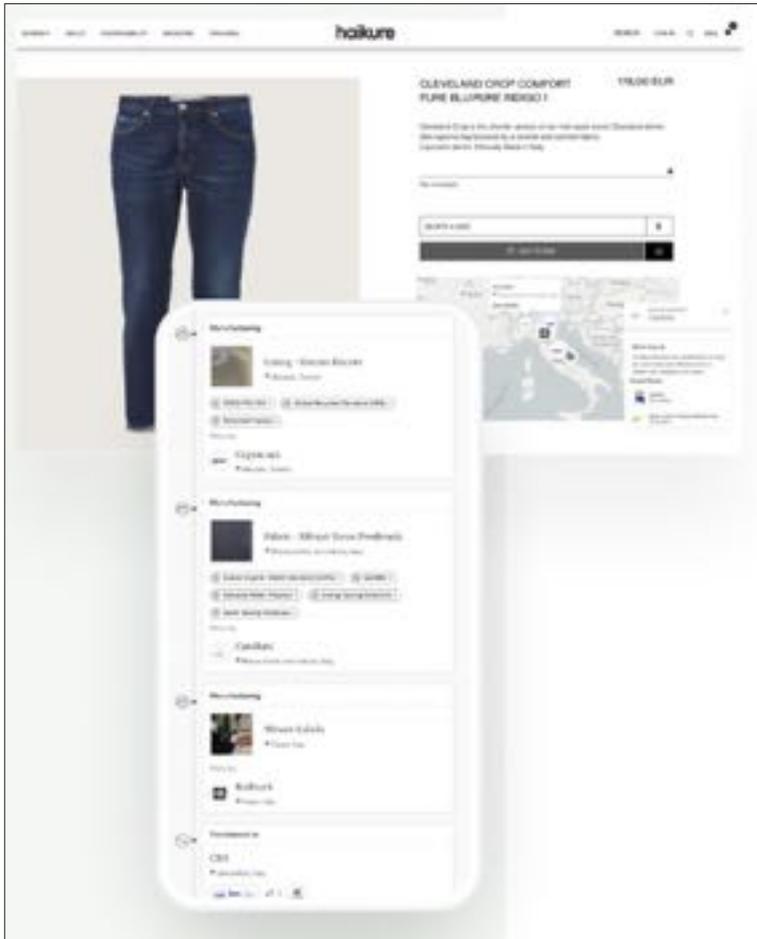


Figure 5. Provenance, Haikure

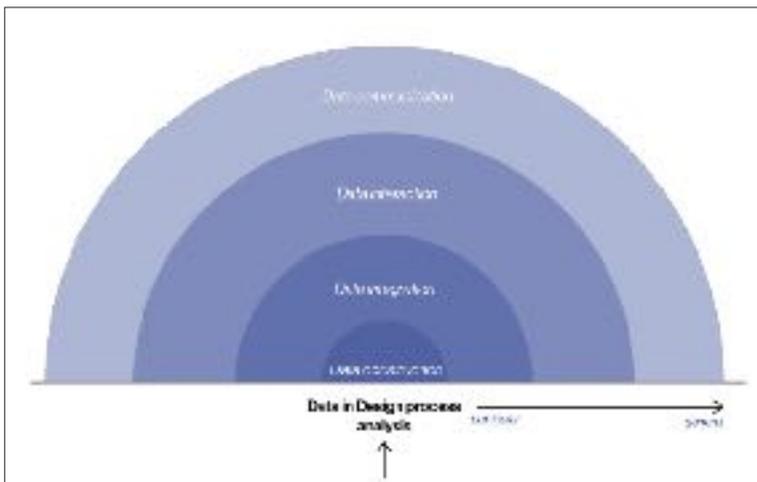


Figure 6.

"Data Object" (Sosa et al., 2018) understood as the output of a physicalisation process, or "Data as design material" understood as the object of a visualisation and not as the object of the design itself.

All these visions in each case address the topic of data through a silo structure.

Therefore, for an interdisciplinary understanding this research adopts a systemic approach to data that goes beyond 'numbers'. This approach is necessary in order to observe and approach the wide variety of data practices in the design process and especially to be able to apply them in socio-technical contexts with a sensitivity towards sustainability.

Considering the existing gaps in the literature, this article recommends four perspectives for the study of data integration in the design process, namely: (i) data construction (exploration of all data collection practices in design), (ii) data interaction (exploration of the interactions between designed objects from data, through to output), (iii) data communication (exploration of data communication practices) (iv) data integration (the integration of data at multiple stages of the design process). In this way, by interrogating theories and concepts across these four dimensions, it becomes possible to address new ways in which research can probe the practice of design in communion with data science in order to understand, but

more importantly, develop models and methods capable of bridging.

## 4. CONCLUSIONS

What is presented in this conceptual framework are guidelines for analysis. In particular, we intend to highlight how designers can meaningfully incorporate multiple forms of data into various stages of the fashion creative process to yield sustainable outcomes that facilitate the development of interdisciplinary relationships and foster collaborative conversations. The focus is on data communication aspects in the relationship between human and non-human systems, aspects of integration of information flow, and all the interactions generated through data and leads to better decisions, both by designers and end-users. Each of these aspects will be the result of applied research experimentation directly in the fashion sector, with research phases already underway and others being tested. The research underpinning the conceptual framework has not included aspects of participatory design across disciplines or co-design with end-users, e.g., recipients of data communication or interaction. We believe further research is needed to extend the framework and apply it to the fashion industry.

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# DESIGN AND CONNECTED HERITAGES FROM THE MEDITERRANEAN TO INFOSPHERE

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## ABSTRACT

On the occasion of *WIAD, World Information Architecture day*, the design and information architecture professional community met in Palermo for a day of theoretical reflection and sharing of projects and experiences on a global scale on the theme of *A Connected World*. This contribution - which also contains a reflection on the importance of the Mediterranean vocation to "liquid connections" based on exchange, coexistence and tolerance between cultures - is structured within a theoretical framework that investigates the complex relationships between "Connected Heritage" and design disciplines at the time and in the hybrid space of the infosphere. This part is followed by the presentation of an innovative and emblematic design experience, which traces a possible path of research and design practice, oriented to the generation of new "semantic, informational, constructional and datapoietic artifacts" that will populate our future (or present) habitats.

**DIGITAL TRANSITION, INFOSPHERE, DATAPOIETIC ARTIFACTS, SEMANTIC ARTIFACTS, CONNECTED HERITAGES,  
SOCIAL INNOVATION, INFORMATION DESIGN**

*This paper was reviewed by **Anna Catania**, Associate Professor at the Department of Architecture - University of Palermo and **Dario Mangano**, Full Professor at the Department of Culture and Society - University of Palermo. My sincere thanks to them!*

## 1. INTRODUCTION

On the occasion of the *WIAD*, *World Information Architecture day*, a large professional community gathers to share projects and experiences on a global scale, reflecting and debating around a specific theme of great interest, each year different, related to the great challenges of contemporaneity. A unique listening and comparison experience, shared with 40 other locations around the world whose central theme was the "connections": *A Connected World*. Through the articulated point of view of design disciplines and information architecture, today, in fact, you can explore and decode our hyperconnected world, our *Infosphere*, to discover "relevant connections" or reveal new relationships, original and more significant (between people and communities, people and things, people and places, etc.) able to find and activate possible, innovative solutions to the difficult and complex global challenges. It is on the basis of these brief premises that, for a day (March 4, 2022), Palermo is become an international laboratory of transdisciplinary research that, starting from the great challenges induced by the socio-economic changes of this time of planetary crisis (climate change, pandemic, misinformation, conflicts, etc.), reflected and debated on the issue of connections.

Multiple and interesting points of view emerged that find in the intersection between design, science, technology and humanities, the humus to feed possible and innovative trajectories of research and project able to significantly intervene on economic, social and cultural emergencies of our time.

From Information Architecture projects for fostering sustainability in new design solutions, to public programs for assistance and protection of the elderly population (in Portugal); from new frameworks for STEAM education, to social innovation collaborative platforms for communities and territories; from Information Architecture projects for new hybrid and proximity spaces generation, to "inclusive" design for digital public services; from data-driven platforms for the fashion system sustainability, to projects for the "Metaverso"; from new "semantic" and "datapoietic" artifacts design, to new various forms of archives and "digital spaces" for cultural heritage.

Community, common goods, education, heritages, inclusiveness, tolerance have become the keywords and recurring terms of a constructive and passionate debate held at ARCA's open innovation Hub<sup>1</sup>, in the heart of Palermo's University Campus, that - still in the hybrid dimension of post pandemic distance - has allowed to return to connect people and

community "lukewarmly" in the physical "proximity" of the city.

## 2. "LIQUID" CONNECTIONS AND MEDITERRANEAN PLOTS

In 1984 Fabrizio De Andrè released an experimental world music album (very successful and appreciated all over the world), entirely written and sung in a sort of "superlanguage" - a mix of Ligurian, Arabic and Turkish dialect - able to "play" as an idiom common to all the peoples of the Mediterranean. *Crèuza de mà*, title of the album and opening song, translatable from the Genoese dialect as "sea path", poetically refers to a particular condition of the sea perfectly calm on which you can see the streaks lighter or darker, generated from winds and surface currents, comparable to "roads" and real or imaginary paths. *Crèuze* of the sea, like those that "miraculously" sees Fernand Braudel (1998) from his seaplane that flies low to explore, "see" and know more and more in depth his "favorite" sea, the Mediterranean. Sea roads and streets, visible in the reality but traceable also in a "fantastic aerial map, made of memories arranged next to each other" (Braudel, 1998, p. 24; tba - translation by author), which tell of the very strong relationship between this great geo-anthropic system and the great history that (together with the multitudes of microstories

of the "humble") it has made it his favorite setting. It is also an imaginary map "of sea and land routes connected to each other, and therefore of cities that, from the most modest, to the medium, to the major ones, all hold hands" (Braudel, 1983. p. 348; tba).

An articulated and complex map of relations and connections that the "Mare Internum" has guaranteed over the centuries - through flows and ebbs, multiple signs of continuous, magmatic movement<sup>2</sup> - and that testifies to a specific, enormous human/cultural heritage resulting from the sedimentation of "a series of civilizations stacked on each other" (Braudel, 2010, p. 7-8; tba). A "liquid continent", formed by many seas "in the midst of lands", which has managed to bring together and mix multiple religions, languages, traditions, knowledge, rituals, cultures (material and immaterial). Civilisations and peoples that, despite their differences (sometimes even exaggerated, which have given rise to contrasts and even conflicts), have been able to interact, enrich and contaminate each other in time and space. In this Mediterranean that connects diversities, Sicily has been the centre, the "connecting interface" between west and east, north and south, simultaneously outpost and frontier. Conditions, these, that have allowed it to take on a mediation and integration role for various cultures,

allowing different civilisations to meet and not clash. A Sicily, microcosm at the centre of the Mediterranean sea "liquid plains", - "milieu du monde", to quote Braudel again - that for centuries has continued to be an extraordinary laboratory for investigating the processes of interaction between communities and cultures and, at the same time, a laboratory for re-writing and re-producing the identities and heritages of these communities.

Scholars and thinkers, artists and artisans, travelers, traders and pirates, the common people who belong to this "miniature continent" have prodigiously shown for centuries, what an immense treasure of civilization can spring from mutual understanding, tolerance, cooperative will and cultural exchange. Architecture, ceramics, fabrics, costumes, jewelry, everyday objects, myths and rituals, dialects and music, traditions and knowledge, information and ideas, have become real "treasures" that this common sensitivity and these "connections" have told and continue to tell.

Complex relationships between heritages, material and intangible, capable of generating an extraordinary and unique cultural landscape: the "continuum" (Settis, 2002), the context, or our most precious cultural asset. "Mediterranean plots"<sup>3</sup>, therefore, that generate a "solid" connective

tissue - landscape, cities, objects - and 'liquid' - the sea and communities (with their stories, dialects, rites, songs, traditions, knowledge, etc.). A sea that also preserves and conceals "submerged plots", such as those that Sebastiano Tusa<sup>4</sup> and the *Sovrintendenza del Mare*<sup>5</sup> - a unique Sicilian cultural institution and an extraordinary metaphor of this "connective" land - are trying to unveil through a visionary and original project with Unesco that makes submerged archaeological finds and areas, such as the one in the *Egadi Park*, accessible in situ. Or, again, like the 'living plots' that connect - in a temporal dimension between past and present/future - the sea to the city of Palermo through the "interface" of the *Mare Memoria Viva Urban Ecomuseum*. A young and dynamic institution (which we will talk more about later) that is configured as a sensitive and living place - like the memories it preserves and regenerates - a hub of active connection between sea, city and community.

### 3. DESIGN TO CONNECT HERITAGES AND COMMUNITIES

We have seen how the Mediterranean and its cities (and therefore also Sicily and Palermo), have in their DNA, in the peculiar traits of their identity, an extraordinary

propensity to "connection", to relationship, to dialogue. An extraordinary "interweaving of conversations", as Manzini reminds us (2018, p. 37) that "produce" communities and projects, starting from the strong and two-way correlation between places (understood as spaces with meaning) and communities (whose meaning is given by human conversations) that continuously re-generate them (Manzini, 2018, p. 45). In this sense, the reflections of Vincenzo Guarrasi (2014)<sup>6</sup> on the complex relationships and connections between the metropolises or the contemporary urban systems and the Baumanian liquid societies (with all their load of dystopian criticalities and related issues) that inhabit them, are very interest, which, today, find themselves facing an even more challenging and complex context and time, driven by digital hybridization and the domineering transit to the infosphere (Floridi, 2017) together with the global pandemic crisis and the renewed, probable "madness" of an imminent atomic world conflict.

To be able to face and act within this complexity, according to Guarrasi, it is essential to adopt a "cosmopolitan view" open to the diversity of cultures; a look that can change only thanks to a paradigm shift, generated by the scientific and thought communities responsible for the "construction" of new images

of society and the world. This "view" must be accompanied by a renewed cooperative approach and a rethinking of analysis tools, interpretative models, research protocols and design tools, aimed at overcoming a "methodological nationalism" that "permeates" the scientific communities. But it's not enough! For Guarrasi it is, in fact, necessary to add to the "cosmopolitan view" also a "Mediterranean lens" - pivotal tool for decoding the transition in progress, which in cities and metropolitan areas manifests itself more fully. "In a world that increasingly tends to organize itself by networks, flows and contact zones, Mediterranean cities could establish themselves as privileged places of emergency and formation of new cultures and identities" (Guarrasi, 2014, p. 44; tba). This "special" condition occurs for a complex of reasons that have to do with the intensity and duration of flows (mobility of people, migration, exchange of goods and information) the frequency of contacts/ variety of cultures and the stratification of a very strong shared cultural heritage. This heritage is manifested through an "endowment of devices of contact and intercultural understanding, accumulated and layered over time in large numbers and variety in a milieu of great thickness" (Guarrasi, 2014, p. 44; tba). Open scientific communities, "cosmopolitan view", "Mediterranean lens" linked to

cities and its "urban devices of contact and intercultural understanding", become - in an open and polyphonic multidisciplinary framework - the fuel needed to power new trends in contemporary research<sup>7</sup>. This has also happened within the University of Palermo's design community, which has on several occasions hosted and accepted the intellectual challenge of confronting and debating about the contemporary great themes, in particular digital transition, to try to draw new research evolutionary lines and identify new possible disciplinary boundaries (which, by definition, remain for the design always in motion). *Design to connect | People, heritages, processes* and *A Connected World* clearly express a well-defined direction of research, which places the utmost attention on the complex "relationships" and "connections" of which we have spoken so far. And the cultural context of a Mediterranean city like Palermo, as Germak (2022) observes, seems to perfectly embody the above directions that design knows well and that has long translated into good design practices that are concretized towards "the social, cultural and economic inclusion of individuals and groups, the enhancement of heritage made of cultures, contexts and territories, the dissemination of models for more conscious and sustainable production and consumption processes"

(Germak, 2022, p. 15; tba). A city that "intertwines conversations" and generates new communities; a "city of welcome" and "exchange" that becomes a laboratory of experimentation that connects and regenerates heritages; a "city of connections", as defined by Viviana Trapani, which enables and activates innovative "processes of interaction between the most advanced scientific fields and a renewed centrality of humanities, between common good search and production, between territorial actors and project experts, especially around systemic innovation search forms, that can meet the complex environmental and social challenges" (Trapani, 2022, p. 24-25; tba). In short, "Connected Heritages", in which design becomes the director of the complex relationships between knowledge, communities, ideas, territories; it becomes an instrument of understanding and decoding; and, at the same time, it becomes an original and innovative solver of critical issues, but above all, generator of new sense, of new value (also economic), of new processes of "rewriting" of cultures and identities of communities and territories.

