Senses & Sensibility'21

Designing Next Genera(c)tions

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Senses & Sensibility '21: Designing Next Genera(c)tions

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Table of Contents

Proceedings of the 11th International Conference,
Senses & Sensibility: Designing Next Genera(c)tions
09-11 December 2021, Bari, Italy

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Senses & Sensibility '21: Designing Next Genera(c)tions

The time between the 10th International Conference Senses&Sensibility'19 in November 2019 and this edition in December 2021, represents a period of important changes. The pandemic of Covid-19 started in November 2019 changed the lives of billions of citizens, with significant repercussions on the economies and radical changes in the social contexts.

The various responses to this event showed important capabilities in terms of resilience and reactions to the change. This occurred, in various forms, in all the main areas impacted by the emergency (from school to work, from the family to the most extended social communities), and in relation with the territories, the cultural contexts, the communities, and the organization of the productive systems (industrial and manufacturing).

Even if the post-pandemic scenario is still not defined, the need to move the action plans towards process adaptability appears quite evident. In this context, the design reflections are encouraged to move towards a new transitoriness and planned flexibility.

The post-pandemic transition is presented as a high complexity task. Firstly, because it is expected to last a long time, and secondly because it will be a pot for the most cogent questions coming from the past, about instances for many years in the European and Trans-European agendas, such as fair climate, digital transition, recovery and resilience in health, biodiversity protection e gender equality.

The political interest on these topics, together with new reflections regarding concepts as exaptation and dark ecology, are signs of a new awareness in which the means and the forms of the knowledge are placed at the center of the investigation in a new context that is no more spatially static and temporally measurable, but in a continuous variation of solution and complication, according to a principle that we could define as "trans-action".

The International Conference Senses & Sensibility'21: Designing next Genera(c)tions intended to collect from researchers, practitioners, students, and academics original cutting-edge contributions, with a focus on inter-generational relational dynamics and the role of the inter/trans-actions activable in design, that must be used for building long-time scenarios.

The aim was to activate a new perspective in which the internal problems of the different design fields are addressed with a new co-evolutive responsibility that, through the research, acquires new determinations.

The "Interactions" and "trans-actions" become two possible strategies to activate processes that might involve design practices and enable the capabilities of the multiverse design, requiring the interpretation of the following terms/principles.

Interactions	interception, interchange, interface, interference, interpret, intersection, intergeneration, interconnection, intercultural, interdisciplinary, interstice, international, interface, interval, intermission, internet, ….
Transaction	transcript, transdisciplinary, transferability, transference, translation, transform, transfusion, transhumanism, transience, transition, transubstantiation, transpose, transmigration, translate, transcode, ….

The Design course of DICAR (Dipartimento di Ingegneria Civile e dell'Architettura) of Politecnico di Bari, and UNIDCOM/IADE, Unidade de Investigação em Design e Comunicação, questioned possible scenarios that the academic design community might generate in a context which unites both realities

Keynote Speakers

Mathilde Bretillot

InteriorDesign/Design/Creative Director Celebrated Paris-based International designer, Mathilde Bretillot is known for her signature works, be they quirky twists on traditional luxury for Christofle, DAUM, la Manufacture de Sevres, and Boffi — or global projects in Europe and Asia for restaurants, movie theatres, apartments, houses and offices. Her iconic simplicity — often married with color and mirrored surface– belies a passionate interest in design as a joyful expression of life in its richness for all ages, in all places. From interior architecture to product development her work is seen widely in France, and across a range of brands worldwide. Early on Bretillot worked in Milan and London taking up the experimentation and social interests of Memphis to Solid.

Keynote Speakers

Peter-Paul Verbeek

Peter-Paul Verbeek (1970) is Distinguished Professor of Philosophy of Technology and codirector of the DesignLab of the University of Twente. He is also honorary professor of Techno-Anthropology at Aalborg University, Denmark. His research focuses on the philosophy of human-technology relations, and aims to contribute to philosophical theory, ethical reflection, and practices of design and innovation. He is also chairperson of the UNESCO World Commission for the Ethics of Science and Technology (COMEST). Currently, he is one of the 6 Principal Investigators of a 10-year research program on the Ethics of Socially Disruptive Technologies.

Keynote Speakers

Lorenzo Imbesi

Lorenzo Imbesi is an Architect, PhD, and Full Professor at Sapienza University of Rome, where he is also director of SDR Sapienza Design Research. Previously, he was an associate professor and the chair of the Master of Design at Carleton University (CA). At the moment, he is a member of the Cumulus Association Executive Board, where he is chairing the Cumulus PhD Network, a member of the Executive Committee of EAD European Academy of Design, and a member of the board of SID Italian Society of Design. Also, he is co-editor of the Design Principles and Practices Journal Collection and a member of the editorial board of The Design Journal and DIID Disegno Industriale.

Keynote Speakers

Lara Penin & Gui Bonsiepe

Presentation of the Book – The Disobedience of Design – Gui Bonsiepe

This volume presents for the first time in English a curated selection of writings by the design thinker Gui Bonsiepe from the 1960s to the present day. Addressing as it does questions of non-Western design and a design practice that is both radical and democratic, Bonsiepe's work has assumed new importance for current debates inspired by global political and environmental crises. Structured into three sections, the anthology first addresses Bonsiepe's work on design theory and practice, particularly in relation to the history and contemporary relevance of the Ulm design school, where Bonsiepe was a professor in the 1960s. A second section then represents Bonsiepe's writings after his move to South America in the 1960s and '70s, where he worked as a design consultant for the Allende government in Chile before the military takeover. In writings from the period, Bonsiepe explores the concept of design 'at the periphery' and the relationship of national design traditions and practices in Latin American countries to those of 'the core' – Western European and American design. The final section comprises selections of Bonsiepe's writings on design in relation to literacy and language, visuality and cognition. This indispensable volume includes new interviews with Bonsiepe as well as his original, previously unpublished texts.

Track 1
Design for Territories and Cultural Contexts

Track 1
Design for Territories and Cultural Contexts

Ecolã Textile Company on the Axis of Culture and Tradition Dialogue Sustained since the 3rd Generation

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Traditional weaving art has been a part of the rich cultural heritage that reflects the identity, essence, tradition, traces of the times and lifestyles of the nations throughout history. With the effect of technological developments in the industrial period, the traditional production method has been replaced by mass production, and weaving has turned into an important industry branch due to its added value, employment and contributions to the country's economy. However, without ignoring the needs of the age, nations continued to protect their own identities, traditional and cultural characteristics, transfer them to original local designs and ensure their sustainability from generation to generation, with the effect of globalization.
The aim of this study is to examine and record the raw material, loom, weaving technique and local product features and fabric design process of Ecolã Textile Company based on traditional craft-based production. In this study, ethnographic research method was used. While the universe of the research is textile companies in Portugal, the sample of the research is Ecolã Textile Company in Manteigas, Portugal. Within the scope of the research, a semi-structured interview form consisting of 29 questions was applied as a data collection tool.

Keywords *Culture, traditional, weaving, design, craft-based*

Introduction

Culture, forms, norms, values, ideas, behaviors, attitudes, etc. It constitutes the social mixed structure that is channeled, developing and changing. At the same time, culture, history, literature, art, design, etc. It also covers various fields (Kroeber, 1952). White (1940) emphasizes that culture is basically the way of life of human beings. Geertz explains it with a similar approach:

> *"Culture is the fabric of meaning in terms of which human beings interpret their experience and guide their action; social structure is the form that action takes, the actually existing network of social relations" (Geertz, 1973).*

In another definition, culture is emphasized all the tangible and intangible heritage that people inherit from their ancestors, use, transform, add and transfer to different periods (Firth, 1963). The art of weaving, which dates back to ancient times, has emerged to meet the needs of protection, dressing, covering and adornment in human life. The art of weaving, which continues to develop day by day, diversified and progressed according to the cultural and local characteristics of each nation, art, design, technical knowledge and ability (Blumenau, 1955; Gürsu, 1988). Traditional weaving art includes the craftsman's tradition, culture and working principle shaped by his instincts. However, with the industrial revolution, a transition was made from the craft stage to the modern industry stage, and differences began to emerge in the traditional production method. An industrial production system with less manpower and more production capacity was adopted in a shorter time (Hamitoğulları, 1982). With John Kay's invention of the "weaving shuttle" in 1733, the weaving process became easier and production accelerated. Progress has been made in the development of weft insertion systems and the mechanisation of looms. In addition, innovations in the field of weaving reached its peak with the invention of automatic shedding systems working with the help of punched cards and the jacquard machine in order to produce complex patterns (Alpay, 1985). These radical technological developments and inventions in the 18th and 19th centuries led to the creation of many new industrial areas, especially the weaving industry. However, although industrial weaving production is fast in terms of time and labor, it has caused the standardization of weaving products (McNeill, 1989/1994).

Keeping up with the returns and conditions of the changing age brings together monotony and alienation from its essence, while meeting on a common ground in the international arena. Today, changes in science, technology and industry affect cultural, social and social life to the same extent. Especially with the effect of globalization, while cultures reach beyond borders, it is important for societies to protect and maintain their identity, essence, values, accumulation, tradition, art, cultural heritage and to record them with scientific studies (Başaran, 2018). This study is important in terms of revealing how the traditional weaving craft of the Portuguese family company is followed in terms of raw materials, weaving production, the preservation of the local cultural characteristics in terms of design, keeping them alive, ensuring their sustainability from generation to generation and transferring the cultural heritage to the international stakeholders. This study was carried out in order to examine the Ecolã Textile Company in Manteigas, Portugal, where the traditional weaving heritage continued since the 3rd generation, and to reveal the raw material, loom, weaving technique, traditional products features, weaving product design process.

Method

In this study, ethnographic research method was used. A comprehensive literature review was conducted in line with the available sources. While the universe of the research is textile companies in Portugal, the sample of the research is Ecolã Textile Company in Manteigas, Portugal. Semi-structured interview technique was used as a qualitative data collection technique was used in this study. In the semi-structured interview technique, questions are asked by the researcher to the person participating in the research, regardless of a certain order. Depending on the flow of the interview, additional questions may be asked by the researcher (Smith, 2003). The interview form consisting of 29 questions was personally applied by the researcher after receiving expert opinion. The interview with António Costa who is Ecolã company authorized was video recorded. The data obtained as a result of the literature review and the interview were evaluated and were explained under appropriate sub-headings.

Findings

It has been made an interview with António Costa in the scope of the research. To briefly mention António Costa, he is 55 years old and graduates Law University in Lisbon-Portugal. He works at Ecolã that is a very small company handicraft based since 2003. He has responsible for commercial issues of the company. His first task is to talk and to organize international clients namely, Japanese, German clients. As a result of the interview with António Costa, the following data were obtained.

Ecolã Textile Company and Its Brand

Ecolã was founded in 1925. It is in Serra da Estrela which is the highest mountain in Portugal (see Figure 1). Ecolã is a handmade

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Figure 1. Ecolã textile company (Ecolã Portugal, 2021).

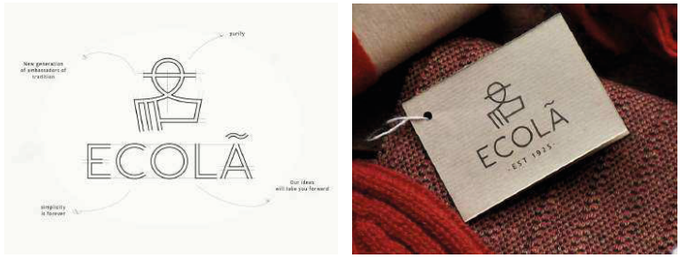


Figure 2. Ecolã brand (Ecolã Portugal, 2021).

certificated third generation family and now, third generation is leading in the company. Ecolã's speciality is following all cycle of the wool since the shearing until the final products. According to people from organization of handicraft certification, this is the oldest family and 100% Portuguese company in Portugal. 20 people work in the company. Two of them are (fourth generation) in the family and the others are Portuguese local people. Ecolã brand identifies the simple and genuine colors of pure sheep wool. And also its brand has ecological label. 4 points have emphasized in the brand: "new generations of ambassadors of tradition", "purify", "simplicity is forever", "our ideas will take you forward". In this way, while respect for Portuguese cultural heritage and the natural elements linked to the Portuguese mountain culture, especially it has been focused future and innovation (see Figure 2).

Raw Material Features

It uses mainly 100% natural wool yarn from the local sheep which is called "Bordaleira Serra da Estrela" (see Figure 3) and "Merino wool" as warp and weft yarn in the products.

The stages of obtaining yarn from wool fiber are as follows:

1) Shearing Process: Spring is the right time to shear wool from the sheep to ensure its growth till the following winter. Starting with the legs the wool should be removed in one go. Approximately 6 kg of wool is obtained from each sheep of which only 3 kg are of fine wool.
2) Selection Process: For textiles only the best quality wool is used which comes from the animal's back which is the longest and cleanest. The wool from underneath is very short and the rear area is very dirty (see Figure 4).
3) Spinning Process: Spinning can be done with a manual or electric spindle which transforms the wool into yarn, twisting it to obtain yarn of the desired thickness. It is used 100% natural wool as raw material both warp and weft yarn. Especially it should use "Bordaleira Serra da Estrela" for making good Burel quality (see Figure 5).

Figure 3. Bordaleira Serra da Estrela (local sheep) (Ecolã Portugal, 2021)

Figure 4. Shearing and selection process (Ecolã Portugal, 2021)

Figure 5. Transform wool into yarn (Spinning Process) (Ecolã Portugal, 2021)

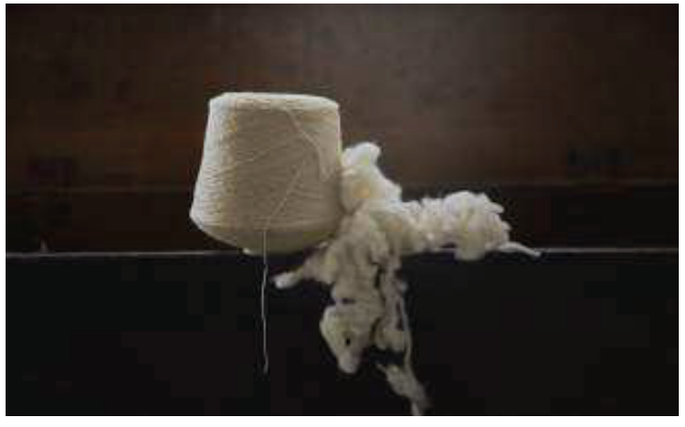


Photo 6. Weaving Process (Ecolã Portugal, 2021)

Loom Features
There are 16 weaving machines in the company. While some of them are Gripper machines, the others are Lucas shuttle looms in the company. They are very old models which are in 1940-1950. Gripper (half manual- half electronic) machine that is worked by punchcard and one shuttle of loom. Punchcard can be reuseable for 3 or 4 years. When the punchcard is destroyed, it has been needed to use new punchcard. The gripper loom models are "Sulzer", "Somet" and "Nuevo Pignone Smit". The shuttle loom "Lucas" was produced in Covilhã (see Figure 6). It is used Only plain weave and twill as weaving technique in the fabrics. The weaving process is listed below (see Figure 6).

Finishing Process
Dying process is made outside of the company. After weaving it is used ironing brush to become softer. But Burel fabric doesn't need to finishing process. According to the final function of the product it is made finishing.

Product Features
Ecolã company has two main product dimensions that are home textile and fashion- accessories. Various products are made like burel fabrics, handmade carpets, curtains, bedcovers, throws, blankets, woman clothes (coat, vest, poncho, cloak), man clothes (coat, vest, cardigan, jacket, cloak, blazer), bags, backpacks, leggings, mittens, caps, shawls, slippers, scarfs, baby bags, baby blankets etc. Ecolã company produces a special woven product called Burel. Burel is a traditional Portuguese fabric made from 100% pure sheep wool, always connected to Region of the Serra da Estrela (highest mountain in Portugal), mountains and shepherds with their handmade covers. The authenticity of the Burel is a result of a specific sequence of operations in the manufacturing process. The wool after being sheared, washed, spun and woven in a loom of shuttle, is pounded and scalded on a machine called "Pisão". This operation "pisoar" transforms the tissue in Burel and ensures the genuine and unique characteristics of this fabric: strength and high resistance against cold and

Figure 7. Burel fabric (Ecolã Portugal, 2021)

rain. Burel is not felt. Because burel fabric is weaved and also can reverse same shape when you use force, but felt doesn't reverse same shape. Also Burel is a Portuguese method to make what a improve wool. There are similar materials in the northern of Austria, Italy and France. Burel is a life-time investment for it is a natural wool as a material. It is used local sheep type as wool (see Figure 7).

Design Features and Design Process
The used patterns in fabrics are the tweed, herringbone, checks, stripes, and diamond. The major part is based on the regional patterns. It doesn't make triangle, floral, cycle motif by reason of limitation of weaving system (see Figure 8). The patterns preferred by international customers Mr. Costa expresses it as follows:

Figure 8. The Losa pattern, a diamond shape style (Ecolã Portugal, 2021)

"I don't know why stripes do not prefer by France. Another example is Japan clients prefer minimalistic shape pattern and multi-functionlism like origami. German clients prefer fuctional based fit simple designs instead of pattern, otherwise Italian clients prefer orientalist pattern." (A. Costa, personal communication, June 28, 2017).

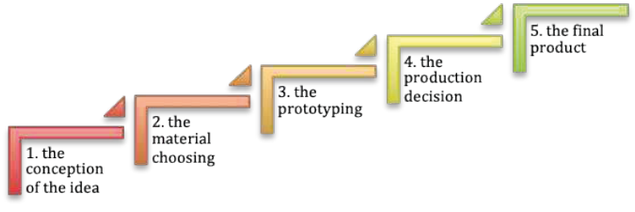
It is still using patterns since the beginning of the company. For new markets such as Germany, Japan, even Italy from time to time it is made new models. People in the factory have skills with to making and creating new models. Also, designers are sometimes worked with for new designs. It is worked with designers such as Thomaz Bondioli (Brazilian Designer) and Fernando Pedro (Portuguese Designer) for mainly making new products (e.g. one clothes and table for office). 4 or 5 years ago it has been worked with Nele De Block who is a Belgian Designer to make accessories and clothing that is ecological and minimalist design. They come to the factory and stay for 1 or 5 days when collaborating with the designers. The following points are taken into consideration during the design process. The fabric design process consists of five important stages: the conception of the idea; the material choosing; the prototyping; the production decision and the production itself (see Figure 9). Products are customized according the client needs and market trends.

Color Features

Usually it is preferred the natural colours of the typical sheep of the region, "Bordaleira Serra da Estrela" which is white, beige, brown. Since 1925 it is used dyed colours with a ecological certification Ecotex 100. Ecotex stylizes minerals and vegetables, not chemicals. Mr. Costa also states below that they can make different colors in accordance with customer demands.

"Besides, we can do customized colors. For example if the clients want to make 50 meters color, we can do special colours for the clients. According to my experience, Portuguese people prefer all the colours, but I can say you we sell blue blankets in France; a lot of natural colours products (white, beige, brown) in Germany; powerful colours products (strong red, pink, yellow) in Italy. Also Israel is new market this year when started to sell products. Israel clients prefer conservative colors (white, beige, brown). The reasons for that are the marketing tendencies. Normally, German people are related to less-fashionable products. Because they want very useful things. If we go to Italy, we can discuss with a man about blue colour of belt should be same colour with trousers. It depends on product. Each country has its culture. In my opinion, all the fashion level and fashion people are the same everywhere. Even in Turkey you can find very well designers, you do not know if it German, French, Dutch. It is part of the my job to understand different cultures." (A. Costa, personal communication, June 28, 2017).

Photo 9. Fabric design process



Conclusion

Ecolã Textile Company is based on traditional craft-based production, because is related with its background and with its production. products are exported Japan, Germany, France, Italy, Israel (New Market), Spain, Switzerland, Austria, The United Kingdom. Mr. Costa explains the success of the company in the national and international arena as follows:

"The quality of raw material and relation quality-price are the key of our success. First, from shearing to selection is the most important part for the quality of raw material. Second, it is quality of the weaving. You should do width density. Third is good commercial. Listen your clients for expectation client. For example, if you send an email in the morning, normally you will answer at the end of the day. To be available is rule of the market. We have a high level customers loyalty for those reasons. Also, we created a brand Ecolã (eco-wool) based on a local product, which is the wool from the Bordaleira sheep of Serra da Estrela. Yes, we have Portugal company since 1962 or 1964 in Portugal market and my German client we work with us for 14 years and also my Japanese client since 2008 in International market." (A. Costa, personal communication, June 28, 2017).

As a result, to be privileged and have a say in the national and international arena, it is extremely important to be able to make cultural-local design and production, to protect and maintain the originality, provided that the characteristics of the traditional craft are adhered to. In addition, transferring cultural characteristics to contemporary weaving designs without ignoring customer and market expectations is another important issue. It is recommended that national and international projects, academic and sector collaborations be carried out in various regions to obtain sustainable and nature-friendly textile products, to revive local weaving activities, to produce them in accordance with the original.

A sustainable future for tourism sector managing Covid-19 situation.
Systemic Design approach to co-design the Place Branding for territorial and cultural cohesion.

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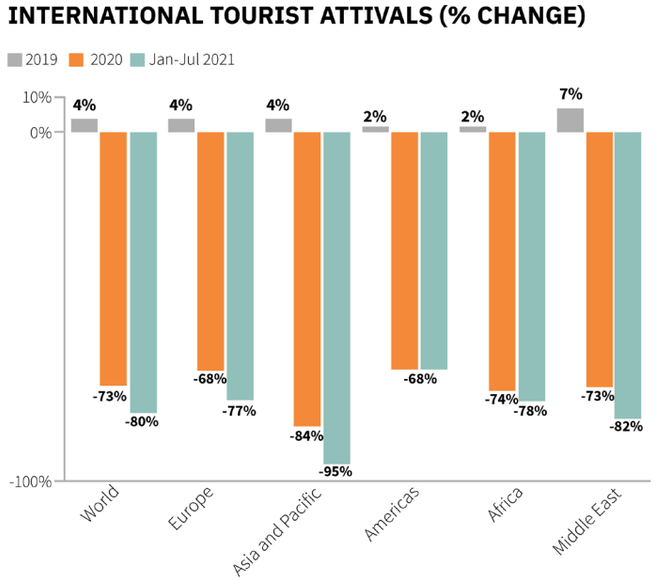
The tourism sector is by nature a complex one, characterised by a multitude of actors and supply chains that interact that interact in an implicit way during users' travel experiences. However, until the arrival of Covid-19 all its elements were considered as single and linear. The design has always been done without a holistic view of the context. The 2020 brings with it a strong need for reorganisation of the sector and its Next Rel(actions). This is one of the most polluting sectors, but it is evolving and needs a systemic vision within which design can make its complex and innovative strategic contribution. This research aims to investigate the needs of strategic stakeholders in the Piedmont region (Italy) in terms of promotion and identity to stimulate sustainable forms of territorial development, including tourism. The UNESCO denominations in Piedmont are set up as a District, which fosters dialogue and mutual exchange with regional administrations. Here they represent an applicative case study to promote a co-designed Place Branding intervention, a driver of sustainable initiatives. The paper presents the methodology adopted, which refers to Systemic Design, the activities carried out until now and the reflections for the next steps of the research.

Keywords *Systemic Design, Place Branding, Circular Economy, Sustainable Tourism.*

Introduction

The outlook for the global tourism industry is currently characterised by a high degree of uncertainty and instability due to the Covid-19 pandemic. With travel restrictions between countries around the world, the pace of tourism has slowed dramatically, affecting all parts of the supply chain.
According to the declarations made by the World Tourism Organization (UNWTO) on its website, in April 2020 during the Covid-19 pandemic, 96% of world-wide destinations had implemented travel restrictions. Around 40 destinations were experiencing a partial border closure, while 90 destinations have totally closed their borders.
The UNWTO World Tourism Barometer periodically shows the most relevant data to understand the entity of the sector and its trend. This publication would like to monitor short-term tourism trends on a regular basis to provide global tourism stakeholders with up-to-date analysis on international tourism.
The impact of Covid-19 on the sector is clearly visible in this graph (Tab.1) showing the drop in arrivals in different regions of the world, comparing 2019 to 2020 and 2021. An unforeseen and, for the time being, unpredictable situation that urges survival measures for the sector.

Table 1. International tourist arrivals, World and Regions (UNWTO)



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Higgins-Desbiolles, F. (2020). *Socialising tourism for social and ecological justice after COVID-19*. Tourism Geographies, 22(3), 610–623. https://doi.org/10.1080/14616688.2020.1757748

Maas, S., Bugeja, M. & Attard, M. (2021), *"Sustainable Tourism Mobility in Malta: Encouraging a Shift in Tourist Travel Behavior Through an Innovative Smartphone App for Trip Planning"*, Zamparini, L. (Ed.) Sustainable Transport and Tourism Destinations (Transport and Sustainability, Vol. 13), Emerald Publishing Limited, Bingley, pp. 79-95. https://doi.org/10.1108/S2044-994120210000013009

Given this current scenario, many academia areas and business sectors are trying to focus on Sustainable Tourism highlighting that it may the current situation can be a great opportunity for its development (Higgins-Desbiolles, 2020).

The Crisis Of (Tourism) Values Calls For A Paradigm Shift
It should be emphasised that the tourism sector, before Covid-19 pandemic, was already undergoing radical transformations. For example, mobility for tourism was experiencing a shift in the choice of ways to travel, especially by tourists who were more aware of their environmental impact. (Maas et al., 2021) Beyond the choices that each traveller can make as an individual, it is interesting to see how B-corp realities such as Goodwings have set up new sustainable services in recent years. They allow to their members to remove their CO2 emissions from travel or choose hotels with a low environmental impact that they have selected. But it is not such a widespread practice to make certain decisions during a trip or visit, because the factors that compromise such choices are many, from time availability to money saving or just for the sake of comfort when travelling.
In contrast to these actions related to sustainable mobility, which are still quite few and not widely considered, other transformations to which the tourism sector is subject are due to climate change, which characterise the impossibility of travelling to certain areas of the world, for example, or visiting

Figure 1. Goodwings B-corp website

and admiring animal or vegetation species because they are no longer present. Or not being able to admire ancient heritage infrastructures because they have been vandalised and cannot be restored due to lack of funds, or not being able to access certain sites because they have been damaged by civil conflicts and war. (Fyall et al., 2021)
Despite these facts, which have characterised some sites around the world for years, on the other side, for several years now, the figures for the tourism sector have been in substantial recovery.
The general economic recovery, up to 2019, has increased the spending capacity of families and therefore the possibility of more structured and elaborate trips characterised in some cases by long stays or short stays, but usually in holiday periods (UNWTO, 2020). 1.5 billion international tourist arrivals were recorded in 2019, globally, all regions saw a rise in arrivals.
According to the first comprehensive report on global tourism numbers and trends of the new decade, the latest UNWTO World Tourism Barometer, this represents the tenth consecutive year of growth. (UNWTO, 2021)
If, however, these data are analysed from a qualitative and not just a quantitative point of view, it emerges that, until the start of the pandemic, the overtourism phenomena, associated with better known and more popular destinations, characterised most tourist destinations, which needed a breath. It is thus necessary to take a two-fold perspective on the historical period we are living through, which is decisively marking what the concept and experience of travel should be.
This period of great change, due to the Covid-19 pandemic, has brought greater attention to Sustainable Tourism, a concept that is increasingly widespread throughout the world. Many political actions and governmental programmes have been set up to create international frameworks for cooperation towards sustainable tourism development.
Zurab Pololikashvili (2020), Secretary-General of the World Tourism Organisation (UNWTO), stated in July 2020 that: "The massive decline in the number of tourists threatens jobs and economies.", stressing that: "It is therefore crucial that the reboot of tourism is a priority and managed responsibly, protecting the most vulnerable and with health and safety as a major concern of the sector."
There is therefore a need for a new paradigm for tourism that can be regenerative for the natural, social, cultural, and economic capital of a territory.

Fyall, A., Garrod, B., & Wang, Y. (2012), *"Destination collaboration: A critical review of theoretical approaches to a multi-dimensional phenomenon"*, Journal of Destination Marketing, pp. 10-26

World Tourism Organization, op. cit.

Einarsson S., & Sorin, F. *"Circular Economy in travel and tourism: A conceptual framework for a sustainable, resilient and future proof industry transition"*, CE360 Alliance, 2020

From Recovery To Design a Sustainable Development For The Sector

Starting from 2020, with the launch of the Green New Deal Plan and its Farm to Fork and Biodiversity strategies, Europe has set out a series of macro-objectives that can directly and indirectly concern the tourism sector, connected to the territory and the supply chains that characterise it. In the last year, following the pandemic, these initiatives have been joined at a more general level by multiannual recovery plans such as the NextGenerationEU (NGEU) at a European level and the National Recovery and Resilience Plan (PNNR) in Italy. In addition, there are national plans that have been known for some time, such as the Sustainable Development Strategy, which refers to the SDGs of the 2030 Agenda. At the same time the World Tourism Organisation, over the years, has been proposing several initiatives aimed at promoting and developing tourism that enhances local communities without damaging the landscape, society, or the local economy. Among the initiatives promoted are Best Tourism Village and the #Restart Tourism campaign after Covid-19. The latter is a key activity for the recovery of the sector. When we talk about tourism, we are not only referring to the action of visiting new places but also to the discovery of traditional tastes and flavours and knowledge of the host culture. The European Green Deal and the initiatives related to SDGs, in particular the 11 and 12 SDGs, aim to enhance both fields of action. Rediscovering the authenticity of a given product is a way of enriching the travel experience. Having the opportunity to taste organic food handled according to local traditions is a way to learn about the traditions of a new culture. These aspects need to be effectively narrated and local businesses that have made radical choices in terms of sustainability made known. To do this, however, relations with local administrators, the public sector and strategic stakeholders have a role to play in managing and revitalising the area.
Furthermore, regarding the transition of the tourism industry, there are several long-term social and industrial trends that, according to Einarsson S. and Sorin F. (2020) will influence the actors in the travel and tourism industry in the years to come from the demand side. First and foremost is the tendency to undertake travel 'for change', with a desire to live like a local, seeking authenticity, participatory travel for transformative experiences. Then follows a post COVID-19 rethinking of the relationship of visitors with the cultures they visit, with travel becoming a tool "to showcase" excellence and distinctiveness. All of this with the search for a healthier (and more sustainable) lifestyle, e.g., slow travel, characterised by sports experiences

and wellness tourism, health tourism and food and wine tourism. Also, not to be underestimated is the increased interest in domestic travel, a rediscovery also given by COVID-19 of local attractions and cultures in less crowded destinations. The common denominator, however, is found in the growing awareness of sustainability, driven by global challenges on plastic waste, the climate crisis, etc., making sustainability a key purchasing factor also for Generation Z and the next consumer groups.