**An emblematic example:  
*U-DATInos | sensitive to water***

In the light of the reflections made so far and in relation to the idea of the complex "Mediterranean liquid

connections" of which we have spoken, the *U-DATInos - Sensitive to water* (Iaconesi & Persico, 2020) research/project experience, made in Palermo between 2019 and 2020, is particularly interesting and innovative. A return to water - which in this paper has become a significant and connective metaphor - materialized in an "info-esthetic" and "fragile technology" work, halfway between a "meditative" art installation and an augmented design object. *U-DATInos* (name translated from ancient Greek means *aquatic*), is an interesting project<sup>8</sup> by Oriana Persico and Salvatore Iaconesi (two researchers/ teachers, designers/ artists and Italian hacktivists) born from desire to take care of the Palermo south-east coast and the Oreto river. A sensitive city area on which there has been for few years the *Mare Memoria Viva* Urban Ecomuseum. An innovative design driven institution, that has become a cultural, educational and social presidia crucial for the territory. A perfect "device of contact and

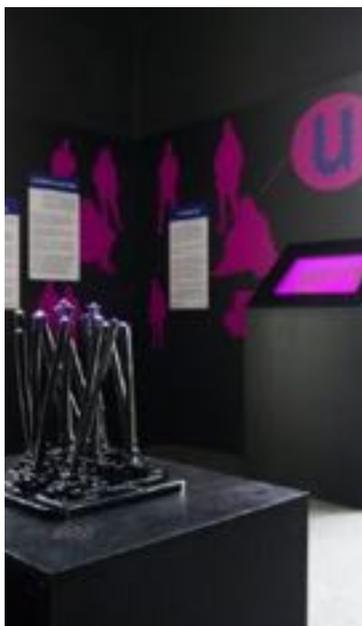
intercultural understanding", (Guarrasi, 2014; tba), "marker of identity" (Settis, 2002) and fundamental connection hub between city and community. A sensitive and alive place, like the memories it preserves and regenerates, which lives of "proximity" and "care" (Manzini, 2021, p. 75), and which establishes strong relationships with the inhabitants who actively participate in its conception, its growth, its development. They become "guardian", like the Custodians of the Oreto River Water (*I Custodi dell'Acqua*), a group of citizens, students, researchers and activists who, amid a thousand difficulties (in the midst of a pandemic!), organize themselves in an innovative and poetic exploratory adventure to try to "give voice to the river". A new voice that comes thanks to a series of sensors that collect data and information on the health of the river. A new voice that comes thanks to a series of sensors that collect data and information on the health of the river (the Custodians have received a



**Figure 1.** *Custodi dell'Acqua on the Oreto river in Palermo. Iaconesi & Persico. Credits: HER srl*

kit for data collection). These data feed the installation within the Ecomuseum, thus allowing the experience of perception and understanding of a complex phenomenon of our environment: the dynamic state of health of the river and its ecosystem. (the dynamic state of health of the river and its ecosystem). An installation that is configured as a new kind of hybrid objects, in which the informative architectures that generated them, are made matter, the bits become atoms (Anderson, 2013) that give shape to a kind of "living digital plant", belonging to an unusual ecosystem, within which coexist, in a new delicate balance, all the actors strongly interconnected with each other: the well-being of the river, the Custodians and the "digital plants".

It is an innovative kind of hybrid artifacts - that the duo Iaconesi/Persico defines "datapoietic" (2019) - that, in a close and two-way relationship of coexistence environment-society, are configured as "semantic artifacts" (Floridi, 2021), that mix technology (data, sensors, cards, etc), innovative design practices and processes (speculative design, design for Future, etc.) and new cultural approaches based on open source, collaborative and active citizenship logics. In short, "people, heritages, processes" simultaneously connected by design that acts as a "fluidifier" (Mecca, 2016) - to return to the metaphor of the liquid



**Figure 2-3.** *U-DATInos* (Iaconesi & Persico. Credits: HER srl)

connection of this contribution - and, once again, as Flaviano Celaschi reminds us, as a "mediator between knowledge" (2008a, p. 19) and "between needs" (2008b, p. 40).

## 4. CONCLUSIONS DESIGNING INTO THE INFOSPHERE

Illustrating the *U-DATInos* | *Sensitive to water* project, we have seen how through data, computation and algorithms,

the social and psychological activation triggered by design and art, the project has managed to bring together in an absolutely innovative, original and contemporary form, Science, Technology and Society. This approach fully intercepts the themes and reflections on the theories and practices of design (of which we have spoken at length in this contribution) and connects them - in an original and innovative form that traces possible new directions of design research - theoretical reflections related to the multidisciplinary and "multidimensional" international debate on the digital transition. It does so by connecting, in particular, with the philosophical views and theories of Luciano Floridi (2017), according to whom we are increasingly immersed in a world dominated by information - the "infosphere" - in which the separation between the real world, offline, and the ICT open world, online, is getting thinner and thinner; a world in which we live an "OnLife" life, or a condition that represents the hybrid nature of our daily social, communicative, working and economic experiences, perpetually connected in a continuous relationship between material and concrete reality and intangible and interactive reality. A hyperconnected world in "which everybody constantly has to design and redesign their existence" (Manzini, 2015,

p. 1); a world in which we all live the dual, hybrid condition of designer, producers and consumers of information. A new habitat that needs to be continuously populated by a new kind of objects and artifacts, material or immaterial, that are capable of generating new knowledge: the "semantic artifacts" (Floridi, 2020, p. 110). It is a new kind of hybrid artifacts, borderline between analog and digital, "datapoietic" (Iaconesi & Persico, 2019), or objects (material or intangible) generated by data and computation that enter into strong relationship - in reticular, inclusive and peer-to-peer form - with different entities or agents strongly interconnected with each other (nature, people, communities, institutions, objects, data, artificial intelligence, software, etc.). "Semantic", "informational" and "constructionist" artifacts, such as *U-DATInos*, which Oriana Persico and Salvatore Iaconesi have been experimenting with for some years. "They are not only technical artifacts, but also cultural and existential ones, as they dive deep into contemporary culture and in human perception and understanding, creating new opportunities for social imagination. [...] New objects of art and design able to create new opportunities for the understanding of the world and its phenomena that, connecting to data sources, they animate themselves to allow their owners and the public to

establish new relationships with the great themes of contemporaneity and the planet: poverty, energy, climate, migration" (Iaconesi and Persico, 2019; tba). But there is more. The philosophy behind the

project is extremely interesting; that is, an absolutely, innovative approach in data collection/processing/use that transforms and reverses the usual "extractive" practice into a more ethical and human

## NOTES

- 1 The ARCA Consortium for the Application of Research and the Creation of Innovative Companies, active since 2003, is a partnership between the University of Palermo and the University Consortia of Agrigento, Trapani and Caltanissetta. Located within the university campus of Palermo, it is configured as a regional hub of innovation that, in a highly international context oriented to technological and social experimentation, develops activities and projects in the field of open innovation, technology transfer, innovation and sustainable growth, entrepreneurial culture and business creation.
- 2 "[...] All this because the Mediterranean is an ancient crossroads. For millennia everything has converged, complicating and enriching its history" (Braudel, 2010 p. 7 - 8; tba).
- 3 Here, the term refers to an original museum that represents an unprecedented and open interpretation of the cultural history of the Mediterranean, starting with the influences that came from the Middle East to North Africa and Europe via Sicily. Established in 1996 by the **Fondazione Orestadi of Gibellina** (TP), the **Trame Mediterranee** Museum exhibits objects from different periods and origins and presents the evolution of the main decorative motifs developed in the visual arts, crafts and material culture of the Mediterranean.
- 4 Sebastiano Tusa was an internationally renowned Italian archaeologist, politician and academic, who was appointed **Sovrintendenza del Mare** by the Sicilian Region's Department of Cultural Heritage in 2004.
- 5 The establishment of the Sovrintendenza del Mare qualifies the Sicilian Region in its policies for the protection of its underwater archaeological resources, inspired by Greece, which - unique in Europe - has a similar structure. The multidisciplinary approach, which mixes archaeological, ethnoanthropological and naturalistic aspects, is an innovative feature that makes it unique in the European context.
- 6 Vincenzo Guarrasi is Professor Emeritus of the University of Palermo and Vice-President of the Italian Geographers Association. His research has ranged from the human geography of the Mediterranean to the evolution of mapping techniques. (PNRR), following step by step the implementation of the various funded projects.
- 7 Here the reference is to the national and international research activities that have involved, on several occasions, the Palermo's design community. The first in 2004 (**MeDesign Research**) focused on the relationship between design and Mediterranean cultures; the others, in times closer to us, in the midst of a pandemic, dealt with the theme of "connections": **Design to connect | People, heritages, processes** on the occasion of the **SID - Società Italiana di Design Annual Assembly** (25-26 February 2021); and, subsequently (4 March 2022), **A Connected World**, as part of **WIAD, World Information Architecture day**.
- 8 The project was the winner of the Creative Living Lab (II Ed.) competition, promoted by the Direzione generale Creatività contemporanea of Ministero per i Beni e le Attività Culturali.

generative practice, based on relationships, reciprocity and collaboration. This reversal is driven by art and design that allow data and computation to transform from dry technical matter to existential matter. As the Iaconesi/Persico duo say, art and design "can take the data and bring them into the midst of society, removing them from isolation, giving them to people and organizations so that they can be part of their lives" (Iaconesi & Persico, 2021b; tba). Data that, guided by a more ethical approach (typical of design), can leave an extractive or merely functional logic and arrive - through new rituals, practices and collective and connective actions - to new forms of expression and sensitivity.

We are, therefore, faced with a possible, innovative way, in which algorithms, artificial intelligence, big data and IoT, generate for people not only efficiency, but also sense and poetry. A new season - that Iaconesi imagines as a kind of neo-renaissance of the "made in Italy data-driven" - in which, a new artifacts generations will populate our habitats. New "semantic", "informational" and "constructionist" artifacts, "datapoietic" objects capable to activating thought, conveying meanings, producing sense; or rather, to put it in Mari's words (2011, p. 2), "producing intelligence".

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# GAME ANALYSIS METHODS. FROM VIDEO GAME TO SERIOUS GAME

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## ABSTRACT

This paper is in the broad sector of Game Design, identifying a specific design field inside the Serious Games, useful for addressing the issues dealing with learning, training, and the cooperative management of emergency scenarios. Serious games are recognized as valid systems for the acquisition of skills through playing, based on specific structural and rhetorical characteristics. Currently they are a fertile ground for the project of digital games, designed as a training aid in dealing with emergency situations in disaster scenarios, involving many people.

This work reports the results of a research on Game Design developed in two main directions: 1. identification of a method able to generate possible answers on the project of a Serious Game, as an activator of good practices connected to the state of risk; 2. data processing, acquired from the application of the results of the first point and their implementation in real design scenarios.

**SERIOUS GAME, PERVASIVE GAME, AUGMENTED REALITY. DIGITAL EDUCATION, GAME DESIGN**

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## 1. INTRODUCTION

The current state of research on Serious and Pervasive Game (a type of ARG capable of presenting and solving complex issues) highlights that the issues related to the acquisition of skills and the enhancement of knowledge can be strengthened with the use of this specific videogame tool (Kirriemuir e McFarlane, 2004). Several published studies have shown that Serious and Pervasive Games can be more efficient learning methods than traditional ones (Papastergiou, 2009). In fact, although the current number of video games used in education is still limited, it is shown that their application leads to the improvement of knowledge and skills (McCall & Work, 2011).

However, it is essential to reiterate the substantial difference highlighted by the US historian, James Paul Gee (2013) who, interested in considering the video game as the testing ground for new theories of cognitive development, exemplifies the two main approaches to the use of games as a learning system. The first, that of edutainment or GBL, which recognizes the videogame as a system for producing learning in a fun and easy way; the second, that of serious and pervasive games which identifies in the use of "serious" games the possibility of offering the student environments that

have the same characteristics of the game, but which are not necessarily marked by entertainment.

The first point of view concerns games as training or teaching tools whose main purpose is to make the learning process more enjoyable, attractive, or accessible. In this case, to achieve a predefined goal – for example the transmission of some information on mathematics, philosophy or some other science not considered substantially playful in itself – the system of the game intended as fun is used, that is, a fun without any intrinsic connection to the main content you want to teach. In practice, the play system is considered as a vehicle for entertainment to maximize the effectiveness of teaching. The second approach is based, instead, on a connection between learning and play that is not only contingent but essential since it recognizes in the use of serious games a learning process useful for illustrating the nature of the subject taught, for transmitting digital activities and knowledge to be poured, then, real. Johannes Breuer and Gary Bente (2010) further pointed out the nature of serious and pervasive games by separating them from purely commercial games: a serious and pervasive game is admittedly a game designed for learning, active and open, while a commercial game is primarily developed to entertain. (Learning may or

may not be evident and / or considered).

The use in this sense of Alternative Really Game (ARG) also is not marginal: research has demonstrated the speculative character of Serious games and the strength of the Game design approach that imagines critically possible futures using video games as lenses with which to focus on them.

The validity of direct dialogue with the players and the use of their mental energy capable of returning a series of valuable and otherwise unavailable indications, has been demonstrated. In this sense, also through the analysis of the most recent experiences of playful crowdsourcing included in experimental research projects.

However, despite they're growing success, the academia is still struggling to accept video games as a cultural form worthy of rigorous study and analysis and proves unable to fully understand that their project must be accompanied by adequate evaluation of scientific processes, results and contexts involved, and by an adequate methodology dedicated to contents.

There is still a lack of scientific explanations and methodologies on the mechanisms by which the components of the videogame can facilitate behavior change and the formation of people, which further hinders the adoption of video games as

educational tools. This also happens because, on a more general level and within academic research, it has been difficult to provide digital culture with a conceptual and theoretical introduction of its innovative methods understood as "models of knowledge" in development. In fact, after the publication of the fundamental text *The Art of Computer Game Design* by Chris Crawford in 1982, the scientific papers on this subject have been published only recently. It is reasonable to think that all these improvements that have characterized the commercial videogame dimension in recent years, can be transferred to 'serious' gaming applications, in those playful products designed for collaborative learning and interactive teaching.

## 2. WHY A SERIOUS GAME?

The type of video games considered more suited to stimulate this type of learning are the so-called Serious Games (in Italian, 'applied games') in which simulation themes, learning and conveyance of contents foster guided training processes: "they are anti-escapist games that are played to obtain more from real life, unlike those games which are played to escape from it" (McGonigal, 2011: 46). Such games are aimed at "building up the players

'competences or conveying a rhetorical message so as to make the players reflect on a particular theme" (Salvador, 2015, pos. 864). More precisely, "an applied game is a game that deals with a complex theme without revealing it, that is to say presenting itself as an ordinary game like any other" (Maestri, Polsinelli, Sassoon, 2015: 68).

This type of game stimulates experiences that do not isolate the player in a world of self-referential and gratuitous amusement, but rather fosters "a shared and, at the same time, significant game experience, which generates satisfaction and knowledge for the players and improves non-linear vision, critical analysis and problem solving" (McGonigal, 2011). Serious Game projects can vary a lot from one another in terms of style, graphics, scale, purpose, and budget: there are some that are made and tested with a very low budget by independent researchers or game developers or supported from millionaire investments like *World Without Oil* whose project involved at least thirty-five designers (including Jane McGonigal), cartoonists and developers, and was presented by ITVS Independent Television Service.

Some Serious Games today face such themes as industrial or road safety (*S-Drive*, Samsung, 2014), solve business problems (*Lego Serious Play*, Lego, 2000), introduce correct practices and habits as regards

the conservation of our planet's resources (*Food Force*, FAO, 2005), deal with situations and contexts with important socio-political implications such as the Palestinian conflict (*Under Siege*, *Dar al-Fikr*, 2005).

The first successful serious game that showed the possibilities of training with this type of medium is *Flight Simulator*, which is a realistic simulation video game produced by Microsoft in 1982. Its peculiarity is that it was created as a game for casual players but then it has become a true training tool.

*Lego Serious Play*, on the other hand, was designed to facilitate communication processes between people working in the same company and improve creative thinking and strategy in the workplace. In this same direction, the recent *PlayDecide* (2021, funded by the European Community), a card game for simple, respectful, and fact-based group discussions. Dr Lorraine Coghill, University Science Outreach Coordinator, UK, says: "PlayDecide allows people to explore a topic in depth in an informal and informal way. The play element really helps to explore thoughts and opinions that would be difficult to reach and express in other ways".

In the medical field, one of the most recent projects in this sense is *Clinispace*, a medical realistic simulation video game in Real Time 3D that simulates a virtual hospital. It is aimed at medical students, and it

allows training in procedures in a virtual hospital. Finally, the game *Superbetter*, designed by game designer Jane McGonigal, is a casual browser game that helps people to overcome physical or mental problems.

Summarizing, a Serious Game is a type of game designed for a serious purpose (and not with a serious theme) where the players have a complex experience through simulation: the players' experience can be interactive or not, realistic, or conceptual, digital, or analogical and it can change players' attitudes and beliefs, and potentially, it can lead to significant and long-term social changes.

Since, as Bogost said, "videogames are uniquely, consciously, and principally crafted as expressions. As such, they represent excellent candidates for rhetorical speech - persuasion and expression are inexorably linked", to design a good serious game it is necessary to have the 'procedural rhetoric' under control in check (2007: 45).

By 'procedural rhetoric' I mean a new type of persuasive and expressive practice at work in artifacts like Serious game: "More specifically, procedural rhetoric is the practice of persuading through processes in general and computational processes. Just verbal rhetoric is useful for both the orator and for the audience, and just a written rhetoric is useful for

both the writer and reader, so procedural rhetoric is useful for both the programmer and the user, the game designers, and the player. Procedural rhetoric is a technique for making arguments with the computational system and for unpacking computational arguments others have created" (Bogost, 2006: 3).

### 3. GAME'S ANALYSIS: STORY AND REALITY

The basis of this work are the results of the research that the author has developed starting from the A.Y. 2018/19 with - and thanks to - the young designers of the Digital Design Laboratory of the master's degree Course in Design of the University of Florence. The data derive from a first transversal quantitative study project that the author followed - and carried out - to structure a critical map to be used as a working tool for the analysis of the type of interaction of some Serious Games.

The evaluation of the data that emerged convinced the author of the validity of their use as the core material useful for the design of a serious game on the theme of education.

Currently, the project has reached the formulation of a methodological reference scheme which has proved useful not only for the videogame project but also for all those training / educational

activities that have the value of interpretation and study of the emergency.

The videogame as an artifact has some characteristics that Chris Crawford has summarized in 1984 in *The Art of Computer Game Design*, and these are:

- *Representation*: the game is a closed formal system that subjectively represents a subset of reality: by "closed" we mean that the game is complete and self-sufficient as a structure.
- *Interaction*: the games are the media dynamic, they show change with time, they can represent the changing aspect more richly. The games provide this interactive element, and it is a crucial factor in their appeal.
- *Conflict*: the conflict arises naturally from the interaction in a game because the player is actively pursuing some goal. The obstacles prevent him from easily achieving this goal. Thus, conflict is fundamental to all games.
- *Safety*: a game is an artifice for providing the psychological experiences of conflict and danger while excluding their physical realizations. In short, a game is a safe way to experience reality.

In relation to the central theme of this article, interaction is a most important point in the Serious Game project as it focuses a lot on stimulating the active participation of players

through a "meaningful gaming experience" (2004, 314). With this expression - coined by Katie Salen and Eric Zimmerman - the game is considered not strictly as an activity but as an experience able to generate a true legacy that (in the form of emotions and memory) invites the players to reflect and often to change. A way to illustrate the role of interaction is to compare the narrative structure of the games with stories. A story is a collection of facts in time sequenced order that suggest a cause-and-effect relationship. Frequently, the facts presented are deliberately fictitious because the facts of a story are intrinsically unimportant. Indeed, the entire concept of fiction, that is "an untruth that is not a lie" (Caillois, [1967] 2005, 46) only makes sense when one thinks that the facts presented in the fiction are themselves unimportant. The cause-and-effect relationships suggested by the sequence of facts are the important part of the story. Thus, a story is a vehicle for representing reality, not through its facts per se, but through the cause-and-effect relationships suggested by the sequence of facts. Games also attempt to represent reality. The difference between the two is that a story presents the facts in an immutable sequence, while a game presents a branching tree of sequences and allows the player to create his own story by making

choices at each branch point. The audience of a story must infer causal relationships from a single sequence of facts; the player of a game is encouraged to explore alternatives, contrapositives, and inversions. The game player is free to explore the causal relationship from many different angles. In fact, "while a story is meant to be experienced once and its representative value decreases with subsequent repetitions, because it does not present new information, on the contrary the value of representation of a game increases every time you play until the player has explored a representative subset of all branches in the game network. Therefore, the game designer creates a complex network of routes skillfully created to show the player all the possible aspects of a single truth" (Salen Zimmermann, 2004, 6). The network must be a coherent and complex system that, in general, the game designer can enhance by keeping two aspects under control: a good aesthetic balance and a fluidity of mechanics and dynamics.

### **Aesthetic balance and space exploration**

The first item, the aesthetic balance, refers to the enjoyment of images, colors, animations, sounds, etc. that accompany the player's time to be "inside" the playful reality, and refers to a good exploration of spaces created with great

care, fascinating and full of details that inform, develop, and transmit knowledge and skills. This enjoyment is called "sensory gratification" and depends on the simulative development of the representative/narrative plan of the project.

The simulation of the game's story is very important to improve this gratification because it makes the closed world of the game credible. But you must make the difference between simulation and game. As Crawford writes: "a simulation is a serious attempt to accurately represent a real phenomenon in another, more malleable form; a game is an artistically simplified representation of a phenomenon" (1985, 4). The difference is fundamental because if the simulation tends to be as similar as possible to reality, the game will be an unusual way to see reality. "The simulations - he continues - designer simplifies reluctantly and only as a concession to material and intellectual limitations. The game designer simplifies deliberately to focus the player's attention on those factors the designer judges to be important. The fundamental difference between the two lies in their purposes.

A simulation is created for computational or evaluative purposes; a game is created for educational or entertainment purposes. Accuracy is the *sine qua non* of simulations; clarity the *sine qua non* of games"

(1984, 4).

An accurate choice of details, therefore, is essential to make the simulation as similar as possible to the real and able to stimulate a gratification to the player. We must not, however, confuse its function: sensory gratification is a crucial support function, not a central feature as the sensory plot improves the impact of the imagination created by the game, but a wonderful graphic or sound does not make the product itself: a game made only as a fun fantasy is just a collection of beautiful interactive images.

#### **Fluidity of mechanical and dynamics**

The second item, the fluidity of mechanics and dynamics, is useful to make the player experience a harmonious, coherent, and credible experience.

The fluidity depends on the relationship of the four elements of the *Elementary Tetrad* of Schell (2008) that are four categories with which the scholar has grouped all the elements present in a game and they are: aesthetics (sensory elements), history (the sequence of events that occur during the game), technology (materials and tools, computerized or not, used to actually make the game) and mechanics (the rules that govern the game or "rules plan" that is the set of elements and their relationships with which the player plays, that is, the rules that organize the relation

of objects within the game and the actions of the player with these objects).

## **4. DATA ANALYSIS**

In a Serious game, the basic story must include some features of the narrative structure that the designer must consider as analytic work. He must be attentive to the intentions of the player, to the linguistic characteristics of the text he uses and its hidden meanings, to the evocative power of images that refer to the shared aesthetic identity to create a quality and training experience in the player.

To understand the type of structuring process of a Serious game on emergency scenarios, the study highlighted three fundamental conditions for the game and necessary for the design of the narrative structure and the related aesthetic experience: participation, immersion, and exploration, highlighting some of their characteristics fundamental. This information was used as a reference by the students of the Digital Design Laboratory of the years 2018/2019 to 2020/2021 to analyze a selection of video games on the subject (history, setting) of war, catastrophic, tragic; the information obtained was compared to highlight the recurring characteristics of some of these video games that relate the type of story to the type of interaction.

#### **Participatory dimension**

The main feature of a videogame is its ability to respond adequately (output) to the stimuli proposed by the player (input). This process must be considered from a bilateral point of view as the player also reacts to the situations presented by the game. It is therefore an interactive participation which is "the action that a subject performs within a given system" (Andreoletti, 2012, 43).

In the participatory dimension, the subject must be aware of being the beginning and the end of the relationship with the game-system and that the relationship must be understood as a process of enrichment for him and for the other participating subjects. To achieve this goal, the subject must know the nature of the "serious" relationship with the game in relation to

- Goal: why does this relationship exist?
- Modalities: how is this relationship implemented?
- Moment: when it starts, ends, and does this relationship last?
- Space: where does this relationship take place?
- Relationships: with whom does this relationship take place?

Therefore, to enhance the participatory dimension in a Serious Game on the theme of disaster it is necessary:

- design a game activity in which the player can try to modify colors, materials,

dimensions, chromatic relations, etc. seeking a personal aesthetic-formal balance of the object.

- think about analysis and comparison exercises of products also in relation to their marketing (packaging, poster, flier, etc.).
- offer the player the possibility of being able to disassemble an object in its technical and communication components.

### **Immersive dimension**

Playing means that the player separates himself from reality and enters the "magic circle" (Huizinga [1938], 2002, 13), but he also has a close relationship with reality. The player is aware of this double aspect because, when he plays, he knows he is in the real world (he never separates himself from it) but he also finds himself in another fantasy world, which has close ties to the real world. Every ludic experience is characterized and individuated with reference to the various rules and resources available to the person. Different types of play can be distinguished from one another via the structures that underpin them and thus the quality of the player's experience depends, at least to some extent, on the structure of norms and resources that guide or organize her actions. Experience is inseparable from structured action, which is seldom carried out by an isolated ego. In most situations,

the player confronts either another player or some impersonal obstacle. There is always a dynamic interplay of move and countermove. Thus, the player's experience is partly made up of this moment of otherness. The player must respond to certain events in the context of a structured situation and for this the game consists of a trans-individual process of action and reaction. It is the scheme of this movement, rather than the "psychological make-up of the individual participant" (Rodriguez, 2006), which fundamentally characterizes the experience of the game. Therefore, a good balance of the aesthetics of the game is essential to improve the quality of the player experience and depends on the choice of constraints related to the realization: the invention of the narrative structure of the game is the first of these. Since each game is structured on a story that is described by the designer and played by the player, the narrative plan is initially based on the story told. Schematically, the plot of a game has a typical structure: it starts from a situation of equilibrium to get to that of the imbalance, passing through obstacles, then returns to a final reconciliation that coincides with the victory. The victory depends on the player's actions aimed at carrying out a series of rebalancing interventions (Fulco, 2004).

The game designer to get a good immersion of the Serious

game on disasters must design a simulation process:

- reductive and reconstructive
- realized through the analysis of a phenomenon, a process or a system and the consequent programming of a mathematical model.

Therefore, to enhance the immersive dimension in a Serious Game on the theme of disaster it is necessary:

- build history by proposing a path within an open space used by many people at the same time (museum, event, etc.).
- invent a dramatic event that involves all the players (game characters) in a single instant and where the surrounding environment is not just the background of the narrative but the useful environment for exploring the causes of what happened.
- develop a path where the player's skills increase as he discovers, solves, interacts with people and objects.
- Propose part of the story as a masking (camouflage) in which the player "puts himself in the shoes" of different decision-makers (politicians, administrators, doctors, teachers, etc.) and tries to carry on the story by deciding independently.

### **Exploratory dimension**

The nature and the constraints of each game are determined

by the rules that define it, but these should not be confused with the player's strategies. Rules are the heart of the game and constitute the series of obstacles that the player chooses to face; strategies are the general principles that govern the choices of the player.

The strategies, therefore, could be wrong while the rules of the game are commands.

Therefore, to enhance the exploratory dimension in a Serious Game on the theme of disaster it is necessary:

- Identify elements of rhetorical narrative that refer to known or unknown scenarios connected to environmental problems (pandemics, climatic emergencies, earthquakes, etc.).
- Prepare characters to contribute to the story, objects and settings that accompany the players to identify what disturbs, what they like, what they prefer in a scenario.
- Possibility to compare the solutions adopted between players of different cultural backgrounds, ages, experiences, etc. who have engaged in the game to solve the same problem.
- Offer the player the possibility of identifying the strengths of the choices of other players, even if they are opponents, and with which changes it would have been more useful to intervene

## 9. CONCLUSIONS AND THE FUTURE APPLICATIONS

The research aimed to highlight the emerging narrative and design aspects of video games on themes openly connected to war, disasters and the tragic to highlight two factors:

1. What interactive skills acquired through these virtual play experiences can be useful in real disaster scenarios.
2. what guidelines can be used to create Serious games on these issues.

Given that all gaming activities related to war and emergency themed video games virtually put players in dangerous situations and consequently in the need to make extreme choices, this specific category of video games was taken as an example of study. This type of video games was then

compared and analyzed to find characteristic and "quality" data that could be designed. The comparative analysis carried out on these latest generation video games has highlighted some fundamental characteristics useful for the narrative project of a Serious Game that wants to enhance all the practices that generate different types of skills depending on the type of digital experience. The most important were all those connected to the decision-making process and connected to the ability to foresee and decide; as well as the social aspects, such as the ability to understand, dialogue and relate to other individuals. These guidelines obtained from real virtual experiences are very useful to be reused to face real situations especially in a serious game which, unlike Wargames, puts the player in a less ambiguous state of mind about what he is about to play.