Methodology

Design As A Facilitator Of Transdisciplinary Context

The following research, starting from the work done on a specific case study, carried out by the Politecnico di Torino, which investigated the connections between the UNESCO sites of the Piedmont Region (Italy), proposes a co-design activity for the Place Branding of this Region. The guidelines of this research are part of the activities of a PhD project aimed at defining tangible actions by a Systemic Designer able to promote a new concept of tourism, directly connected to the valorisation of the territory and its supply chains by developing forms of experiential tourism through Circular Economy practices. The research question at the core of this work will investigate the possibility of designing integrated solutions to combine ecological, economic, and social benefits that could be directly linked to the process of sustainable innovation in the tourism sector by managing the consequences that the Covid-19 situation has caused. Specifically, this paper will highlight the study on the role of the communication of a territory to stimulate sustainable forms of tourism and territorial development by promoting activities in cooperation with the local stakeholders. It is in fact crucial to emphasise that the medium-and long-term strategies introduced in this year of transition at international government level to emerge from the pandemic crisis are strongly characterised by the concept of transdisciplinarity. This concept highlights a level of interconnection between disciplines that is becoming increasingly fluid and dynamic, capable of responding to the complex demands of the global market. In this perspective, Design aims to bring disciplines together in a constructive way and to make them dialogue in a fruitful and interconnected way. Over the last decade, the design discipline has focused more on sustainability as a system of resilient relationships instead of a characteristic of individual components in systems. (Ceschin, Gaziulusoy, 2016) Acting locally without losing sight of a wider, interconnected context is the basis of the methodological principles of Systemic Design (Bistagnino, 2011). Systemic Design has a crucial and valuable role in the context of sustainable development. Thanks to its ability to frame complex problems and foster co-design processes (Jones & Kijima, 2019), Systemic Design becomes the effective tool to be able to address the complex field of Circular Economy, thanks to the use of systemic thinking, in fact, as Senge (1990) states "this discipline helps us to see how to modify systems more efficiently and to act more in harmony with the natural processes of the natural and economic world".

A first research project was launched in 2018 to apply the Systemic Design approach to define a policy and governance process for the creation of an open and fluid system that is shaped according to the changing nature of the cultural territories originating from the Piedmont UNESCO sites. The research defined the path to be followed for the implementation of a pilot district involving different stakeholders and citizens, thus proposing an innovative bottom-up systemic approach to Sustainable Tourism (Barbero, Compagnoni & Pereno, 2019). Based on this, it was possible to work on the involvement of local stakeholders from 2020 onwards. This process involves co-design methodology aimed at defining a territorial identity, to adopt new approaches to tourism also at local level. Innovative tools are thus introduced to dialogue with local communities and involve all stakeholders in this transition. To do this, it is essential to widen our view to international contexts that suggest best practices in terms of sustainable tourism at UNESCO heritage sites and other sites. We will start from the European context to establish profitable relations with the Piedmont Region to then carry out our field research.

Strategy And Tools For Co-Design With Policy Makers

The launch of the co-design activities started with a research process mapping of the stakeholders in the area for whom a customised questionnaire was created to find out the state of the art of the area in which they live, administer, or operate through associations and local bodies. The team of Systemic Design researchers of Politecnico di Torino is working in close collaboration with the Piedmont Region and the UNESCO District which coordinates and promotes activities in the area through the involvement of UNESCO sites and recognitions to create a context for dialogue and exchange between them.

At this stage it was necessary to rethink how to involve multiple and diversified stakeholders, mainly related to the area of government policies and administrations, in the co-design process. Exploring and experimenting with digital and hybrid methods of interaction is one of the challenges to be addressed in

Ceschin, F., & Gaziulusoy, I. (2016), *Evolution of Design for Sustainability: From Product Design to Design for System Innovations and Transitions*. Des. Stud., 47, 118–163

Bistagnino, L. (2011), *Systemic Design: Designing the Productive and Environmental Sustainability*. Bra (CN) Italy: Slow Food Editore

Jones, P., & Kijima, K. (2019). *Systemic Design: Theory, Methods, and Practice*. In Translational Systems Sciences Ser. (Vol. 8).

Senge, P. M. (1990). The fifth discipline: the art and practice of the learning organization. New York: Double day/Currency.

Barbero, S., Compagnoni, F., & Pereno, A. (2019) *A systemic district for sustainable tourism co-designing interconnected networks for enhancing the natural and cultural heritage of local ecosystems*. In: Relating Systems Thinking and Design (RSD8) 2019 Symposium, October 13-15, 2019, Chicago, USA.

this research. The digital tools integrated during the pandemic to organise conferences and focus groups, starting from the use of MIRO digital platform to web applications that allow engagement through scored quizzes, are key strategic elements to stimulate end-users (Fig.2). Together with the mapping and the administration of the questionnaires, a holistic analysis of the territories within the Piedmont Region, in which UNESCO sites are located, is being carried out. The Systemic Design is characterised by a preliminary overview research step known as the Holistic Diagnosis which "provides practical tools to approach complex scenarios with a holistic perspective, while supporting active cooperation among involved stakeholders" (Pereno, Barbero 2020). This step plays a key role in defining the cultural, landscape and economic elements that characterise the context. These ones become more relevant because of data that may emerge from stakeholder survey questionnaires. It will be crucial to communicate the peculiarities of the context that have emerged and those that will continue to emerge from the research, so that they are promoted and told in the best possible way. For this reason, the Place Branding project is also a key element to restore the confidence of end visitors and to enhance the innovative elements related to the new forms of tourism that will arise. The operation of "place branding", known as the "branding" of a place, involves a complex multidisciplinary approach which, going beyond the conception of the territory as a set of varied products or services to be promoted, focuses on the spatial fabric that characterises it, within which urban policies, the tourism sector, the sphere of enterprise and economic investment relate and overlap (Hankinson, 2004). Even though too often there are misunderstandings when talking about or explaining the meaning and purpose of Place Branding development. In the common mindset it is confused with a mere development of a logo and corporate image for a city for promotional purposes. At the expense of misunderstandings, the crux of Place Branding are the concepts of identity and image. As Boisen et al. (2011; p. 136) said: "the identity of a place is sought, identified, extracted and orchestrated to further load the place brand with positive associations. Ultimately, the goal of such practices is to improve the image of the place."
And it is for this reason that it is interesting to highlight how Boisen et al (Fig.2) visualised the relationship between the three concepts and the three dominant market segments of a context which are: businesses, residents, and visitors. All these subjects have to be taken into account when proposing a strategic co-design of a Place Branding.

Pereno, A., & Barbero, S. (2020). *Systemic design for territorial enhancement: An overview on design tools supporting socio-technical system innovation*. Strategic Design Research Journal, 13(02), 113-136. http://dx.doi.org/10.4013/sdrj.2020.132.02

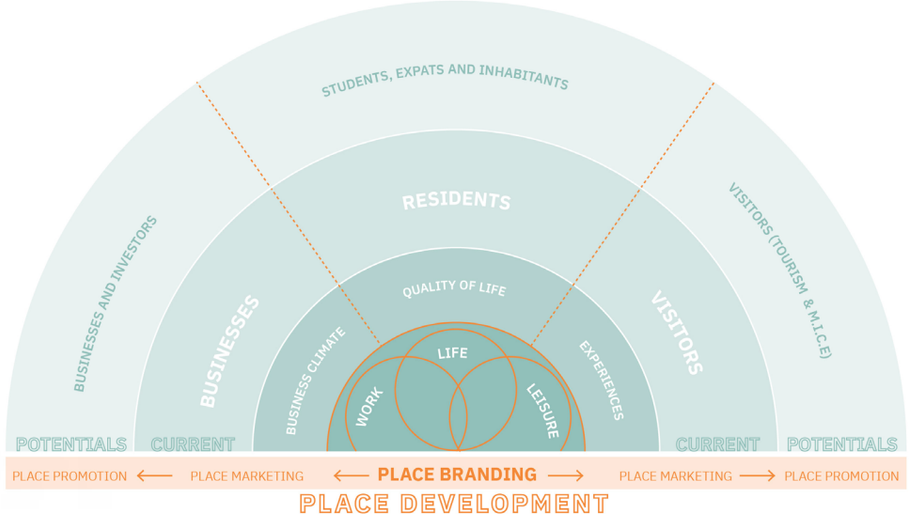
Hankinson, G. (2004), *Relational network brands: Towards a conceptual model of place brands*. Journal of Vacation Marketing, 10 (2), pp. 109-121

Boisen, M., Terlouw, K., Groote, P., & Couwenberg, O. (2018). *Reframing place promotion, place marketing, and place branding - moving beyond conceptual confusion*. Cities, 80, 4-11. https://doi.org/10.1016/j.cities.2017.08.021
org/10.18111/9789284422456

Ongoing Activities and Expected Results

The research is ongoing and indeed the results elaborated so far from a selected area such as the Piedmont Region and UNESCO sites represent a strategic starting point. It is also worth noting that the process undertaken is a scalable and replicable design strategy at transnational level, but strongly based on the specific features of the local context. The global tourism industry is complex at the same time is crucial for the local and national economy. It combines many aspects that cannot be identified as separate and independent factors.
The sector needs to be revitalised by increasingly developing a holistic vision that highlights and enhances the interconnected elements. Systemic Design offers a series of strategic methodological tools, capable of stimulating transdisciplinarity, for the development of projects on a territory by promoting co-design activities.
To find out the opinion of the various UNESCO designations present in Piedmont on the themes of Sustainability and Circular Economy, a survey was drawn up divided into macro sections useful for developing an initial individual analysis to be reported and shared later at District level. The main sections delved into the designations and the context in which they are found, the relationship between the designations and

Figure 2. Organisational aspects of place promotion, place marketing and place branding



sustainability, and then concluded with a section on the communication of the site and the UNESCO District.
The survey represented a first phase of approaching the realities and at the same time an initial activity that allowed us to get to know the needs of our target audience. Later, the data collected were presented during the Table of Culture that is held periodically, coordinated by the Piedmont Region. Following the presentation, an interactive activity was carried out remotely to reflect on the strategic lines regarding multi-level Sustainability (UNESCO Recognition, UNESCO District, transnational) all the issues addressed were reported in a visualisation on MIRO (Fig.3) to facilitate sharing among the participants and will constitute a first element on which to continue with a thematic co-design meeting on the strategic elements that emerged.
All the reflections represent a first phase of the bottom-up process started to define the identity of the Piedmont UNESCO District and therefore to continue with the Place Branding proposal.

Figure 3. Visualisation of the interactive activity done with stakeholders on a MIRO board

Discussion And Conclusions

The COVID-19 crisis has raised awareness of the importance of local supply chains and the need to rethink how goods and services are produced and consumed, both key elements of a circular economy. In most instances, when dealing with circular economy issues, we refer to the processing of material products and their supply chain. Now the time has come to explore the ways in which circular economy and sustainability principles can help make the travel and tourism industry more sustainable and resilient in the long run. The integration of circular, systemic vision and further advancing resource efficiency in the tourism value chain represent an opportunity for the tourism sector to embrace the sustainable growth pathway.
A great level of rethinking and innovation will be required to adapt to a new reality, regulatory and customer demands.
The co-creation of value, the optimisation of the system, are capable of developing interconnections aimed at rethinking the entire tourism sector. For too long this supply chain has been conceived with linear thinking. It is time to review the elements that characterise it from a systemic point of view, promoting concepts at the heart of the circular economy to develop a new way of travelling, discovering territories and cultural contexts. In this scenario, the role of Designers, and in this specific case of Systemic Design, becomes a facilitator in project contexts that intersect public and private sectors, administrative and productive fabric, local supply chains and consumers. Rethinking and redesigning with bottom-up operations facilitates inclusion and responds to the needs of the tourism and cultural sector which, more than others, will have to develop an increasingly glocal perspective.

Design For Territorial Innovation.
Participatory design process and good practices for socio-cultural sustainability

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This article studies at length the role of design within territorial socio-cultural transformation. It investigates and describes the industriousness of projects/processes which are particularly effective for social and territorial innovation and are applied above all, to fragile and problematic urban contexts. It focuses on communities and its inhabitants who are often excluded from traditional narrative through some particularly significant projects, with an emphasis on concrete experiences of recent projects in southern italy. Thus, the article, traverses topics and critical points of a more extensive and profound disciplinary reflection, it explores innovative roles of design in the social transformation of places and resources and in the use of public spaces, through the description of participatory processes and of identity construction. addressing some relevant issues which are inter-connected (such as sustainability, innovation in fragile contexts, cultural identities) the article weaves the necessary interdisciplinary approach of Design for Territories and Design for Social. By attributing specific attention to social impact and design applied to social policies, it is attainable to project and promote interactions which are capable of determining behaviour chancing experiences, thus creating a positive and sustainable impact, accompanying people in the design and development of a new SOCIETY (manzini, 2015).

Keywords *participatory design, territorial innovation, cultural processes, social sustainability, design as a process.*

Introduction

Disciplinary reflections, new challenges and new roles for design

"The design of the 21st century [is] an expert design which presents itself as a set of skills, sensitivities and cultural tools (the tools and culture of the project) applicable to any type of problem" (Manzini, 2015[1]).

Human beings interact with each other and with objects and places around them. In doing so, they continually and creatively re-adapt this system of relationships, to create something which is missing.

Since the 1970s, design has moulded to the needs of people and their behaviour more carefully, placing them in their context; the designer was the observer whilst the user was the object to be observed. This relationship, however, was highly disbalanced and this observation led to the definition of a new user figure: as an expert actor, as an active subject and bearer of knowledge, thanks to their direct experience with the context. On the contrary, this debate has had an impact on the evolution of the figure of the designer: from analyst to interpreter. The designer has thus become an observer who, on the one hand, must know how to interpret the active story of people and, that is, recognizing the meanings of their actions and their relationships with places (Manzini, 2009, p. 8); on the other hand, he must interpret and capitalize on these meanings, facilitating processes that are useful for stimulating and orientating the creativity and planning skills of the actors themselves, through the projection of future visions and actions. Therefore, by aiming at the active participation of people who can be considered as contributing multiple ideas and suggestions, design can structure ideas suitable for generating innovation and planning ad hoc activities to stimulate creativity (Rizzo, 2009).

By definition, planning in close contact with the user and with society, oriented towards the production of specific cultural innovation and the construction of experience and knowledge process, based on involvement and participation, design is able to promote connections within the complex dynamics of communities (Trapani, 2016, pp. 16, 17). As a discipline, therefore, it is capable of designing mediation strategies between knowledge, sectors, territories, actors (Lotti, 2016), design itself becomes a process, a service, an activity capable of establishing connections and creating synergies between different systems (Irace, 2013), in order to use these synergies to generate the conditions for a more favourable socio-material environment.

The general objective of these processes is primarily to improve the quality of life for people and to make the inhabitants aware of the concrete possibilities of real change through the autonomous enhancement of cultural and environmental, social and economic resources which are present and available.

In light of these new perspectives, the designer, who is able to analyse and interpret the complexity of phenomena, is thus recognized as holding privileged role in their ability to articulate, mediate, coordinate, with awareness and effectiveness, the great complexity implemented in a network of collaborations extended to experts of specialized disciplines and to create conscious social communities, capable of sharing, enjoying and benefiting from knowledge, intellectual and cultural experiences.

In these processes, creativity and a new cultural paradigm become the subject of the design driver thanks to which territorial innovation strategies can be developed. David Throsby (2001) with the Concentric Circle Model expressed the driving force of development that, starting from the art sector, is also able to involve the other sectors of the Cultural and Creative and non-cultural industries, which make up the economy of a territory (Parente & Sedini, 2018, p. 214). In more recent years, the focus on creating a system suitable for the development of activities in the field of creativity and culture has been reaffirmed both internationally and nationally. Primarily, the ability to react to a status quo is one of the peculiarities recognized by the Cultural and Creative Industries, as noted by the studies of Stumpo and Manchin (2014) which highlight how in times of crisis the Cultural and Creative Industries have improved resilience skills, in comparison to other sectors. Furthermore, in the Culture: urban future report (UNESCO, 2016), culture is placed at the centre of urban renewal and innovation, becoming a veritable strategic asset for the creation of more inclusive, welcoming, sustainable and creative cities (Parente & Sedini, 2018, p. 214). In support of this vision, the Italian report I am culture provides a definition of culture, as a "driver of territorial development" (Symbola Foundation - Unioncamere, Report 2016, p. 250) which includes both the system consisting of cultural heritage such as museums and galleries, both include events such as festivals and performing arts, also related to literature, cinema and various productive activities utilizing creative lymph from culture.

Internationally, the Cumulus 2005 conference, held in Lisbon, entitled Pride and pre-design. The Cultural Heritage and the Science of Design[2] has woven similar important links between cultural heritage and design culture; design allows for a continuous regeneration of heritage while safeguarding local diversity through acquisition, representation and appropriation of the tacit knowledge of places and typical productions by allowing tradition and memory to dialogue with contemporary identity.

Hence, it is evident that thanks to design, the maturity attained

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Irace, F. (2013). *Design & Cultural Heritage*. In D'Averio P, Trapani V, Il design dei beni culturali crisi territorio Identità cultural heritage design. Crisis territory identity. Milano: Rizzoli

Throsby, D. (2001). *Economics and culture*. Cambridge: Cambridge University Press

Parente, M. & Sedini, C. (2018). *Valorizzare il capitale territoriale con un approccio design oriented: il caso di Biella*, fabbrica culturale creativa. Scienze del territorio n. 6. Le economie del territorio bene comune.

Stumpo, G. & Manchin, R. (2014). *The resilience of employment in the Culture and Creative Sectors (CCIs) during the crisis*. European Expert Network on Culture Report

UNESCO (2016). *Culture: Urban future. Global report on culture for sustainable urban development*. Parigi: Manual UNESCO

Unioncamere – *Rapporto (2016). Io sono cultura. L'Italia della qualità e della bellezza sfida la crisi*. Roma: Quaderni di Symbola, Fondazione Symbola

[1] *Ezio Manzini: design per l'innovazione sociale. Interview by Daniela Selloni. Available on https://www.che-fare.com/ezio-manzini-design-diffuso-per-linnovazione-sociale/*

[2] *Conference program and themes are available on the website http://unidcom.iade.pt/cumulus/cumulus.html*

via the design field of cultural heritage is mainly expressed by enriching the traditional concept of enhancement with models capable of activating cultural heritage as a lever for development, to recontextualize, actualize and incorporate into meanings, products, processes which people are attuned with, redistributing the cultural value within the territory and in communities. "It is a question of combining the project for cultural heritage with the project together with cultural heritage" (Lupo, 2019, p. 122). Furthermore, to have a effective impact, it is necessary to re-imagine the value of cultural heritage, planning not only cultural offers for end users, but also enabling opportunities for the various actors and stakeholders of the system, such as institutions, policy makers, cultural and creative enterprises.
The widespread diffusion of design driven participatory projects documents an ever deeper rooting of the project discipline, in interdisciplinary and inclusive multi-actor systemic processes capable of operating in complex multicultural contexts.
Through the ability to recognize the most promising social dynamics and to work with them, design can promote and support social innovation, as a producer of a new system of meaning, which redistributes the value of places and relationships, from which originate new cultural processes promoting collaborative work aimed at a new idea of collective social well-being, addressing the definition of a new project culture capable of generating shared meanings, models and good practices[3] that can be exported and declined at different scales.

Territory and *capitale sociale*

At this point, it is necessary to look primarily at two basic concepts: that of capitale territoriale[4], namely the group of material and non-material elements, knowledge, endogenous resources, economic activities, infrastructure, networks, but also of physical and social interactions that convey the experiences of people present in a specific territory (not yet sufficiently capitalized in order to support the process of economic and institutional innovation mandatory for sustainable development), and that of the circuito cognitivo (Rullani, 2006) which represents knowledge settled in a territory together with its own capitale sociale, able to characterize its identity and social practices, through material artefacts, production processes, industrial districts and people who share that same knowledge (Parente et al., 2017, p. 4).
Each project, due to its programme rooting in local dimension of the geographical and social context and the indispensable active role of the community, thus represents a unique and constantly changing reality as is defined in a dynamic way starting from resources, relationships and specific local processes.

Lupo, E. (2019). *Design e Cultural driven innovation*. I+Diseño Vol. 14-XI-4-2019

Farrel, G., Thirion, S., Soto, P. (1999). *La competitività territoriale. Costruire una strategia di sviluppo territoriale alla luce dell'esperienza LEADER*. Innovazione in ambiente rurale, Quad. 6 - Fasc. 1. Osservatorio Europeo LEADER

Rullani, E., (2006). *Capitale sociale e nuova modernità. Sociologia del lavoro* n.102, FrancoAngeli

Parente, M., Lupo, E., Sedini, C. (2017). *Tangibile e intangibile: concetti sfumati e coesistenti*. In Parente M., Lupo E., Sedini C., (a cura di), Tangible/Intangible Dialoghi sul design per I territori, D4T Design for territories. Milano: Dipartimento di design Politecnico di Milano

Parente, M. (2016). *Design for Territories as reflective practice*. PAD. Pages on Arts & Design n. 13

[3] *Ezio Manzini, founder of DESIS, an international network on design for social innovation and sustainability, identifies some significant steps in the co-design processes that can be summarized as follows: recognize (the values of social innovation), amplify (making the hidden value of resources more visible and tangible), elaborate (building guidelines and scenarios), co-produce prosperity scenarios based on relational goods (Manzini, 2015).*

[4] *The concept of capitale territoriale was introduced in the nineties by the LEADER European programs for the development of rural areas (Farrel et al., 1999) and elaborated by the Organization for Economic Co-operation and Development (OECD) in the 2001 Territorial Outlook; this concept was assumed to analyze the territories, to understand the articulated and complex set of material and intangible resources, outlining the framework of constraints and opportunities for a possible development or renewal .*

[5] *Me.design. Strategie, strumenti e operatività del disegno industriale per valorizzare e potenziare le risorse dell'area mediterranea tra locale e globale is a national research co-financed by MIUR for the years 2002-2004 and coordinated by prof. Giuliano Simonelli, Polytechnic of Milan*

[6] *Born in 2015, Design for Territories is a Research Network of the Design Department of the Politecnico di Milano, dedicated to the study and application of design methodologies for the empowerment, regeneration and enhancement of territories. D4T uses specialized approaches, intra and interdisciplinary methods and tools for research, design and academic and professional training. The network gathers the different skills present in the Design Department and compares itself with national and international researchers, institutes and research centers.*

In particular, in the field of cultural productions, design is called upon to develop new ways of enhancing, communicating and using territorial assets and resources by exploring their multiple aspects, also through highly experimental design methodologies. By carrying out multiple investigations of heritage (tangible and intangible), design can thus decipher and favour, the conditions for activating virtuous processes of requalification and re-meaning of environments, practices and knowledge, through forms of dialogical interaction with the community and with different territorial actors.
With the Me.design[5] research (Politecnico di Milano), for example, through some design experiments conducted in specific contexts, the methodological foundations have been laid for a design-oriented approach to enhance the territories, which is characterized by the centrality of the community as an active subject in the processes decision-making, and for the visionary and directorial capacity of design in prefiguring strategic multi-sectoral and multi-actor scenarios. In line with this project, the design for the territories has deepened in recent years the areas of interest, the methodological approach and tools, forming the D4T research network of the Design Department of the Politecnico di Milano[6].To transform territorial resources from potential to actual, it is necessary to redefine methods and sensitivity of observation and disclosure. Read the territory, interpret it, visualize it; build areas of shared meaning and visions; promote forms of participatory planning and community empowerment; transforming visions into actions and initiatives; design product systems and resulting service interfaces; promoting and implementing effective communication of the entire process are the main activities characterizing a design-oriented approach to the territory (Parente, 2016).

Narrative tools in participatory processes

What can be noted, at this development stage during the debate on co-design and participatory processes, is that there is no systematic elaboration in progress defining themes and principles; moreover, it is possible to report the experiences in progress. These are experiences aimed at understanding the most useful tools required to support creative collaboration and to generate innovation processes.
These are processes that open up to communities and individual histories, pursuing the objective of a necessary cultural revolution, which favours the construction of a terrain of dialogue and cooperation between individuals, discussing its ethical dimensions and investigating how it can move towards the creation of a synergistic and interconnected global society. This highlights

the existence of a new trend in research on design methods which is not based on the response to the requirements necessary for the realization of a project, but focuses on the process of co-designing the requirements themselves and on the need to generate an empathic relationship between designers and citizens (Koskinen et al., 2003).
"The goal of this new design approach is to discover rather than respond; imagine new opportunities that become visible right in the process; mediate between the needs of spontaneous and local planning and their directing towards a systemic vision" (Rizzo, 2009, p. 129).
Firstly, to engage the user as a tester, as an information resource and as a designer, design research and professional practice drew on the tools of social sciences and ethnography, such as interviews and tales or participatory observations, but they have also been able to produce a series of original tools such as design probes[7] and workshops. Tools adopted and organized on collaborative activities to explore users' ideas (Mattelmaki, 2005), through the activation of listening practices capable of putting users at ease in telling visions, experiences and sensations related to the lived context and, at the same time, to propose and share future life scenarios with respect to the services deemed most significant by the people who live there.
Stories are composed of characters, objects, places, actions and, at least, of a conflict that moves the story along and triggers an arc of transformation (Vogler, 2010). The stories therefore reflect cultural and social change and, in the telling of these stories, they form a shared heritage. They build upon reference imagery, organizing a repertoire of knowledge, continually regenerating its meaning, providing interpretation keys and behaviour models to deal with relationships, overcome obstacles and grasp opportunities. They define a common ground for comparison from which it is possible to activate a process of understanding, knowledge and projection (Piredda, 2018, p. 155).
In the field of communication design, research applied to the territory has developed languages, tools, technologies for information design over the years, which make even very complex scientific content accessible. These are interactive and narrative artifacts and are devices which reveal the abilities of a territory, the memory of communities, the reading of the contexts by individuals, through a meaningful narrative construction that knows how to produce connections, sharing and awareness (Rossi, 2016, p . 65). Activating the planning potential of the local actors has a significant dimension, precisely through narration (audio-visual language and participatory video) and developing engagement strategies[8], in the awareness of the fact that the lack of participation from people culturally has limiting and unequal effects also in cultural, social and economic terms. On the one hand, various envisioning processes, through various prototypes and communicative artifacts (paper mock-ups, textual micro-scenarios, story boards) allow users themselves to view their stories, providing the design with useful data to see, and thus to be able to interpret and translate them for project of community strategies; on the contrary they can be reworked to visualize and render the results of the research accessible to all. Many experiences have demonstrated the effectiveness of these methods and how they create a new generation of tools which are being produced from traditional ones such as workshops, laboratories and design toolkits to newer and more experimental ones, such as tools for remote collaboration, made available by web 2.0 technologies with open and peer-to-peer architectures (Piredda, 2018).
Design can thus make use of narrations, more generally, to support the different phases of the project and to trigger virtuous processes of dialogue and action within communities and stakeholder systems. Manzini (2015) identifies two dimensions of the role of design: on the one hand, design as a problem solver (Simon, 1969) is capable of offering solutions to the problems of users and communities; on the other hand, design is capable to "collaborate actively and proactively in the social construction of meaning" (Manzini, 2015, p. 35). The sense-making dimension is closely linked to the story, both in terms of creative processes and expression (individual or collective), and in terms of conflict management (real and/or narrative) that trigger a need for change and determine a transformation path. To do this, however, it is necessary to work by sharing objectives and actions with city institutions, local administrations, as well as associations and companies; activate opportunities to deal with other disciplines and skills, such as social sciences, philosophy, territorial marketing, finding the interest and support and collaboration of researchers and professionals.

Projects

"The study of the territory through its material and intangible peculiarities leads to the relationship with complex situations, in which the designer has to make choices: a dualism, but also an overlap, between narratives, stories and collective memories compared to those of individuals or small groups (Augé, 1992). From the design point of view, the interpretation of this complexity translates into design actions that from time to time must mediate the universal and the particular, the objective and the subjective, or favour one of these aspects" (Parente, 2017, p. 14).

Koskinen, K.U., Pilhanto, P., Vanharanta, H. (2003). *Tacit knowledge acquisition in a project work context*. In International Journal of Project Mangement 21(4)

Rizzo, F., *op. cit.*

Mattelmaki, T. (2005). *Applying probes – from inspirational notes to collaborative insights*. Co-design International Journal of CoCreations in Design and Arts, vol. 1 n. 2. Londra: Taylor Francis

Vogler, C. (2010). *Il viaggio dell'eroe*. Roma: Dino Audino

Gaver, W., Dunne. T., Piacenti, E. (1999). *Cultural Probes. Interactions*, Vol. 6 - n. 1. New York: ACM

Piredda, F. (2018). *Il territorio come mondo (narrativo). il confine fra mondo reale e mondo finzionale come luogo del progetto*. In Parente M., Sedini C., (eds.), D4T design e territori. Approcci metodi esperienze. Milano: LISt Lab

Rossi, M. (2014). *Life Behaviour Design*. DiiD 58 - 14D

Piredda, F., *op cit.*

Manzini, E., (2015), *op cit.*

Simon, H. A. (1969). *The sciences of the artificial* (1st ed.). Cambridge, MA: MIT Press

Manzini, E., (2015), *op cit.*

Augé, M. (1992). *Un etnologo al metrò*. Milano: Eléuthera editrice

Parente, M. (2017), *op cit.*

[7] *Designed by the team of designers to allow the user to record data, facts and events necessary for the documentation of what happens every day in the context in which he is immersed, probes are tools to access the personal perspective of the participating user. They can contain information about people's daily lives, they can be designed to invite people to take actions and take note of past experiences, they are also a way for designers to put themselves in the user's shoes to initiate the process of empathy between these two figures. The first type of probes developed by design research was that of cultural probes, developed during the 90s within the Presence Project (Gaver et.al, 1999) in which designers from all over Europe participated. The project, funded by the European Union and coordinated by the Royal College of Art, aimed to collect inputs for the design of new technologies to support the active participation of the elderlies in local communities.*

[8] *Many ongoing processes develop collaborative tools typical of design thinking, but also introduce tools developed ad hoc for listening to the stories of users and communities; the collaborative construction of stories. These processes are based: on listening, through the documentation of both the transformations underway and the good practices already active; on envisioning, that is the visualization through communication devices to activate conversations between stakeholders; on the promotion of reference values with respect to the subject of the research, as an opportunity for socialization and reappropriation of urban space.*

PUSH. Borgo Vecchio Factory. Palermo, 2014.
In the intent of providing a constructive and effective response to the economic and cultural crisis which has been suffering for years in Italy and especially in the South of Italy, several initiatives were born in fragile and problematic contexts. PUSH, for example, is a design laboratory for urban innovation based in Palermo that designs and develops services with the aim of making cities more sustainable (and citizens happier) through applied research projects, participation activities or social innovation initiatives, to address critical issues and solve problems, capable of improving the experience of citizens or facilitating the interaction between different actors in a given context. Borgo Vecchio Factory, to mention one project among all, is a social promotion project for the creation of artistic workshops for children (FIG. 1) in a particularly disadvantaged neighbourhood of the city; an ancient district of the centre of Palermo inhabited for the most part by families with serious economic difficulties; with an unemployment rate of 40%, widespread illiteracy and an insufficient level of education. The neighbourhood experiences a clear condition of social exclusion caused by the lack of services and a high crime rate. One of the biggest problems, on which the future of the neighbourhood depends, is undoubtedly

Figure 1. PUSH. Borgo Vecchio Factory. Palermo, 2014. Children at work with the mural artist Ema Jons during the workshop; urban scenes of the neighborhood of Borgo Vecchio in Palermo (Collage of images. Credits: Mauro Filippi /PUSH_www.wepush.org/projects/borgo-vecchio-factory/)

the school non-attendance. The project was born as a continuation of Frequenza 200 project, an experience undertaken by the Arteca Onlus and Per Esempio Onlus associations, in collaboration with the muralist artist Ema Jons, who in 2014 involved twenty children and young people, between 5 and 15 years old, in workshops of street art after school. The drawings and paintings produced during the workshops were used as sketches for murals made by several hands on the buildings' facades in the neighborhood. Borgo Vecchio Factory project has experimented in the neighbourhood with a practice of involvement and animation that has produced, in a short time, a real open-air museum in the streets. About 30 large murals (FIG. 2) were created, involving about sixty children of various age groups, through workshops and creative working groups. Non-formal art education, combined with the involvement of the entire urban community starting from the younger generations, in fact, can be a very powerful tool capable of "redeveloping" small parts of the city and having a significant social impact, able to undermine and break the status quo, sometimes managing to influence systems on a larger scale, to shake institutions, innovating them, or at least to suggest a rethinking. The practices of social innovation - through art and culture, through new uses of space, through regeneration processes - can change the configuration of territories, through a process in which experimentation is carried out locally, producing new forms of use and sociality. The crowdfunding campaign and the related communication strategy adopted in this project are applicable to other contexts, not only strictly connected to the sphere of social promotion.