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# THE DESIGN THAT CONNECTS. TELLING TO EDUCATE

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## **ABSTRACT**

Our socio-economic system – powered by fossil energy, non-renewable and polluting, and based on the exponential growth of consumption, with consequent exponential growth of waste (planned obsolescence) – is now collapsing. So what can design do to improve the society in which we live? The thesis of this discussion is that design can do a lot. Of course, we do not refer here to the projecting of niche products, technologically advanced, hedonistic and for the lucky few. If we want to change things, the designers of the future will have to direct industrial production towards sustainable solutions: reducing, repairing, reusing, recycling. These ethical actions should not be entrusted to individual common sense but should be seen as prerequisites for (sustainable) design. In addition, designers will increasingly have to consider the use of renewable and clean forms of energy (such as Sun and wind). Above all, they should be concerned with sustainable processes, from project to consumption. Only in this way, retracing the history of the product (from the extraction of raw materials to what will be at the end of its life cycle), will it be possible to attribute its true value to it. Designers, then, should have as their first objective social innovation: to really improve people's lives. But this cannot be possible if the sustainable products of the future do not take on meaning within new sustainable scenarios that must be wisely projected. And this is the critical point: the battle for sustainability can only be won by communicating sustainable scenarios, behaviors, relationships, services, products... within which people can recognize themselves by feeling a sense of gratification.

## **SUSTAINABILITY, INNOVATION, SYSTEM, ENERGY, COMMUNICATION**

*This paper was reviewed by **Paolo Tamborrini**, Full Professor in Industrial Design at the University of Padova and **Antonio Labalestra**, Researcher in History of Architecture at the Politecnico di Bari.*

# 1. INTRODUCTION

Design, it is always said, is aimed at improving the world, daily life, to change the current situation into a preferable (projected) one. So, according to the inclusive definition of Herbert Simon (Nobel Prize for Economics), designer is anyone who generates innovation in any field<sup>1</sup>. And certainly we can only agree with Enzo Mari when he says that design has "meaning if it transmits knowledge"<sup>2</sup> (but we will return to this in the conclusions). Above all, we like to emphasize that design, the one with the capital "D", is historically affirmed by placing emphasis on the ethical approach and social responsibility of the designer. Already in the nineteenth century William Morris, an English artist-designer who always appears at the beginning of the stories of design, shines a spotlight on the disastrous effects of industrial production on both the social and environmental level, yearning, not without utopia, the construction of a better world – *News from Nowhere* (1890) – in which man would finally be free to express his innate creativity<sup>3</sup>. The problem, in the nineteenth century, is not so much the machine itself as the entire industrial system that reduces man to mechanical gear. And then the Bauhaus – aimed at making "art and technique a new unity"<sup>4</sup> – struggles

strenuously, in its 14 years (1919-1933), to spread beauty socially or, one might say, democratize art through industrial processes. In the same way, the School of Ulm – which critically relaunches the Bauhaus twenty years later (1953-1968) – pursues a clear objective: "The designer, while working for industry, must continue to fulfil his responsibilities towards society. In no occasion the engagement taken with the industry must be in conflict with the engagement taken with the society"<sup>5</sup>. Subsequently, Italian design – consecrated internationally on the occasion of the legendary exhibition "Italy. The New Domestic Landscape" at the MoMA in New York in 1972<sup>6</sup> – becomes an international reference point thanks to the work of designers and entrepreneurs with the ambition of rebuilding the country materially and culturally. Fortunately, today we still appreciate smart and environmentally friendly projects such as *Moscardino*, a fork spoon made of biodegradable plastic (Mater-bi) (Giulio Iacchetti and Matteo Ragni, Pandora Design 2000) or *Solar Bottle*, which purifies water using the energy of the sun (Solar Water Disinfection) (Alberto Meda, 2006). But that's not enough. These are niche projects, which sometimes do not exceed the prototype stage, such as the *Solar Bottle*, in fact. So, let's ask ourselves: is design, today, up to its history?

The ongoing Russia-Ukraine war, which exposes us to the risk of nuclear conflict and – best case scenario (!) – to consequences ranging from the murder of thousands of civilians to dramatic economic repercussions, to a global food crisis that will bring Africa to its knees... climate change, the overheating of the planet, the dissolution of the poles, the shortage of resources, the financial crises that destabilize governments, the social iniquities that are raging, indeed increasing dramatically... are unequivocal indications of how the world has become a restless and dangerous place. Our planet, our home, the environment that includes us and of which we are part (even if we sometimes forget it) shows more and more evident signs of structural failure. How far do we want to go? It does not take a futurist like Bruce Sterling to understand that "the ways of production currently used are no longer sustainable [...]. The status quo uses archaic, limited and toxic forms of energy and matter, damaging the climate, poisoning the population and fomenting resource wars. They have no future"<sup>7</sup>.

Now, the blame for this state of affairs should not be attributed primarily to design, because the complexity of the problem would require political solutions in the sense that Plato gives to politics, that is, the supreme art form, to which

all the other *téchnai*, all the other arts must conform<sup>8</sup>. Yet, already in the 1960s, Viktor Papanek attributed to the design serious faults towards society and consequently the environment: "Of all the professions, one of the most damaging is industrial design. Perhaps, no profession is more false. [...] With the project of criminally treacherous cars, which kill or cripple almost a million people a year around the world, with the creation of entire categories of indestructible waste that disfigure the landscape and with the choice of materials and processing processes that pollute the air we breathe, designers have become a dangerous weapon"<sup>9</sup>. Papanek's criticism, in essence, was that designers only projected for 10% of humanity, the so-called Happy Few who could afford it, and also in relation to this small percentage, they dedicated themselves to luxury items such as "electronic hair brushes, office files lined with rock crystal and bath mats in mink".<sup>10</sup> The designers, in short, according to Papanek, did not work with the intention of improving society; certainly: they did not design for the "real world" (*Design for the Real World* titles precisely Papanek's essay), or for 90% of the world population.

Is it possible today to conceive an elitist idea of design aimed at the aesthetic gratification

of the lucky few (which, moreover, no longer coincide with the "Golden Billion" of the West)? Does the design have to be solved in the design of luxury items for a few or of sustainable objects for many? Our idea is that design takes the second path, as it is already doing, if we really want to improve society while respecting the environment. But it is not just a matter of projecting sustainable objects but rather of foreshadowing sustainable scenarios and ultimately generating social innovation. That is why, as Ezio Manzini argues, today design must become "politics of everyday life", aiming at an impact on society that far exceeds the configuration of furniture and lamps, as we will see at the end of this discussion<sup>11</sup>. What we are facing, indeed in which we are already immersed, whether we like it or not, is a poly-systemic crisis that undermines the world as we know it. *The storm has come*, as the title of a very disturbing book says<sup>12</sup>. We designers, teachers, educators... we designers in the broadest sense should therefore try to turn this situation into something sustainable (*à la Simon*), mastering all our creativity.

## 2. SUSTAINABLE DESIGN

The statement sustainable design is tautological, because

all design is – or should be – sustainable. But let's take it by steps.

At the beginning of the Third Millennium, when the contradictions of our socio-economic system were now evident to anyone who had eyes, the movement of Decrease took hold. The basic idea was simple and immediately centered in the name: it was necessary to reduce global industrial production, contract consumption, decrease materially, and grow, consequently, spiritually. The movement, in fact, had an optimistic momentum, because it was believed that this would be concretely feasible through an organic series of actions within a "serene"<sup>13</sup> and even "happy" program<sup>14</sup>. It did not question our lifestyle *in its entirety*; above all, it challenged the principle of growth for growth, with an almost irrefutable argument: in a finite system of resources (Earth), infinite growth is impossible. This was reiterated in all the sauces, not without sarcasm: "Whoever believes that exponential growth can continue indefinitely in a finite world is a madman or an economist"<sup>15</sup>. Moreover, it was already clear in the 1970s that the *limits of development* had been greatly exceeded<sup>16</sup>. So much so that in the field of design an important concept began to assert itself, which today assumes a relevant position

and stimulates the formative tension of the most important educational and cultural institutions: environmental sustainability. Since then, in fact, the attention of many designers and of design scholars relevant to the world scene, has shifted to the environmental issue and how to design in an ecological key. This becomes almost an obsession and certainly also a "fashion" when simplistic or ecological solutions are put in place only superficially, when the designer does not take on the complexity that each project implies by focusing everything on a superficial image of sustainability. A new term even emerges, a strange phrase that would come to circumscribe the sustainable project: eco-design, literally "ecological design". But it really makes sense to talk about ecological design when the design – the real one – is by its very nature ecological (and not just ecological). Distinguishing ecological design from tout court design would then be like distinguishing functional design or ethical, social, poetic design etc.; which would mean cutting through the complexity that the design itself includes, as if the design could also be non-ecological, non-functional, non-ethical etc.<sup>17</sup>. That said, today, since designers have introduced the importance – and urgency – of the environmental issue, it is no longer possible to conceive of a design that is not, among

other things, sustainable.

Well, what are the characteristics of sustainable design in particular; or rather: considering that design should be sustainable, how can it be well framed within the environmental issue? What is the current situation in which design comes to be part of? Let's make a premise. If, as stated in the report of the International Commission on Environment and Development (WCED) on *Our Common Future* (1987), sustainable development is based on the idea that 'the present use of resources must be such as not to jeopardize the future use by the new generations'<sup>18</sup>, there is no doubt that, today, we are a long way from having focused on our objectives or those that should be. On the contrary: let us say that, by continuing to manage resources, the production of energy and industrially manufactured goods as we have done over the last two centuries, it will in no way be possible to achieve a sustainable society (which also means a fairer and more just society). If this is the case, design, as a "total social phenomenon [with] the task of mediating dialectically between needs and objects, between production and consumption"<sup>19</sup>, is called to play its significant part through the configuration of more sustainable techno-productive processes (clean energy, recycling, km 0 etc.) such

as reducing the ecological footprint and therefore the emission of CO<sub>2</sub> on the environment, as well as the prefiguration of scenarios where sustainable behaviors assume meaning.

So, what are the concrete actions to be put in place for sustainability? Essentially four: reduce, repair, reuse, recycle will increasingly be the verbs of the future or, better, of a "different present", to use the words of Maurizio Carta, or the present "that we project thinking about the future"<sup>20</sup>. Projecting in a sustainable way means thinking about the future: for example, simplifying the process of assembling and disassembling products (for the future recovery of materials), possibly folding and compactable (so that we will occupy less space during transport) and even better if flexible, customizable and multifunctional (so that they will last longer), etc. Above all, projecting thinking about the future means thinking about renewable (for obvious reasons of quantity) and clean (for obvious reasons of quality) forms of energy, first and foremost taking advantage in primis of the incessant and profitable action of the sun (for example solar panel) and wind (for example wind shovel).

But let's see point by point. First, we have to reduce. On the one hand, it is necessary to design products that are

less and less full-bodied (matter) and bulky (space). That is to say: should be used less material as possible, also to avoid increasing transport costs with heavier products that take up a lot of space in the containers. On the other hand, above all, we must reduce industrial production tout court; decrease materially and grow spiritually. To what extent can we continue to squeeze our planet like a lemon by continuing to consume exponentially every resource. Heidegger already said this more than sixty years ago: "The world appears as an object to which calculating thought makes its assaults, to which, it is believed, nothing is more able to oppose, while nature is transformed into a single gigantic reservoir of energy at the service of industry and technology"<sup>21</sup>. This, evidently, corresponds to a predatory attitude that sees in Consumerism its commercial reason: the (un)reason why the obsolescence of products must necessarily be programmed: a phenomenon to which the design of the twentieth century has become very accustomed<sup>22</sup>.

Another fundamental point is then to repair things that break instead of throwing them away lightly to buy others. This would be a very easy and normal thing if the mass media system did not hammer us incessantly instilling in our minds the

need to constantly display new or better fashionable products and most of the time, designed precisely to suggest. Consequently, it is considered preferable to get rid of things even before they break, because their usefulness is above all symbolic. Those who consume, after all, always want to show themselves as flamboyant and polished as a brand-new product: a product entrusted with the task of representing those who own it. So, if this is going to start working badly, why would anyone bother to fix it? Might as well throw it away, also because repairing it, paradoxically, would cost more than buying it back. Here again is the diabolical mechanism of planned obsolescence, made possible by the aesthetic appeal of the goods and the symbols that are embodied in them: you must feel the "moral" obligation, the aesthetic diktat of buying something, even before feeling the practical need. Bucking, designers could envisage a simple disassembly of the products, not only to facilitate the recycling of materials; also to make it advantageous to replace a damaged part. But that's not all. Designing a product for assembled parts would make it possible to upgrade the product itself, perhaps replacing a part with the technological evolution of the same (the technique produces aesthetics) or with custom accessories. But that's

not all. Designing a product for assembled parts would make it possible to upgrade the product itself, perhaps replacing a part with the technological evolution of the same (the technique produces aesthetics) or with custom accessories. For example, it is possible to build a 3D printer at home whose parts are 3D printed by another printer (3D RepRap 2004); which greatly shortens the production and distribution chain. Or – even better – you can update the products (*upgrading*), implement them you could say, with more performing parts that are added later or come to replace others that are now obsolete.

When it is not possible to repair the object, before delivering it to the landfill (which is always polluting), we must ask ourselves if it is still possible to use the object in another way, that is, to give it a new function, different from the one for which it was produced. The basic principle on which this need is based is that throwing away an object means generating a waste, something that pollutes and does not exist in nature. Nevertheless, with the advent of industrial civilization, we human beings have become serial accumulators of products and waste. And we have so radically changed our environment – with "entire categories of indestructible waste", to use Papanek's

words – to the point of creating, without realizing it, a new continent (!), the Great Pacific Garbage Patch, “the great garbage machine of the Pacific Ocean”: an exorbitant accumulation of waste, mostly plastic, that the Pacific hourly currents hold together, a gigantic, monstrous, anti-ecological island made up of hastily discarded objects, which perhaps could have been repaired or used again to perform new functions. This “continent” was discovered in the eighties, and it struck public opinion so much that someone hoped for the advent of “a new aesthetic [...] capable of dealing not only with the golden proportions and with the beautiful ideal [...], but also with the garbage”<sup>23</sup>.

If it is not possible to repair or reuse, instead of throwing away, we must seek to recycle, just as nature does. Recycling, therefore, is the *last ratio*, after which we shipwreck in the landfill, but not at all costs. In fact, it is not always worth recycling. If recycling involves the consumption of a greater amount of energy (CO<sub>2</sub> that is dispersed in the environment) than is needed to make the same object using raw material (not recycled), this is obviously inconvenient, and not at all sustainable. Just to give an example: is it preferable to use a plastic or glass bottle? A glass bottle (!), everyone would say, without bothering to measure the energy needed

to move a huge amount of tons of glass around the world. So, what is the most sustainable material? In absolute terms it does not exist, it depends on a series of variables that must be evaluated from time to time.