Figure 2. PUSH. Borgo Vecchio Factory. Palermo, 2014. Murals on the buildings' facades of Borgo Vecchio. (Credits: Mauro Filippi /PUSH_www.wepush.org/projects/borgo-vecchio-factory/))

From technological innovation to artistic projects, there are many areas in which to develop a project with similar characteristics. Furthermore, street art, can also be declined in different places such as theatres, training centres or prisons, aiming to involve new subjects such as associations, administrations, schools.
Simultaneoulsy, the Street Art Factory project is a digital map which allows to locate urban works of art in the city, obtain information on artists and buy prints and serigraphs signed by them to support artistic projects with social purposes in the urban area and in the territorial context.

Ecomuseo Mare Memoria Viva. Ex deposito locomotive Sant'Erasmo. Palermo, 2014.
The urban Eco museum[9] Mare Memoria Viva (MMV) is another example that was born in 2014 in Palermo. From the controversial relationship of the city with the sea, sanctioned by a succession of political choices that from the second post-war period to today have perpetrated a process of continuous removal of Palermo from the sea[10], the MMV[11] Eco museum was born with the intention of conveying public attention precisely on those relationships which, since the foundation of the Phoenician city, constituted the identity reasons of the city, in its distinctive relationship with the sea.
The main objective of the Eco museum project, outlined by the needs, aspirations and community awareness of its local resources, therefore, is, first of all, to highlight (and thus contrast) the ruinous processes of de-territorialization caused by various regional, national and global factors, to become a sort of garrison in defense of the territory understood both as a universal value and heritage, and as a space of specific belongings that

Figure 3. Ecomuseo Mare Memoria Viva. Palermo, 2014. Meetings, interviews, workshops within communities and stakeholder systems (Collage of images from the MMV official website www.marememoriaviva.it)

[9]Conceived and imagined as a structure that should have a strong impact on society, the ecomuseum was defined by the archaeologist Hugues De Varine as "an institution that manages, studies, explores the global heritage for scientific, educational and cultural purposes of a certain community, including the totality of the natural and cultural environment of this community" (Pinna, G. (1997). Fondamenti teorici per un museo di storia naturale. Milano: Jaca Book, p. 111). The definition of ecomuseum introduces the extended notion of heritage related to the concepts of territory and landscape, as stratified entities, in continuous change, adaptation and transformation, characterized by a composite structure made up of environmental, cultural, social, architectural and community elements. The ecomuseum, as an open, participatory and collaborative entity, placing itself in a dialogical position with the community, becomes an active and integral territorial actor capable not only to preserve and exhibit widespread heritage, but also and above all to produce culture and the capitale sociale, promoting dialogue and social cohesion, offering citizenship tools for relating and understanding the other. The ecomuseum can also contribute to re-evaluate local knowledge, practices and values in a strategic key.

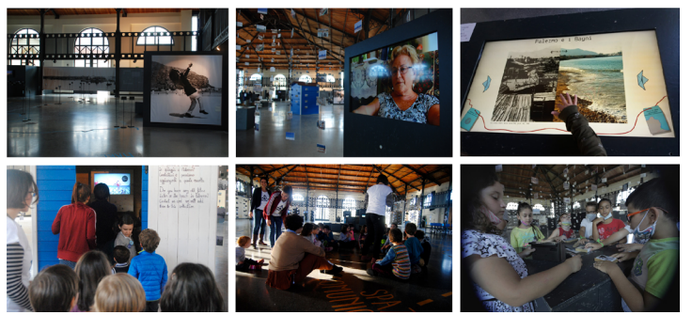
[10]The removal process, which began with the spillage of the rubble of the bombings along the Foro Italico and in other parts of the coast, had continued with the construction of the road artery along the Porto della Cala which constituted a barrier towards the coast where, in the meantime, warehouses, barracks and sheds of various kinds had accumulated. The extraordinary and unruly expansion known as the Sacco di Palermo, in thirty years (50s-80s) then completely changed the lay-out of the city.

[11]The ecomuseum is a project conceived by CLAC· a cultural organization active in Palermo since 2003· and was created· thanks to the contribution of CON IL SUD Foundation· through the historic-artistic 2011 call in partnership with the Municipality of Palermo - Department of Culture (with Assessorato alla Cultura - Francesco Giambrone)· the Soprintendenza per i Beni Culturali e Ambientali del mare, the Dipartimento dei Beni Culturali e dell'Identità Siciliana - Regione Sicilia· the Dipartimento di Architettura of Palermo University· Kursaal srl· Le città del mondo - Centro Fiaba e Narrazioni Association, Ass· Gruppo SALI· UMIP – Unione Mediatori Interculturali Professionisti· Official website: www· marememoriaviva·it

[12]Located at the mouth of the Oreto river· in via Messina Marine· the former deposit constitutes one of the most important testimonies of the archeology of the early industrial age of Palermo· Anna Maria Fundarò wrote about it in a text dedicated to it· describing it as "a real object of industrial design· produced and conceived in other places (in this case in fact the production is Belgian)· where the industrialization processes were already widely tested· The large wooden and iron sheds were the great containers of the nineteenth century, the new cathedrals, which, due to their typology, were adapted to the different needs of a changing world" (Fundarò, A.M. (2000).

are rooted in the maritime landscape and its values, its history and its profile they express themselves.
Deputy to narrate and explain the stories of sea and land in Palermo, the ex-locomotive depot of Sant'Erasmo[12], located right at the mouth of the Oreto river, houses the Eco museum (also involving a room in the Arsenale of the Regia Marina, monumental seat of the Soprintendenza del mare[13]). The MMV Eco museum has aimed, above all, at exploring the potential of the collaborative design dimension, through the construction of listening practices, aimed at promoting and fostering knowledge through an integrated and active reading of the various environmental, artistic, productive and social aspects.
The project began with a wide-ranging reconnaissance of materials collected in the neighbourhoods of the coastal strip of the city, meeting and interviewing the inhabitants of the seaside villages, mapping the significant places in the area, collecting stories, photographic and video material, even amateur ones, organizing activities and meetings, in public spaces and meeting places, organized together with the reference communities (FIG. 3). The landscape was read, interpreted, documented through an interdisciplinary, participatory and integrated methodology, based on horizontal cooperation between external and local experts, on the knowledge and direct experience of the place and the stories of its inhabitants, on the comparison and dialogue within the community and on the enhancement of opinions, perceptions, individual and collective knowledge on the territory, applying co-design tools and methods for social and cultural innovation, in territorial development processes.
From the exploration of the territorial context (especially recorded in photographies and videos) and from the analysis of the results that emerged from the meetings with the various

Figure 4. Ecomuseo Mare Memoria Viva. Palermo, 2014. Interiors of the exhibition space (Collage of images from the MMV official website www.marememoriaviva.it and photos by Serena Del Puglia)



territorial actors (administration, associations, artists, operators, entrepreneurs and citizens), with the support of community and several interdisciplinary experts (from the fields of anthropology, sociology, architecture, history of the territory and landscape), the Eco museum hosts a series of communicative audio-visual artifacts, designed by teams of designers and architects (FIG. 4), to communicate a composite vision of themes and related material and intangible elements, inviting the community to reappropriate from below the cognitive, analytical and representative tools of its territory.

The exhibition is based on the idea of building a large documentary-photographic archive[14], also through digitally supported devices, including interactive ones, imagining that the purpose of this archive is not the archive itself, but the new meanings that can be traced from it, starting from a narration of Palermo, as a city intimately linked with the sea. Inside the Eco museum exhibition there are some user-generated installations, stations where visitors can leave their narrative contribution as well as small sets to host temporary exhibitions and installations for artists.

The possibility offered by the web to share open and implementable visualizations on the network with constantly updated data, has made it possible to design, within the MMV project, Geo Blog[15], a platform that allows to place texts, images, videos and sounds, in a multimedia online map. The map, which can be updated daily from the web platform, with personal narratives of citizens, becomes a community map capable of recording the different experiences perceived on the sea and on sea places by the community.

"In re-evaluating and reconstructing the wounded memory of a place, the Eco museum can therefore contribute to re-attach the community to its history, helping it to recover the sense of a collective identity and individual one, through the sharing of information, knowledges, perspectives, experiences and multiple narratives. To do this, it is necessary to go beyond the conflict, and not cancel it, allowing to deconstruct and reconstruct the meaning of a sense of belonging, not only in antagonistic, oppositional and claiming terms, but also and above all through the rediscovery of material and symbolic value of local knowledge, practices and resources as potential tools of collective resistance" (Cancellotti, 2011).

Cancellotti, C. (2011). *L'écomusée n'est pas musée. Gli ecomusei come laboratori produttori di cultura*, territorio e relazione in Saggi / Ensayos/Essais/Essays N. 5. Available on https://riviste.unimi.it/index.php/AMonline/article/view/1044/1276

L'ex deposito locomotive S.Erasmo a Palermo. In Carcasio, M., Amoroso, S., Le stazioni ferroviarie di Palermo. Palermo: Regione Siciliana, Assessorato Beni Culturali Ambientali e Pubblica Istruzione, pp. 157-169).

[13]The first Soprintendenza del mare of Italy was established in Sicily· a peripheral body of the Assessorato regionale dei Beni culturali e dell'Identità siciliana, which protects, manages and enhances the culture of the sea in Sicily with tasks of research· census· protection· surveillance, enhancement and use of the underwater archaeological, historical, naturalistic and demoethno-anthropological heritage of the Sicilian seas and its smaller islands (art· 28 Lr 21/2003).

[14]The recovered archive consists of images in super 8 and 16 mm of the seaside leisure in the 50s and 60s· interviews with historical figures· experts, fishermen, sailors and citizens, ancient and contemporary photos that reconstruct the alterations of the coast from the first Twentieth century to today· To this initial corpus are added photos and videos from the archives of the CRICD – Centro Regionale per il Catalogo e la Documentazione, of the Mare Negato project and of authors, photographers and inhabitants of the city who shared their work (Melo Minnella· Sandro Scalia· Playmaker Produzioni are some of these)·

[15]Geo Blog was created thanks to the participation of many citizens of Palermo and seafront inhabitants· within the Mare Memoria Viva project, by a group of passionate and creative professionists: Carmela Dacchille, Antonia Giusino· Davide Leone· Giuseppe Lo Bocchiaro, Luisa Tuttolomondo, Valentina Bellelli and Cristina Alga di CLAC.

[16]ICSID, International Council of Societies of Industrial Design, THAT Gathers DESIGN ASSOCIATIONS FROM ALL OVER THE WORLD, has appointed Turin as the First World Design Capital because it is a city that has been able to redesign itself a renewed international post-industrial role also and above all thanks to the processes and methods of design. The first meeting between researchers and scholars of design processes and methods was held in Turin on 12 July 2008 on the occasion of the Changing the Change international forum conference of design doctoral schools. The Carta di Torino, so called for these premises, is the proposal for a manifesto for the development of methods and processes design, developed in 8 points and brought to the attention of the members of the permanent forum, in order to propose it to the international design community. The manifesto is available on: http://arsfluentes.es/ddiseno/ddiseno-6/doc/carta-torino-ita.pdf

Manzini, E., 2018, *op. cit.*

Conclusions

"We believe that the task of contemporary design culture is to suggest and pay attention to certain research themes for design [...]: design for the suburbs, the design of sustainability, the centrality of man within one's own cultural system" (Carta di Torino, 2008[16]).

The projects contained in the text describe some models of interpretation of the territory and cultural identity, capable of producing design action schemes and good practices of social innovation design centred and malleable for the different territorial resources and dynamics. In these processes, design expands its capabilities, proposing an increasingly close and synchronic relationship between the analysis of reality, project of communication and of multidirectional fruition. The designer becomes an essential figure of mediation between project and context, able to activate virtuous strategies for the elaboration of experience and for the communication of the complex aspects of a territory, in connected, shared, multidisciplinary forms.

These original and hybrid design processes can allow people, communities, companies and social actors to activate, manage and experiment sustainable and collaborative ways of living and act and develop a design methodology capable of forming new skills and new values in the generations of professionals and citizens, aware and ready to respond to the ethical challenges centred on the territory in which they live.

These practices are based on the assumption that the crisis is an indication of a necessary change in styles and needs, capable of activating, starting from the knowledge, the skills acquired and shared, the hypotheses of collective life pacts, acting for the common good. Stories of re-appropriation, of generation and generativity, of care. Actions occurring daily and politically as they have the power to lead to other paths, accumulating listening skills and empathy, critical sense, adherence to reality but also an essential dose of imagination to give birth to new futuristic visions and feasible utopias in the present (Manzini, 2018).

Participatory Design and the democratic production of Urban Spaces. A possible utopia.

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The following article aimed to explore the sciences that work the urban space, particularly Geography and Urbanism, to try to identify the gaps between theory and practice. Approaches were made on some aspects involving the theme, including Urban Planning, Urban and Daily Life, highlighting the main points of intersection. The reflections were theoretically based on texts by authors recognized for their respective research areas, including Henri Lefebvre, French sociologist (1901-1991), to deepen knowledge about the production of social practices, connecting concepts and thoughts consequently, possible developments. It is understood that each city project must consider its society, a society composed and built by its respective individuals. All the efforts put into the proposed reflection were intended to illuminate aspects that are still being ignored, left aside. The objective of keeping the individual as the primary focus must never be forgotten, as it is this focus that will direct any project towards a result that rescues the main functions of a city. It is necessary to look back and inwards if we want better solutions, solutions that are the right of any society that aspires to live, to inhabit.

Keywords *Participatory Design, Urban Space, Daily Life, Society, Well-being.*

Introduction

Urban space is an activity frequently practiced by several scientific disciplines, the most specific being Architecture and Urbanism. As it is a highly complex topic, it is natural that its points of reflection are distributed along more specific paths and, consequently, be further studied by specialists, such as Geographers, Landscapers, Engineers, and Public Managers. However, the fragmentation of this knowledge, without the intention of dialogue or interlocution between the parties, becomes a process without developments.

Interdisciplinarity is a path where different interests and methodologies interact, usually with the objective of first understanding and then transforming. There is often a tendency to make a discipline dominant when a process of exchange between sciences is established, which ends up constituting a hierarchical and power relationship. According to Sales (2010, p. 282), for interdisciplinarity, a pertinent methodological arrangement is required to research various areas of knowledge. In this scenario, Design stands as an interface tool capable of producing, planning, and managing the production of Urban Space.

From an Urban Planner perspective, the lack of communication between the disciplines that involve the Urban is notorious; we have been observing city projects that do not promote spatial relationship, everyday life, social practices - freedom for decades. Ortigoza (2010, p. 158), having Daily Life as a category of analysis means also dwelling on the common, on the elementary, considering in everyday life the moment of the extraordinary, the possible. According to the author, Daily Life cannot be a universal model, as it depends on the commoner's relationship with the place and its specificities. Urban projects must come closer and take ownership of the Daily Life of local society throughout their entire process.

This article will attempt, therefore, to propose an approximation between Design. These sciences touch the Urban, and Everyday practices, which are fundamental and inherent to any society, but have been losing their importance in the face of daily political choices based on order and in control, essentially aiming at capital and power. Why has the city become the place of work, and not leisure/pleasure? Would it be possible to produce spaces that produce the everyday/common? And how can Participatory Design contribute? Space is a product and producer of relationships, it is consumed and consumer, it is a part and not a receptacle; there is no history and social relations without space.

> What about the street, however? It serves as a meeting place (topos), for without it no other designated encounters are possible (cafés, theaters, halls). [...] And there are consequences to eliminating the street (ever since Le Corbusier[1] and his nouveaux ensembles: the extinction of life, the reduction of the city to a dormitory, the aberrant functionalization of existence. The street contains functions that Le Corbusier overlooked: the informative function, the symbolic function, the ludic function. The street is a place to play and learn. The street is disorder. [...] This disorder is alive. It informs. It surprises. (Lefebvre, 2003, p. 18-19)

The geography of urban spaces

There is a difficulty for Urbanism to understand the dimensions of the Urban beyond the physically constructed. The design of space often gains priority given the possibility of producing urban life. The power that the project - and who designs it - apparently must 'organize the mess' is seductive, there is nothing that seems more important to the Urban Planner at the moment of creation than imagining a functional and beautiful city. What escapes him - because there is no desire to see - is the fact that control is not just in what you see. The symbolic representations produced in and by space are also largely responsible for defining the dwelling of a society.

> Until today, the center has never been man. Creativity has always remained marginal, suburban. Urbanism clearly reflects the vicissitudes of the axis around which life has been organized for millennia. [...] It becomes more and more obvious that the point of reference they propose is always elsewhere. In these labyrinths where the only thing allowed is to get lost, the prohibition of playing, meeting, living is hidden behind kilometers of glazed openings, in the grid of grids of arteries, on top of the habitable cement blocks. (Vaneigem, 2002, p. 160 - translated by the author)

Creativity is necessary and fundamental for us to seek new points of reference and thus see other possible futures for life in society. Next, some approximations will be made in themes that involve the space, its production and the problems produced in it, by him and by him. (Space is always part of the problem because it is produced).

About Urbanism

Gottdiener (1994, pp. 146), in his book The Social Production of Urban Space, quotes the following phrase by Lefebvre: "it is worth remembering that urban has no worse enemy than urban planning and 'urbanisme' which is capitalism's and state's strategic instrument for the manipulation of fragmented urban reality and the production of controlled space". There is no way to disagree. Urbanism ends up expressing the desires of Power

Sales, E. J. C. G. (2010). *A teoria geográfica nos estudos do turismo: elementos teórico-metodológicos*. In Godoy, Paulo R. Teixeira de (Org.). História do pensamento geográfico e epistemologia em Geografia. São Paulo: Cultura Acadêmica, p. 277-289

Ortigoza, S. A. G. (2010). *As possibilidades de aplicação do método regressivo-progressivo de Henri Lefebvre na Geografia Urbana*. In Godoy, Paulo R. Teixeira de (Org.). História do pensamento geográfico e epistemologia em Geografia. São Paulo: Cultura Acadêmica, p. 157-184.

Lefebvre, H. (2003). *The urban revolution*. Minneapolis: University of Minnesota Press.

Vaneigem, R. *A arte de viver para as novas gerações*. Livro completamente digitado e revisado por Arnaldo de Carvalho. Disponível em: https://colectivolibertarioevora.wordpress.com/livros-digitais/

Gottdiener, M. (1994). *The social production of urban space*. 2nd ed. Austin: University of Texas Press.

[1] Charles-Edouard Jeanneret - Gris, better known by the pseudonym Le Corbusiere was a Swiss architect, urban planner, sculptor and painter, naturalized French and born in 1887.

much more than the desires of Society. But how to think about a possibility of a more pleasant urban life based on cities that start from projects carried out by a science seen as the enemy?

> People without imagination are beginning to tire of the importance given to comfort, culture, leisure and everything that destroys the imagination. This does not mean that people are tired of comfort, culture and leisure, but the use that is made of them and that precisely prevents them from enjoying them. (Vaneigem, 2002, p. 13 - translated by the author)

First, it is important to understand that every space is produced with an intention, that we produce the space that also produces us, and that these productions are responsible for aggregating or segregating society. It is also important to highlight that space is an element of consumption and that capitalism is the great parasite of this production. But this is not its only source of survival, but the relationship between what is produced and what exists, the spatial practice, where the reproduction of relationships predominates (Lefebvre, 2013, p. 379).

> An immense amount of effort, including the formation of a vast advertising industry, has been put into influencing and manipulating the wants, needs and desires of human populations to ensure a potential market. But something more than just advertising is involved here. What is required is formation of conditions of daily life that necessitate the absorption of a certain bundle of commodities and services to sustain it. (Harvey, 2010, p. 106)

The urban project, therefore, camouflages itself in the role of 'solver', while its practical actions involve the constant creation of new needs for a society that no longer even has its existing needs met. New demands are introduced into society with such intensity and speed that there is no space/time for reflection. Alienation reigns and society naturalizes - does not see - the absurd. Although the human being is essentially considered a being of needs, according to Marx, the realm of freedom is only possible if we abandon the realm of necessity. Urban planning builds consumers while it should build citizenship; cities are sold, nature is sold, the idea of experiencing these spaces is sold, even before the experience itself. The value is in the representations and not in the real. As a social practice, Lefebvre (1996, p. 96) states that urbanism has already surpassed the initial stage, that of confrontation and communication between experts, of what is called interdisciplinary. According to him, either the urban planner is inspired by the practice of partial knowledge that he applies or else he puts into action hypotheses or projects at the level of a global reality. Therefore, a constant critical exami-

Vaneigem, R. op. cit.

Lefebvre, H. (2013). *La producción del espacio*. Madrid: Capitán Swing. mesa pilotis

Harvey, D. (2010). *The enigma of capital and the crisis of capitalism*. London: Profile Books

Lefebvre, H. (1996). *Writings on Cities*. Translated and edited by Eleonore Kofman and Elizabeth Lebas. Oxford: Wiley Blackwell.

Lefebvre, H. (2016). *Espaço e Política. O direito à cidade II*. Belo Horizonte: Editora UFMG.

Jacobs, J. (1989). *The death and life of great American cities*. New York: Random House.

Lefebvre, H. (2003). op. cit.

nation of the activity called Urbanism is necessary, questioning its propositions and decisions, which often produce negative effects. Urbanism turns to the promotion of spaces that can be reappropriated for everyday life; valuing space must be the basis for a fairer society. Lefebvre (2016, pp. 147) asks if this would be a utopia (as being something impossible today, but possible tomorrow), and indicates a possibility: between architecture and urbanism we have the macro-architectural and micro-urbanist level; and it is at this level that research and the possibility of the new are found. And it is exactly at this level that Participatory Design becomes efficient, proposing that specialists put aside part of their pre-existing knowledge and make space for new learning.

> Cities are an immense laboratory of trial and error, failure and success, in city building and city design. This is the laboratory in which city planning should have been learning and forming and testing its theories. Instead the practitioners and teachers of this discipline (if such it can be called) have ignored the study of success and failure in real life, have been incurious about the reasons for unexpected success, and are guided instead by principles derived from the behavior and appearance of towns, suburbs, tuberculosis sanatoria, fairs and imaginary dream cities - from anything but the cities themselves. (Jacobs, 1989, p. 6)

About Urban

Beyond the City and its urban planning, beyond the Urbe (physical city) and, even more, beyond the Polis (political city), there is a range of possibilities that transcends these categories, the Urban is presented. Lefebvre, in several works, unravels this concept with the intention of making the most of all its dimensions and scope.

> This is how this new concept is formed: the urban. It is necessary to distinguish it well from the city. The urban is distinguished from the city precisely because it appears and manifests itself in the course of the city's explosion, but it allows us to reconsider and even understand certain aspects of it that went unnoticed for a long time: centrality, space as a meeting place, monumentality etc. (Lefebvre, 2016, p. 79 - translated by the author).

Another fundamental aspect in understanding what Urban is and its 'simultaneity'. The author describes it as a pure form, a place of encounter, assembly - “is a center of attraction and life” (2003, p. 118). If we consider that the subject does not define himself, that his definition is in the relationships, and that every relationship involves interdependence, the importance of the si-

multaneous becomes evident; it is the space for the happening, for the unexpected, for the unpredictable.

> As a form, the urban has a name: it is simultaneity. This form is among the forms that can be studied by discerning them from their content. What urban form brings together and makes simultaneously can be very diverse. They are both things and people and signs; what is essential is reunion and simultaneity. (Lefebvre, 2016, p. 80 - translated by the author)

Therefore, its existence occurs through the contradictions that arise from the encounters, from the relationships, from the exchanges - from life. So, the Urban doesn't exist? It not only exists, but it is also the pure representation of existing; it takes place in the between, in the through; by contradictions and differences. According to Lefebvre, it is a concrete abstraction, linked to practice (2003).

> The urban, that is, urban society, does not yet exist and yet exists virtually; through the contradictions between the habitat, the segregations and the urban centrality that is essential to social practice, a contradiction full of meaning is manifested. (Lefebvre, 2016, p. 80 - translated by the author)

What structures the Urban, what gives it meaning, is what lies behind it; what sustains it are the relationships and their processes, not the objects themselves. Social practices are spaces of experience, they define habits and places, they are structuring - and structured. And even though it seems to be an accumulator of 'things', its essence is in movement, in spaces that are sometimes produced and sometimes occupied, in transformations, in multiplicity.

> Living creatures, the products of industry, technology and wealth, works of culture, ways of living, situations, the modulations and ruptures of the everyday - the urban accumulates all content. But it is more than and different from accumulation. Its content (things, objects, people, situations) are mutually exclusive because they are diverse, but inclusive because they are brought together and imply their mutual presence. The urban is both form and receptacle, void and plenitude, superobject and nonobject, superconsciousness and the totality of consciousness. (Lefebvre, 2003, p. 119)

About Everyday Life

According to Santos (1996, p. 52-53), Everyday Life is established through three orders: the order of the technical form (acting established by the technique), the order of the legal form (acting that obeys legal, economic and scientific formalisms) and the order of the symbolic (acting that is not regulated by calculation and comprises affective, emotional and ritual forms. While the first two orders impose their data, the third is constituted through the force of transformation and change, of symbolic action, where we produce meaning, representation and affection.

> According to Lefebvre (1981), daily life is, on the one hand, a modality of empirical organization of human life and, on the other, a set of representations that mask this organization, its contingency and its risks. Its approach is not an easy task, as the reality that everyday life gives us is often doubled: inconsistency and solidity; fragility and cohesion; seriousness and futility; deep drama and comedy mask about life. (Ortigoza, 2010, p. 159 - translated by the author)

In addition, Everyday Life is the place of alienation and production at the same time, and it takes place in the urban space, a place of reappropriation of life, of the common. How to produce/realize the common in big cities? Perhaps, because it is a local activity, which develops more easily on smaller scales, daily life ends up not being contemplated by the sciences - urban planning - which project dwelling. Well, but isn't the starting point of a project its object and its relationships? Moreover, isn't the main object of cities the everyday and its representations? The starting point should always be the real, but reality has been replaced by its image. Again, we can identify the potential of Design through the importance of including social relations, with their desires and needs, in city projects.

> Under the seeming disorder of the old city, wherever the old city is working successfully, is a marvelous order for maintaining the streets' safety and the city's freedom. It is a complex order. Its essence is intricacy of sidewalk use, bringing with it a constant succession of eyes. This order is all composed of movement and change, and although it is life, not art, we may fancifully call it the art form of the city and liken it to the dance - not to a simple-minded precision dance with everyone kicking up at the same time, twirling in unison and bowing off en masse, but to an intricate ballet in which the individual dancers and ensembles all have distinctive parts which miraculously reinforce each other and compose an orderly whole. The ballet of the good city sidewalk never repeats itself from place to place, and in anyone place is always replete with new improvisations. (Jacobs, 1989, p. 50)

Inhabiting modifies and shares space, and it only exists through the inhabitants. Individuals build the process of inhabiting a city as a society, and they are also the ones who design urban spatiality, based on their own needs and desires. In other words, the being who designs is also an urban being, creator and creature of Everyday Life. According to Santos (1996, pp. 115), the creative process of new objects, gears, and materials is

Lefebvre, H. (2016). op. cit.

Lefebvre, H. (2003). op. cit.

Santos, M. (1996). *A natureza do espaço. Técnica e tempo, razão e emoção*. São Paulo: Hucitec.

Ortigoza, S. A. G., op. cit.

Jacobs, J., op. cit.

Santos, M., op. cit.

powerfully multiplied thanks to increasingly intimate associations between science and technique. Although apparently utopian, the solution lies in changing the established pattern, the limits established by the projects/capital need to be transgressed and society to appropriate the urban space.

The sociology of urban spaces

It is understood that each and every city project must consider its own society, a society composed and built by its respective individuals. Therefore, we resorted to sociological studies to deepen the knowledge of social practices, aiming to increase the quality of public spaces in cities and, consequently, the quality of life of populations. The intention is, therefore, to try to understand the societies that inhabit the public spaces of cities in the light of sociology, in particular, through the thoughts of Gabriel Tarde, a nineteenth-century French sociologist and criminologist, who had his work smothered at the time, in in a way, due to the success of the theories of the also French sociologist Émille Durkheim. At first glance, thinking of the city as a space for inhabiting, for living seems natural to us. However, there is often a gap in the process of understanding spatial functions. Indwelling exists only through the inhabitants, through individual people; it is the individuals who build the process of inhabiting a city as a society. And they are also the ones who architect the urban spaces, starting from their needs and desires, and transgressing the limits of the functions pre-established by the projects. Countless nineteenth-century thinkers focused on writing papers and developing methodologies that aimed to understand society in all its complexity. Sociology had its first outlines defined by Auguste Comte (1798-1857), based on 'positivism. It was later consolidated through the methodology developed by Émile Durkheim (1858-1917), based on 'social facts' in the late nineteenth century. The French sociologist assumed to understand society as an object, as a mass; he analyzes society as a 'thing' and always with detachment, defending that it was necessary to observe it from the outside.

However, at the same time, Gabriel Tarde (1843-1904) developed thoughts with an approach opposite to that of Durkheim. The French sociologist also argued that it was necessary to study subjectivity to understand society. Tarde puts forward the idea that society is built through its individuals, thus abandoning the superficial view of the social, where the individual would be a product of society (as defended by Durkheim).

> A study of societies is not possible without a study of subjectivities; social production is subjective production. It's the same mistake, says Tarde, what a physicist commits when studying atomic compounds discarding the analysis of atoms. The social is no longer animated by abstract forces, but by a multiplicity of individuals in constant interpenetration, in mutual constitution. Abandoning this superficial view of the social to become forward towards its real components: individuals. But this vague idealism we cannot move on to banal individualism. if impersonal factors should not explain the societies, they nor should they grasp the social transformations as a result of whim of some great men, as we are used to seeing in our history books. (Themudo, 2002, p. 23 - translated by the author)

The differentiation in the relationship between individual and society that was set in the period that Tarde and Durkheim debated is extremely important in understanding their behavior in spaces. We may venture to say that the prevailing theory was, in a way, more comfortable for thinkers, as it placed them outside the problem under analysis. The same happens with urban projects, developed by specialists who are almost always in superior positions, where they are able to define needs from their own point of view. This movement of observing the "problem" from the outside has always been involved by the desire for control, whether to control its variables when studying a society, or to control a society when designing space. It is not about condemning or canceling this zoom out (removal) movement, as it makes possible to have a vision of the whole, of the whole. But what Tarde comes to question, in fact, is about the practice of zoom in (approximation), with a close look at the micro. He argues that the fundamental in understanding societies, subjectivity only becomes visible when we pay attention to microsocial dynamics. The idea defended is to put a magnifying glass in society so that we can see what actually happens within it. Defending that there is a single collective consciousness makes the analysis imprecise, as it ignores the uniqueness of individuals and their autonomy in thinking. Again, here we are not ignoring the fact that people are influenceable and induced by the collective, what we are emphasizing is that, in addition to the constant turmoil of social relations that take place in spaces, there is the uncontrollable, the unexpected, what Tarde goes call it 'event'. He thus clearly places the dimension of the impotence of science in the light of chance. While Durkheim said that the individual is a product of society, Tarde said that the individual was its creator. In fact, we can no longer separate society and the individual, as they are creators and creatures at the same time. Tarde will add in his speech the concept of the 'monad' to exemplify the uniqueness of the individual, as there is no one equal to another. These are spheres that interpenetrate and are in

Tarde, G. (2007). *Monadologia e Sociologia e Outros Ensaios*. São Paulo: Cosac & Naify.

Themudo, T. S. (2002). *Gabriel Tarde. Sociologia e e subjetividade*. Rio de Janeiro: Relume Dumará.

Tarde, G., op. cit.

constant interdependence, producing the 'events' that promote 'imitations' and drive 'inventions'. And it is from this somewhat simple process that originality emerges through its accumulation and repetition (often expressed through art, an activity that highlights the uniqueness of life).

It is curious to realize how late he was able to see microsociology at that time, without exposing technological resources as we have today. The city and its urban spaces have likely been great scenarios for observing this social practice more closely. Not that the events did not take place in private environments, as an 'elementary couple' is enough for imitative and inventive processes to develop, but in fact, it is in the public space that they become more evident. This vision is very subtle, but it is this simple movement of transformation that Tarde focuses on, the transforming power that exists when countless daily inventions overlap. We cannot think of the city as dichotomous, with the micro and the macro existing in isolation. When an urban planner understands society as something previously defined and static, that is, as an object seen from the outside, he will not foresee the real needs within that group. Again, thinking from macro to micro, at some levels, is necessary. However, one must be careful with the feeling of superiority, of control, that distancing provokes; creation is almost always related to genius, to the gift, something almost divine, and which, in turn, requires no effort. Thinking about space without feeling like a user, without placing oneself as belonging, is a failed process; without belief and desire there is no possibility of invention, of creation. Without belonging there is no memory and, consequently, there is no creation.

It is noteworthy that Tarde spontaneously proposes interdisciplinarity in his work, when he brings psychology, for example, into his speech. During this period, psychoanalysis was not yet consolidated. However, the author has enormous attention regarding the subjectivity of each subject in his speeches, which will later be directly related to the discovery of the 'unconscious', a concept explored by Freud for the first time in 1900.

> Diversity, not unity, is at the heart of things: this conclusion it is, moreover, deduced for us from a general observation that a simple glance released to the world and science allows us to do. everywhere an exuberant richness of variations and unusual modulations emanates from these permanent themes we call living species, star systems, balances of all kinds, and ends up destroying and renewing them entirely; however, nowhere are the forces or laws that we are used to calling principles of things seem to propose variety as a term or as a goal. Forces are at the service of laws, we are told, and all laws apply to phenomena insofar as these are perfect repetitions and not varied repetitions; all, evidently, tend to ensure the exact reproduction of themes and the indefinite stability of all types of balance, to prevent its alteration and its renewal. (Tarde, 2007, p. 104 - translated by the author)

Tarde, G., op. cit.

Tarde, G., op. cit.

Moraes, A. (2013). *de. Ergonomia, Ergodesign E Usabilidade: Algumas Histórias, Precursores.* Ergodesign & amp; HCI, [S.l.], v.1, n.1, p. 1-9, june 2013.

Urban spaces, with their meeting places, even though they always try to impose laws and limits to ensure stability, will always be uncontrollable. They are fundamental in promoting 'events' between individuals in societies and, therefore, even if retrograde urban planners try to apply their "divine" projects, their goals will never be achieved. The city, like society, is alive, and because of that it is changeable, fickle, and unpredictable; and accepting its unpredictability is as close to the ideal as you can get when trying to project it.

Human Factors/ Ergonomics and urban spaces

For many years, the Human Factors/Ergonomics discipline was seen as something detached from the creative process disciplines; his attention to the physical and motor aspects of the human being stood out for years compared to its scope. It is a science that aims to interact with an individual and a non-individual (object, machine, environment, system), satisfied well-being - satisfaction, security, comfort (both physical and emotional). Therefore, it is evident that the discipline focuses on numerous aspects beyond the anatomical, such as cognitive and organizational aspects. The Ergodesign and Interface Usability Laboratory (LEUI)[2], for example, is divided into five research themes: Ergonomics and Product Usability; Ergonomics and Usability of Information Systems; Ergonomics and Human-Computer Interaction; Ergonomics and Transport Systems; and Ergonomics of the Built Space, area in which this research is inserted (leui.dad.puc-rio.br). The Urban Space is a highly complex built environment, composed of information systems, circulation, signage, accessibility; but it also involves subjective systems that provide sociability, experience, pleasure, health and well-being. However, even though we are talking about an area of Ergonomics studied within a Design program, these two disciplines have not always interacted in such a fluid way and perceived coherence in their relationships. According to Anamaria de Moraes:

> Why is there a need for a separate Ergonomics group in the Industrial Design Society? The fact is that there is a dramatic cultural difference between the Human Factors and Ergonomics Society and the Industrial Designers Society of America. Industrial designers, as a general rule, have little interest and don't really appreciate the technical presentation mode that is typical of Ergonomics congresses. They tend to be more

[2] Laboratory belonging to the Ergonomics, Usability and HCI research line of the Graduate Program in Design at PUC-Rio.

> visual than verbal and more intuitive than technological in their methods. Industrial design programs operate on a fast timeline that is very different from what ergonomists are used to. (Moraes, 2013, p. 6 - translated by the author)

According to the author (2013), designers need a special focus on ergonomics in terms of timing, methods, transmission and reports. She says that designers are becoming more sophisticated and that ergonomists are increasingly inserting themselves in the middle of Design. Even so, she thinks that the two areas will continue to work in parallel in the near future. As long as this distance is maintained, we will continue to project medium objects and environments, with their potential reduced and even often triggering negative consequences in the long term.
So that there is a way out for the production of better Public Leisure Spaces, this work proposes the interaction not only of the experts involved, such as architects, urban planners, designers, ergonomists, mayors and private investors, but mainly the interaction with users, with both local and regional population; the problems are systemic and the solutions too. We need to address the physical aspects of space (furniture, temperature, lighting, infrastructure, accessibility), cognitive aspects (perception, memory, orientability, belonging, information), and organizational aspects (system optimization, public policies, management processes, short-, medium-and long-term planning).

Ergodesign and the city

According to Anamaria de Moraes, (2013, p. 3-4), it becomes increasingly difficult and confusing to define and apply ergonomics and design separately. It is impossible to decide when ergonomics ends and design begins during the development of a project. However, she argues that there are barriers between the two disciplines, as ergonomists solve problems through analysis and designers prefer synthesis, that is, each works at the opposite extreme of the design process.
In order to keep Ergonomics and Design together, considering that we believe that this union is fundamental, we will use the term Ergodesign from now on. According to Moraes, its focus is macroergonomic and creative, focused on both the individual and the environment simultaneously, ensuring the optimization of the development of the technologies involved. As systems have become more complex, interdisciplinarity is needed, thus ensuring that the user's needs are met and that the product, or space, also has its attributes assured.
Cities are extremely complex and evidently interdisciplinary environments; demand management and optimization; they require creativity both in their design and in their maintenance and problem solving. Ergodesign therefore contributes directly to the theme. However, according to Sofia Águas (2012, p. 61), when projecting in and to the public space, it is necessary to understand that the products and spaces we design belong to the community, which will serve as a fundamental support for the construction of the place's identity, and that the notion of appropriation is, therefore, essential. She goes on saying that:

> The design project can influence the citizen's relationship with the urban public space: on the one hand, more pragmatic, through its explicit functions associated with contemplation, relaxation, leisure, service, etc.; on the other hand, less evident, through its implicit and abstract functions related to the identification and understanding of identity and local character by the user. It is necessary to take into account that design resources can acquire symbolic qualities, by establishing concrete changes in public spaces, building scenarios that can contribute to the definition of local identity traits, characteristics related to climate, behavior, urban landscape, to the history and memory of each public space. (Águas, 2012, p. 61 - translated by the author)

This aspect, of identity, memory, symbolic; of the construction of the feeling of belonging cannot be considered a consequence of the experience of space, purely and simply. One must be aware that the project directly interferes in this relationship and in this construction, even though it cannot foresee all the possible consequences from the use of a space. It's a kind of balance, between planning and making possibilities viable, but without having control or limitation as the objective. The user-focused project aims at the freedom of use, the possibilities, the event; the everyday essentially.

> [...] projects for public environments, such as squares, parks, buildings and other spaces for public use, must be discussed with a view to the future, understanding that designers and users/citizens are fundamental actors in the discussion. In addition, this inter and multidisciplinary project for the public space must always meet the basic issues of Ergonomics, applied to the built environment: health, safety, wellbeing. (Mont'alvão, 2020, p. 1 - translated by the author)

Next, Ergonomics of the Built Space will be presented in more depth and the existing participatory methodologies that relate to Ergodesign. It is intended to highlight the advantages of working collectively and the economic, social and cultural benefits that we can promote, creating a link between user and space, adding value and rescuing the sense of belonging, considered essential in the production and demand cycle of Public Spaces of Better leisure in cities.

Moraes, A., op. cit.

Águas, S. (2012). *Do design ao co-design: uma oportunidade de design participativo na transformação do espaço público*. Barcelona: W@terfront, n.22, p. 57-70.

Mont'alvão, C. (2020). *Ergonomia do Ambiente Construído e o conceito de Valor Público: o foco está no cidadão*, p. 3-4. In: Anais do VIII Encontro Nacional de Ergonomia do Ambiente Construído e do IX Seminário Brasileiro de Acessibilidade Integral. São Paulo: Blucher.

Ergonomics Environmental Design

The Ergonomics Environmental Design intends to study the relationship between an individual and a space, based on an activity performed. According to the technical group Environmental Design Techinical Group - HFES3, at a time when there is a strong focus on creating sustainable environments, it plays a vital role in bringing together researchers with the latest ideas to improve the places where we live, learn, laugh and love, encompassing all ages, from children to the elderly. (hfes.org, translated by the author). However, this focus is not so recent. In the 1960s, the EDRA - Environmental Design Research Association was created and, according to the association, it was a period of social awareness, the emergence of new visions and horizons in relation to healthier and more democratic human environments. It was believed that a clear and conscious understanding of the project decision process, together with a similar understanding of the methods and techniques used by the social sciences, would provide the necessary basis for improving environmental problems. (edra.org, translated by the author)

Mont'Alvão and Villarouco (2011), present a series of methodologies developed and presented through articles focused on EAC: pre-project evaluations; post-occupancy assessments; ergonomic intervention; guided tour; monitored displacement; constellation of attributes. The authors recall that the Technical and Ergonomics Group for the Built Environment was only recognized by ABERGO (Brazilian Ergonomics Association) in 2004. However, although this area of ergonomics is recent, these methodologies presented are mostly seen being applied in research involving built environments considered simple. Could existing methodologies be mature enough to meet the complexity of environments such as urban spaces? Or is it that we still don't have specific methodologies to work these spaces?

Space is perceived and experienced individually, it is an experience of a qualitative nature and directly related to the emotional state, cognitive conditions and cultural influences of each individual. Therefore, Environmental Ergonomics connects with other branches of Ergonomics, such as Informational and Affective. A user's comfort in an urban space probably starts from their familiarity with the information and reference marks present. The act of understanding where you are, locating yourself in space, is directly linked to the feeling of security (directly linked to the feeling of comfort and well-being).

> As the environmental graphic design profession matured over the past forty years, the range of wayfinding projects rapidly expanded. In the 1970s the early professional practice of architectural graphics mainly entailed designing signs for architects' and developers' buildings. Today almost every type of public space and most private complexes require a wayfinding scheme. (Gibson, 2009, p. 17)

Thinking about the act of locating oneself in a built environment and understanding its importance for the individual, how can you design spaces where people find their way around? It's not just a matter of signaling, as this feeling of security based on orientability is something extremely individual. For example, Wayfinding helps us better understand this process, to locate oneself or to get from one point to another in a safe way. But what is important to highlight here is that Wayfinding, or any other discipline and methodology that aims to work on understanding the relationship between the individual and the environment, must necessarily listen to the individual; the citizen. It seems obvious, but most of the time it doesn't. Promoting and/or demanding that participatory and collaborative methodologies be applied to projects may no longer be enough. There needs to be a deeper and more consolidated understanding that the individual's voice is critical.

Ergonomics and Collaborative Methodologies

According to Sanders and Stappers (2008, p. 7), the practice of collective creativity in design has existed for almost 0 years, named as Participatory Design. Much of the activity in participatory design (terminology used until what is now called cocreation/codesign) has been taking place in Europe. Research projects on user participation in systems development date back to the '70s.

> Within this landscape, in the area of participatory design, the notions of cocreation and codesign have been growing. The terms codesign and cocreation are today often confused and/or treated synonymously with one another. Opinions about who should be involved in these collective acts of creativity, when, and in what role vary widely. Online dictionaries do not yet have entries for cocreation, cocreation, codesign or codesign. Wikipedia, the online encyclopedia, has only preliminary entries on cocreation and codesign (Sanders, Stappers, 2008, p.6)

The authors go on to explain that cocreation would be any collective activity involving creativity and that codesign would be this collective creativity activity applied to a design process. Therefore, codesign would be an instance of cocreation, which can refer to the creativity of both designers and non-design-trained people working together in the design development process. But why did these practices and principles take so long to be inserted into design processes? Trying to explain the reasons why these approaches face so many barriers to being

Villarouco, V. (2011). *Tratando de ambientes ergonomicamente adequados: seriam ergoambientes?* In: Mont'alvão, C. & Villarouco, V. Um novo olhar para o projeto: a ergonomia no ambiente construído. Rio de Janeiro: Faperj, 2AB, p. 25-46.

Gibson, D. (2009). The *Wayfinding Handbook: Information Design for Public Places*. Princeton: Architectural Press.

Sanders, E. B.N, Stappers, P. J. (2008). *Co-creation and the new landscapes of design*. Delft; Taylor & Francis Group, Codesign Journal. Vol.4 No 1. March, p. 5-18..

[3]Human Factors and Ergonomics Society.

implemented, they point out some possible reasons and their possibilities for change (Sanders and Stappers, 2008, p. 9-10):

1- Cocreations threaten existing structures, demanding that this control be renounced and given to potential customers, consumers or users. It's difficult for those who were successful while in control to give up or imagine a new way of doing business that can also be successful. On the other hand, new generations are finding it easier to distribute and share control and ownership. This change in attitude is largely possible because the internet has given a voice to people who were not even part of the conversations before.

2- Participatory thinking is averse to consumerism, where personal happiness is compared to the purchase and consumption of material goods. In many parts of the world, the needs that capitalism has worked so hard to generate have been met and therefore new needs are being invented. However, more and more people want a balance between passive consumption and the ability to actively choose what kinds of more creative experiences they want to engage in and how. The renewed interest in sustainable practices is also helping to fuel this movement.

3- Participatory design has been seen as an academic endeavor with little or no relevance to the competitive job market. Investing in user research and studies is seen as a big and expensive step, and user participation a radical step. However, this view is beginning to change now, as product development becomes increasingly knowledge-driven, and industries and universities look to each other for collaborative research on innovation.

Definitely, relinquishing control and going against capitalism are difficult paths to be followed, with countless barriers structured by money and power. And certainly, these difficulties hampered any attempt to include the population in urban projects in a truly participatory way. Designing under the demand of the client (in this case, the citizen) is not profitable. Cross (1972), according to the authors, said that professionals in all fields have failed in their supposed responsibility to predict and project the adverse effects of their projects. Side effects are extremely harmful and can no longer be tolerated and considered unavoidable. He concludes by saying that citizen participation in decision-making could possibly provide a necessary reorientation (translated by the author). Participatory Design allows people to collaborate by exposing their demands and actively participate in decision-making from the beginning to the end of the project, producing greater engagement by the population and increasing the feeling of belonging, essential to everyday life.

Sanders, E. B.N, Stappers, P. J., op. cit.

Águas, S., op. cit.

Zink, K. J., Fischer, K. (2013). *Do we need sustainability as a new approach in human factors and ergonomics?* Ergonomics. 56(3):348-56. doi: 10.1080/00140139.2012.751456. Epub 2013 Feb 5. PMID: 23379889.

> Citizens are starting to take charge, directly, of their cities, they are taking initiatives and building the infrastructure that politicians do not carry out or are slow to carry out, they are reacting proactively. These demonstrations are mostly carried out by local groups, which manifest themselves through various types of actions all over the planet. (Águas, 2012, p. 63 - translated by the author)

Ergonomics and Well Being

We already know that we need new ways and tools to produce healthier urban spaces and to transform existing ones. It is now necessary to give space and attention to manifest the methodological possibilities and present their knowledge. When we approach aspects related to the health and well-being of a society, Ergodesign presents itself strongly as an active discipline concerned with promoting improvements. These aspects are in fact global and fundamental problems that are part of numerous social projects, such as the UN Agenda 2030. Its 11th objective is to make cities and communities more sustainable, through measures such as investment in safer housing, more efficient public transport, increase in urbanized areas, preservation of cultural heritage, protection of people in situations of urban vulnerability, reduction of pollution, accessibility and democratization of public spaces. The authors Zink and Fischer (2013, p. 351) present 5 principles to be followed in the sustainability-oriented project process (adapted by the author):

1- Preservation and development of human and social capital: adopting a narrow approach focusing on the individual, it is necessary to add interdisciplinary social and methodological competences and their respective attitudes (such as commitment or readiness to learn).

2- Focus on a systems-wide approach, including complete value creation chains: can ergonomic principles and interventions contribute to better sustainability performance in different phases of value creation?

3- Search for a lifecycle perspective concerning the design of products and work systems: the entire lifecycle has to be considered; not only the development process itself, but also maintenance and repair, disassembly, reuse and recycling, as well as (negative) impacts on users.

4- Consider impacts on society and impacts on other related systems: if specialists are not educated on a sustainable way of dealing with resources, the world of work is the best chance to learn.

5- Address barriers to sustainable development, such as paradoxes caused by conflicting goals: the skills to deal with the

> scarcity of resources and to balance conflicting demands are important individual and organizational capacities.

The scope of a sustainable project is much greater than the simple idea of ecology, it encompasses physical, social, time, value, impact, cause and effect aspects; addresses tangible and intangible aspects. Cities definitely need to be sustainable, considering the full breadth of the term. The design of cities directly interferes in the lives of its inhabitants, both for its physical and symbolic aspects. The negative consequences of this interference produce a reduction in the population's quality of life and economic losses. A sick society is costly, both in the present and in the future, its "diseases" contaminate other sectors of the city, generating more and more failures in the system. Healthy and free people are happier, live better, eat well, move more physically, are more efficient at work, relate better with others; sustainable cities provide well-being, and wellbeing promotes sustainable societies.

> What determines whether a space is valued as a public space is not so much its ownership status or its design, but whether it is actively used and shared by different individuals and groups. In other words, the public quality of the space is made up of the experiences that people are able to create within it. [...] In this sense, it can be said that the public space is co-produced. That is, it is not only created by the design of its designer, but also through the participation and daily use of its population. (Águas, 2012, p. 58 - translated by the author)

Final considerations

Through interdisciplinarity and participatory methodologies, it is believed that new ways of designing may emerge, which prioritize democracy and the reduction of environmental impacts, which promote social and economic benefits, which are accessible and accessible, which result in quality of life for the user and for society as a whole. The city is a political and social tool capable of generating value. Its spaces, especially those for leisure and socializing, must be transformed according to who uses them, and not who produces them. As a premise, they must be safe, maintainable and exist with quality for everyone, but we will only know what else should be included in the scope if we give space for the user to express themselves.

Urban spaces, with their meeting places, even though they always try to impose laws and limits to ensure stability, will always be uncontrollable. They are fundamental in promoting events between individuals in societies and, therefore, even if retrograde urban planners try to apply their "divine" projects, their goals will never be achieved. The city, like society, is alive, and so it is changeable, inconstant and unpredictable; and accepting its unpredictability is as close to the ideal as you can get when trying to project it.

> As much as we can define it, our urban object will never today be entirely present in our reflections. More than any other object, it possesses a very complex quality of totality in act and potential the object of research gradually uncovered, which will be either slowly or never exhausted. To take this object as a given truth is to operate a mystifying ideology. (Lefebvre, 1996, p. 153)

Why did the city become the place of work, and not leisure/pleasure? Perhaps because the focus of the projects is the consumption of spaces, not their use. Would it be possible to create spaces that promote the everyday/common? Certainly! Daily life is inherent to the public space, but the conditions of the spaces define the quality of life present there. And how can Participatory Design contribute? According to Águas (2012, p. 62), if we face urban design as a participatory process, which involves many actors with different perspectives, there may be great potential for change. In this sense, participatory design may be an appropriate approach, as it facilitates the organization and allows transferring part of the decision-making process to the population.

Everything and nothing, and at the same time. The urban issue is always dialectical, the urban is the possibility, it allows life in all its forms and/or 'non-forms' and, therefore, it always tends towards an infinite number of possibilities. Moreover, to be an urban individual is inevitably to exercise urbanity, always loaded with freedom and limits. The structure of urban space takes place through experience, culture, and diversity; it is a spontaneous process that will always be unfinished. Remember that the abstraction of urban space, which takes place in the field of ideas, does not make it unreal but in constant transformation. Finally, reaffirming the concepts of Participatory Design, the objective of keeping the individual as the primary focus should never be forgotten, as it is this focus that will direct any project towards a result that rescues the main functions of a city. It is necessary to look back and inwards if we want better solutions, solutions that are the right of any society that aspires to live, to inhabit.

> The right to the city manifests itself as a superior form of rights: the right to freedom, individualization in socialization, habitat, and inhabit. The right to the oeuvre, participation, and appropriation (clearly distinct from the property right), is implied in the right to the city. (Lefebvre, 1996, p. 173-174)

Acknowledgements
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Águas, S., op. cit.

Lefebvre, H. (1996), op. cit.

Águas, S., op. cit.

Design and 4.0 technologies.
The custamization of the sensory qualities of silk yarns between zero-lot production and the enhancement of the productive identity of sou-thern Italy

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4.0 technology is conquering all productive scenarios. Even the world of textiles is embracing the most recent technological innovations to respond to new needs and satisfy different and increasingly customized needs. Nonetheless, this innovation has not developed uniformly. As matter of fact, a precious fiber such as silk has not yet been involved in this development due to the complexity of the process chain, developed from the industrial revolution onwards. Moreover, in terms of large production quantities, China is the largest holder excluding the great historical production linked to the Mediterranean production context, about the south of Italy, including Puglia. Furthermore, this complexity of the supply chain also involves the production of raw material, the cocoons of bombyx mori linked to the cultivation of the White Mulberry, which have characterized not only the production but also the Mediterranean landscapes now in decommissioning, interrupting a sustainable ecosystem. Therefore, this research proposal focuses on the necessity to respond to the need to re establish this ecosystem, bridging this innovation gap through the design of production modules with low infrastructural cost but with high added value in terms of design potential. This can be achieved using technologies made available by industry 4.0 aimed for silk production: these are customizable for small series batches and able to respond to the renewed need of young start-ups which today in the south are rediscovering and promoting silk production opposing to globalization that has deterritorialized silk products.

Keywords *Silk, Industry 4.0, Lotto zero production, South Italy, Sensoriality of surface.*

Introduction

As of today, Italy, above all the southern part, has almost entirely lost the role that it would play in the production of silk (Maccarelli, 2020). Consequently, the core of sericulture has been held by China ever since; indeed, China has been going through a massive and rapid process of industrialization for the last decade (Stanisci, 2017; Cardini & Vanoli, 2017). However, the high demand for silk has brought to the need of increasing the production in that sector as much as possible and a way to achieve that has been making use of a peculiar production chain, which is significantly different from the past one. To delve further into that: Bombyx Mori, (Cappellozza, 2020; Reali, 1990; Acqua, 1943) a being capable of secreting a specific saliva from which it is possible to make silk, used to be fed with leaves of mulberry; now it is fed with a mixture made of leaves of mulberry (Cappellozza & Cordazzi, 1995) along with sp cific chemical substances which are to speed the growth of the animal itself (Mirabella, 2018). These new techniques break the profound bond between traditional usage (Saviane, 2018) and production. As a matter of fact, the usual traditions have always been deeply connected with the industrial world, which has turned out to be detrimental to the quality of the final product, commercialized in the west part of the world. Nonetheless, nowadays the interest in this kind of traditions has been growing more and more on young people and those who set out to launch a start-up; however, they struggle with having equipment suited to the production of silk (Giovanni, 2005; Crippa, 1990). It is possible to address this kind of issue through creating a project which resolves to make appropriate technologies to satisfy the needs of the industry 4.0 and, also, to allow small business to carry out the production of silk. To attain that target, it is fundamentally needed to establish a solid collaboration between design and technology. It would be focused mainly on the perception of surfaces which are the core of some modern products.

State of Arts

In the field of digital textile innovation, we find the Hilo case study (Studio Hilo, 2018). It is a start-up based in Berlin and founded in 2018, which by developing an open hardware digital spinning wheel, has combined different disciplinary areas: from fashion to design through to engineering. Studio Hilo's efforts focused on the creation of a new method of yarn production, which should no longer be considered as an industrial exclusive, but as a practice within everyone's reach.
The Hilo studio machine (fig. 1,2) in fact, allows you to design the yarn according to your aesthetic needs with ease, using

Meccarelli M., (2020). *Le antiche vie della Cina. Un'indagine archeologica e artistica*, Manfredi edizioni.

Stansci L., (2017). *L'età della seta*, [tesi di dottorato, Università degli studi di Pavia], http://www-5.unipv.it/bachicoltura mellina/

Cardini F. Vanoli A., (2020). *La via della seta. Una storia millenaria tra Oriente e Occidente*, il Mulino.

Cappellozza S., (novembre 2020). *Aspetti attuali dell'allevamento del baco da seta.*, [Relazione a convegno], Seminario in setti utili, Sant'Angelo Lodigiano, Lodi, Italia.

Reali G., (1990). *L'allevamento dei bachi da seta*, L'Informatore Agrario.

Acqua C., (1943). *L'allevamento familiare del baco da seta*, (n. d).

Mirabella F., (2018). *Analisi biometrica di varietà di Morus Alba*, [tesi di dottorato, Università degli studi di Palermo], https://iris.unipa.it/handle/10447/91325#.YaYQWvHMLeo.

Saviane A., (2018). *Selezione di Razze di bombyx Mori ad alta efficienza nutrizionale*, [tesi di dottorato, Università degli studi di Padova], http://paduaresearch.cab.unipd.it/6849/.

Giovanni F., (2005). *Seta, agricoltura e sviluppo economico in Italia*, il Mulino.

Crippa, F., (1990). *L'importanza della seta*, il Mulino.

Studio Hilo, (2018). https://www.studiohilo.com/.

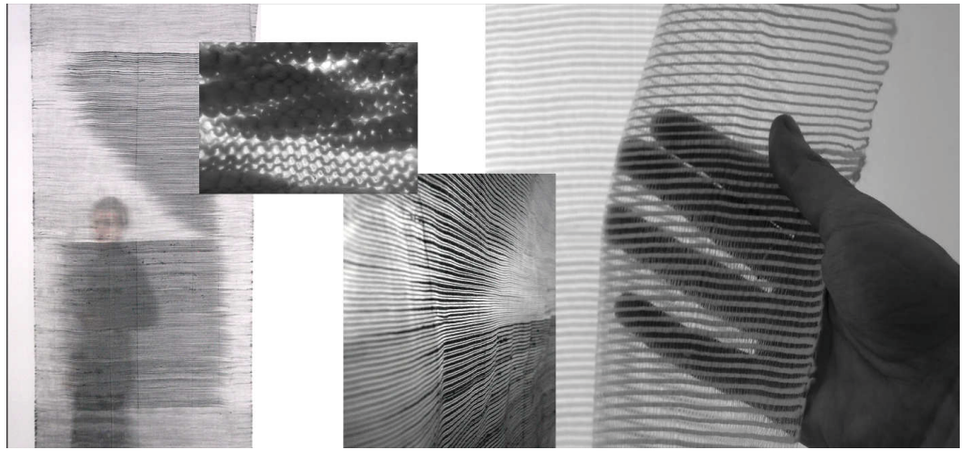
Tecnoseta, (2019). https://www.tecnoseta.com/.

Figure 1: Studio Hilo's machine
Figure 2: Wool yarn produced by the machine

a special software controlled by Arduino[1]. To do this, it takes inspiration from the ancient Ikat textile technique: the yarn was partially dyed by hand, to create motifs, so, almost in a similar way, through the software, the Hilo yarn translates a digital pattern or an image into different properties of the yarn, creating, for example, gradients of thickness and different material density (fig. 3), offering infinite design possibilities.
Then, focusing on the silk sector, we find a Roman start-up called Tecnoseta (Tecnoseta, 2019) a founded by Maddalena Mariani, Antonella Della Bella and Massimo Proia, in Zagarolo in

[1]*Open-source electronic prototyping platform enabling users to create interactive electronic objects.*

Figure 3: Fabrics produced by Studio Hylo's Machine



May 2019. They have carried out a work of cultural recovery of the gelsi-sericulture, through the planting of mulberry trees and the breeding of silkworms, to recover all the knowledge and experience necessary to produce cocoons. At the same time, they embarked on a path of study and research, aiming at recovering both the operating principles of the old machinery to build new ones, and the skills of the spinning mills to resume silk production for large industrialists.