The question of materials has always been central in the practice and theory of design. In the eighties, in fact, we began to talk about “design of materials”: new materials, projected to perform specific functions (for example, to create very light but resistant chairs); materials, therefore, innovative and technologically advanced<sup>24</sup>. More recently, in the direction of sustainability, a crucial frontier is undoubtedly that of biomaterials. They, in fact, may seem the most sustainable materials in absolute because, deriving from plant or animal organisms, they are renewable, do not pollute and can be dispersed in the environment in a few months of composting, with the useful function of fertilizing (like everything that is organic). In a sense, they are the exact opposite of plastic, whose production depends on oil, a non-renewable energy resource (fossil), which is dispersed in the environment, polluting over the centuries. As we have said, however, there is no absolute sustainable material, the perfect solution always and in any case: biomaterials are, yes, environmentally friendly but, precisely because of

plant or animal origin, if used massively, they could reduce the food of a world population already partly hungry and malnourished. This explains why research is under way to replace agricultural products used for starch extraction with organic solid waste. Thus, by forcing the hand a little, it is possible to contradict the previous statement: the most sustainable material in absolute is waste (exactly as it happens in nature). Fabrizio De Andrè was right: nothing is born from diamonds, flowers are born from manure.

If the perfect material is waste or, better, the one that is recycled, the perfect energy is the one that is renewed. On the contrary, our complex industrial system today is mainly powered by dirty energy, that is, based on polluting and non-renewable resources (oil), which are, moreover, destined to run out within a few decades and which we will therefore have to give up even if we could, by magic, stem the disastrous effects they produce on the environment (which at the moment is scientifically impossible). Obviously, we must look elsewhere and get energy by focusing on other resources, renewable and clean; which, in fact, we are already doing, but not significantly enough and not quickly enough. Above all, Sun could provide us with all the energy we need. It has

taken us centuries to develop an oil technology; how long will it take to develop a Sun technology? Did the ancient Egyptians, whose works are still the subject of mystery (pyramids), who worshipped Ra, that is, the Sun, know more than we do? Yet, design has made its first steps here. An example is the revolutionary Solar Tree designed by Ross Lovegrove for Artemide (in collaboration with Solar Sharp) in 2008: a "solar tree" made of steel tubes that support light bubbles substantiated by solar cells connected to a system of batteries and electronic devices under the base. Another source of clean energy is the wind.

This is well known to Norman Foster, author of a wind turbine for Enercon (1993-95) whose high technical efficiency corresponds to a low visual impact on the landscape. Still, a viable solution is to use hydrogen. This is the case of the *Fuel Cell* hybrid bicycle, conceived by No Picnic for Aprilia in 2001 (prototype), with fuel cells powered by hydrogen introduced into the tank under the barrel. Another example is the *Scoot* scooter, designed by Johan Liden (Fuseproject) in 2001 (prototype), agile and foldable, with a mono-material steel structure, therefore easy to recycle. Let's not forget, moreover, that pursuing environmental sustainability thanks to design also means

experimenting, trying to optimize what already exists: from the ingenious automation system (home automation) *My Home* (BTicino 2001) that allows reducing the electricity used; or venturing prototypes such as the futuristic LuxCorp light system that exploits the bioluminescence of bacteria during the oxidation or combustion process (John Nicholson and Kathy Takayama, University of New South Wales, 2004).

### 3. SYSTEMIC DESIGN

The first point of sustainable design, that is, reducing, could suggest the design of services, the integration of the service into the product, the product-service or, even better, the transformation of the product into a tout court service. In this case, in fact, the function without form is realized or, at least, the production of physical goods is greatly reduced. For example, if you do not have something but share it (sharing economy), it is evident that the same function determines an ecological footprint that is abundantly reduced compared to the individualistic possession of everything. In this sense, Flaviano Celaschi's warning is addressed: "Use and do not possess"<sup>25</sup>.

However, we cannot deny that the coming decades will be

characterized by a pressing request for physical objects, especially from countries with strong economic development, such as China today and tomorrow who knows...

Moreover – if still in the nineties of the last century Ettore Sottsass could afford to declare: «Those who build warships and use tons of steel must be concerned about the ecology. Do not tell me that I make a handle every five years"<sup>26</sup> –, to think that the designer has a completely negligible quantitative impact is equivalent to a "creative license" of design that results in products for a few connoisseurs with a lot of taste and a lot of money, which goes beyond the environmental issue and today, frankly, we can no longer afford. Our position, on the contrary, is that design has a significant quantitative impact and therefore a great social responsibility, which is reflected in a great environmental responsibility. This – we reiterate – is the fundamental premise of the School of Ulm; and it is today a firm point that marks the culture of the project whatever form and whatever function it may take in physical and virtual space.

If this is the case and that is, in the near future it will still be necessary to project-realize a large quantity of physical products, the most sensible thing seems to be the systemic design. Systematically designing, in fact, means relating each

atom of the project (from A to Z), so that the waste of one process (output) coincides with the resource (input) of another process<sup>27</sup>. In this way it is possible to obtain a product – indeed a system-product – with “zero emissions”<sup>28</sup> (maximum sustainability); which represents for a company an innovative business model (the green economy today offers excellent opportunities), without externalities (social and environmental costs) and an appreciable position in terms of image (positioning). This, moreover, is the *modus operandi* of nature, prolific beyond all imagination: everything that dies (waste) makes possible a new creation, within a perfectly ecological system. From the cradle to the cradle, you could say, endlessly. All the production of nature is organized according to cyclical processes, not at all linear, which (self-)regulate themselves systematically. This implies, by applying this system to the business world, a rapid and not risky innovation, an articulated production (richness and variety of species) and the use of minimal resources. There is impersonal genius, a colorful and unstoppable creative lymph, in the strict functionalism of nature; the motto of Mies van der Rohe *less is more* – maximum result minimum effort – is the most iron rule that permeates every atom of creation.

## NOTES

- 1 “Everyone designs who devises courses of action aimed: at changing existing situations into preferred ones. The intellectual activity that produced material artefacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare policy for a state”, Herbert A. Simon (1969), **The Sciences of the Artificial**, MIT Press, Cambridge (MA) 1996, p. 111.
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- 13 Serge Latouche, **Petit traité de la décroissance serene** (2007). **Breve trattato della decrescita serena**, Bollati Boringhieri, Turin 2008.
- 14 Maurizio Pallante, **La decrescita felice**, Editori Riuniti, Rome 2005.
- 15 Kenneth Boulding, dalla homepage della decrescita.it.
- 16 Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, **The Limits to Growth** trad. it. **I limiti dello sviluppo**, Mondadori, Milan 1972. This text describes a very important study, conducted by a group of world-renowned scientists within a circle known as the Club of Rome, “on the dilemmas of humanity” (as the subtitle says), that is, on how life on Earth will evolve starting from the status quo and on the basis of the available knowledge. Scientists at the Club of Rome formulated a mathematical model, superimposing demographic, food, energy, industrial and economic trends. Conclusion: the possible alternative scenarios developed were all more or less catastrophic. “The problem of food production, that of the consumption of raw materials, that of the growth of pollution and its neutralization, involve a series of very difficult and demanding choices: however, it should now be clear that all these difficulties arise from a single simple circumstance: the Earth has finite dimensions. The more any human activity approaches the natural limits beyond which the Earth is no longer able to sustain it, the more manifest and serious such difficulties become. [...] It seems that the world system currently tends to increase both the number of inhabitants and the availability of food, material goods, air and this trend will eventually lead to reaching one of the many natural limits of the Earth” (p. 74). The scientists of the Club of Rome warned the world about the limits of development, with predictions that were dramatic at the time but which, with the benefit of hindsight (i.e. today), we can even consider rosy. In fact, they hypothesized that the planetary disaster would occur by the middle of the 21st century, but did not take into account the climate changes due to the overheating of the Planet or the melting of the Glaciers; not to mention the wars that rage everywhere with the series

So, who is the systemic thinker ante litteram? According to Fritjof Capra, none other than Leonardo Da Vinci, the great artist-scientist of the Renaissance, absolute genius, daily immersed in the observation-reproduction of the "miraculous things" of nature<sup>29</sup>. And just like Leonardo Da Vinci, the systemic designer operates not only with lucid rationality but also with "imaginative fantasy, in a lasting and collective commitment that involves all the actors in the life cycle of a product"<sup>30</sup>. Above all: the systemic designer puts in place a polycentric approach, developing not a product, but a process whose phases are circularly connected as calibrated parts of a perfect organism (system-product). And also those who work in this direction do not only pursue economic objectives (zero-cost resources, quality control at every stage of the process, certifications...); as has been said, they assume a considerable competitive advantage in social and environmental terms. And what could be better for a company, today as tomorrow, than to make a profit by improving the world?

#### 4. THE VALUE OF THINGS

An interesting – indeed crucial – issue related to sustainability is how it must

be communicated so that virtuous behaviors can consolidate to become social habits. It is widely believed that people would be more likely to embrace a sustainable lifestyle through a rewarding and fully conscious choice, rather than going along with a diktat based on vague moral reasons. In other words, sustainability should be ridden as an opportunity and not suffered as a constraint. It is therefore clear that informing and communicating, in the sense of sustainability, is a fundamental prerequisite for its implementation. This concerns, for example, the purchase of commercial products, at the moment based only on the pleasure of the thing itself and on economic convenience, that is to say on individualistic incentives. What would happen, however, if people stopped to reflect on how much (dirty) energy is consumed to make a product that goes around the world, consuming other (dirty) energy, to be sold, consumed and then discharged who knows where, to deface the environment for centuries? What would happen if people stopped to reflect on the real costs that this trivial operation – repeated on a planetary scale, billions and billions of times – inexorably entails? Would something happen? Perhaps not. People don't seem to have much trouble buying compulsively. But this is what the mass media

system does with its firepower: it induces the compulsive purchase. Or yes: something would happen, telling the contradictions and the intrinsic follies of this system. Only in this way is it possible to trigger a cultural revolution or even trivially for people to stop and reflect on the consequences of what they do. Because the fascination of compulsive buying is based on ignorance of consequences; and ignorance of consequences is a necessary ingredient of the pseudo-happiness that unbridled Consumerism magnificently unlocks.

So, what is a sustainable product? It should be born from the reuse or recycling of another product, designed to be easily assembled and disassembled, implemented, repaired, durable... in short, a sustainable product should have more or less the characteristics we described above. An organic food product, we assume at zero km, within a circular process, which intensifies relationships between people and generates social innovation... it is a great good; but how do you tell this great good? And again: if this great good is not staged, why should anyone buy a sustainable product instead of an unsustainable product (but who knows?) whose price is lower and whose function is identical? Indeed: why should anyone buy a sustainable

"silent" product instead of an unsustainable product that tells a beautiful story? In fact, it happens that those who make a sustainable product, precisely because they focus on the substance of things, have the presumption of thinking that communication does not serve a great deal or, worse, that it is a kind of black magic that advertisers use to deceive buyers. So let us reiterate one obvious thing: to communicate does not mean to lie. You can very well tell the true nature of a sustainable object by highlighting its value convincing. And this is, in my opinion, the most important battle for sustainability: communicating the value of things.

On the contrary, what does a commercial-type product tell whether it is a food or an item of clothing? It tells some of its appealing characteristics (for example nutritional values or tissue quality), gives a sense of belonging within a certain social class, but above all incorporates the history of a brand with the values or pseudo-values that this brand recalls to itself. And here a slice of the universe opens up. It is a pity, however, that, most of the time or almost always, we fail to provide information on the process of construction of the product and the path that led it to us: where the raw materials come from, where it was manufactured, who manufactured it, under

of chained disasters that they carry. In any case, the scientists of the Club of Rome have updated their forecasts, making the point 30 years later: Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, **Limits to Growth: The 30-Year Update**, 2004, trans. it. **I nuovi limiti dello sviluppo**, Mondadori, Milan 2006. According to their calculations, the implosion of the planet will begin around 2030. Humanity, they believe, is faced with 10 possible scenarios, one worse than the other, in the sense that, moving forward as we have always done and that is by transforming the few remaining resources into pollution, we cannot avoid the last scenario, the worst: the extinction of the human species. That is why it is important to decide immediately – as a species – to review the way we exploit the Planet, that is our current socio-economic system. But we've already wasted precious time. And since the point of no return has been exceeded, it is now a question of limiting the damage.

- 17 Cfr. Paolo Tamborini, **Design sostenibile. Oggetti, sistemi e comportamenti**, Electa, Milan 2009, p. 7: "The classification that for a long time differentiated design from ecodesign no longer has any meaning; the project must go in the unique direction of sustainability of the production process, the product and the behaviours that the latter will be able to trigger. Environmental needs have become prerequisites for contemporary design and future projects will increasingly arise from the study of the functional, semantic and environmental demands that arise from the relationship between man and the land on which he lives".
- 18 Cfr. WCED, **Our Common Future**, trad. it. **Il futuro di noi tutti. Rapporto della Commissione Mondiale per l'Ambiente e lo Sviluppo**, Bompiani, Milan 1987. This report, in English **Our Common Future** is also known as the Brundtland Report (named after the chairman of the committee, Norwegian Prime Minister Gro Harlem Brundtland). For further information and a current reading, see Aurelio Angelini, Piergiorgio Pizzuto, **La società sostenibile. Manuale di Ecologia Umana**, Franco Angeli, Milan 2021, p. 141.
- 19 Tomás Maldonado, **Disegno industriale: un riesame**, Feltrinelli, Milan 2008 (1976), pp. 14-15.
- 20 Maurizio Carta, **Futuro. Politiche per un diverso presente**, Rubbettino, Soveria Mannelli 2019, p. 18.
- 21 Martin Hedegger, **Gelassenheit** (1959), tr. it. **L'abbandono**, Il melangolo, Genova 1983, p. 34.
- 22 Cfr. Dario Russo, **Vanità e socialità nel design. Icone e paradossi**, Mimesis, Milan 2021.
- 23 Cristina Morozzi, **Oggetti risorti. Quando i rifiuti prendono forma**, Costa & Nolan, Milan 1998, p. 20.
- 24 Cfr. Ezio Manzini, **Nuovi materiali e ricerca progettuale**, in Andrea Branzi, **Il design italiano 1964-2000**, Electa, Milan 2008, pp. 326-337.
- 25 Flaviano Celaschi, **Design mediatore di saperi**, in Claudio Germak (ed.), **L'uomo al centro del progetto**, Allemandi, Turin 2008, p. 20.
- 26 Ettore Sottsass, **La vita, un grande progetto**, intervista di Juli Capella, in "Domus", 796, September 1997, p. XXX. This is also the position of Renato De Fusco, **Il design che prima non c'era**, Franco Angeli, Milan 2008, p. 77: "In the accumulation of waste, the part occupied by objects born from industrial design is radically modest and largely recyclable".
- 27 It is worth noting that the teaching program of the Hochschule für Gestaltung (School of Ulm) included the teaching of Systems Theory, an absolute novelty in the 1950s.
- 28 Luigi Bistagnino, **Innovare: in quale modo?**, in Claudio Germak, **L'uomo al centro del progetto**, Allemandi, Turin 2008, p. 32.
- 29 Cfr. Fritjof Capra, **La scienza universale. Arte e natura nel genio di Leonardo**, Rizzoli, Milan 2006.
- 30 Paolo Tamborini, **Design sostenibile. Oggetti, sistemi e comportamenti**,

what working conditions, how much CO<sub>2</sub> was released into the environment, where it was assembled, packaged, transported and so on. Yet this is precisely the information that would allow us to retrace the history of the product, and therefore to attribute its true value to it.