Objectives and methods

The proposed research aims at the design of a family of production modules to automatize all the phases of the silk production chain (fig. 4), namely reeling, tortiglia[2], twining and twisting (Santorini, 2012; Battistini, 2003). To be more specific, reeling is the operation that allows to obtain the raw silk thread by unraveling the cocoons of the silkworm in boiling water. Then there is the tortiglia (Strobino, 1943) which consists in the crossing of the silk thread being formed between two rollers, with the aim of eliminating the excess of water and drying the thread. We then move on to the doubling phase (Provasi, 1923) which, through the machinery used for twines, the silk yarn coming from reeled spools is combined with several garments to obtain the "thickness" and therefore the desired mechanical properties. At this point the yarn is loaded onto the twisting machines (Zonca, 1979) to be "twisted" on itself as many times as the twists / meter required by the type of yarn to be produced to lend: luster or opacity, softness or creping, resistance, smoothness, and the possibility of being dyed. The twist can be given both before and after the doubling operation depending on the yarn to be produced. Sometimes the same yarn can be twined and / or twisted several times. It is essential in twisting to control the speed of the spindles, the tensions, and the collection of the yarn on the bobbins to avoid producing defective yarn. Specifically, we want to pay particular attention to a smaller dimension and at the same time linked to a traditional reality, as well as an intense study on the sensory aspect of design surfaces (Lucibello, 2005; Bruno, 2016; Ashby, 2007; Dal Curto, Fiorani & Passaro, 2010). To achieve this result, it was necessary to study different areas, starting therefore from the harmonization between design and technology, up to the analysis of the economic and financial aspects of the project. In detail, it is possible to specify the macro-objectives of the research and the respective methods of achievement: The first objective of the research was to introduce a 4.0 technology within a sector in which it is completely new, dominated in fact by large and expensive industrial plants, making it possible to digitize the design phase by addressing in particular way to the world of makers and small producers, thus giving value to a series of start-ups that in the south are building around a renewed desire to rediscover the identity of their places.

1: This goal was achieved through:

- A modeling phase of the three production modules: the one relating to the reeling, doubling and finally the doubling and twisting phase. This is done using CAD software such as Autocad (fig. 5,6) and Rhinoceros (fig. 7) to study the morphological and construction aspects, during which the materials that best meet the technical needs and at the same time those purely design have been identified.

Santorini G., (2012). *Nuova Macchina Per La Trattura Della Seta*, Nabu Press.

Battistini F.,(2013). *L' industria della seta in Italia nell'età moderna*, Il Mulino.

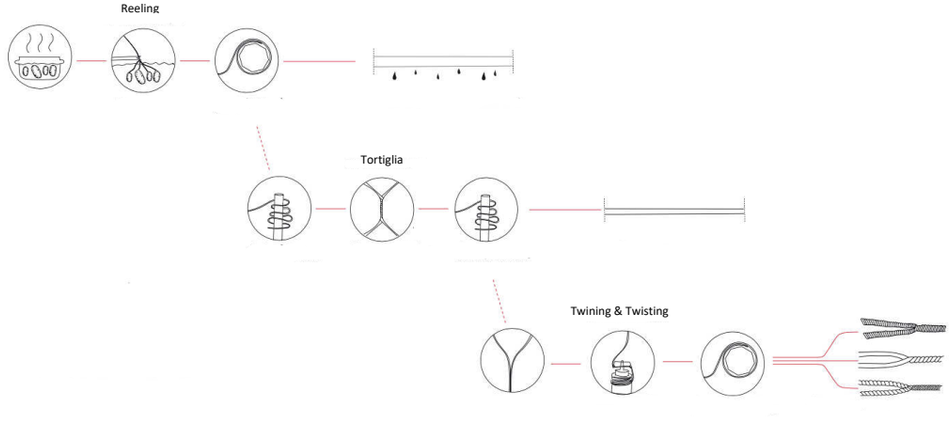
Strobino G., (1953). *Leonardo Da Vinci e la Meccanica tessile*, Industrie grafiche Stucchi.

Provasi. A., (1923). *Filatura e Torcitura della seta e i suoi cascami.*, Hoepli.

Zonca. V., (1979). *Nuovo teatro di machine et edifici.*, Luigi Maestri Editore.

[2]*The tortiglia has the power to weld the flocks that make up the flock more closely together, increasing its cohesion.*

Figure 4: The entire silk chain process



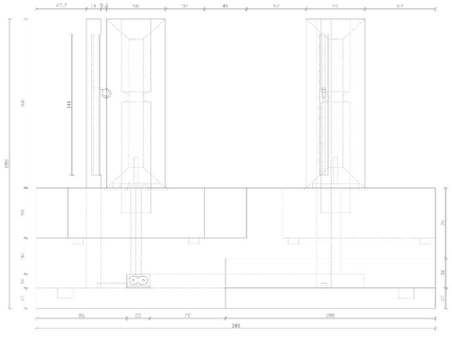
Lucibello S., (2005). *Materiali@design*, Librerie Editrici Dedalo.

Bruno G.,(2016). *Superfici*, Levi Editore.

Ashby M., (2007). *La scelta dei materiali nella progettazione industriale*, Zanichelli.

Dal Curto B., Fiorani E., Passaro C., (2010). *La pelle del design. Progettare la sensorialità*, Milano, Lupetti.

Figure 5: 2D side view of tortiglia module
Figure 6: 2D isometric axonometry of tortiglia module



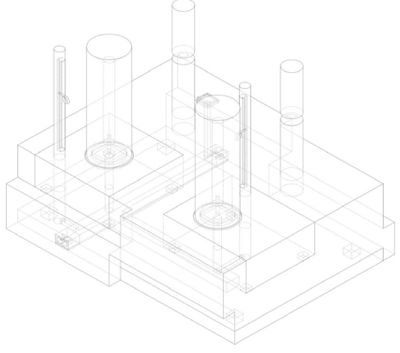


Figure 7: 3D prototype of tortiglia module

- A design phase of the mechanical and electrical part, during which the various mechanisms necessary for operation were designed in detail and the specific electrical components were chosen to allow in a future development the implementation of a software that can digitally control the parameters of twisting and doubling
- Finally, a cost analysis was required, including raw materials, components and assembly and transport costs, in anticipation of a product marketing, using a BEP (break-even point) analysis.

2: The second goal was to achieve a real revolution of meaning, we therefore want to use this new 4.0 technology to give a new meaning to the historical value of the productions. The young realities present above all in Southern Italy, through the use of a completely accessible 4.0 technology able to allow them to follow all the phases of the silk production chain, will be able to strongly relaunch this solid tradition, which thanks to technological innovation introduced, it will be contemporary on the basis of the new needs of the modern consumer. In fact, the latter no longer requires only a technological performance from the product but its uniqueness, which resides in its meaning, its identity and its unreproducible being, an objective that can be achieved through:

Nido di Seta, (n.d.). https://www.nidodiseta.com/it_IT/.

Le Costantine, (2007). https://www.lecostantine.eu/.

- The implementation of the possibility of customizing the process by adjusting the parameters of doubling and twisting of the silk thread, according to the ultimate needs of the manufacturer; together with the possibility of programming the process controller in order to obtain a yarn that can present property gradients, by cyclically varying the twisting parameters, thus obtaining a unique product that can reflect this gradient of mechanical properties in its perceptual-sensorial characteristics, creating thus a completely innovative material surface.
- Collaboration with companies already active in the silk sector, such as the Nido di seta[3] (Nido di seta, n.d.) start-up and organizations such as Le Costantine[4] (Le Costantine, 2007), in order to acquire know-how and to better understand the needs to be implemented in the project and the implementation methodologies.

Innovative aspects.

This research presents several innovative aspects that allow it to be attributed a considerable added value compared to the other realities currently present, and which therefore constitute the strength of my work.

In fact, at present, silk production technologies are limited to expensive and bulky equipment aimed at a production dimension that is anything but domestic or aimed at small nuclei, which severely limits the possibility of growth of small local identities, which desire precisely to reconnect with an ancient tradition of our territory. In fact, the proposed project aims to provide a solution to this imbalance through the creation of a modular and accessible machinery, which, by digitizing the silk production process, starting from the reeling phase up to the complex twisting phase, according to the assumptions industry 4.0, allows zero-batch production on smaller scales. A second important innovative aspect is represented by the high customization value that is to be introduced through this project and which constitutes a real novelty within this sector. The ambition is precisely that of being able to obtain, as a final product, a wire that has proprietary gradients along its length, and this through the continuous variation of the doubling and twisting parameters in a computational way and using a controller programmable. In this way, during the weaving phase, it will be possible to create fabrics that reflect these gradients of characteristics, allowing the creation of a completely new type of material with considerable commercial potential.

[3]*The Nido di Seta (CZ) is a younger Start-up who have rediscovered the ancient art of gelsi-sericolture.*

[4]*The Constantine foundation (LE) is a Center for educational Services accreditated by the Puglia Region.*

Identities and Territories

Autochthonous furniture between cultural heritage and production potential.

Research on the identity matrices of Apulian living as tools for possible product innovation.

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Italian territorial identities, in their international recognition, have become a reference model for a specific entrepreneurship that has regenerated its own production processes, starting from the knowledge of local heritage and its peculiarities. This approach, which can be traced back to the whole 'Italian story' of design, is not new (the same industry has drawn on typical local elements to direct them towards more international markets), but it acquires another value if placed in territorial contexts that re-evaluate the material cultures that identify them.[1]
This contribution is oriented towards a research direction that starts from the knowledge of a specific cultural heritage in order to draw from it those identity matrices that can be used as a design tool. Autochthonous furniture as an expression of Apulian ways of living thus becomes the starting point for an investigation that combines technical and formal analysis with iconographic analysis linked to the memories of a society. Research into the origins of a tradition of Apulian furniture craftsmanship, in its intrinsic idea of the Mediterranean,[2] can become an operational model for possible innovations in production areas, in an attempt to hold together the evocative dimension of that place with the productive dimension that encourages the development of that territory.

Keywords *Cultural heritage, Apulian knowledge, Autochthonous furnishings, Artidesign, Sense innovation.*

The research project aims to get to know the heritage of objects used in domestic spaces, whose cultural value is intimately linked to the places, traditions and craftsmanship that identify a territory and a community.
This investigation is not merely historical research into the forms of furnishing in that particular geographical area, but a source of formal and aesthetic inspiration that design can transform into processes of regeneration and innovation of contemporary languages, towards the world of production.
The promotion of Apulia as a tourist destination, with the rapid spread of the region's typical products, has triggered a process of enhancing the value of local traditions, religious rituals and high quality manufacturing (some of which are already recognised throughout the world), changing the idea of the Mediterranean in relation to those specific places or ways of living in the area (Figure 2). The attempt is to trace a "permanent" line of research on the region of Apulia (or in the wider Mediterranean area), through surveying, historical investigation, and the study of the socio-cultural contexts that have defined the characteristics of Apulian living and the world of furnishing objects linked to it.
The principles of "Artidesign" (Alison, De Fusco, 2018) described by F. Alison and R. De Fusco become the theoretical references to contextualise a phenomenon that holds together design and craft practices, in this case from the south of Italy, in opposition to a historical vision that has minimised the role of the regional manufacturing tradition in the "vicissitudes" of Italian design.
From the "despecialised" furnishings of the single-cell peasant house to the typologically defined furniture of the aristocratic home, this is the context in which the study of Apulian autochthonous furnishings is set up, covering a period of time that goes from the end of the 19th century to the second post-war period, an interval beyond which the history of furnishings in Italy acquires new values and meanings (Figure 3).
This is the starting point for a general look at the history of Italian furniture (the research restricts the field to wooden furniture): anonymous furniture and designer furniture. The former is addressed as the central theme of the research, as it is free from design and stylistic speculation and reveals the primary essence of craftsmanship as a synthesis of tradition, technique and a sense of belonging. The second, that of the author, is no less important, supported by historical research in its evolution and the personal experiences of the masters addressed in the custom designs. The research on the origins of a material culture, not yet definable with the term design, but well identifiable with the presence of manufacturing activities on the territory, historically can be made to start from when it acquired a relevant economic dimension sustained thanks to the expansive Bourbon policies (De Fusco, Rusciano, 2015, p. 5).
The socio-political events of southern Italy during the Bourbon dynasty are not secondary to the construction of a history of Apulian craftsmanship, and of wooden furniture in particular. There are probably no emblematic cases of furniture factories in the region, but it is certain that the strengthening promoted by the ruling house for craft activities transformed cities such as Naples or Palermo into points of reference for the whole of southern Italy, in the development of arts and crafts which then

Figure 1: Poster for thesis workshops of the Industrial Design-DICAR course

Alison, F., De Fusco, R. (2018). *L'Artidesign*. Altralinea Edizioni.

De Fusco, R., Rusciano, R. (2015). *Design e mezzogiorno tra storia e metafora*, Progedit.

[1]*The text mentions some reflections of Lotti, G., Trivellin, E.* (2018). *Design per i nuovi territori*. MD Journal, 7. http://mdj.materialdesign.it/index.php/mdj/issue/view/8

[2]*The theme is part of a research carried out at the Polytechnic of Bari-Dicar- which enhances the territorial specificities carried out around the idea of Mediterraneity- its cultural and material inheritance-highlighting the role it has consciously played and can still play in contemporaneity.* (Carullo, R., Labalestra, A. (2018, 5Luglio). *Manus x Machina, Il design per la valorizzazione delle identità dei territori meridionali e il caso della Puglia*. MD Journal, 95. http://mdj.materialdesign.it/index.php/mdj/issue/view/8)

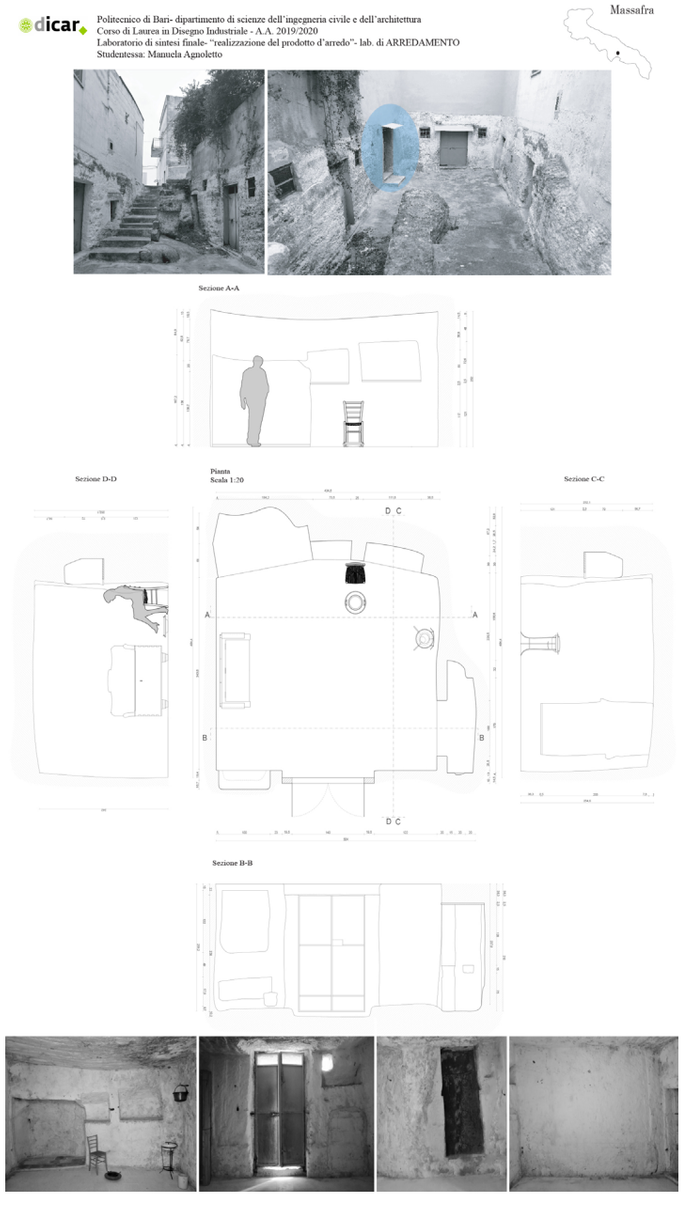


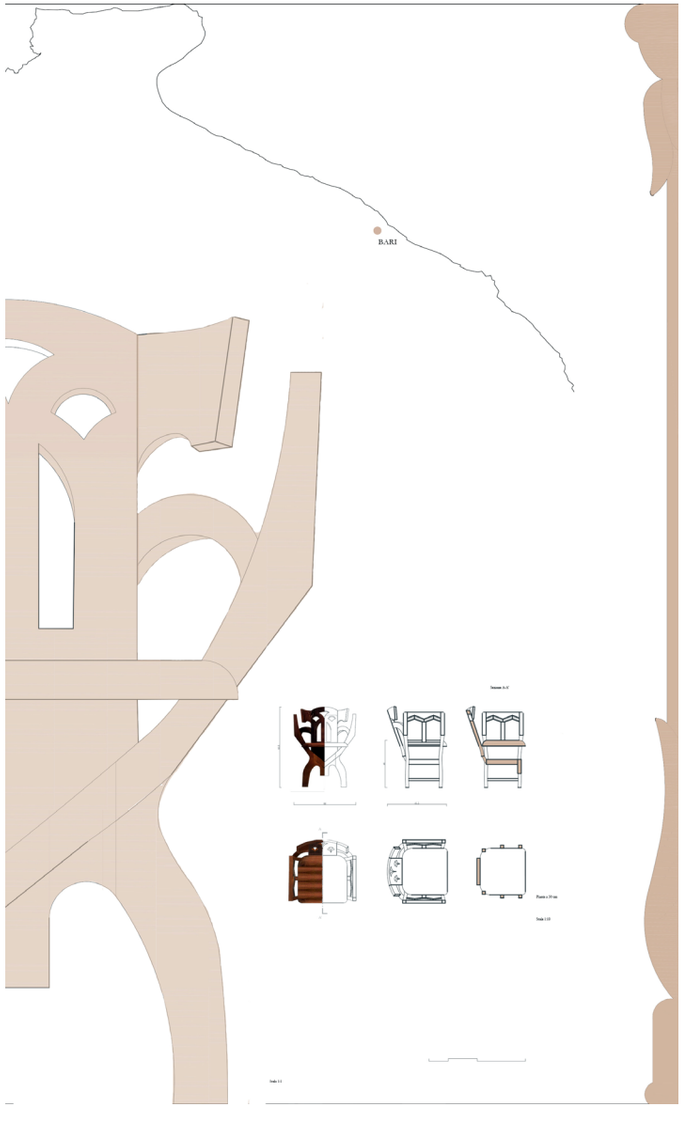
Figure 2: Traditional peasant dwelling in the Massafra countryside

spread to every region (including those in the north). In fact, migratory flows towards more economically developed poles have become precisely the means of disseminating artisanal knowledge, acquiring, depending on the circumstances, specificities and identities that differ from those of the places where they were established. Recognising these peculiarities is the goal of the investigation and the soul of the research.
The theme of autochthonous furnishings has become an operational model for carrying out an educational experience which, in continuous exchange with the research activity, has generated an important material of knowledge of this heritage, followed by a new awareness of the potential it can express.
The first act of the investigation is the selection of the furnishings in their authenticity, according to criteria of typological classification, starting from areas close to one's own living

Figure 3: Despecialised" furniture from the rural tradition. Container/table/kneader

experiences or from local knowledge of contexts in which this identity is unequivocally recognisable.
Two possible fields of "exploration" are defined: the first one identifies an "anonymous" production present in private residen-

Figure 4: Duilio Cambellotti's chair designed for the Palazzo dell'Acquedotto Pugliese 1927-32



De Guttry, I., Maino, M.P., Raimondi, G. (2000), *Duilio Cambellotti, Arredi e decorazioni*. (pp.129-130) Editori Laterza.

De Fusco, R., Rusciano, R., *op. cit*.

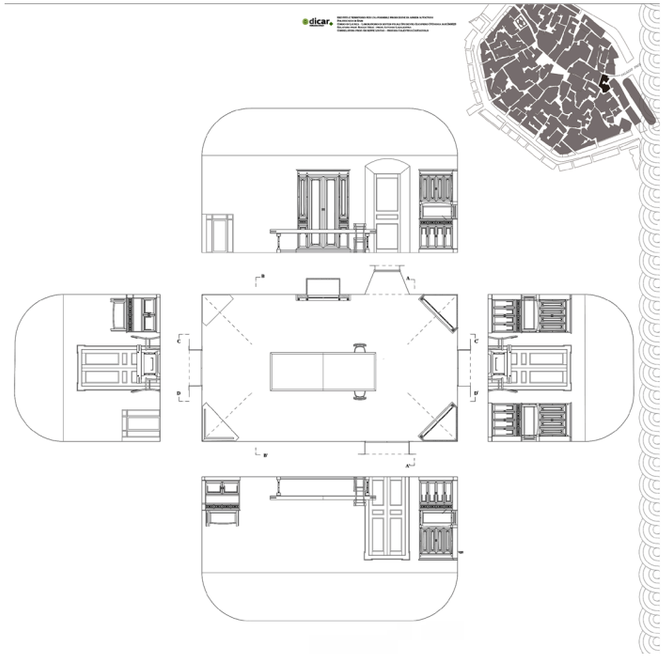


Figure 5: "Arte nova" in Apulia in an interior of a noble building in Noci (Ba).

ces in the city or in the countryside, in small museums of local traditions, in restoration workshops; the second one addresses the "author's" production present in institutional and religious buildings (e.g. Palazzo Acquedotto Pugliese - interiors by Duilio Cambellotti) whose investigation acquires further values linked to the relationship of the authors themselves with the territory (De Guttry, Maino, Raimondi, 2000) (Figure 4). Custom-designed furniture opens up another important field of research on the theme of the interior (and its relationship with architecture), of the total project, of the international stylistic currents that have contaminated local cultures and the designers themselves who have worked in those contexts (think of Art Nouveau or "Arte Nova" reinterpreted in the floral and all-Italian/Sicilian variants of E. Basile) (De Fusco, Rusciano, 2015) (Figure 5)[3].
The mapping of places, furnishings, socio-cultural contexts, production sites (whether certain or presumed), artisans (and their personal stories) builds an initial network of knowledge of local knowledge, which is however open to possible new research contributions and probable revisions, but above all, which may become "project material", a reservoir of creativity at the service of design.

[3]*Thesis presented in the Final Synthesis Workshop in Furniture of the Degree Course in Industrial Design-DICAR-Politecnico di Bari.*

The mapping of places, furnishings, socio-cultural contexts, production sites (whether certain or presumed), artisans (and their personal stories) builds an initial network of knowledge of local knowledge, which is however open to possible new research contributions and probable revisions, but above all, which may become "project material", a reservoir of creativity at the service of design. The survey becomes a tool for getting to know the autochthonous artefact, for formal analysis, and for in-depth technical and structural analysis: the breakdown by elements tells of the most secret nature of craftsmanship. From the "cardboard" construction system to the "solid" system (Pieresca, 1985, p.187-190), to the ante litteram hybridisation of functions, construction systems and materials, the latter marked by time and revealed in their natural materiality.
The graphic restitution of the surveys becomes the starting point for the cataloguing and typological classification of the selected objects: the drawings, rigorously in orthogonal projection, represent a part of this research, an important act of the study, which will support the subsequent comparative and classification analyses. The representation tables (with drawings on a scale of 1:1) outline the artefact in all its parts and according to a precise compositional scheme that is consistent with the narrative it is intended to convey. The furniture is thus described in all its details, in its dimensional relationships, in its relations with the ornamental parts with objective and scientific "necessity" (Figure 6).
The attempt is to document that "artisan instinct" that leads to configure (and therefore to construct) the object only through those relations of strict necessity that bind forms to their functions and to the symbolic values that these signs carry. The latter are never meaningless or an end in themselves, always linked to the acts necessary to give form to an idea, even when it is simply a purely decorative application or formal invention as a dissimulation of technical form.
This is the great inheritance from which Design, through the tools of modernity, can make a qualitative leap: the definition of a virtual space where traditional practices intersect with avant-garde industrial techniques, where the artisan dimension persists even with the large numbers of industry, where innovative processes are grafted onto existing ones without disrupting them, where weaknesses become opportunities, where the presence of the designer is not just for marketing needs.
The aim is to activate innovative processes linked to the territories, to their history, preserving their recognisability but without relegating them to localism. Research into Apulian autochthonous furniture could open up new perspectives and opportunities for in-depth study of more lateral themes than the classic areas of design, such as the conservation of this heritage.
The field survey documented furnishings in an excellent state of use as well as those in a poor state of preservation or restoration: it is precisely this last topic on which a new research path can be undertaken with ample possibilities for development in this sector.
The conservation of autochthonous furniture (and in general of historical furniture) can become an autonomous discipline and prefigure new professionalism among design specialisations.

Pieresca, G. (1985). *Il legno*. Hoepli.

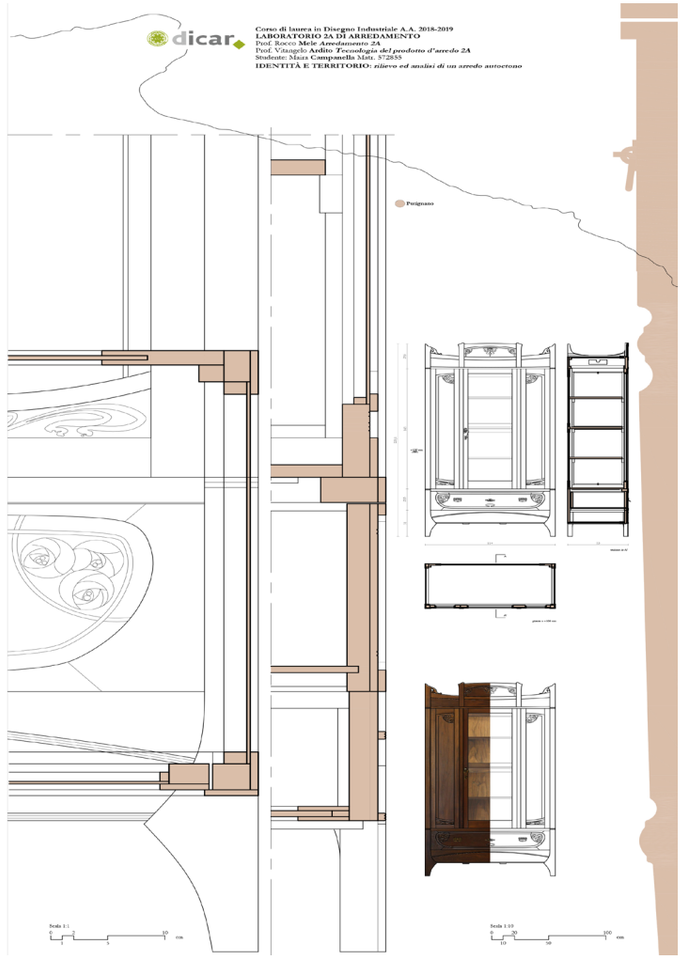


Figure 6: Representation board with 1:1 scale drawings, sections and details

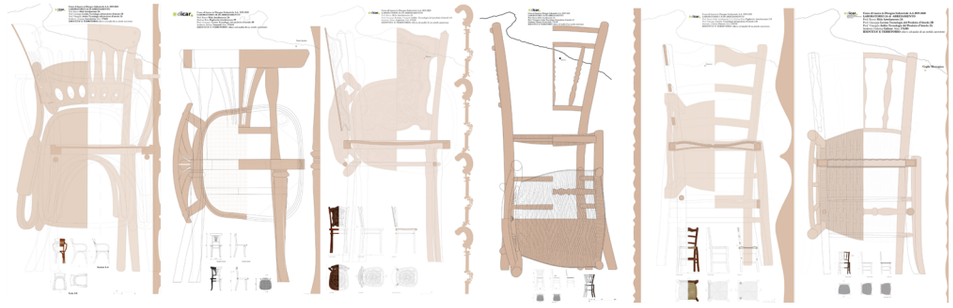


Figure 7: Classification by type of furniture: wooden chairs represented in orthogonal projection

Figure 8: Multi-functional furniture: an example of functional hybridisation.

Establishing methodologies for intervention in the restoration of wooden furniture could avoid the arbitrary and crude approaches of restorers who, at the mercy of fashion, distort pieces of domestic and social history.
Methodologically, the research reaches an intermediate stage in which the organisation of the information gathered (surveys, drawings, photos, materials, craft techniques, history of the object, etc.) is geared towards a scientific systematisation of the data. The typological classification of furniture is the first sieve whose mesh canonically selects the families of objects according to their basic functions (Figure 7).
This grouping does not remain a mere list of typologies but is the support for an initial critical analysis that will lead, through comparative criteria, to the identification of formal, constructive and in some cases symbolic variants of a given type of furniture. Although the order presents a taxonomic approach (inevitably, the transition is obligatory), it aspires to analyse the recognisable iconographic references in their repetition over time according to the models accepted by that cultural sphere.
This reveals ancient types of furniture with functions that are no longer in use: among the many examples, the most emblematic is the one linked to food preparation, specifically bread, the artefact of which mainly presupposed the presence of a work surface and a container compartment for kneading and storing. In short, a table deprioritised of its main function but with the characteristics of a container. This is a lesson in contemporary themes of flexibility, contamination and functional hybridisation (Figure 8). The large number of furnishings examined, thanks also to the support of the teaching staff and the valuable collaboration of Prof. G. Lovino[4], brought consistency to this type of research, the results of which could only acquire rigorous credibility with a large number of case studies[5].

[4]*Prof. G. Lovino, Professor of Technology of Materials in the Laboratory of Furniture2- Course of Industrial Design-DICAR-POLIBA took care of the surveys and technological aspects.*

[5]*We would like to thank the students of the Furniture 2 course and the Final Synthesis Laboratory of the Industrial Design Three-year Degree Course at DICAR-Politecnico di Bari for their contribution.*

Marchetti, L. (2008). *Dall'oggetto invisibile verso il design dell'esperienza*. Lotus 136. 94-107.

Micelli, S. (2011). *Futuro Artigiano. L'innovazione nelle mani degli italiani*. Marsilio Editore.

Martini, A. (2012). *Legno e disegno, dalle prime botteghe alla mostra del mobilio di Cascina*. Edizioni ETS.