Let's take an example. Consider a pear juice whose raw material was grown in Argentina, packaged in China and sold €1.50 in Italy and in who knows how many other places. What value does this product have if it has had to travel around the world to get to us while costing 1.50 €? But are we really sure that "costs" only 1.50 €? Or better: if it costs only 1.5 € (selling price), who pays the (real) cost of the product? Who pays the social and environmental (external) cost of the product? Question: Why are some production costs reflected in the sales price and others not? Answer: The market logic within our socio-economic system does not take into account the social and environmental cost<sup>31</sup>. Corollary: although pear juice is presented as "organic" (pears have been grown without pesticides), if it has to go around the world to get to us (Argentina, China, Italy), it certainly has very little organic. The same can be said for many products that we find on supermarket shelves, clothing, furniture, furnishings, home accessories and more, within

a commercial system that operates according to obsolete logics, certainly harmful and not at all eco-logical. And here the paradox is revealed: the value we attach to these things is based on a systematic distortion of the evaluation process.

Now, if we all, as consumers, have responsibilities that concern the choice of what we buy, the designer, who is asked to project the configuration of the products and therefore the integrated communication (self-advertising value), should, for cultural training, carefully consider the social and environmental repercussions of what he designs. He should, in other words, operate with an ethical approach, balancing the complexity that each project – true – entails. Let's take an example: *Risacca* (2021) the sustainable project of a team operating in Sicily consisting of two designers, Federica Ditta and Cristiano Pesca, and the social entrepreneur Carlo Roccaforita. It is a (re)made bag (Re-bag) with abandoned fishing nets recovered from fishermen's warehouses and abandoned along the coast of Mazara del Vallo, home to an important port and place where the three operate. *Risacca*, however, is not only a sustainable product; it is a circular economy model that promotes innovative solutions

for territorial development through the reuse and recycling of waste. The value of the product, in fact, does not lie so much in its function of use, in its being useful as a bag, as in that *Ri-*, bearer of connections. What are the actors in this process? The fishermen and ship-owners of Mazara who provide the nets (waste), the tailors and upholsterers of Mazara who sew the nets together with other waste from a local company, the craftsmen who make natural dyes and recover organic waste from restaurants to make them into dyeing herbs, the shopkeepers in the Historic Centre of Mazara who give up the boxes they would throw away and which will be turned into packaging. This is therefore an entirely traceable and circular process, which creates connections (re)generating value from the waste. But what does this circularity depend on? Certainly, the sharing of information makes the actors aware of the possibility of giving value to processes and products, differentiating their activity on the market giving you new impetus or creating new activities; but the fundamental point, from which the whole process moves, is the connection-sharing of resources. A fact for everyone: in the last century the weight of all the Earth's commercial

products has increased exponentially, doubling every 20 years until reaching, in 2020, the weight of all biomass, that is, of all living beings. Well, if we could reuse-optimize what already exists and that would otherwise become waste, we would not be forced to produce ever new products in a world with ever fewer raw materials available.

## 5. CONCLUSIONS

Our thesis is that sustainability cannot be achieved simply by relying on the sacrosanct assertion that we must pollute less by reducing consumption in an increasingly devastated world. But above all, *the turning point* can only be reached with a real eco-literacy campaign<sup>33</sup>. Every technical revolution (solar, wind, hydrogen locomotion...) must be preceded by a mental, intellectual, cultural revolution... such as to deeply affect generating awareness (environmental). For this reason too, more than in the field of technological innovation, the battle for sustainability will take place in the field of social innovation. The designer of the future, therefore, will not only be involved in projecting sustainable products, but also and above all in foreshadowing scenarios in which sustainable products become more important and

Electa, Milan 2009, p. 17. For further details on systemic design, see. Luigi Bistagnino, **Systemic Design, Designing the Productive and Environmental Sustainability**, Slow Food, bra 2011.

- 31 Cfr. Raj Patel, **Il valore delle cose e le illusioni del capitalismo**, Feltrinelli, Milan 2018 (2009), pp. 52-53: "The goods and services produced in a sustainable way seem more expensive, because their cheaper equivalents lead to savings in the short term but in the long term generate costs that must be borne by all. The systematic distortion of the valuation process is a direct consequence of profit-driven markets. Driven to lower costs, corporations are intrinsically driven to avoid paying social and environmental costs as often as they can. [...] In order for the economic mechanism of the markets to function properly, the external costs and benefits of production and consumption must be reflected in prices."
- 32 Cfr. Emily Elhacham, Liad Ben-Uri, Jonathan Grozovski, Yinon M. Bar-On, Ron Milo, **Global Human-Made Mass Exceeds All Living Biomass**, nature.com. [9 December 2020]
- 33 Fritjof Capra, **Il punto di svolta. Scienza, società e cultura emergente**, Feltrinelli, Milan 2003.
- 34 Ezio Manzini, **Design, When Everybody Designs. An Introduction to Design for Social Innovation**, The mit Press, Cambridge (MA) 2015.
- 35 Ezio Manzini, **Politiche del quotidiano**, Edizioni di Comunità, Rome 2018. As Vanni Pasca says, **Dopo i discorsi sulla fine**, in Umberto Eco, Vittorio Gregotti, **Sulla fine del design**, Editoriale Lotus, Milano, 2018, p. 39: today's design has expanded and it is necessary to include "the attention of young designers to Social design", as well as "that tendency of design to become political, evident in the appeal to the designers of Victor Margolin and Ezio Manzini: 'Stand up for democracy'. And those tendencies to abandon the area of artifacts in favor of that of processes, such as Service Design".
- 36 Ezio Manzini, **Abitare la prossimità. Idee per la città dei 15 minuti**, Egea, Milano 2021. His metaphor of the sailboat was evocative: "If we imagine the project as a navigation, we should think about doing it with a sailboat, rather than with a motorboat. The motorboat has an engine that we think we can drive on ourselves, following a course that points straight to where we decided to go (or, at least, so we delude ourselves that we can do, until the engine breaks down, or we run out of oil, or a too high wave sends us down). Sailing, on the other hand, is clearly the result of a co-generation: it is made by us, by the boat, by the wind and by the currents; we must know the boat well, listen to the wind and the currents, adapt the route to them, change it as necessary. Sailing is an exercise in continuous recognition of complexity. Which doesn't mean we're overwhelmed. Sailing does not at all mean being adrift: rather it means having a destination, having imagined a route taking into account the currents and the foreseeable winds, and then knowing how to adapt it from moment to moment according to what actually, locally, happens. Every project, at every scale, today is like this. But that for proximity and in proximity, for communities and in communities, is more so than any other", p. 146..
- 37 Carlos Moreno, **Droit de cité, de la "ville-monde" à la "ville du quart d'heure"**, Éditions de l'Observatoire, Paris 2020.
- 38 Bruno Munari, **Fantasia. Invenzione, creatività e immaginazione nelle comunicazioni visive**, Laterza, Rome-Bari 2017 (1977), p. 22.
- 39 Stefan Sagmeister, cit. in Peter Hall, **Sagmeister**, Booth-Clibborn, London 2004 (2001), p. 275.
- 40 Giorgio De Ferrari, **Produzione industriale ed etica progettuale**, "M&A-Meccanica & Automazione", 37, April 1998, p. 186.
- 41 Paolo Tamborini, **Design sostenibile. Oggetti, sistemi e comportamenti**, Electa, Milan 2009, p. 31.

people's sustainable behaviors correspond to a collective feeling. The designer of the future, in short, will deal more with relationships than functions.

This is the focus of the research of one of the most authoritative scholars around design: Ezio Manzini. The design of our time is for him *Design. When everybody designs* that is the condition in which not only experienced designers but a bit of everyone is projecting: design made for and with people, local communities and collaborative networks<sup>34</sup>. The design of our time, therefore, arises from below - Manzini defines it as 'emergent' - and tends to produce social innovation by fostering collaborative and sustainable behavior. In doing so, he prefigures the *Policies of everyday life* with "actions on the world, relevant to everyday life, made by operating where one is. That is, from one's point of view and action. In other words: a daily policy is the systemic effect of a life project"<sup>35</sup>. Here and now, together and very concretely. *Living in the proximity*, as Manzini titles his latest essay (2022), corresponds then to a sustainable lifestyle in a truly sustainable city: a city characterized by diverse collaborative services, rich in intangible relational assets such as trust and care for others<sup>36</sup>. This is also the city of 15 minutes, where everything

you need can be easily reached in 15 minutes, such as the Paris described by Carlos Moreno<sup>37</sup>. This is therefore an ideal framework for social innovation, the first objective of design and a precondition for sustainability.

But how is this achieved? Design can not only do the right thing; it must also do the beautiful thing: it is imagination, dream, poetry, creativity, poised between imagination and invention<sup>38</sup>. In short, it must excite: "touch the heart"<sup>39</sup>, as Stefan Sagmeister affirms. Thus, to educate to sustainability, we must not make the mistake of neglecting the opportunity that a sustainable product is also beautiful; indeed, precisely as sustainable, it should also be beautiful, according to the ancient integration between the cognitive dimension, the ethical dimension and the aesthetic dimension of the experience. In configuring sustainable products, therefore, the designer will have to prefigure meaningful scenarios, as we have said, working on attractive characters and personal gratification that lead to the following conclusion: "I buy what protects the environment and this is part of the beauty"<sup>40</sup>. Hence, the need to build new values, as well as to measure well-being with parameters that are not so much quantitative (GDP) as "qualitative, such as the quality

of life, of the environment, of the level of education, of services, that is, the indices that show the degree of not material but moral well-being of people"<sup>41</sup>.

So, we return to the beginning of our discussion: the ethical premise of design - its social value (social innovation) - is not simply the starting point but also the point of arrival, which must always be, wisely, pursued. The most common pitfall, in fact, is that attention to the environment, to social costs - and therefore a sustainable choice - ends up degenerating into a fashionable trend or, worse, in a trick to raise the perceived value of the product. This is the case, for example, of Frank Ghery's pressed cardboard furniture, initially produced at low cost with fully recyclable cellulose fibers as mono-materials, designed to replace wood, steel or plastic. Conclusion: despite the general enthusiasm, low-cost industrial production was quickly replaced by a chic collection of very expensive pieces.

On the contrary, the most intriguing project to talk about sustainability, in my opinion, is the flower pot designed by Enzo Mari for Alessi: *Ecolo* (1995). The idea is very simple, brilliant: reuse discarded plastic containers with few cutting operations. These, however, are not sold, since the user buys the instruction booklet to make the vase

himself. *Ecolo*, therefore, is a case of sustainable design ideal for several reasons: it is a waste that assumes a new function (from output to input, systemic design and circular process), it is a reuse project (km 0), it is a durable object. But it also has a didactic, educational value: it works a bit like a "project-manifesto. To put a brake on the perverse cycle of the continuous production of useless gadgets ... is a lesson in applied ecology"<sup>42</sup>. But you don't just live on ecology; you also need a pinch of poetry, as we said. And *Ecolo* excels on all fronts: both the practical (reuse, environmental protection, durability...) and the cultural (communication, symbol, poetry...). For this reason, too, Mari's object disorients and produces aesthetic shock, like an oxymoronic work of art: it is a waste (rubbish) but also a flower vase (poetry); it is an industrial product (discarded) but also a unique piece (made ad hoc by the user); it is an object of practical use but also a declaration of love towards the environment. In short, it is a materialized intelligence, a *Proposal for a self-design, like the one* Mari delivered to the history of design in 1974<sup>43</sup>, but above all it is something that contributes to forming critical thinking because, as we said at the beginning, design has "meaning if it transmits knowledge"<sup>44</sup>, and as we well know, knowledge is a game of connections.

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# MOBILE APPS AND GENDER EQUALITY. WHY IT IS RELEVANT THE DESIGN OF INCLUSIVE DIGITAL INTERFACES

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## ABSTRACT

Designing digital interfaces that deliver an inclusive user experience should be the goal of any designer, regardless of the type of service or target audience. This concept is related to the fact that any service on the face of the earth should offer a satisfying, smooth experience that invites the user to repeat it in the future. In this context, it is crucial to prevent generating feelings of frustration or exclusion even among a small percentage, usually defined as a minority, of people. Therefore, inclusiveness and accessibility are fundamental requirements and should be considered from the earliest stages of designing a product or service. The MUV case study shows how it is possible to design a digital service that is inclusive and thoughtful for each gender.

**INCLUSIVE DESIGN, GENDER EQUALITY, DIGITAL INTERFACES, MOBILE APPS**

*This paper was reviewed by **Salvatore Di Dio** and **Mauro Filippi** from University of Palermo.*

## 1. INTRODUCTION: WHAT IS INCLUSIVE DESIGN?

The British Standard Institute defines Inclusive Design as:

*«The design of products or services accessible to, and usable by, as many people as reasonably possible...without the need for special adaptation or specialised design.»*

Designing a product, service or experience that is fully inclusive implies an in-depth understanding of human diversity and building on this to make design decisions. The relationship between the diversity of people and the design choices and, consequently, the user experience is therefore, central since every design decision has the potential to include or exclude customers [1].

This awareness concerning the impact of each individual decision is essential, as it underlines the direct responsibility of each designer. Quoting Stephen Frost, founder of the diversity and inclusion consultancy Included:

*«Unless you consciously include, you will unconsciously exclude.»*

## 2. USER DIVERSITY: WHAT STOCK PHOTO PEOPLE CAN TEACH US

Hence, Inclusive Design

focuses on user diversity, a distinctive trait of humanity. It can be defined as the entropy of users within a certain cluster. Naturally, the more users a cluster has, the greater the diversity.

There are so many aspects that distinguish people that it is almost impossible to list them all. Below is an attempt to list the top twelve in strictly alphabetical order:

1. Age
2. Culture & customs
3. Diet
4. Disabilities
5. Education level
6. Ethnicity
7. Gender
8. Income
9. Sexuality
10. Shape
11. Size
12. Spoken languages

For the sake of reflection on the diversity of users, a fitting example describes the evolution in the representation of a very special group of people, extraordinarily photogenic and well-known, even if not exactly famous. It is Stock Photo People (aka SPP). SPP are real people, but far from any person one has ever met and are portrayed in poses and situations very different from any photo one would ever take. They are usually beautiful, smiling, and energetic people whose pictures can be bought for a few dollars. Up to a short time ago, they were the main stars of websites, presentations and even advertisements. Until a few years ago, all these images had distinct features, as the following two figures indicate.



Figure 1. A classic Photo Stock of a business team corporate. Courtesy of crushpixel.com



**Figure 2.** Stock Photo of happy, funny people. Courtesy of dreamstime.com

The first represents a working environment. Everyone here looks young, good-looking and well-dressed; everyone has a confident expression and is in great shape. In the foreground are the men, then the women and only at the back can some non-caucasian employees be identified.

In the second one, there is a very different group of people, all of whom are slim, smiling, and with a considerable sense of rhythm. Of course, they are also all young and white.

Stock Photos are relevant as they are widespread and contribute to highlighting and reinforcing our sexual, racial and ethical labels on a visual and immediate level.

Fortunately, nowadays, there is more sensitivity towards these issues, which has naturally also influenced the Stock Photo People who now look more like the image below. Different ages, ethnicities, shapes and even tastes in clothing. There is indeed more entropy



**Figure 3.** A modern-day Photo Stock community.

in this shot than in the previous ones, and this contributes to more inclusive imagery with which different people are more likely to identify.