Therefore, the study aims to build a great Atlas of autochthonous Apulian furniture, acting as a reference point for research that is always open to new theoretical contributions. Above all, it is a reference point for an identity dimension of the Heritage value expressed by artisan knowledge and a history of Apulian furniture that has never been investigated in its technical and formal aspects (Figure 9).
Atlas as an operational model of reference whose design themes find fertile ground on which to implant a project methodology far emoved from market formalisms and consistent with the region's craft/industrial "know-how". This is not a nostalgic vision nor a recovery of past forms or styles, but a revitalisation of design processes through the filters of traditional knowledge in a continuous osmotic relationship with the languages and technologies of modernity. The comparative analysis of typologies and elements lays the foundations for tackling the project themes through their decomposition and formal reconfiguration that transfigures their meaning while leaving a trace and memory of their original matrix. The design by elements consolidates a methodological approach in which the final object is almost never prefigured: the study of sections and joints in their resistant and more expressive form generates multiple variations on the theme: this process originates as many formal repertoires that make this method always "open" to new design inventions (Figure 10)
The innovation lies precisely in this potential: the ability to regenerate itself within the existing craft processes that draw from Design the cultural codes for project control.
The latter can also aim at product innovation, starting from the formal matrixes that identify it, and on which the design activity will direct its actions towards those "models" of transfiguration that will produce a re-edited or completely reinvented contemporary object (Figure 11)[6].

[6]*Thesis presented in the Final Synthesis Workshop in Furniture of the Degree Course in Industrial Design-DICAR-Politecnico di Bari*

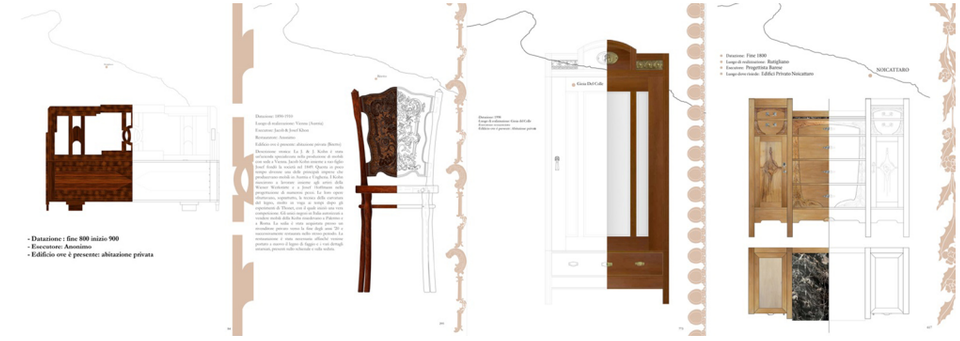


Figure 9: Atlas of Autochthonous Apulian furniture.

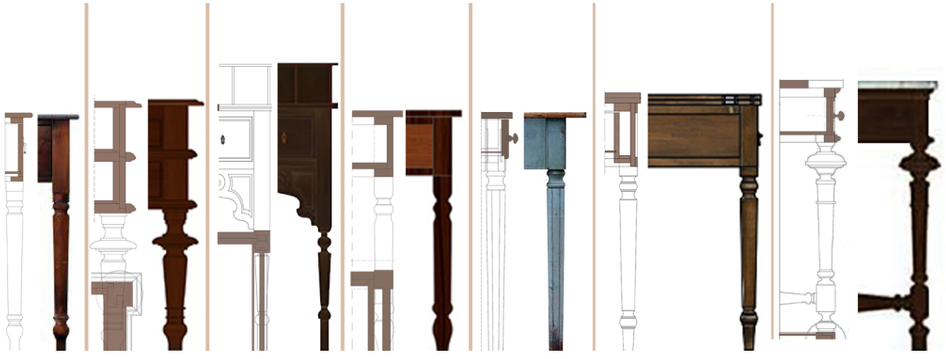


Figure 10: Model of decomposition and comparability of elements.

Figure 11: Wooden chair project. Reinterpretation of the "Paesana" chair with a comparative study of designer chairs.

The "exploration" of the territory is still in progress, its mapping is susceptible to corrections and its results, especially in the planning field, may reserve unexpected evolutions, as it happens in the planning practice where the possible paths are multiple and almost always coherent with its assumptions.
Ultimately, the research aims to connect with the world of Apulian craft and industrial production (or in the wider Mediterranean area) in an attempt to establish with it a reciprocal exchange on the state of innovation present in academic research and in the companies themselves (perhaps giving rise to new furnishing districts), where it is important to uncover and strengthen existing production processes, starting precisely from those identity matrices potentially capable of generating, (even through re-editions), artefacts with new expressions that give new meaning to contemporary living.

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Track 1
Design for Territories and Cultural Contexts

Long Abstracts

THE TOURIST'S SENSORY EXPERIENCE ON THE TOURISTIC BAZAAR ATMOSPHERES IN ISTANBUL AND EFFECTS OF COVID-19

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Recent analysis of problems has been appeared with such as socio-economic crisis, psychological distress, anxiety and depression on the entire world (Serafini et al. 2020). Pandemics, natural disasters, and other diseases have existed for centuries and have observed many pandemic conditions until today also foreseen that similar pandemic situations may continue (Finsterwalder, Kuppelwieser 2020). Throughout the introducing that epidemic COVID-19 into our lives, it is very essential at this point to carry out the studies for sensory multimodal stimuli because sensory stimuli are not just from one sense brought about by many of our senses and provides transfer between memory and behavior (Coppin, 2020). Chaaban et al. (2021)'s Research have tended to focus on that the majority of Danish adults who experienced changes in appetite, sensory perception, and/or food-related pleasure due to COVID- 19 disease experienced problems and sensory perception changes due to their sensory function (Chaaban et al. 2021). Despite the fact that these results belong only to changes in the sense of taste, many studies have estimated that sensory experiences are may be changed by the COVID-19 outbreak. In addition, the epidemic caused changes not only for cognitive changes but also in some basic physical behaviors. For instance, the traditional handshake and the elimination of direct contact with the handshake or by taking a new form, it has been observed that it turns into fundamental changes such as not touching the palms of the hands (Lixing 2020). Given that the findings are based on the results from such analyses, therefore, assuming that the experienced pandemic conditions are frequently encountered to adapt to the new normal order in accordance with these conditions. One of the questions that needs to be asked, "which were the senses that developed or changed with COVID-19" with this new normal process, it will be one of the significant points that the decrease in the effectiveness of these senses will create a prediction and how it will create differences in procedural experiences.

Keywords
Sensory experience, Sensory walk, COVID-19effects, Tourist experience, Bazaar atmosphere

Afterwards, the senses that lost this effectiveness after the pandemic may turn into a more negative experience, as they may remind the pandemic. For instance, the smell of hygiene, cologne or disinfection may be associated with the pandemic and remembered as a negative experience.
Using the senses in heritage and cultural studies not only helps to connect people in the past, and the present also contributes to a wide variety of unique knowledge, a more complete understanding of the lived heritage of people and places. All of the sensory experiences are built on and around a range of sensory memories. If try to define these sensory experiences in cultural and touristic spaces, and the changes followed and discovered values can be enable in-depth access to cultural heritages and remember important memories.
This paper is an overview of research examines the multi-sensory experiences and changes of tourists visiting the touristic bazaar atmospheres in Istanbul, and a doctoral research is being conducted on this subject. As the field study, the most touristic, cultural and ethnic bazaars in Istanbul that touristic and ethnic bazaars with a very intense sensory experience were selected. In the bazaar, it is aimed to identify, research and develop the five senses that tourists experience during their sensory walks. COVID-19, which effects all over the world and causes us to experience a new role and experience sensory-perceptual qualities, sociological and psychological changes cause our lives and while building this new atmosphere of sensory experience for tourists, the most affected sensory experience must be correctly identified and, it is desired to be an important base for future studies and new proposals design studies.
In order to desire to understand and improve from this research, further studies will be carried out in touristic, cultural bazaar atmospheres, how sensory experience research can be rearranged in light of the pandemic for future research by making a prediction that it can be design. In this context, experiences in the COVID-19 pandemic situation and retrospective experiences before COVID-19 can be determined on different sample groups. Different sample groups can provide a further understanding of the sensory experience effects of COVID-19 and reveal the temporal dynamics of sensory experiences.
The temporal dynamics of the hegemonic senses can be examined within the scope of Kahneman's Peak and End Theory (The theory argues that positive or negative peak emotions during interaction and the last stage of the interaction reveal the memorable self-state (Fredrickson, Kahneman, 1993). Inasmuch as sensory experience has a very multi-stimulus process, our brain allows us to make sense of any stimulus.

Expected assumptions of the study are from results sensory experiences of tourists with the help of the Peak and End Theory, will contribute to a deeper examination of the tourists' sensory experiences changing during the COVID-19. From that point, the research the further experimental studies needed to form a base for sensory experience research in many touristic places and atmospheres for the future studies.
A possible to see that the social distance imposed by COVID-19 significantly affects tourist's experiences, such as reducing social contact or travel. Social distance or a better physical distance can affect tourists' perceptions and experiences (Sigala, 2020). Traditionally, tourism has always been a large scale hedonic and sensory experience process. However, COVID-19 operating standards require a redesign of environments; it is necessary to be able to redesign the experience without eliminating the sensory elements, for example: cleaning scent rather than smell; social distance and the number of customers' coexistence at restaurants, festivals, and other tourism environments will affect new standards of psychological comfort and acceptable levels of perceived crowd (Sigala, 2020). The research provides the framework for measuring the sensory experience differences between the tourists by asking them to compare the level of these sensory experiences they have made under pandemic conditions in the touristic bazaar atmospheres in Istanbul with their retrospective sensory experiences in the same bazaars. Instant stimulus sensory experiences are compared with retrospective experiences, and the effect of these pandemic conditions on sensory experience is tried to be analyzed.
During this experience, the happiest peak experiences and sensory experiences at the end will guide the study. The research, which is planned to be applied empirically, should be based on the touristic bazaar atmospheres they have visited before in Istanbul, so that the comparison criteria should match within themselves. The data obtained from Peak and End theory only may not be sufficient to give the actual values therefore, revealing retrospective experiences and stimulant experiences on a map over the touristic bazaar, where they experienced, will result in a reliable result by constantly updating the data and enriching the data with more participants. It is generally accepted physical maps are known and used as a visual representation of that region, but in this research, these maps are used as a method and a visual image that will allow us to see all the sensory experience intensities of the tourists in that region, which is obtained from stimuli and retrospective experiences throughout the map and to reach the sensory and dynamic experiences embedded on this touristic atmosphere (Bereitschaft, Scheller 2020).

The tourism industry has stated that it must not only improve but also redesign and reform the next new normal situation. Donthu and Gustafsson (2020) pointed that it is clear that there is currently a lack of research on how crises can change the industry, how the industry can adapt to the process with new techniques, and how research can be carried out in later norms. Many cities around the world have been pro-active in creating new practices, regulations and design changes to relieve the spread of the coronavirus and reduce economic and social challenges. The COVID-19 pandemic has highlighted that many nations and cities around the world are mostly unprepared to face this challenge and infrastructural weaknesses that needs to be addressed before the next pandemic (Bereitschaft, Scheller 2020). Past and emerging and future literature should be reviewed for some ideas from different research areas that will allow tourism to grow and develop (Donthu, Gustafsson, 2020). Within that sensory experience-oriented research that for sensory touristic bazaar atmospheres, further research on this subject can be encouraged or turning to more sensory-focused studies in this regard. Thus, it can be ensured that our sensory experiences can be sustainable even under pandemic conditions, without departing from our cultural, ethnic roots and sensory experiences.

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DESIGN AND HERITAGE: NEW SENSES AND SENSIBILITIES IN THE ARCHAEOLOGICAL SITES

Vincenzo Paolo Bagnato[a]

1.
The topic “design and heritage” is framed in the more general study on the relationship between design and public space developed by the author, with the objective to outline new approaches and strategies in the contemporary design actions, following the new disciplinary paradigms and according to the transforming cultural senses and social sensibilities.

2.
In this mark, the historical-archaeological sites constitute a peculiar problem due to their specificity of being sensible places with a deep relationship with the urban context, not only when well-known monuments but also (and more importantly) when small episodes of ancient times. Furthermore, as quickly as the information technologies impose new instruments and rules, the social visions and perceptions on history and on the past tend to change creating new cultural interpretations. And not only that: as the relationship between people and archaeological places change its traditional sense and sensibility, becomes increasingly common to see advanced technological devices very able to offer virtual reconstructions, pathways and easy and quick knowledge recalls. The reasons for this situation can be outlined if we consider the relationship between the child and the mirror studied by Jean Piaget: as Maldonado reminds us, for the child the mirror is originally a virtual machine able to produce a passive image, but when the child reaches a later stage of knowledge, he starts using the mirror in an active way, so to create his own interpretation of the image. In the same way, the relationship between man and history is virtual when he doesn't use it except in a contemplative way, while is active and cultural when he uses it through his own interpretation: in the first case he only asks for help from technological devices, in the second case he strongly needs the contribution of design.

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Keywords
Heritage, Archaeology, Expandability, Contextual design, Design of territories

3.
Thus, the challenge of this study is to understand if there's any possibility for the discipline of design, differently from architecture and urban planning, to socially and culturally improve these places correctly using technology, connection systems and interaction devices, stimulating at the same time peoples' active participation and respecting the historical memory of their context.
Starting from the intersection of the relationship between reality and virtuality and between memory and knowledge, the article offers and analysis of the impact of the new information technologies in the field of archaeological sites' fruition and it presents a reflection on the new forms of accessibility and use of urban historical and archaeological areas in which design and new digital technologies have radically changed the paradigms linked to their relationships with users and with the public space of the contemporary city.

4.
By observing the most recent interventions in the historical-archaeological contexts it's possible to detect a new approach (understood in the broadest sense of a system of different interpretative declensions) that no longer belongs to the idea of "transformation" and "rehabilitation" but, rather, it is configured as an expression of a new form of dialogue with the physical and social context whose new key to reading resides in the concepts of “expandability”. This concept can be articulated in three dimensions: social, disciplinary, formal. In the social dimension, what is "expanded" are the systems of relationship between people, at different levels of specialism and use: let's think, for example, of the integration between different categories of users in archaeological areas (from tourists and occasional visitors even researchers, students and academics), a totally new condition with respect to the clear separation of areas that in the past defined historical contexts (area for tourists, area for archaeologists, area for restorers, etc.); Or we may think of the physical distinction of the spaces that followed the different forms of use of the space itself (areas for exhibition, areas for documentation and information, areas for conservation and restoration, etc.), which is now completely disappearing.
Second, there is the disciplinary expandability. In fact, if in the past decades the disciplinary debate on the historical-archaeological areas focused mainly on the disciplinary relationship between architects, restorers and archaeologists, now other disciplines appear, including industrial design, computer science and digital communication, which are now able to “expand” dia-

logic perspectives by giving an active role to user participation; a dialogue that thus becomes more open, collaborative, interactive, both horizontally and vertically. Finally, expandability acquires a formal dimension, and this means two things: on the one hand, the historical urban contexts, dense and compact, need to expand their spatial dimension to connect to other contexts (that is, small Roman findings regarding a system of deposits at a regional level, or medieval ruins with respect to other sites that have similar settlement or constructive typologies, etc.); on the other hand, the present time needs now more than ever to establish connections with the past (history, memory, etc.) and with the future (new generations, the transmission of heritage to new users, etc.), although this goes through more virtual forms when not "liquid" or ephemeral.

5.
In short, this new dynamic condition of expandability of historical contexts is found at the intersection between the line of space/time and the line of reality/virtuality.
The capacity of adaptability to changes is for the archaeological areas a great opportunity but nonetheless it represents a risk at a time when the solutions and the decisions are taken into a 'virtual' dimension without any dialogue with the real conditions of the historical contexts. On the other side, if the productive and economical transformations may determine a slight change in the physical aspects of the city, under a social point of view we always have strong impacts not necessarily immediately visible. In this perspective, design can give an important contribution to detect and control these changes, trying to maintain, according to the community needs and requirements, a high level of quality for the public space, in social terms.
What, then, is the ethical role of design and digital technologies and their impact on the physical and social dimension of space? Which are the new technologies, the innovative materials and forms of the new urban public space? Which is the role of design in the definition of quality standards for the contemporary public space? Starting from the issues described above and through the analysis of specific case studies, the article will attempt to provide answers to these questions.

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DESIGNING THE "THRESHOLD" IN RESILIENCY CITIES

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Resiliency cities, Cultural interactions, Post-pandemics scenarios, Temporary urban solutions, Spatial proximity

Resilience has consistently been recognised as the strength of communities and institutions to deal with environmental, economic and social crises constructively and innovatively. Landry (2017) not only defines the city as a multifaceted entity but also as a dense system, comprising "entangled meshes of dynamic, interrelated, emergent, self-organising systems" (Koch et al. 2017) at different organisational, political and technological scales. Its vitality is proportional to its ability to respond to these stresses through a continuous adaptation and reinterpretation of spaces. In recent decades, public spaces are becoming places for everybody in terms of interactions and social innovation, offering a context where creative communities provide original solutions to the daily problems that the current economic system can no longer provide. This means that new social and economic hierarchies emerge within the reticular, translatable city, which assigns new meanings to its spaces. Urban changes are perceived more strongly at the neighbourhood level. It is a specific location where the population can find a concentration of functions and services at a reasonable walking distance rather than spread to the immense scale of the city (Mumford, 2002). Resilience involves a system of knowledge, opinions and behaviours that characterise the ability to react to the unexpected to create new equilibriums. When focused on social innovation, the solutions that support it are to be found in people. Not so much in individuals, but in the way they group in forms of cohesion, around an idea of community: associations, circles of friends, inhabitants of the same block of flats, of the same neighbourhood. This way of being together today, especially after several months following a pandemic event, finds forms that lead to collaborations to counter the unforeseen to imagine the future together. The recent pandemic has radically changed many social habits and interfered with the economic situation, generating new needs linked to neighbourhood living, from the availability of goods and services to the very possibility of meeting, together with a widespread crisis in the world of work. Several examples show how living in the city in its proximity, starting from one's own neighbourhood or block, is propaedeutic to reacting to adverse situations. When local communities prepare to participate in collaborative action, it is much easier to design, produce and activate solutions for a better life. There is a level of proactivity that facilitates the creation and multiplication of this model: from small events related to entertainment or solidarity to actions that respond to particular needs and affect public spaces that are often residual, to transformations of spaces in anticipation of a structural change that takes on the character of temporariness necessary to test their validity, effectiveness, correct use and benefit for people. The point is that these experiences can then become a system. If people are involved in a project, it becomes an infrastructure capable of creating the physical, social, cultural and economic conditions that allow other projects and actions to emerge and flourish, in a constellation of solutions that make city neighbourhoods more resilient. According to Manzini (2015), resilience as to be understood as “a deeper expression of the human character and, at the same time, as the ground for a possible reconciliation between human beings and nature, between human beings and the irreducible complexity of our world”, take into account four different features of the socio-technical system: diversity, efficiency, adaptability, and cohesion (Fiksel, 2003). “Cities that are strategic sites in the global economy because they concentrate command functions and high-level producer-service firms oriented to world markets; more generally, cities with high levels of internationalisation in their economy and their broader social structure” (Sassen, 1994).

Margins between open public spaces and buildings contribute to creating urban paths that form the structural part of the city’s form. Urban pathways are the best places where inhabitants perceive the physical elements of the city, where citizens have close encounters with buildings, especially when space is perceived while walking. The inner margins “to show the evidence, the traces of what happens in the interiors, where people and activities determine the real functioning of the city” (Camocini & Fassi, 2017). The threshold interrupts the continuity of the enclosure of the open public space and allows its crossing. “Threshold is something that sets between two situations, and it amounts to an in-transit space and at the same time a space of demarcation and differentiation; it connects two places, two territories, two environments and at the same time distinguishes them” (Bogoni, 2006). Pandemics have always shaped cities, and Covid-19 is already doing that. From the Plague of Athens

in 430 BC, which brought about profound changes in the city's laws and identity, to the Black Death in the Middle Ages, which transformed the balance of class power in European societies, to the recent wave of Ebola epidemics in South Africa, which highlighted the growing interconnection of today's hyper-globalized cities, public health crises rarely fail to leave their mark on a metropolis.
From the Covid-19 pandemic, the concept of living changed: we, individuals in a busy society, had to orient our routines within our domestic walls, seeking new ways of timekeeping. Suddenly the home has become the main character, our world and our nest, the place that hosts and defends. The domestic environment became a multifunctional space where we carried out various activities. This forced confinement increased our awareness of the importance of the private sphere but also highlighted its problems and difficulties. To find contact with the external reality, totally changed in the quarantine period, the elements that gained importance were the thresholds and everything that faced outside: windows, balconies, terraces became the bridge through which to connect with other people. According to La Pietra (2020), "the balcony, that living medium which in my works of the 1970s represented a way of breaking down the barrier between the interior and exterior space, has now become one of the most useful domestic spaces for overcoming forced domestic claustrophobia". We have learned to listen to the city and its needs through a more active perceptive sphere. From the windows, balconies, stairs of our private homes, we collect sounds and smells that distracted life has never allowed us to hear, and we can afford to enter a fragile and Emotional city landscape. Each of us has wondered at least once in this period if the state of isolation was not the right occasion to stop and reflect on the tomorrow that will be at the end of the pandemic. In this situation, the balcony is salvation, the only possibility of still feeling, at least in part, in urban space. The reality is that to imagine a collective enjoyment of culture in the spaces available to us in quarantine, starting from an individual experience. The private area comes out of the walls that contain it. It shows itself outside to interact with the public space. The result of this intersection is the enhancement of semi-public areas in the living sphere: they have the power of connection, communication and transition between a private and a public world. In connection with this, Savage (2002) said, "the home is that spatially localised, temporally defined, significant and autonomous physical frame and conceptual system for the ordering, transformation and interpretation of the physical and abstract aspects of domestic daily life at several simultaneous

Spatio-temporal scales, normally activated by the connection to a person or community a nuclear family". However, there is a space, like a balcony, that we have revalued the most. A revolutionary architectural element previously considered a demarcation point of the domestic boundary is now the house's place. It is still possible, indeed somehow stimulated, the relationship of proximity with the neighbours and a connection between private and public space. Florida (2005) affirms that "the distinctive character of the creative class is that its members engage in work whose function is to create new meaningful forms". In this way, solutions help improve the perception of spaces, especially public areas, which are often temporary, low-cost, and respond to the needs for everyday liveability, slowly changing cities' faces. One concerning this article's strong motivation and intent is to show the first insights into social and cultural experiments: starting from bottom- up activities to promote high teaching and innovation, enhancing the multi- disciplines of Design and its tools by connecting them with new digital approaches and analogical transitions. Also, this article aims to present different points of view, with a design purpose, and to create a collective legacy, in terms of spaces and activities, for the future.
Then, the article explores a research teaching project that involves 30 international students – with different design backgrounds (product, interior, communication and product service system design) – from the second-year studio of the Master's degree elective course, Temporary Urban Solutions (TUS) in the School of Design at Politecnico di Milano, to project possible cultural resiliency solutions enhancing the semi-public spaces of the city. This experimentation between research and didactics, starting from the cultural and social investigation, translates into analogical visions and digital practices emphasising artistic disciplines to give a post-pandemic urban and collective redemption. During the scheduling of teaching activities for this course, we unexpectedly found ourselves amid a real global emergency due to the explosion of a pandemic that generated a necessity to adapt, to redesign a teaching method investigating social and cultural issues in order to experiment with new educational approaches in the field of Design for Social Innovation and prototype new temporary urban scenarios during periods of a pandemic. A new methodological and design process was tested within six weeks, which consisted of rearranging themes and practices already consolidated with the basis of Design for Social Innovation, using new digital and analogue tools for co-design activities and the generation of simulations for the prototyping of the final project. These experiments result from a new possible educational methodology that reflects on these changes and

transforms them into possible new scenarios. Manzini (2015) urged us «to consider the whole society as a huge laboratory for sociotechnical experimentation». This practice is an example that could use as a model in the future on a large scale. Future designers must manage complex and innovative processes, possess transdisciplinary knowledge, and combine them in their projects. The ability to resist and be resilient to these transformations, which were anticipated but found us unpredicted, gives a new meaning to ideas, concepts, or expectations that we thought were clear. In this never-before-seen pandemic scenario, we are all called upon to act, especially those involved in Design, to envision potential solutions from the short-term to a long-term legacy. There are already many research and system experiments to reflect on possible future scenarios, developing solutions that could allow a transition to the new world that could come after the pandemic. The course example shows the many potential projects between research and education, which investigated the issue by adapting to the cultural and social transition we are experiencing. The choice to involve students in a sensitive design for the not easy period has been a challenge to promote creative solutions and social involvement, also because they are the future designers of our cities, and it is right to start from the bottom to reach high expectations for a not far future. We want to present the first experiments, carried out in an academic sphere, but easy to replicate and generate for new social challenges.
It is just a starting point for possible future scenarios, not only a descriptive vision but a reasonable action for our present: in terms of the spaces we live and everyday use, relationships with others, intercultural connections, and how to give importance to the factor of time. Surprisingly, changing from a fragile present to a mutable future thanks to creating new cultural and innovative systems.

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DESIGN FROM WITHIN. A STUDY FOR ENDEMIC AND ENDOGENOUS DESIGN PROCESSES

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Overview

"Designing From Within" stands for a specific area of interest and a related new design approach characterized by endogenous and endemic processes. Starting from a culture studies theoretical framework, in which anthropology intertwine with artifacts' social life, in this paper, we will investigate the possibility to think of designed objects as a direct and pure representation of humans' activities (=endogenous), and/or rooted in specific geographical and cultural contexts (=endemic). Moreover, we will analyze how adjacent subjects, such as material studies and circular design could play a fundamental role in explaining how endemic and endogenous design is defined and what are its principles and methods. Finally, we will illustrate and reflect on a case study based on the use of bioplastics within the viticulture sector providing a ground for reflection on a specific design scenario within which to test our assumptions.

A problem of scale, weight and time

Looking at design history, specifically within the product and industrial design's realm, it is relatively easy to identify those main principles that, since its dawn, characterized the discipline and later revealed themself as problematic and controversial. Scale, Weight and Time are the three drivers that will help us highlight those critical points and will serve as guidelines to illustrate how endemic and endogenous approaches could depart from those mistakes and redirect design towards alternative sustainable paths. The scale factor is definitely one of the elephants in the room that occupies the design's building. "The incredible shrinking man", Arne Hendriks fascinating research on the implications of downsizing the human species to better fit the earth, is a great provocation against the beliefs that scaling up is preferable and needed. Mass production and one-size- fits-all models, set at the core of the industrial revolution, while granting access and democratizing purchasing power, demonstrated on multiple occasions their unsustainability and the danger of their short and long-term consequences.

Weight is another factor that is strictly connected, both physically and metaphorically, with the legacy of industrial production. From the heavy load of resources consumption to the human Anthropocene's footprint, it is self-evident that Mies van der Rhoe's less is more or the Japanese wabi-sabi principles haven't been fully able to transfer their values from aesthetics to a well-rounded design ethos. Almost 20 years ago Michael Braungart, William McDonough wrote the book "cradle to cradle" setting the foundations of what is now called the circular economy. A circular economy is an alternative to the traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life. Cradle to cradle's call for action is more relevant and urgent than ever and often vernacular practices are capable of providing a great circular lesson.

The last critical factor is Time. On the one hand, time has been the preference for "fast" over "slow" at the detriment of quality and safety in products' development. On the other hand, has been a representation of the western colonialism that set speed as progress and defined the values to assess who's ahead or behind. From the Slow Food movement, that fosters a holistic approach to agriculture and nutrition, to Slow Factories that privilege quality over quantity, and to design practices that chase harmony with natural cycles, are all demonstration that alternative ideas of time and a more acceptable design pace is possible.

Endogenous and Endemic Design

To facilitate the passage from the design's problematic past to a brighter responsible future and switch to a better and more sustainable scale-weight-time paradigm, we suggest adopting the biological terms endogenous and endemic as principles for just design practices.

Endemic generically defines something "native"; in the case of diseases, for instance, is about their persistence in a particular geographical area or human population while for spices can refer to their unique presence in one region and nowhere else in the world. The term Endogenous, which is generally defined as "from within", describes what is produced or found within living organisms like, for example, hormones, genes ,or viruses but it can also refer to the specific characteristic of a place as far as topography, climate, or geography.

The use of a biological framework is motivated by the idea that a sort of Lex Naturalis (Natural Law), intended here in its laic

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Circularity, Bio-materials, Do It Yourself, Design Anarchism, Endemic Design

exception, should drive design decisions in a way to create as little friction as possible between the natural environment and human activities. Moreover, we argue that a deep observation of human behaviors in their natural habitat should bring designers to implement processes and outcomes that "almost" naturally fit those specific actors and contexts. While scientifically the two terms address very specific conditions, the way we use them in this research may often overlap. To better define the boundaries within which a Design From Within exists, three examples will follow, from three different locations, and characterized by different and unique traits.

"Something Fishy", by the Icelandic designer Róshildur Jónsdóttir, is a toy construction set that uses discarded fish bones from the local fishing industry as components. The project can be seen as endogenous as the raw material comes specifically from within a well-framed environmental context, the fish belonging to its biosphere and the fisheries from its anthropogenic activity. In addition, the figures that result from gluing together the various osseous shapes recall Icelandic mythology and resemble aesthetics that are unique to local traditions. Finally, every aspect of this project suggests circularity and stays "within": the designer is local, the raw materials are local, and the recipients of the message are Icelandic kids who can play/engage with the essence of their native land while enriching their identity.

In Addis Ababa – Ethiopia-, the artist Elias Sime and the curator Meskerem Assegued revitalized vernacular architecture crafting all the buildings of the Zoma Museum with wattle and daub. In opposition to the common trend of African cities where imported architecture and urbanism, mostly from China, is creating anonymous and massive concrete settlements, Zoma forces to look at the local heritage and resources as a way towards a more sustainable development. Endemic is the way the project valorizes the construction tradition of Northeast Africa, deeply connected with its climate, terroir and aesthetics in opposition to a global modernity. It is also endogenous because of the material utilized, that comes directly from local soil, and because of the vernacular know-how that is grown and preserved through generations. Moreover, the entire museum is a self-sustaining ecosystem in which rainwater is collected, plants and sediment function as filters and the manure from animals on the museum compound create biogas to help power the museum.

Finally, Chiara Vigo is a craft woman living on the island of Sardinia – Italy. Chiara weaves a very rare cloth known as sea silk or byssus, which comes from the saliva of a large clam, known in Latin as Pinna Nobilis. The harvest of the byssus is extremely difficult and it takes 300 or 400 dives to gather 200gr of

material. The production process involves chant and prayers, the products created are not for sale but given to people in need as best luck and the entire process is surrounded by a mystical aura. Endemic is the local craft tradition and the closed link with the island, its waters, and its bio-organisms. Endogenous, however, is something less rational and more spiritual. What comes from within, in this case, is the supposed sacred gift of Chiara and her family who are in charge to keep the tradition alive and the only ones able to make the silk "shine like gold".

Design Neorealism and individual anarchism

The passage from customers to users, the incremental use of participatory practices, co-designing and any philosophy within the discipline that tries to merge the gap between design and people, are all symptoms that design got too far from the real world, good products are affordable by few, and the abundance of glittered and frivolous design events is in contrast with the lack of design sensibility in the everyday life. If we acknowledge that design is intrinsically a human activity and it has always existed since the human species started to use its intellect and hands to solve problems, we should consider any design experience as a natural extension of peoples' life. Design processes, materials, and tools should come, as much as possible, from within the context we are working in and the scale, weight, and time of any design solution should be tailored to that specific framework.

With the goal to reinstate design processes close to people and into natural cycles, we have decided to look at the specific context of viticulture and wine production to test our assumptions and reflect on the results of our quest. The research ground has been set in the eastern part of the Liguria region in Northern Italy and specifically around the La Spezia province. The selection of this specific research context has been suggested by the proximity and accessibility to local resources, the presence of a good number of reachable small producers, and the geographical characteristic of the place, contained between the sea and the Apennine mountains, favoring endemic and endogenous reflections. The design process started with the analysis of the environment and the identification of the potential design intervention. The experimentation described in the paper followed a DIY-Materials approach. The material drafts and the demonstrators are developed through a tinkering process to find the best sources and ingredients for improving the material from a performance and aesthetic point of view. DIY-Materials enable the use of local sources and mainly waste or scrap, implementing the possibility of developing circular materials.

Materials and tools are the focal points around which we developed our research efforts. The materials we experimented with are mainly three, grape skin, grape leaves and wine. Grapes' skins have been utilized to produce bioplastic that was later used for the creation of objects useful for the wine production process like vats or vessels. The bioplastic production process has been made as easier as possible, trying to reduce its complexity and privilege materials that are affordable and easy to find (like corn starch rather than agar). Grapes' leaves have been processed to create paper for labeling wine bottles. To conclude, wine served to create the ink/paint with which the labels were screen printed. The tools adopted for the production came directly from what was already present in the environment. The pump used to transfer the wine from one barrel to the other during the filtering process was used to vacuum-form the bioplastics and the press, used to squeeze the leftover juice out from the grapes, was used to press the leaves into paper.
All the activities were intentionally inserted in the natural harvesting cycle and planned in a way to have as much integration as possible between the farming pace and the product development. Time revealed to be crucial for both materials and labor. Grape skins and leaves had to go through a drying process before being used and the bioplastic and paper production activities were allocated in a time when the wine was resting and the farmer had the time to dedicate to these new tasks. The Weight of the full production cycle has been also reduced to the minimum granting a complete circularity; after their use, the objects produced return to the land enriching the soil. Finally, the Scale has been maintained detached from macro socio-economic systems focusing on the only purpose to serve the specific context the design effort was directed to.
From vernacular know-how, through which the farmer augmented their knowledge without major technological gaps, to a sort of individual anarchism that let the farmer/designer taking full ownership of the production process, the experiment presented positive results suggesting the feasibility of an endemic and endogenous thinking in product design.

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TOWARDS A DIMENSIONLESS NARRATIVE IN DESIGN

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Introduction, theme, objectives and methodology

Human architectonic space is at the same timea narrating and to be narrated one. The ways in which this narration has been configured in the past, takes shape in the present and hopefully will also be concretized in the future, are a subject that constantly questions us about the coding of languages.
Therefore, in its cyclicality (language/code/memory/language) the narration strives to root our existence in what preceded us, almost as a legitimacy of our actions, while the language code acts as a continuous medium between the meaning of things and their cultural significance.
The design disciplines must now considerably take these aspects into account, since clearly a new mediality is pushing the narrative capacity of the project towards new directions.
The paper aims to implement a critical reflection on some changes underway on the theme of narrative in design disciplines, an aspect that affects today not only architecture, but also design, especially since the latter discipline is assigned the task of managing, in their formal and interactive aspects, information and transactional contents.
Methodologically, through the analysis of some philosophers of the twentieth century who have repeatedly sought a path of meaning for the complex world of signs, the paper aims to give a place to a certain contemporary phenomenology. This issue, that in the '80s was an exquisite prerogative of architectural disciplines, rather today extends to all disciplines of design: the language and narrative that derives from it. This question today affects art, architecture and design, disciplines inevitably called to compare with the rampant and noisy world of images, witness today of an excess of communication and information, but at the same time of a narrative deficiency.
Through the analysis of some case studies, the tripartite core of the paper aims to provide a specific analysis, before drawing the appropriate conclusions.

Keywords
narrative, codes, languages

The role of the interiors: the “Renaissance” approach.

Given that, for the reasons better expressed below, all the disciplines have to do with the narrative, the interior design specifically occupies a crucial role, strategic and perhaps in part even privileged.
In its disciplinary articulations in fact (the museography, the furniture, exhibition and scene design), the discipline of interiors not only cannot disregard the theme of the narrative, but in a certain sense it makes it its own, at the same time as it acts as an interface between architecture and object.
In fact, the articulations of the disciplinary core of interiors, among the many common denominators, draw on specific parameters (such as the ratio of scale to human measure, reversibility, transience, specific attention to human sensory), and, for this reason, share an aspect of an almost functional nature.
The above mentioned disciplines with their spatial organization offer something concretely to the individual. "To offer" in the proper sense of "to provide", "to assign", "to propose", "to exhibit". Given that in Italian the word "esposizione " o “esporre” express in a single word both the concept of “exposition” and the one of “exhibition”, it is therefore intuitive that "esposizione" (exposition + exhibition) and "narration" are closely related concepts, so much so that the "capacity of exposition" is one of the parameters of evaluation for those who are about to tell something. Moreover, in the Italian university system, the scientific area of the interiors is one of the few that contains within itself the historical nucleus, that is the core of its own story, and holds it as its own specific relevance, in an encoding genetic character, recognizable behind the physicality expressed by the formal aspects of the discipline.
"Recognizing encoding characters" means two things: if we recognize them, it means that they subtend a memory; if we encode them, it means that they project themselves into a language.
Language and memory find their point of contact in the narrative, which in fact derives from the possibility of using a language and, in turn, continuously enrich the memory. This virtuous circle, code/language/narration/memory, flows circularly and also reflects the quadrinomic theory/technique/praxis/transmissibility, typical of the Renaissance approach (not historically understood, but as a matrix of thought) that has so far characterized the Italian school and research. The subject is passionately explored by Raimonda Riccini (2013), where the scholar constantly feels, as in others of her writings, the need to reconsider the technique in the light of a neo-humanism, often, not even so veiled, invoked by her.

The role of design: the shrinking size of the medium

Renato De Fusco (2004, 1-2), in one of the many editions of his History of Design, speaks of the invention of movable characters as a seminal act for the industrial design, since they combine the possibility of serial reprocessing of the product (the first copies of the Bible printed by Martin Luther), with the seriality of the medium and with the procedure that generates it (the movable characters).

Two valid crossed motivations that, for example, the sensitivity of Règis Debray (2010) places as the end of the logosphere and the beginning of the so-called graphosphere, a moment that fixes not only the passage from autographism to allographism, but also from the transcendent myth to the ever more immanent story, from prehistory to history.

Through a series of case studies, the paper aims to a definition of the interior in the direction of contemporaneity, with regard to the third sphere of communication, identified by Debray as the videosphere.

This sphere of communication takes origin as a fusion of the two-dimensional code of the images with the one-dimensional one of the text. Cinema is exemplary in this sense: an image in motion that, by changing, follows a diachronic development.

From a scientific point of view, the result of this fusion is extremely interesting and we try to synthesize it in points:

1) a hyperdense narrative code, in which there is a linear and diegetic sequence of a two-dimensional code (the image one), in continuous motion and also supported by sound;
2) a code that is presented as "authentic" and "truthful", as produced by technological means and therefore presumably "objective";
3) a code that professes to be democratic, accessible and capable of giving voice to all us, in the meanwhile become publishers of ourselves. Walter Benjamin (1966) with “The work of art in the era of mechanical reproducibility” was nothing short of prophetic;
4) a code that professes reassuring, as we are protagonists of a space expressly created for us, our own stage adapted to our individual needs;
5) an attractive code, as it instills the belief that we are all its complementers, with a final individual passage that will make it unique, "our" personal code, and that at the same time will provide us with the opportunity to rise to the rank of popularizers and producers of images and aesthetic processes, and therefore, to be also "writers", "artisans", or even "artists".

The following passage is crucial: from an autograph image, an unrepeatable unicuum, fruit of the artistic magisterium, catalyst of the convergence of infinite glances, to an allographic image, the result of an endless repetition in series, whose magisterium is concentrated in the generative process, the cloning one. From autograph to allography and from the latter, finally, to the last passage, unsuspected until a few years ago: the heterography, that stage that Règis Debray (2010) and Vilém Flusser (1997) do not fail to define as a multitude of images waiting for a completion, or for an epidemic spread, increasingly devoid of a glance willing to look at and understand them.

The role of art: death of the masterpiece

This process, which entrusts the completion of sense to the user, brings art to be compared with a complex phenomenology that surely we will soon be called urgently to reorder with a scientific criterion.

First of all because the new communicative code, breaking down the classical conception of art, no longer provides for the user’s simple positioning as a spectator, but as a protagonist.

Subsequently, because, having broken down the aura of the work of art, we can try to give an answer to Baudelaire (1973, p. 403), when in his poem in prose Perte d’auréole, he wondered who will settle the head with the halo fallen from the head of the artist in the mud of the street.

The loss of the principle of authority is parallel to the replacement of the "product" with the "process".

This type of change, deeply rooted in contemporary art, is obviously having an impact on the design disciplines, from architectural to industrial, through the interior design.

Through some case studies, combined by a different scientific approach, the paper aims to investigate certain contemporary phenomenology:

1) The account of historical houses, milestones in the history of humanity, in which historical and cultural events condense in myth and narrative the symbolic centrality of the owner, vs. houses that do not tell, but communicate the centrality of the individual, confirmed by the presence of remote controls, and programmed devices, diligent automatisms, and obedient spotlights willing to follow us on the stage of which we are protagonists.
2) The story of museums of the best museographic tradition, vs. the so-called "immersive environments", in which in absentia phoenomeni the user attends a representation that takes the place of reality, indeed, through the objectivity of the technological means that presides over it, becomes the possessor of a degree of realism far beyond the "degree one " of reality itself: the augmented reality.

3) Unique examples of furniture history, expression of a principle of authority, focused on a lucid and conscious anthroposophical vision capable of narrating crucial human desires, bodily and mental needs, the importance of technological progress, its applicability and above all the opportunity to transfer all these concepts into a form, vs. the continuous proposition in the hypermarkets of furniture of affable objects, whose completion is entrusted to the assembly of the user, infusing with it an illusory democracy, even saving the environment.

That relationship, between user and object designed at any scale, which in the past was frontal, today more and more tends to become immersive. What was first placed on high, to emphasize its ancestrality, like the vault of the Sistine Chapel, has now descended, like the halo of Baudelaire, providing us with the saving illusion of being elevated. But the question is that in the original intentions of the past, users and works of art, we should not meet at all, but remain one in front of the other, in a transaction of dialectic type and therefore inclusive of a narrative.

Conclusions

Regardless of the increasingly articulate framework that seems to emerge today on the subject of narrative, however, we are still writing another page of this long and complex book. That is to say, we are continuing to narrate. Perhaps we are narrating the narration, or perhaps also the non-narration, as we have done so far in part, but anyway, we are narrating. We are doing this and we will do it more and more byother means, by other codes, which are no longer two-dimensional or linear. They're probably dimensionless codes. And according to the philosophers mentioned above, from prehistory to history, we are now in a new revolution: we are entering post-history.

But even in linear codes, the written ones, there are dimensional references that should make us reflect on how to find an ethical and normative sense in the continuous excess of explicitness in which we live. Think of the worlds evoked by the fabled narration of Aesop, by the futuristic scenarios of Aldous Huxley, by the alternative settings of Lewis Carroll, by the paradoxes of Luis Borges (among the many, The Babel Library and The Map of the Empire).

They are multiple, projective worlds. After all, the projection of what we cannot see is sometimes the best or the only way to see it. Physics deals with it, not able to see the atom, but its shadow; psychology, which does not see the human interiority, but its reflection; descriptive geometry, which does not see the improper point, but works on its representation at the finite,

which falls, as a wonderful metaphor, on the horizon.

In this last part, the paper aims to draw some conclusions on this contemporary scenario, with particular reference to the role of narrative and how it is radically changing. If we are already talking about "a work of art in the era of its social reproducibility", citing the title of a recent book by Francesco Bonami (2019), we should ask ourselves whether it would be more appropriate to present today "a technical work in the era of its artistic reproducibility".

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INVESTIGATIONS OF THE OLIVETTI. MICROSTORIES OF MEN AND TYPEWRITERS

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At the beginning of the 20th century, the engineer Camillo Olivetti developed a streamlined industrial system for the production of typewriters, based on the model of similar successful trials in America. After some initial difficulties and the stop caused by the war, the project of the engineer from Ivrea resulted in an absolutely typical manufacturing model which combined the serial production culture with the quality of the Italian manufacturing tradition. Over the years, the Ivrea-based company's range of machines and equipment increased in line with its vocation for experimentation and research in the field of culture and society, man's condition and man's working conditions. Olivetti products actually reflected peculiar ideologies and concretized their ways and contributions in the field of reality and life, moving from the work environments to social service, architecture and urban planning, until to cultural and editorial initiatives. This paper intends to analyze Olivetti case as emblematic for the Italian design because it was able to combine the "taste for machines" with the Italian production culture introducing an innovative way of conceiving and implementing a project based on a Human-Centered approach.

Keywords
Olivetti, Human centered design, History of design, Typewriter, Age of the machine

The "taste for machines" at the dawn of Italian design

In the context of industrial production, national and international exhibitions between the two world wars became fundamental occasions both for the comparison between the companies and for the orientation of a wider public–not only of experts - who was approaching these new products (Bassi, 2014; Labalestra, 2018). The "International Exhibition of Serial Production" of the VII Triennale di Milano in 1940 played a decisive role in this field, as one of its three sections was entirely dedicated to the industrial production. The exhibitors were some of the most important companies in the country, such as Fiat, Olivetti, Innocenti, Salmoiraghi, and Ducati (Seventh Triennial, 1940).
The exhibition was organized by the architect Giuseppe Pagano in collaboration with many other designers and was the first exhibition specifically dedicated to design in Italy. This event was preceded by other exhibitions which encouraged in various ways a broader reflection, conducted by Pagano himself, on the national serial production of objects in different manufacturing industries: house tools, interior design, technological objects and cars. However, the most industrialized sphere of the Italian design remained the one of products with machinery and chassis within many goods industries: "From typewriters and calculating machines to white and brown goods, from work equipment to home tools and leisure equipment" (De Fusco, 1985, p. 278). Manufacturers common aim was hiding the mechanical and electrical components, both for practical safety reasons and for aesthetic reasons. Pagano and the cultural operators following him aimed at unifying the industry in order to foster a "reduction of the multiplicity of types, the creation of the necessary conditions for serial production, the subdivision of work, the promotion of more perfect and cheaper production systems" (VII Triennale, 1940, p. 126). To this end, a priority role was played by the achievement of the objectives of cost reduction, higher production with a consequent "wider diffusion of well-being" and, finally, a better appearance, facilitated also by improved manufacturing techniques. In particular, they aimed at a solution that not only had a good-looking frame hiding the machinery but that was also the result of a research oriented to a more functional configuration based on anthropometric and ergonomic principles. This is the reason why "Olivetti typewriters become vivid expressive fascinating elements - with their colours and shapes, prisms and bright glass blocks made in Italy by the Istituto del Boro e del Silicio, very modern glass fabrics by Termolux, optical instruments by Galileo, Salmoiraghi and Koritska – when you catch their beauty to the point that 'the magic of the machine' emerges in the current environment" (Casabella 1937, p. 27).

From the first devices to the industrially produced typewriters until to the "electronic galaxy."

Although some experts believe that the first industrial patent intended to "use the machine as an aid during the extended and important writing activity; generally replace the hand that writes the letters with a mechanism including built-in perfect and consistent letters" (Iuvara 1967, p. 28) was by the Italian Giuseppe Ravizza in 1837, the production of a typewriter on an industrial scale started many years later in Italy.
When this happened, the company "E. Raminton & sons of Illinois" had been producing and marketing its models together

with its popular precision rifles for some years, at least since 1873. It was not until 1908 that the engineer Camillo Olivetti founded the company having his same name in the city of Ivrea, in Italy. It took two additional years for him to develop his first prototype; he actually gave up the idea of following the models already on the market and preferred to prepare the project of "a new machine, entirely designed by him, whose details had been designed by him" (p. 73).
The first Olivetti typewriters were introduced only at the Esposizione Universale in Turin in 1911. The catalog given to the visitors stated that the company of the engineer from Piedmont was "the first and single Italian typewriter factory" and that the model "M1", available exclusively in two prototypes, was built according to an original design featuring visible writing, standard keyboard, decimal tab, return key, multiple margins and absolute precision. The appearance purpose of this machine was extremely clear, both in the lines design and in the technical details and finishes; this was made possible above all thanks to modern electroplating and fire enamelling plants. As you can deduce from the booklet of M1(1), right from the production stage, the prototype is part of a modern project which aims at creating a durable, quality product: "our industrial experience had already persuaded us that products studied in their smallest details, built with highly selected materials and modern systems, cannot fail to gain rapidly the public trust, and the success of the machine we designed and manufactured has confirmed this persuasion".
After the war, which coincided with a period when the company was induced to produce war material, Camillo Olivetti's project was restarted even more intensively with the launch on the market of the new model "M20". The new model featured significant improvements compared to its predecessor, especially in the main kinematic mechanism.
In 1930, the first examples of the model "M40" were marketed; this prototype allowed a very sharp writing, featured automatic margins and tabs, a steady tab stop for the paragraph and a 32-keys keyboard requiring a very low pressure on the keys. Together with the lower weight of the machine, these features were the main reasons of the remarkable commercial success of the model. The following year, the project of the first portable machine "MP1" coincided with a wider range of products provided by the company, which started to offer also office pieces of furniture and calculating machines.
The change occurred simultaneously with the entry into the company of the engineer Adriano Olivetti, Camillo's son, who introduced a series of innovations through research and a very effective management system leading to an almost unexpected

period of commercial expansion. Starting from that moment, Olivetti's story became an even more significant part of Italy industrial, cultural and social history. Just while Pagano promoted the serial productive culture, the vocation for experimentation and research of the Ivrea company - in the field of culture and society, man's condition and man's working conditions – turned into an innovative way of conceiving and designing the industrial product. Olivetti products actually reflected peculiar ideologies and concretized their ways and contributions in the field of reality and life, moving from the work environments to social service, architecture and urban planning until to cultural and editorial initiatives.
The climate created within the company around Adriano's increasingly decisive role became fundamental to new choices ranging from the furniture sector, with the Synthesis project, to a new project for a semi-standard machine, the "Studio 42". The latter was designed with the collaboration of a group of experts led by the engineer Ottavio Luzzati, mechanism designer, with the architects Figini and Pollini and the painter Xanti Schawinsky. It was a robust and simultaneously light machine which, unlike the other ones, had an horizontal configuration which made it extremely compact. There already were signs of this change in the design of MP1, a portable device which was not so monumental as the first typewriters but had a flatter and lighter design. However, the new design practice was not evident before the launch of Studio 42 (in 1935), when the close collaboration between designers and planners began from the very first phases of the project; this marked also the beginning of a new working method that would be adopted in the future and lead to the revolutionary Lexicon 80 in 1948, Lettera 22 in 1950, both designed by Marcello Nizzoli, and then to the models by Sottsass in the sixties. By then, "we are far from the real or supposed rule requiring a mechanism to be covered and protected by a frame whose shape makes the object better looking"; on the contrary, it was clear that "such positive results can be achieved only thanks to remarkable experimental tests, to advanced research [...] to the most sophisticated technologies and, in general, to one of the most advanced business policies in the world" (De Fusco, 1985, p. 278).
In the 1950s, Olivetti - which was one of the most popular and internationally appreciated Italian companies for its ability to combine technological innovation and ethical and social issues - introduced its probably most ambitious project: electronical calculators. In 1950 the company had already signed an agreement with the French "Compagnie des Machines Bull" for marketing a similar product in Italy, but, in the meanwhile, they were "drea-

ming of electric sheep" in Ivrea (Mori, 2013).
Adriano Olivetti had actually realized that his company had to promptly enter the computer market to make up for the delay compared to the American companies which had already seen the chance of making a profit with these products (Soria, 1979; Parolini, 2015). The project involved the University of Pisa and led in a short time to the commercialization of a transistor mainframe with ferrite core memory called ELEA 9003.
In the meantime Olivetti had acquired the U.S. company Underwood, a historic competitor manufacturer of typewriters and office equipment, with the aim of exploiting the wide commercial network in the USA and hindering its competitors. However, just because of this important purchase, when Adriano Olivetti (in February 1960) and Mario Tchou - the Head of the Computer Division - died, there was a dramatic slowdown in the project implementation.
In spite of this, Olivetti was the most important industrial group in the office machinery industry in the mid-sixties, boasting 41 companies, 16 industrial plants located throughout the world and about 52,000 employees, more than half of them were employed abroad.

Conclusions

The story of Olivetti, from its origins to the years of the transition to electronic equipment seems emblematic in showing that there was a unique context in Italy with a dialectical approach towards the anthropic reality which represented an ideal field of experimentation for the emerging discipline of design throughout the XX century.
In this circumstance, the Community imagined by Adriano Olivetti offers the opportunity to address, that of mechanisation, as a problem to be ethically oriented (Nunziante, 2018) to the point of representing the factory as a model of a humanistic and cultural project, but also of the opportunity for co-existence and improvement of the worker's conditions.

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MATERIAL INTER-ACTIONS VS SENSE TRANS-ACTIONS. CONCRETE SURFACES IN APULIA

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The paper expresses the results of an experience between research and education regarding hard surfaces, made of cement paste such as grit, cementine and pastina. The study represents a new step of a wider research conducted since 2011 (Carullo & Pagliarulo 2013 a, 2013 b, 2018) on the theme of interior surfaces, aimed to investigate the interaction between the material components in the compositional process, and how these aspects can improve the perceptive and sensorial qualities of the surface itself.
The theoretical field, to which the study of surfaces attends, refers to the Semper's theory on the principle of covering, renewing the founding core of part of contemporary history and of Interior design on the dichotomy between wall (wand) and cover (ge-wand), distinguishing the wall from the surface which covers the wall. Starting from the Semperian fundaments, the research and project work deals with the most recent cultural views regarding the concept of living, according to which the covering conforms and defines the identity of the space itself, giving new voice to the thought of Riegler in supporting the prevalence of the construction of the limits on the construction of the space itself.
The act of recognizing the envelope to be an element autonomous from the structure and at the same time an element capable to define the quality of the spatial envelope, raises questions about the significance that the surface expresses on the relationship between matter and form. The theoretical investigation starts from the definition of the concept of surface itself and then focuses on the concept of materiality and how it represents the formal prerequisite of the expressiveness of the envelope. The word "surface" has a Latin etymology, it's composed of super (above) and facies (face) and means the external part of a body or an artifact. Or, surface, is rather the element that connects and at the same time separates spaces, people and objects.

Keywords
Apulian cultural identity, Surfaces, Material interactions, Sensoriality, Cultural trans-migration

As Giuliana Bruno says, the surface is like a skin, an enveloping fabric that "becomes an extensive form of epidermal and textural contact: a transmission that connects different elements, a membrane that tangibly transforms the creation of internal and external space" (Bruno, 2016/2014, p.21).
The theme of surfaces for interior is investigated as the skin of living, in terms of something that is visible and tangible, because it consists of matter, it occupies a space and relates to an environment. While it definates the limit between interior and exterior, the surface acquires corporeity and form through its materiality. Where the value of materiality is not a question of the composition of the materials, but a question of activating relations among materials, which give sense and value to the composition.The text suggests the exploration of the complex system of relations and interactions among materials, which increases the level of the surface from tangible and visual structure to expressive text of the work itself. And just through that tangible relationship with the substance that conforms the surface, we are able to know reality, the space and the object that are wrapped in it, transforming the contact into the communicative interface (Bruno, 2016/2014, p.10) between us and a space or an object. The investigation of the interactions between materials brings attention to the choice of the elements that define the substance of the surface. In the specific study case, the flat and rigid covering is made of a cementitious substance, available in the variants of pastina, grit and cementine. Its components are natural, such as Portland cement (which gives to the product quality on performances), water, organic and inorganic oxides (for the colouring of the mix) and inert materials, such as gravel, crushed stone and marble for grits, sand and dust for pastines, and dust for cementines. And it is the mixture itself that with the constitutive structure of its elements defines the formal structure of the surface. Construction and form are consubstantial. The physical nature of the surface determines the expressive condition of its composition. As Focillon says, "form does not act as a superior principle that models a passive mass, since it can be argued that matter imposes its own form on form", from which it follows that "materials have a certain destiny or, if you like, a certain formal vocation. They have a consistency, a colour, a grain. They are forms, as we said, and therefore they call, limit or develop the life of the forms of art [...] But it is worth noting immediately that this formal vocation is not a blind determinism, since these materials are so well characterised, so suggestive, and also so demanding with regard to the forms of art on which they exert a sort of attraction and find themselves profoundly modified by them" (Focillon, 1972/1943, p.52-53).

The matter and the representation of its formal vocation through the act of construction introduce connected issues, on which the study of surfaces focuses its interests. First of all, the aim is to pay attention to the material as a bearer of identity values in relation to places of origin and manufacturing processes, thus avoiding an indiscriminate use derived from political and economic strategies of globalisation. The material translates its corporeal value into a cultural value, just as the components of a surface, in the dialectic between the material used and the technique adopted, are a metaphor for the identity of the territorial culture to which it belongs and its sapiential values.
Bringing back the attention to the study cases, the stone material elements of cement grits and pastine are stratified, mixed and densified with different thicknesses and depths through the artifice of a traditional know-how to recompose stone and marble dusts, giving life to new echoes of the Apulian land.
Meanwhile, the single element of grit, the marmetta, is the basic unit that makes up the surfaces of floor carpets on which tales of Apulian knowledge are narrated. Starting from the destiny of the material to be used in a way that is congruent with the knowledge and know-how of its territory of origin, new strategies are outlined which can modify or reinterpret the current paradigms of innovation. We can capture new challenges in the post-covid age if we shift the attention from a globalised writing to meridian and southern views of sapiential processes and phases. In this specific study case, the contribution gives voice to a work methodology, experimented in the research on surfaces, aimed to activate an action of enhancement of the perceptive-sensorial qualities of surfaces. Through a progression of minute experiments on the material of each artefact/surface, a diversification of the states of the given material is restored, so that the material envelope is reversed into a sensitive envelope.
The surfaces in the configurations of corporeity transmit traces of "touching materiality" towards "layers of meanings" and "the sense of feeling spreads from sensations to feelings, from the sensory surface to psychic sensitivity" (Bruno, 2014, p.29).
Paradigms of innovation processes are the sensory enhancement experiments on concrete paste surfaces performed at Attivissimo in Altamura, a firm of excellence in Puglia and in Italy for the production of pastina grit and cementina.
The knowledge of the process is the first condition to give value to any subsequent variation and experimentation on materials.
The production process of a gritstone tile develops according to methods and times that are always the same, and before they are modified or interrupted, they need to been known and reknowned for their values.

The mixture is prepared according to a so-called "secret" recipe that the company has been keeping and handing down for three generations to guarantee the formal and performance quality of the product. The mortar, well-sorted in grain size, must form a monolithic structure that gives to the tile a flat surface. After pouring the mixture into the tile, the inerts are added, so to define the textural character of the surface itself, in relation to the type, shape and colour of the grain. After 28 days of drying, the face of the grit, exposed to view and touch, requires finishing. As well as the choice of aggregates, the type of treatment defines the expressive quality of the tile. Abrasive brushes or diamond resinoids give possible finishings by flattening or removing the binder. The progression, smoothed lapped antiqued and rough polished, restores a plane that from being flat becomes corrugated: the inert is first included in the materiality of the mixture and then releases form and expressive force, getting out from the limit of the cement structure. Starting from a recognition of the traditional phases of the process, the research opens up to experimental actions through minute variations, which first strengthen the perceptive character related to sight and touch, and then define the expressive and sensorial values. The variations operate on two aspects: the grain size of the aggregate and the thickness of the tile. In the first case, the inert material of local Trani stone is selected and divided into three different grain sizes to be used in three different tile mixtures: fine (2/3 mm), medium (4/5 mm) and large (8/9 mm). The decision to diversify the grain size gives us the opportunity to verify, initially, the relationship between the size, type and colour of the aggregate in relation to the binder. But it is the subsequent phase of comparison between the three ceramic tiles that reveals their sensorial and expressive qualities. In fact, comparing the three variations in grain size means to stop the process of the artefact on a precise photogram that focuses on the different interaction between the inert material and the mixture, and, by choosing one variation rather than another, allows aspects linked above all to sight to be made explicit. The second experiment refers to variations in the thickness of the tile through the action of brushes. The abrasive activity of the brushes is applied to three tiles of grit respectively with three different degrees of depth, wich extrapolate the physical quality of the aggregate from the composition. Thus the stone take substance and expressive evidence from the mixture in which they were thickened, becoming traces of sediments of the Apulian land. So, what was initially intended only as a " work for finishing", now becomes an action that brings values linked to the tactile perception of the materiality of the artefact that represents the identity of the area of provenance.

The progression of the states of matter described for each tile of grit defines a progression of gradients that bring out new possibilities for interpreting the products. And each of the progressions represents a fraction of a sapiential process referable to the local material culture.
The know-how of tradition connected to material processes is intercepted from the activation of mutating fractions that amplify and expand the potential of sense of the surface itself. Each fragment of surface uses representative materials of Apulian territory, suggests the becoming of the material configuration through manipulation and contamination of traditional processes. The action on surfaces extrapolates from the decorative valence the compositional principles on which they want to bring out the results of the potential of physical and material structure. Each progression puts in place actions of trans-cultural comparison, leading to the acquisition of a wider horizon of meaning. The hard concrete casing translates in this way, its visual, signal and identity statute in experience which leads to mechanisms of perception and sensation, losing the local and vernacular feature to project toward a cultural transmigration, a fertile and necessary condition that responds to the challenge of the post-pandemic age.