### 3. THE GENDER DIMENSION

Within this framework of attention towards user diversity, the gender issue can be addressed. Gender-inclusive design is one important dimension of inclusive design. Of course, it is not the only one, and it is not the most important. However, since designing a product or experience that is fully inclusive can be overwhelming to imagine, a starting point is needed. In the words of Vale Querini, designer and gender inclusion expert: «*Gender is a great place to start!*»

Gender is undoubtedly a significant part of our identity and concerns us all. Designing for all gender identities means acknowledging this and creating experiences that do not discriminate based on gender [2].



**Figure 4.** Unisex logo designed by Pekka Piippo including both symbols for fe/male, fluid definitions, gender re-assignment or genderless people. Courtesy of: <https://uxspot.io/designing-for-gender-neutrality.html>.

A lovely example of this is represented by the Unisex Logo designed by Pekka Piippo, which includes all the different gender types in one single element [3]. Creating experiences that are always enjoyable, regardless of gender identity, is also one of the challenges that MUV B Corp has decided to embrace since its inception.

## 4. THE MUV PROJECT

MUV, an acronym for Mobility Urban Values, is a sustainable mobility entertainment platform. It has been a Horizon 2020 project, developed between 2017 and 2020, which, thanks to the impressive results achieved, became a startup and B Corp in mid-2020 [4]. MUV was born trying to answer a question as simple as it is challenging: *how might we let citizens & organisations play an active role in a more sustainable future?*

The solution focused on citizens' behaviours by nudging more conscious everyday mobility choices and promoting a greener and more active lifestyle.

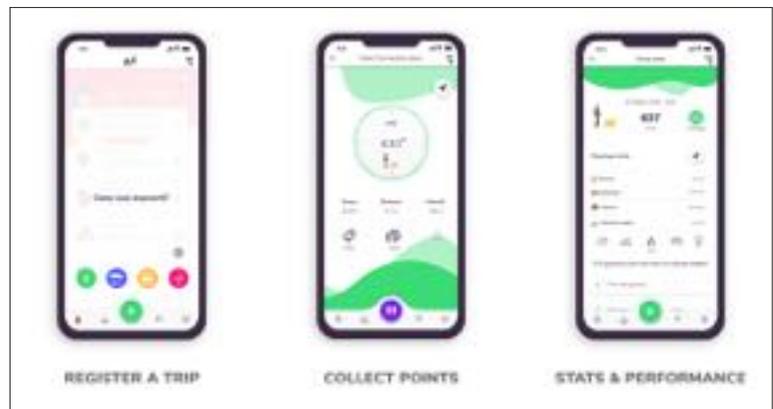
It consists of a digital game that turns sustainable urban mobility into team sport and citizens into athletes competing with each other in open challenges and tournaments.

MUV's game mechanics are pretty simple. Players can

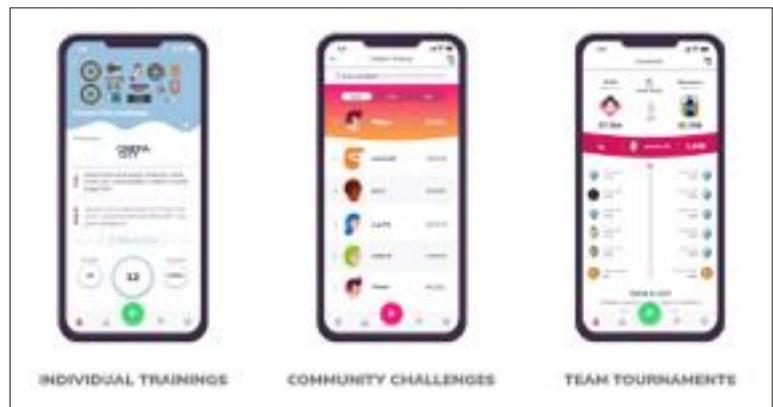
track their sustainable trips and earn points through the mobile app. Points depend on the length of the trip and the chosen means of transport, and at the end of each travel, a short report shows the impact of one's mobility choice. The points collected are exploited in various game dynamics inspired by sports, such as individual training sessions, community challenges and team tournaments.

Another key aspect of our

service is the use of data. Besides developing a certified algorithm to calculate the CO<sub>2</sub> reduction generated by users simply by playing, all the mobility data gathered are exploited to support companies, universities or schools in drawing up mobility management plans and public administrations in enhancing their sustainable mobility policies. MUV has proven effective and generated a significant impact in terms of CO<sub>2</sub> savings as



**Figure 5.** Screenshots summarising MUV's game mechanics: track a trip, collect points and get info on one's mobility choices.



**Figure 6.** Screenshots summarising MUV's game dynamics: training sessions, community challenges and team tournaments.

active users have reduced their emissions by 32% during their involvement in various competitions [5].

## 5. CASE STUDY: HOW MUV IS DESIGNED FOR EACH GENDER

Significant effort was invested during the design and development of MUV to make it as inclusive a service as possible. Three basic principles have been adopted from the earliest stages and consistently over time to achieve this result. They are *inclusion by design* (1), i.e. envisioning an experience that is not categorised by gender; *continuous improvement through user feedback* (2), which means constantly asking people how to get better and listening to their requests; and *fostering a growth mindset* (3), by learning from mistakes and fixing things as soon as arising.

All the efforts can be sorted into three macro activities:

1. Asking for gender, or more precisely, sex.
2. Using gender-inclusive language with particular attention to microcopy.
3. Crafting an inclusive vision suitable for the app, website and communication materials.

### Asking for gender sex

Knowing the gender of MUV

players is not much helpful information because this does not affect the game, mobility habits or calculation of impacts. On the other hand, knowing their sex allows for refining the calculation of calories burned which is one of the pieces of information used to show the impact of mobility choices.

So in the personal data section within the settings, the item "sex" allows you to select the options *Intersex*, or *I prefer not to say*.

### Using gender-inclusive texts and microcopy

The MUV service is available in two languages, Italian and English, and in both cases, great care has been taken to use inclusive language. Gendered words and pronouns were avoided. In particular, any passive verbal form has been carefully avoided since every past participle in Italian has a desinence that identifies masculine or feminine. In this context, UX writing, i.e. creating texts for the interfaces

of digital products (as websites or mobile apps), is vital. It includes the text on buttons, menus, error messages and more. These little pieces of text are named microcopy [6]. Creating inclusive microcopy is a fundamental step toward inclusive digital products.

### Crafting an inclusive vision

MUV relies on avatars to visualise its athletes. No names are shown to avoid cases where the chosen name does not match the legal one. A total of 73 avatars were designed to ensure a wide choice. Of these, 30 are male, 32 are female and 11 unsexed. In addition, MUV is based on a varied, plural graphic identity that does not reinforce stereotypes regarding colours, clothing and activities. The aim is to portray an active, vibrant community represented by a mix of genders to give room for every identity. This graphic language has been used not only within the MUV mobile app but also on the website and social media.



Figure 7. An example of MUV's graphic identity.

## 6. CONCLUSIONS: LESSONS LEARNED SO FAR AND A FINAL OPEN QUESTION

Designing inclusively is undoubtedly hard work, which requires a lot of attention and empathy, which never has an endpoint, but that one can always try to improve a little more. Moreover, everything is highly subjective; therefore, no matter how hard one tries to be inclusive, sometimes individual perception or bias is the real obstacle to overcome.

To explain this concept well, a real-life episode related to MUV activity may be helpful. Among the communications elements recently produced for a client, a graphic has been developed to convey a sense of teamwork and commitment to sustainability.

After receiving it, the client asked for a slight adjustment as the image needed to be considered more inclusive. As they highlighted, this aspect was considered very important for the company. They stated:

«A big topic for our company is gender, diversity and inclusion issues, and we would like to have these aspects respected in everything we do.»

«Could you change one person (the one standing on the left) to female?»

After acknowledging that the character in question was a



Figure 8. Graphics created to promote MUV within a corporate community.

woman, the following request was:

«Could you please make it more recognisable, maybe even with a dress?»

The final result can be seen in the image below.

Therefore, the final open question arising at the end of this work is, “is a woman wearing trousers or a dress more inclusive?”. The answer, probably, is in the eye of the beholder.



Figure 9. Final graphics created to meet specific requests.

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# NEW RESEARCH PERSPECTIVES FOR DESIGN AND DIGITAL SPACES

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## ABSTRACT

The research focuses on the value of digital archives as resources to be designed and exploited, tools for innovation based on the knowledge reuse system. Starting from the scenario that animates the debate on the new dimension of the archive, especially in relation to the topic of Digital Humanities, the contribution intends to investigate a specific context such as that of digital archives in the design sector. At the same time, it is intended to frame this condition in relation to what has developed in terms of research and data collection in recent years. Focusing on the theme of archives operating in the scientific and cultural sphere, and through the analysis of a case study, the aim is to examine how these archives organised in digital spaces are not simply repositories of documents, but rather an opportunity for connection and valorisation for direct access to documents, often unpublished sources, in order to foster the development of new research and study scenarios also for the category of design and its history. In the second part of the article, on the one hand the accessibility and structure of websites containing archive spaces through a seriality of documents will be examined, on the other hand the role of the designer within the design of a digital archive.

**DIGITAL ARCHIVES, DIGITAL HUMANITIES, DESIGN, CULTURAL HERITAGE, DESIGN HISTORY**

*This paper was reviewed by **Antonio Labalestra** from the Polytechnic of Bari and **Dario Russo** from University of Palermo.*

## 1. INTRODUCTION

The contribution intends to identify new relationships and connections between digital spaces and information architecture for digital archives in design and digital humanities in the contemporary, respectively. It is also intended to decline this area of research with respect to the topic of heritage inheritances of tangible and intangible cultural assets in the specific context of archives and museum and private collections in southern Italian regions through the analysis of a case study.

The history of design archives began to develop around the end of the 1970s, particularly with the emergence of important private collections of national interest [1]. These are archives that, compared to traditional documentary archives, have a heterogeneous classification of «designs, (sketches, final, general and detailed), photographs, models, relations, correspondence with clients and companies, etc., and in more recent years, digital files» [1, p. 10]. Since the design archive therefore consists of both visual documents, such as drawings and plans, and three-dimensional documents, such as models and study prototypes, «the variance is not only caused by the abundance of information, or by an oscillation between deposit

and museum, or between inventory and collection. Rather it is caused above all by the intentionality of the design [...]» [1, p. 10]. In fact, in these archives, where present, the digital files are made up of a multiplicity of information data designed according to a digitalisation process that makes the transposition from analogue to digital operable, therefore from systems of objects to systems of documents.

The recent relationship between design and archives first, and then between design and digital archives, not only manifests itself in this design intentionality but also and consequently in the possibility of framing the history of design «from the perspective of a history of design, i.e. of ideas, intentions and the related processing of graphic or three-dimensional models, which cannot be separated from, and indeed is necessarily preparatory to, the history of objects and artefacts» [2, p. 2].

The aim of this contribution is to develop a dual line of investigation guided by design disciplines with the aim of comparing the topic of digital archives (understood as information spaces projected by design) with the theoretical and design debate on the category of Cultural Heritage. In fact, the research intends to investigate how the potential of design can lead to the identification of new

relationships and the design of new connections with respect to the problems of reactivating the heritage of material and immaterial culture with respect to the contribution that the Digital Humanities skills in the specific field of digital archive design provide on these issues.

This will be developed according to the presentation of a case study to verify, operationally, the acquisition by design of new forms of digital mediation. Therefore, a brief analysis is proposed on the I-DEA project, a pillar project of Matera European Capital of Culture 2019, consisting of an online platform that not only gathers all the documents of the exhibition, but also contains a section dedicated to both public and private archives, with the presence of unpublished documents, present in the territory of the city of Matera and Basilicata. The analysis on this project is functional in order to understand both the opportunities that digitalisation brings to the field of design disciplines and the opportunities to enhance the cultural heritage in Southern Italy. Furthermore, with the analysis of this case study it is intended to put forward some considerations on the issue of the online availability of new materials both in relation to the recent post-pandemic scenario and its consequences in the field of research, and with respect to the problem

of managing the quantity of documents produced digitally [2].

Therefore, in this part of the article the intention is to reflect on the progressive networked availability of documents made available by the digitisation of archives, relating this condition on the one hand to the role of the designer in the design of digital archives, and on the other hand to the role of innovation tools based on the knowledge reuse system.

«Constructing meaningful relations between the extended fields of Heritage and the equally vast fields of digitisation (understood primarily as the systematisation of storable, open and sharable data) today means tackling a structural rethinking that, in the corpus of the human sciences, can grasp the opportunities and risks of a constant process of methodological and technical hybridisation that finds fruitful expression in the various operational definitions of Digital Humanities (DH)» [3, p. 9].

This annotation, contained in the article "Open Data for mapping digital humanities and cultural heritage" (*Open Data per la mappatura delle Digital Humanities e per i patrimoni culturali*), highlights a problem of no simple solution concerning the «the difficulty of delimiting the boundaries of a horizon of meaning that computational mechanisms have not merely

enriched and enhanced but have made partly different from how we were used to understanding, describing and practising it» [3, p. 9]. By this assumption, the author refers to a different paradigm of new cognitive behaviour and complex cultural phenomena to which informatisation has provided powerful tools: «Digital Humanities refers to new modes of scholarship and institutional units for collaborative, transdisciplinary, and computationally engaged research, teaching, and publication» [4, p. 122].

In fact, in an attempt to draw a correlation with current studies, the ever-increasing interest of study designers in the animated archive makes it known how «the support of information technology tools is not only fortuitous, but is probably also consequential to the new centrality we have attributed to them. Technology is not just a tool, but rather a way of thinking which implies new paradigms of reconfiguration of memory as an agent of change» [1, p. 12]. Hence, the adoption of digital determines a rethinking of the archive, both with respect to the characteristic of heterogeneity given by the type of documents – audio, video, models, etc. that are added to the paper documents – and with respect to the recourse to different design methodologies of these digital spaces: «[...] in this case,

new technologies [...] provide methods of visualisation which are otherwise impossible in the tangible reality, allowing the integration of fragments, the inspection of objects in all their physical coordinates, their three-dimensional existence: in short, they exponentially heighten tools of analysis, research, study, but at the same time even those for the communication of historical information» [1, p. 13].

Following this line of investigation opens up an interactive dimension of knowledge, as a field that can be implemented by scholars and all users in which «the culture of the digital and the geography of the online [...] may constitute the foundation for the creation of a culture of sharing, which accepts the democratic consequences of social networks, but which delimits (or neutralises) populist deviations and the temptations of technological authoritarianism» [1, p. 14].

Against a backdrop of increasingly widespread circulation of Digital Humanities projects centred on how archives can be consulted online, a theme emerges that is topical both for the progressive paradigm shift in the work of scholars, historians and archivists and for that of planners and designers. The question in fact is twofold, if on the one hand there is the possibility of deriving an

advantageous condition from the mediated use of archive sources, on the other hand this condition is determined in the design of a new accessibility structure, that is, a new organisation for the multiplicity of documents, first real and then digital. In this field of action, design stands as a joint element to make the exchange between analogue and digital possible. Thus, the opening up of new historical perspectives for the discipline of design is intertwined with new relationships of connections in the creation of a culture of sharing that is based on the system of knowledge reuse for the advancement of research, between digital spaces and information architecture. In our contemporary times, the relationship between scholar and object of study goes hand in hand with the evolution of the relationship between designer and project, insofar as the object of study (hence the sources) is the object of design by the designer. This condition is highly dependent but also clearly explicit in the case of digital transcriptions of archives in an attempt to move towards new forms of historicisation of sources in favour of direct access to documents.

## 2. THE I-DEA CASE: PROJECT FOR MATERA EUROPEAN CAPITAL OF CULTURE 2019

In order to verify not only in

theoretical terms but also in practice the assonances between the above-mentioned considerations and the object of investigation on the relationship between archives and the digital, the analysis of a rather recent case of digital transcription framing a particular research context is proposed; that of digitised archives in the Cultural Heritage sector in the heritage context of Southern Italy. The case in question is the 2019 I-DEA project for the Matera European Capital of Culture event<sup>1</sup>.

On this occasion, five exhibitions were presented, curated by leading international artists and designers, using the archives as a starting point: «drawing on seemingly disparate documents and materials, the artists were invited to delve into the archives and formulate their own readings in the form of temporary exhibitions»<sup>2</sup>. In fact, the project was structured from a mapping exercise to identify archives and collections in the region carried out by the University of Basilicata. The first part of the work, which lasted several months, involved not only large public archives, but also small private collections, as well as museums, foundations, consortia, associations, film libraries, libraries, research centres, laboratories, archive repositories, and much more. The theme that united the work displayed in the

exhibitions and coincided with the objective of the project and the research team was to keep «an inquisitive approach towards the shifting question of what constitutes an archive or collection over time and across space»<sup>3</sup>.

The second part, on the other hand, dealt with a process that was defined by the working group as an accumulation process, where the idea of accumulation refers to the archive system as a mutable element: «I-DEA has therefore adopted an open and modular exhibition design system, designed by the Open Design School, in order to introduce a fluid, non-didactic spirit to the curation of archival and collection materials»<sup>4</sup>.

In fact, the five exhibitions were opened one after the other, in consecutive order, inviting each artist to add to, rearrange and remove material already installed in the space by the previous curator. The result was a collective, dynamic performance in which the visitors were also able to attend, then participate. The online platform that was finally designed and put online to collect the artists' experiences, collect the documents and digitise the selected archive sources is also constantly evolving.

The I-DEA project, curated by Joseph Grima and Chiara Siravo, consisted of five exhibitions curated by: 1) Mario Cresci, with an exhibition entitled "The Two Cultures.

Artefacts and Archives" (*Le Due Culture. Artefatti e Archivi*) consisting of «archival material spanning the second half of the twentieth century and the first decades of the twenty-first [...], explores the intersection of disciplines (cultures) in Basilicata, as seen through photography, craft, science and machines»<sup>5</sup>; 2) Studio Formafantasma with "Unique Vision. Cultures of Environmental Manipulation" (*Visione Unica. Cultures of Environmental Manipulation*) in which «drawing upon a variety of local archives as well as unorthodox sources, which implicitly complicate and question the definition of what is an archive and what it means to store information, *Visione Unica* is an installation made up of five projections, ten screens and a small selection of vernacular objects»<sup>6</sup>; 3) Virgilio Sieni with "Thauma:

Atlas of Gesture. 5 Exercises" (*Thauma: Atlante del Gesto. 5 Esercizi*) whose exhibition «consists of a series of vertical and horizontal panels and a cycle of bodily practices, is fundamentally a response to our inheritance both from the archive and the homes of individuals»<sup>7</sup>; 4) Navine G. Khan-Dossos e James Bridle, "The Land of Cuccagna" (*Il Paese di Cuccagna*) exhibition that gathered «objects and stories from across Basilicata which attest to the lifeforce of legends, fictions, and non-humans, and their entanglement with our own lives»<sup>8</sup>; 5) Pelin Tan e Liam Gillick, "Inhabiting archives: communities, movements, harvests" (*Abitare gli archivi: comunità, movimenti, raccolto*) where «the entanglement of archives on show explores the dilemma of dwelling as a 20th century theme that can be

read in the present context of Mediterranean migration flows and displacement within the region of Basilicata»<sup>9</sup>.

The project, consisting of five exhibitions set up in the Hangar of *Parco Scultura della Palomba* also known as *Cava Paradiso*<sup>10</sup>, also included the organisation of performances, workshops and publications on the research conducted, but above all the development of a digital platform (**Figure 1**).

The latter consists of an interactive web space that brings together both the documents presented in the exhibitions, a total of 225 documents, and the archives, 42 in all, that participated in the project in the Basilicata region. Some of these are public archives, others are private collections whose networking represents the publication of unknown sources. From each archive, documents were



**Figure 1.** The graphic interface of the digital platform of the I-DEA project.

selected and detailed files were published containing information on ownership, bibliography, contents, history, themes, location, number of objects, period, purpose, space, type. Among the realities whose archives have been published within the

platform is, for example, the *Museo di artigianato rurale e collezione dei legni intagliati Giovanni e Giuseppe di Trani*, the *Archivio di Stato di Matera*, the *Associazione Archivio Storico Olivetti*, the *Archivio Storico Pirelli*, the *Archivio Mario Cresci*, the *Biblioteca*

*Digitale Italiana*, the *Archivio Audiovisivo del Movimento Operaio e Democratico (AAMOD)*, the *Archivio Studio Formafantasma*, the *Laboratorio di Etnomusicologia e Antropologia Visuale (LEAV)*, the *Rete Carnevali e Machere della Lucania a valenza antropologica*

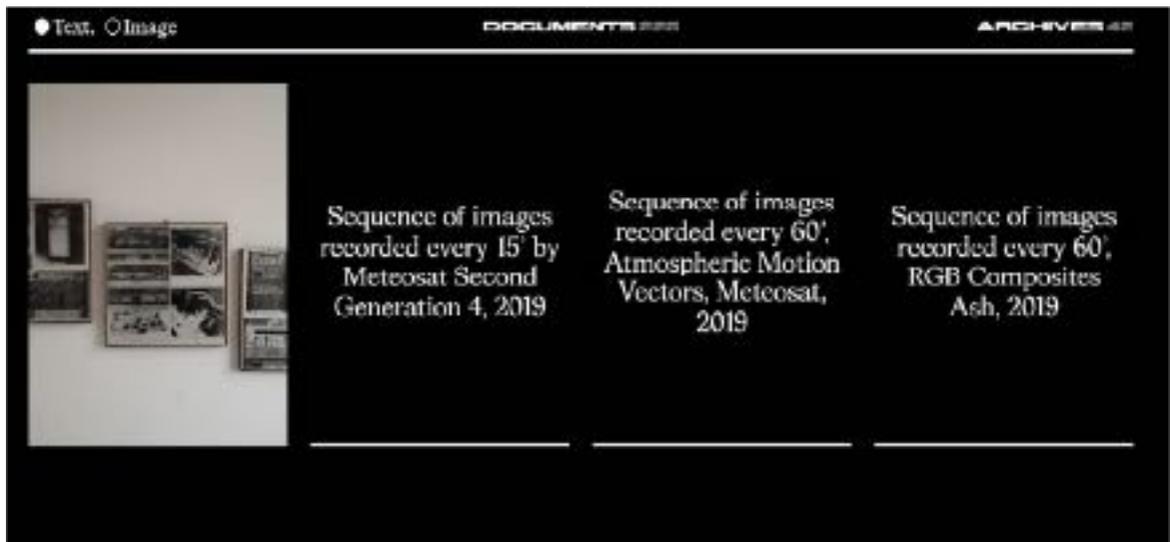


Figure 2. The graphical interface of the I-DEA platform: viewing documents.

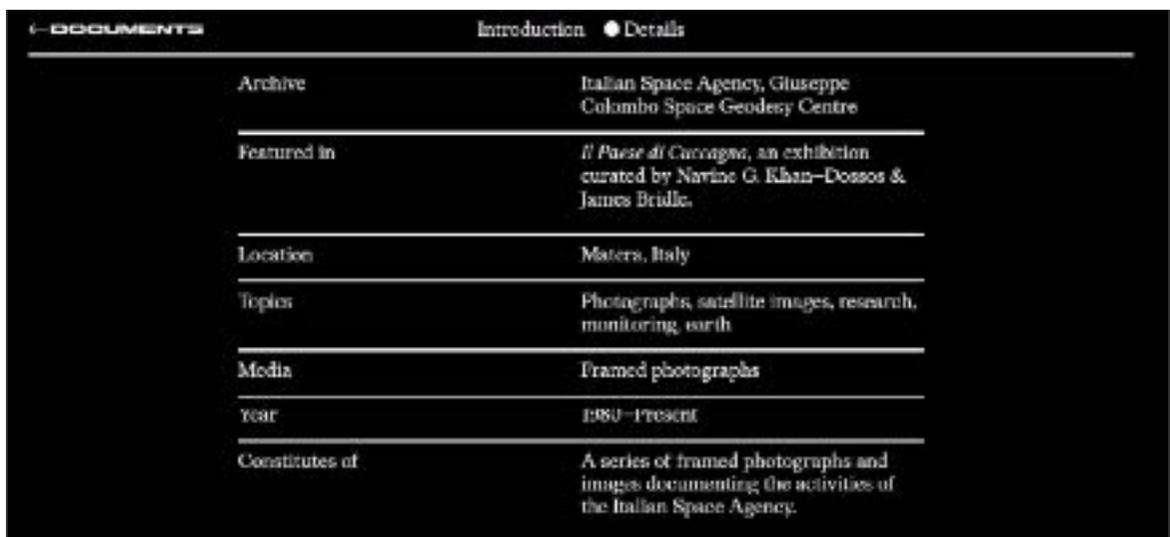


Figure 3. The graphical interface of the I-DEA platform: detail sheet.

*e culturale* and many others. It is therefore an experiment that shows how archives, artistic and anthropological collections can be the subject of project experiences for understanding and enhancing the history and culture of a territory.

The platform was put online

after a process of sorting and digitalisation promoted by a very heterogeneous team of professionals. In addition to the curators and the main organisers, the Open Design School (which dealt with the exhibition design project), the Matera Basilicata 2019

Foundation and the University of Basilicata also took part in the working group.

The online platform presents itself to the user with a very intuitive graphical interface offering two search modes: one by documents (**Figure**



Figure 4. The graphical interface of the I-DEA platform: viewing the archives.



Figure 5. The graphic interface of the I-DEA platform: main menu screen containing the list of the 5 exhibitions.

2) – a total of 225 documents, each with the entries author, archives, selected by, place, subject, media, year, consisting of (Figure 3) – and one by archives (Figure 4) – 42 sections leading to the folders containing the selected documents for each archive –. The main section lists the five exhibitions identified by the name of the curator and the exhibition period (Figure 5). Each of the exhibitions has its own section where it is possible to find an explanatory introduction on the content of the exhibition, a collection of images of both the exhibition and the most important documents, a list of the curators, the selected documents with their detailed information sheets, and a list of the selected archives also with their information sheets (Figure 6).

In the presentation of the project on the I-DEA platform website, it is written that it «is a project [...] that explores the archives and collections of Basilicata from an artistic perspective. I-DEA is an experiment in how archives and collections can be understood as living entities through which the stratified complexity of a region's history and culture can be interpreted»<sup>11</sup>.

The synoptic view of the multiplicity of documents and information made possible by the platform adequately accounts for the multifaceted cultural heritage present in

the territory, from the *Centro di Geodesia Spaziale Giuseppe Colombo*, to the *Fondazione Leonardo Sinigalli*, to the *Agenzia Lucana di Sviluppo e di Innovazione Agricola (ALSIA) di Matera*.

The general layout of the platform declares a very precise archival character while maintaining a narrative dimension within the individual sections, allowing an interrelation between the different documents, even though they are very numerous.

The intention stated in the presentation of the project within the site with reference to the idea of the archive as mutable represents the intention to update the documentary and archival content over time. In fact, at the moment, only the documents used as exhibition material in the exhibitions and a few other selected documents are published for each archive.

The approach adopted by the I-DEA project constitutes a paradigmatic case as it aims to offer an overview for the valorisation of Cultural Heritage, understood in its widest sense, starting from the opportunities of the design project. It is even more emblematic when associated with the case of all those regions that, like Basilicata, and especially in the southern Italian contexts, have a deep-rooted Cultural Heritage, which

is the subject of research and study but also a reason for the cultural and social reactivation and enhancement of these contexts.

In the possibility that such an approach could be adopted not on a local but on a regional level, in a broader perspective it could be possible to imagine connecting relationships also on a national level in a network structure of new connections.

### 3. CONCLUSIONS

At this point, new possibilities could be imagined for relationships not only between documents but also between archives, for example by affinity of content or to advance research on the basis of the comparison methodology. This would probably open up new critical perspectives related to the possibility on the one hand of expanding the field of investigation for researchers and academics who frequent archives, and on the other hand of declining new levels of design both for the design of the archive as a digital space and for the usability and accessibility of the platform according to different research modalities.

A possible archival relationship that would allow new possibilities of connections both between documents and between archives towards new possibilities of research

**I-DEA**  
**22.03 – 07.06**



**LE DUE  
CULTURE**

**MARIO  
CRESCI**

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I-DEA

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*The Two Cultures—Artifacts  
and Archives, an exhibition  
curated by Mario Cresci.*

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**INSTALLATION VIEWS**





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● [Documents](#)    [Installation](#)    ● [Details](#)

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Author	Giuseppe e Giovanni di Tondi
Archives	Archivio di architettura rurale e coloniale del Regio Istituto Giuseppe e Giuseppe Di Tondi
Featured in	<i>House Form – Culture of Environmental Integration</i> , an exhibition curated by Studio Formaculture  <i>The Two Cultures—Artifacts and Archives</i> , an exhibition curated by Mario Cresci
Location	Arenova (PD), Italy
Topic	Agric. (rural culture), wood carving, ruralized memory, revitalization of a culture, discovery and disappearance

Figure 6. Web pages from the section on Mario Cresci's exhibition for an example of site navigation.

and design would concern a model of digital space capable of generating archival links. This is something that the I-DEA platform already offers in part by connecting with not only local archives but also by establishing thematic links with archives at national level. In fact, with the intention of archiving the activities of the Triennale, among the archives involved in the project is that of the Milan Triennale, of which the document "Cronache dell'urbanistica Italiana, 1954" (*Cronache dell'urbanistica Italiana, 1954*) has currently been selected, for "Inhabiting Archives: Community, Movement, Harvest" (*Abitare gli archivi: comunità, movimenti, raccolto*) an exhibition curated by Pelin Tan and Liam Gillick. In a possible scenario of progressive growth of a culture of sharing and in an increasingly real perspective of open-source use, digital spaces such as archives are today no longer understood as units closed in on themselves, neither by researchers nor by those who design them, in favour of a model of information architecture that is increasingly active and able to create links in a networked system.

In the particular context that characterised the pandemic and post-pandemic period, the possibility of using active, online and universally accessible platforms such as the I-DEA platform was a

turning point for research and development activities, and also provided an opportunity to verify how far technological advancement goes hand in hand with contemporary phenomena and was able to make up for numerous shortcomings in such circumstances.

As more and more platforms are moving in this direction by referring to common languages and methodologies that allow different systems to interact, the potential of open data is being exploited to the full to foster the connection and the possibility of relationships between archives.

## NOTES

- 1 For more information on aspects related to the I-DEA project, see the web page <https://idea.matera-basilicata2019.it/it> (May 2022).
- 2-3-4-5-6-7-8-9 cf. footnote 1.
- 10 The **Parco Scultura della Palomba** is one of the largest calcarenite quarries. The space, which assumed its current state after a century of quarrying, was transformed in 2000 into a sculpture park where works by Apulian-born artist Antonio Paradiso are located, exploring the relationship between human beings and nature.
- 11 cf. footnote 1.

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