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WINE ARTEFACTS FROM ANCIENT TO NEW RITUALS: DESIGNING BETWEEN MATERIAL AND NON-MATERIAL CULTURE

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Keywords
Material and non-material culture, Rituals, Wine, Territories, Artisan production

Awareness of the strategic role that design can play today in the development policies of a territory takes into account several factors, first and foremost the typical ability of design to interpret the scenarios of the production world, both artisan and industrial, and to provide effective responses to those instances in terms of planning and innovation. In this sense, it is essential, in a process of qualification of territories, such as Southern Italy, which have never been perfectly integrated by a truly competitive industrial development (De Fusco, Rusciano, 2015), to reverse the trend and reflect on the material wealth that the land itself offers, starting from raw materials.
The contribution proposes the critical outcomes of an investigation carried out within the Laboratory named "The Meaning of Things: renewal of meaning of useful objects", concerning the study and analysis of ritual practices connected to food in the southern Italian geographical area. The aim of the research is to understand those hidden non-material codes that mark the cultural and social dynamics of a territory, in order to translate them into meaning-bearing artefacts, and thus contribute to the renewal of the formal language in line with the instances expressed by the place.
The investigation tools used are, on the one hand, the consultation of literature, which draws on both scientific and humanistic disciplines, and, on the other, the comparison with material culture, which manifests itself in an organised form in the museums of the territory and is more hidden in the places of production, from the laboratories where raw materials are processed to the artisan workshops.
This reflection is generally part of the ongoing research in product design; in particular, in that strand that directs the attention of the project to the respect of the cultural identities of the place and that recognises the role of design in the processes of enhancement of a territory (Carullo, Labalestra, 2018; Di Roma, 2018).

In detail, the case study addressed in the paper is the wine ritual, and the territorial area identified is Apulia Region.
Among the most common food and drink products, wine has a particular character, because historically linked to important social practices. Speaking of wine, we are not only referring to the quality of the product but above all to the way it is consumed: in established rites wine occupies an important position in civil and religious occasions. Rarely, in fact, wine is associated with the individual. Wine is an expression of sociality, it should be consumed in company, in the most appropriate ways and with the most suitable tools for the situation.

Wine and territory

The first part of the survey concerns the definition of the territorial scenario in relation to wine.
In Apulia, the vine, together with the olive tree, is one of the most important agricultural products; widespread across the region, it defines its rural landscape. The geographical and climatic characteristics favour vine cultivation, such as the temperature and the great availability of sunlight, and the direct influence of the sea, which surrounds the region for over 800 kilometres.
Today, Apulian wine is an important economic resource, rooted in the territory's traditional vocation for grape processing, which predates Greek colonisation in the 8th century BC. In fact, Apulia can boast some very ancient autochthonous species, mentioned for example by Plinio il Vecchio in his Naturalis Historia, including Negroamaro and Uva di Troia (Vitagliano, 1985).
Over the centuries, wine production in Apulia has become more specialised, with the development of advanced wine plants (Maddaluno, Monte, 2014), and its consumption has crossed regional borders to beyond the Alps, becoming the main blending grape with which to give body to French wines.
The importance of wine in Apulia is testified by the presence of numerous museums, mainly of private character, linked to the activity of some wineries (e.g. Museo del vino “Piero e Salvatore Leone de Castris”, in Salice Salentino) or consortia (e.g. Museo della Civiltà del Vino Primitivo of the Consortium of Wine Producers of Manduria).

Wine and rite

The relationship that man establishes with wine is very different from that with other alcoholic beverages.
Wine is an institution, and its consumption involves codified practices, which vary throughout the history of civilization, but which are still marked by laws, sequences and norms that constitute its myth.

In this sense, wine requires its own ritual structure, its own constituted order. Barthes (1957) highlights the dual character of wine, that constant search for balance between order and disorder that derives from the right measure of drinking. Wine can be both 'man's friend and enemy' (De Feo, 1999), and this depends exclusively on one's personal desire to adhere to one's own ethical principles or to transgress them.
Drinking is a primary and vital human need, on a par with nutrition. Drinking wine, on the other hand, is a need of the spirit and the mind, and necessarily requires sharing with other individuals, participation, and involvement in the ritual of a small community of people. Yet today we are witnessing new rituals, new codes of behaviour, and above all relationships between drinker and user that are apparently different from those described in the historical narrative. Today there is no longer the drinker, but the taster, and it is no longer common sense that marks the limit between permissible and excessive quantities, but a manual for the perfect taster. An oenological culture has spread that has acquired its own jargon, a technical language that does not allow for incompetence, and that creates barriers between experts and non-experts. The practice of drinking wine seems to have undergone a mutation, rather than a logical cultural evolution, as it presents new structures, in spatial, object and behavioural terms. Above all, the pleasantness of sharing that expressed the very essence of the action has been lost (Marrone, 2014).
In order to understand how the role of wine has changed in the collective practices connected with it, it is necessary to study the ritual from a historical point of view, analysing its cultural evolution by reading the written sources and the material culture connected with it. There are countless descriptions by Greek and Roman poets of the rituals associated with wine and its divine origins, in which each author presents in detail every moment of drinking together in antiquity, the settings in which it took place, the instruments and furnishings, the participants, the hierarchies and relationships between them, the speeches, the behaviour and the final effects of those who drank to excess.
Symposia and convivia, with their due differences, have marked the social but also the political history of the cradle of western culture. What characterises and distinguishes the two cultural events is the social aspect, the way of 'being together' and sharing this collective drinking.
The Greeks attributed a strong social value to wine. In the Greek tradition, the symposium was a topical moment of the banquet, an elitist ceremonial with a social character, due to well-defined codes of behaviour, and a spiritual one, as it was imbued with symbolic meanings linked to the divinity.

A rituality that becomes habit. The symposium is an exclusive moment dedicated to wine, separated in terms of space and time from the gastronomic banquet. It is a collective moment in which there is a shared experience of conversation and drinking among the participants. One feels a sense of belonging to the same community, of equals. In the symposium, bonds of friendship are forged and strengthened, consequently those who participate cannot abstain from the two activities: they must converse and they must drink (Pepe, 2018).
The symposium expresses a true expression of culture, a 'codified' experience built with single repeated gestures and well-defined behaviours, governed by a constant observance of the measure within which to remain, without excess or abuse. The difference, in fact, between civilisation and barbarism depends on the type of consumption: in Greek society, wine should never be drunk pure, but always diluted, it should be sipped, at equally diluted times, and one should not exceed more than three cups, to avoid completely losing lucidity and self-presence in front of others. The Romans observed the symposium with great attention, as in other areas of Greek civilisation, and tried to imitate it, taking the most interesting aspects, and adapting them to a culture very different from the Hellenic one. The result is the convivium, an important moment in the Roman world from a social point of view, as an occasion in which the pleasure of being together through the sharing of food and wine is exalted. However, in the banquet, wine is no longer the exclusive protagonist but shares the scene with the food that abounds on the banquet tables. There is no longer the regulated code of the symposium, the ritual punctuated by the gestures of the divinity who, through the symposiarch, manages the sacred sharing of the moment. In the banquet, wine is still important and necessary, because of its ability to spread a state of well-being in each diner, but it loses its centrality, even from a spatial point of view. But the convivium is inclusive, it welcomes everyone, even women, until it fills the rooms completely.

Wine and artefacts

Today, industrialisation has led to a standardisation of production processes, linked to different choices of materials, which has generated a simplification and standardisation of forms, made more stringent by regulatory requirements linked to hygiene, safety, and comfort. The traditional handcrafted ceramic jugs and cups have been replaced by clear, shiny glass bottles and glasses. The glass is multiplied in infinite variants, adopted at wine tastings, specialised to enhance the organoleptic qualities of each type of wine, and now part of the everyday life of our tables.

Shape, size and thickness, proportion between the parts, transparency, characterise their design in a very rigid way, leaving no space for narrative processes and meaning between objects and users. In particular, the 'poetics of sharing' is absent (Pils, Trocchianesi, 2017): this family of artefacts seems to have lost its relational value, its natural ability to determine conditions and experiences of use linked to sociality.
The rituality associated with the consumption of wine involves, today as in the past, specific artefacts, instrumental to each action that marks the ritual process. History today gives us fragments of memory that have spanned the centuries, subject to technical evolution and cultural change, and thus the repositories of a long narrative.
Historical sources can tell us about the origins of these objects, but it is above all material culture that describes them in a tangible way, both in their formal and symbolic aspects, which relate to their role during ceremonies of collective consumption.
For example, in classical and Hellenistic culture, the symposium was characterised by three distinct actions reserved for wine: pouring, drawing, and drinking. Each act was performed by a different actor, and only the final act, drinking, was intended for the active participants, the symposiasts. For the personal consumption of wine, finally, there were many more types of cups and mugs, also very different from each other: Kylix, Kantharos, Skyphos, Kyathos, Rhyton and Kothon are among the most famous potorials of antiquity, while the poculus, with its simpler and more modest form, born between 900 and 500 BC in Roman times, is the ancestor of our glasses (Antonaros, 2000).
The survey carried out in the territory, including museums and production workshops, has revealed unknown types of tableware intended for wine, among which the secret ceramics stand out (Scarcelli, 2020).

Conclusions

The paper takes a journey through time, between Greece and Rome, and through space, the Mediterranean, to discover formal and functional issues of the material culture that revolves around wine, and particularly to understand the most intimate needs of the individual, conveyed through the gestures and practices of the experience of drinking wine.
This excursus highlights hidden non-material codes, useful in contemporary reflection on the meaning of things, and necessary for design in its role as narrator, through its ability to formally translate those linguistic codes into communicative artefacts.

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Track 2
Design for Culture and Education

Track 2
Design for culture and education

Design, Education and Other Diatribes

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The development and even use of (semi) autonomous technologies based on Big Data, Machine Learning and Artificial Intelligence in learning and evaluation processes are increasing. This paper reflects on the role of Design and Human Factors/ Ergonomics on the theme and their need for more studies and profound (self) reflection. Intelligent systems, based on data collection and mathematical decision-making processes have an increasing effect on human life. How does this scenario take place in the field of Education? From a human-centered perspective, is it possible to put the stakeholders effectively at the center of the process without reflecting on these technologies' possible long-term impact on society? So, a question is posed: shouldn't Design and Human Factors/ Ergonomics go beyond the design of educational interactions and interfaces?

Keywords *Education, EdTech, Autonomous Intelligent Educational systems, Human-Centered Design, HumanFactors/Ergonomics.*

Introduction:

One of the ideas that inhabit the collective imagination around digital technologies and their consequences is that human beings and their bodies are machines of nature (Braga & Chaves, 2019). This means to be subject to improvement and transcendence through technology. We increasingly use technologies based on Big Data, Machine Learning, and Artificial Intelligence (AI) in Education. Systems and devices that take teaching processes to a whole new level of scale, storage, and speed. Exalted as capable to provide greater control over data management and analysis. Cheaper, by comparison, than previous and current analog counterpoints. Many see these technologies as capable of expanding the frontiers of knowledge and education, bringing better life standards, employment conditions and opportunities (Wogu et al., 2019). As Luan at al. (2020) remind us, the current, traditional educational approach was designed for average students. Precision education, on the other hand, could focus on the individual differences of learners and environments, becoming more precise and customizable. For those reasons, these innovations are associated with improved ways of performing tasks (Selwyn, 2011). For example, Big Data technologies (which seek to extract the power of extensive data in real time) would have attributes often referred to as the four V's (Volume, Variety, Velocity and Veracity), while Machine Learning algorithms are said to provide easier decision making, thanks to personalized insights, predictions and solutions with accurate results (Luan et al., 2020). This has led to the institutionalization of systems and educational platforms such as Massive Open Online Courses (Wogu et al., 2019) and Intelligent Tutoring Systems (ITS). These platforms sometimes use learning analytics (data analysis linked to educational, technological systems) and AI applications with promising results in terms of improving academic performance and student retention, on the one hand, and supporting teachers in refining the design of learning strategies, on the other (Luan et al., 2020). Some of these technologies would correct exercises, give grades, and exemplify in real-time - giving teachers more time to prepare their classes (Boechat, Mont'Alvão, 2019).
In this scenario, the so-called EdTech (Educational Technology) took on a new dimension. AECT (Association for Educational Communications and Technology) defines Educational Technology as the study and ethical practice of facilitating learning and improving performance, creating, using, and managing appropriate technological processes and resources (Richey; Silber; Ely, 2008). Wogu et al. (2019) say that using AI technology devices for educational purposes helps the evolution of "Smart Classrooms": "largely technologically enhanced settings" that could "increase the opportunities" of engagement and participation in teaching and learning processes through the use of technology tools (Wogu et al., 2019). Edtech would enable students to meet the challenges of an economy and a society based on innovation and leadership (Mendonça Neto, Vieira & Antunes, 2018). To Luan et al. (2020), Edtech is already moving beyond the demonstration of techniques toward substantial adoption in many areas of Education. Big Data and AI research trends are associated with assessment, individualized learning, and precision education. Model-driven data analytics approaches will overgrow to guide algorithms' development, interpretation, and validation (Luan et al., 2020). These are software based on interactive learning, where students become the central spot of the teaching and learning processes, ceasing to be passive and becoming an active being (Jesus, 2003). For this reason, collecting data on students' actions and characteristics would be essential, whether to inform teachers and parents or to make autonomous adaptive decisions. These systems seek to understand students' behavior during courses (Vicari, 2018). Thus, some of them are intended to interact with and reveal the cognitive and (more recently) emotional profile of students, seeking to "select and apply the most appropriate pedagogical technique" to each one (Jesus, 2003). Some of these systems have been improved and equipped with features such as facial and emotional recognition, natural language analysis and generation, and the ability to decide, explain and exemplify autonomously (Vicari, 2018). Their design is dedicated to identifying students' patterns and profiles of learning and affective behavior, improving individual assessment methods, predicting learning performance, and providing adaptive solutions (Luan et al., 2020), powered mainly by Machine Learning (ML), often composed of layers of models, services and infrastructures, one over the other (Cramer & Kim, 2019). Nevertheless, these systems are not merely tools, but also an essential part of life and social structure beyond their instrumental role (Selwyn, 2011). Social expectations and design decisions shape these systems, bringing discourses and intentions within them. They result from decisions that provide specific product formats (Gasson, 2003). They mirror what we are as much as what we want to be. Technologies not only sustain life arrangements but also improve them. Thus, human needs are being redefined as existing arrangements are improved (Selwyn, 2011). As Argan (1993) said, "an object is anything that is defined by, and at the same time, defines the subject". However, what can be their effects on individuals? How does this occur specifically in Education? This paper aims to be part of a theoretical approach, highlighting and proposing the role of Design and Human Factors/Ergono-

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mics in this new scenario of educational technology. Without forgetting that most design projects are commissioned through production owners, this paper starts from a human-centered approach to reflect and question Design and Human Factors/ Ergonomics, as disciplines, when designing and discussing these systems and their possible consequences. Considering the importance of learning and educational assessment processes in society, this paper asks: by acting primarily in interfaces and interactions, making these systems more usable and effective, is Design and Human Factors/Ergonomics helping these individuals as much as they could be? Is this process human-centered for real? Or are Design and Human Factors, as Foster (2002) accused, just being "conniving" with a culture with no room for reflection?

Reflecting on Big Data, Machine Learning, and Edtech

Analyzing patents, scientific papers, and research worldwide, one can see a tendency to develop these intelligent systems with autonomous, human-independent functionalities (Vicari, 2018). Wogu et al. (2019) point out that Artificial Intelligence research in this century seems to be more interested in an AI field generally known as Strong AI, which is believed to outperform people in tasks that were once typical and practically exclusive to humans. Strong AI predicts that non-biological intelligence will be able to improve itself in rapid redesign cycles, and both hardware and software will recreate human intelligence soon (Braga & Chaves, 2019). Many argue that this would allow more accurate decisions, improve operations, and reduce risks and costs. It would make a personalized learning experience possible, formatted to students' potential and type of intelligence. On the other hand, many authors, such as Wang et al. (2018), consider being false the premise that numbers can measure intelligence, as they recognize that the capacity of exponential learning of a system has only functional characteristics, not human-like (Braga & Chaves, 2019). Anyway, their mathematical processes reinforce discourses of precision and neutrality, and their processing and analysis capacity - infinitely faster and broader than humans' one - reinforces discourses of efficiency. They would be better because they are free from human bias, or, as Japiassú (1982) recalled, they have supreme value, exchanging sensitive perception and experience for mathematical accuracy. This narrative is supported (purposely?) in technological determinist approaches and discourses: the presumption that Information and Communication Technologies (ICT) could strengthen individual freedom, decentralizing power (Macek, 2005). In the 1970s, Bell already saw the coming of a post-industrial society, where theoretical knowledge would be strategic, and science would determine political actions (Bell, 1976). Technology would weaken hierarchical structures of domination, stimulating creativity and communicative skills. It would be liberating and characterized by a world where discourses do not reflect the changes but announce them (Macek, 2005).
Science would master techniques that generate economic gains and social welfare. Possible problems would not be caused by scientific development but by what we choose to do with technology (Rosa & Trevisan, 2016). This view is reinforced, for example, when some use the popular term technological evolution to refer to a new product, system, or update, which implies improvement, development, and progress. An organic, inevitable perspective is a simple consequence of the passage of time and the evolutionary tendency to better adapt to the world presented. Historically, the idea of intelligence is used to value actions and products. The Artificial Intelligence concept, thus, presents itself as an asset with high market potential that moves research, industries, and large economies (Braga & Chaves, 2019).
It does not surprise that this deterministic discourse - added to the inevitability of current scientific development - is taken over and is amplified by companies, governments, and organizations. In general, the same ones that define and decide the paths, models and technological choices that will move society (Williamson, 2017). In summary, this discourse advocates that adapting education to the new connected times is necessary. Technology and data would be able to assess the performance of students, teachers, and educational systems and to translate and foster the necessary changes for the digital world, providing subsidies to, among other things, personalize the learning paths and prepare students for the challenges of future employability. This economic force at the service of an idea produces various effects in culture and social imagination (Braga & Chaves, 2019). Moreover, sometimes, this means neither seeing nor admitting that technology identified by common sense as positive or revolutionary may be harming a person or a group. It may be difficult to admit it to ourselves, and many will blame themselves for failing to adapt to it and not become optimized. One could remember that techno-optimists and the business world also predicted that computer efficiency would decrease working hours. However, this efficiency mainly only reduced the number of workers needed to perform specific tasks (Braga & Chaves, 2019). A "common misconception in appropriate technology development is that any intervention will automatically be an improvement on existing conditions" (Prestero, 2010).
As O'Neil (2016) says, we should look not only at the number of people a system can benefit but also at how many it can make suffer. The base, the foundation of these applications,

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Macek, J. (2005, July). *op. cit.*

Rosa, G. & Trevisan, A. (2016). *Filosofia da tecnologia e educação: conservação ou crítica inovadora da modernidade?* Avaliação, 21 (3), 719-738. https://doi.org/10.1590/S1414-40772016000300004

Braga, A. A. & Chaves, M., *op. cit.*

Williamson, B. (2017). *Big data en Educación - El futuro digital del aprendizaje, la política y la práctica*. Ediciones Morata.

Prestero, T. (2010). Better by Design How Empathy Can Lead to More Successful Technologies and Services for the Poor. Innovations: Technology, Governance, Globalization, 5(1), 79-93. http://dx.doi.org/10.1162/itgg.2010.5.1.79

and algorithms are choices made by fallible humans. Even with the best of intentions, many of these models could "encode misunderstandings and prejudices" (O'Neil, 2016). Researchers in Machine Learning applications keep finding unwanted results from their systems, with unfair or even unethical outcomes (Mayfield et al., 2019). Even when one has the most correct and ethical algorithm or model, there is another problem: the quality of the data used to train and feed the models. For example, in the Natural Language Processing (NLP) case, bias is sometimes passed downstream, producing unbalanced outcomes for tasks like coreference resolution, sentiment analysis, and dialogue systems (Mayfield et al., 2019). NLP and speech processing technologies often combine multiple complex machine learning algorithms and are, thus, vulnerable to the same sources of bias as other machine learning systems (Loukina, Madnani & Zechner, 2019). So, good training data selection is fundamental. Algorithms training for maximum performance may often result in biased predictions against various groups (Loukina, Madnani & Zechner, 2019). Models trained on a standard written professional English, for example, fail to perform for underrepresented language groups, like African American English (Mayfield et al., 2019). Automated scoring also might disadvantage students, depending on their native language – even if it is people proficient in the language used by the system. There is "a danger that the scoring engine might inadvertently assign different scores" to speakers of different native languages (Loukina, Madnani & Zechner, 2019).
However, from the "human victims" who question the results of poorly designed intelligent systems, "we see ourselves repeatedly demanding much stronger evidence than that of the algorithms themselves" (O'Neil, 2016). Mayfield et al. (2019) cite several types of research that show that Machine Learning can amplify results such as racial prejudice in predicting recidivism in court hearings and facial recognition, for example. As algorithms extensively rely on data, they adapt to their inherent qualitative and quantitative characteristics. If data is unbalanced and contains some kind of bias, the algorithms may produce systematic and repeatable errors, disadvantaging people (Luan et al., 2020). It is challenging to keep properties of justice when one unfair output is used as input by another, or, even worse, after iterating through algorithmic predictions over time (Mayfield et al., 2019).
These intelligent processes are sometimes complex for laypeople and challenging to monitor and inspect. They are based on statistical decisions that generate mere probabilities, sometimes raised to certainties' status. But knowledge relates to the use of information in the pursuit of goals. And wisdom, in this sense, would be the ability to choose consistent goals with their own values. How can an AI have values? Values come from their programmers (Braga & Chaves, 2019). Sometimes seen as inevitable and free from human bias, these technologies are nothing more than a model, an "abstract representation of a process." Whether in software or our minds, a model uses what we know to "predict responses in various situations. They tell us what to expect and guide our decisions" (O'Neil, 2016). A model is, by nature, a simplification. Moreover, it is created through choices of what is important enough to be included in it. Despite their so-called impartiality, models and systems reflect objectives and ideology. "Our values and desires influence our choices; from the data we choose to collect to the questions we ask. Models are opinions embedded in mathematics" (O'Neil, 2016). However, the problem with turning opinions into models is that they can only be reproduced. "A model is a form that we must reproduce as it is" (Argan, 1993).
Because of its importance and complexity, it is necessary to reflect on the EdTech scenario. The danger of a smart culture without problematization, as warned by Selwyn (2011), is to see technology only as machinery and abandon exams and critical thoughts on the subject. Mayfield et al. (2019) calls for attention to the risk of unintentionally contributing to harm students if the ethical consequences of research on AI and Natural Language Processing in Education are not considered. Attention should focus on the practices and activities that technologies allow the social and structural relationships they connect (Selwyn, 2011). Can total and continuous customization decrease the individual's ability to adapt and resilience? Can it lead to a culture of exacerbated individualism? Will performance categorization and analysis detect contextual and specific issues around those who learn and those who teach? MOOCs, ITS, Learning Management Systems (LMS), sensors, and mobile devices generate ever-increasing amounts of dynamic and complex data, containing students' personal records, physiological data, activity logs, and learning performance. These are sensitive information. Will there be "a proper balance between desirable use of personal data for educational purposes and undesirable commercial monetization and abuse of personal data"? (Luan et al., 2020). What should be the pedagogical structures and options that need to accompany and guide these processes? Who will be the assistant: teachers or the system in an ultra-developed AI scenario? So, one question becomes paramount about educational intelligence and (semi) autonomous innovations: what could be their positive and negative long-term effects on individuals? It is dangerous to develop these systems without asking this.

Mayfield et al. (2019). Equity Beyond Bias in Language Technologies for Education. In: Proceedings of the Fourteenth Workshop on Innovative Use of NLP for Building Educational Applications, Italy, 444–460.

Loukina, A., Madnani, N. & Zechner,K. (2019). The many dimensions of algorithmic fairness in educational applications. In: Proceedings of the Fourteenth Workshop on Innovative Use of NLP for Building Educational Applications, Italy, 1–10.

Braga, A. A. & Chaves, M., *op. cit.*

Argan, G. C.,*op. cit.*

Selwyn, N., (2011), *op. cit.*

Mayfield et al., op. cit.

Luan et al., *op. cit.*

Thinking technically, automated systems of educational management or assessment, to be efficient, must account for a series of variables. For example, a student progress measurement program would need to consider that students' socioeconomic status and learning difficulty history can affect outcomes. Their algorithms, therefore, would need to include these and other variables, becoming, maybe, more complex (O'Neil, 2016). The problem is that the deeper these systems are, the opaquer they can become, making it difficult to say how they came up with their results. This situation is the so-called black box of deep learning: some systems are fed with data, deliver responses, but as they are self-taught, there is no way to know what they understand or what parameters they used to reach their results (Boechat, 2019). In those cases, all internal adjustments and processes that allow AI to learn and make decisions happen far from human supervision (Zarley, 2019). Going forward, how complex is (or should be) a system that proposes to mathematically measure, qualify and predict people's cognitive and emotional behavior? How many variables and machine learning layers will there be? Will any problems or non-conformities be easily found? If they are opaque systems, how to provide feedback to students, teachers, parents and managers? How to regulate and evaluate the fairness and ethics of their decisions?

Will these systems and the Education they provide be for everyone? Will there be broad access to these smart tools and systems and their necessary pedagogical processes? Luan et al. (2019) point out that in the era of AI revolution, "the disadvantaged students and developing countries are indeed facing a wider digital divide". Castells & Cardoso (2005) considered that new technologies allowed a social organization based on flexible and adaptable digital communication networks, thanks to their decentralization capacity and shared decision-making. This configuration of society in dynamic and technological networks segments and places a significant part of humanity in structural irrelevance conditions. It is not just poverty; it is that the global economy and the network society work more efficiently without hundreds of thousands of cohabitants on this planet (Castells & Cardoso, 2005). O'Neil (2016) stresses that intelligent systems (intentionally or not) unfair tend to punish the poor and oppressed, increasing inequality. After all, they are designed to operate on a large scale (because their capacity and speed result in savings). Several examples show that, while the vast majority (the poorest) are treated quickly in this large amount of data, the rich ones benefit much more from face-to-face recommendations, personalized services and humanized experiences. "The privileged, we will see repeatedly, are treated more by people; the masses, by machines" (O'Neil, 2016). Are we at risk of having automated "educational fast food" for those who cannot afford adequate pedagogical support?

Reverberating Selwyn (2017), how will we conceive what were previously stable categories, such as student, teacher, school, or university? How does this affect society? What will be the benefits and harms of the massive adoption of these systems? Mendonça Neto, Vieira & Antunes (2018) ask if it is right to reduce the definition of learners to the single functional dimension of future economic agents. The authors say that we must have socially integrated individuals "aware of their possibilities, driven by the desire to know and learn constantly". The influence of AI and contemporary technologies probably facilitates better usability and drives progress. However, on the other hand, it might lead to "the algorithmic bias and loss of certain essential skills among students who are extensively relying on technology" (Luan et al., 2020). Machine Learning may also marginalize groups by not representing minority cultures, resulting in educational systems where learners do not see themselves (Mayfield et al., 2019). A lack of representation contributes to a curriculum that privileges dominant cultures and harms engagement. It could also limit learners to writing styles that mirror the norms of the dominant school culture. (Mayfield et al., 2019). And it can also contribute to the erasure of these minority cultures, the standardization of behavior and the disappearance of identity symbols.

Wogu et al. (2019) raise the possibility of relating existential and ontological problems to the mass adoption of innovative AI technologies through Karl Marx's Alienation Theory. Marx addresses the question: how do man's efforts to earn a living affect his body, mind, and daily life? There are academics who argue that the increasing degree of automation and the massive adoption of AI are detrimental to workers' jobs (Wogu et al., 2019). Edtech could introduce systems to facilitate the activities of teachers but also to monitor and evaluate their performance. These systems could even induce the standardization of pedagogical practice, facilitating the replacement of teachers. Selwyn (2019) recalls that the difference between being watched and supervised and between being guided and directed is subtle. There could be a loss of control over the autonomy of their actions, forcing teachers to only adjust to what machines expect or just supplying what systems cannot do.

This situation would make their work less dignified (Mendonça Neto, Vieira & Antunes, 2018), and that is a more serious matter than it appears at first. What marks the individual's place in the world is the function that he or she performs (Rodrigues, 1978). According to several theoretical perspectives, work is the main

Boechat, C. (2019). *Inteligência Artificial, Empatia e Inclusão: um problema de Design*. Ergodesign & HCI, 7(Especial), 51-63. http://dx.doi.org/10.22570/ergodesignhci.v7iEspecial.1306

Zarley, D. (2019, January 28). *Meet The Scientists Who Are Training AI To Diagnose Mental Illness*. The Verge. https://www.theverge.com/2019/1/28/18197253/ai-mental-illness-artificial-intelligence-science-neuroimaging-mri

Castells, M. & Cardoso, G. (Eds.). (2005). *A Sociedade em Rede: do conhecimento à acção política*. Imprensa Nacional.

Selwyn, N. (2017). *Education and Technology: critical questions*. In: G. Ferreira, L. A. Rosado & J. Carvalho (Eds.). Education and Technology: critical approaches (pp.105-121). SE-SES/UNESA. https://ticpe.files.wordpress.com/2017/04/ebook-ticpe-2017.pdf

Mendonça Neto, O., Vieira, A. & Antunes, M. T., *op. cit*.

Luan et al., *op. cit*.

Mayfield et al., op. cit

Wogu et al., *op. cit*.

Rodrigues, J. A. (org). (1978). Durkheim. Ática.

category of contemporary society. It goes beyond subsistence or income. It is the defining activity of human existence, with personal meanings (fulfillment, status, interpersonally) and economic and social meaning for collective structuring (Sá & Lemos, 2017). Work is also social subscription support: the place one occupies in the work division influences the participation of individuals in sociability networks and protection systems.
Castel (1998) says that the attributes linked to work define the status and classify the individual in society. Other identity shapers, like family and community, are neglected by the burden of work. This, thus, structures the daily lives of most people.
It is argued that these technologies will make the teacher's work more pleasurable and that their role is irreplaceable. Nevertheless, Marx already saw that the progress of machinery would increasingly demand fewer workers to produce the same number of products. Those surplus workers would become superfluous, a reserve army that, when necessary, would receive less for their work than it is worth (Castel, 1998). But the main issue here is not all about teachers losing jobs to machines, which hopefully will never happen, but about the teaching work, its political and practical consequences, and the reconfiguration of the whole process, from training to practice (Barreto, 2017). As Kalleberg (2009) states, work reveals a lot about the social order and its changes and the types of problems and issues that people and governments must address.
To whom are we outsourcing the choice of teaching and assessment parameters that will label children in their present and future? Who decides what an optimized person is? Is it someone prepared for the challenges of the future? But who defined the future and its challenges? Will these children grow up taught to ask these questions and to reflect on the world and their role in it? As Williamson (2017) warned, are we exchanging the dialogue and monitoring of students for a mere (autonomous) data analysis?
From the moment the human body and mind (our hardware and software?) were considered a type of machine, the next natural thought would be to consider a machine as a type of human (Braga & Chaves, 2019). This artificial intelligence is a mechanism modeled after the human being, but, at the same time, completely different from people and society. The autonomy of human freedom becomes an intended property of artifacts. This would eventually limit human freedom and autonomy (Hofkirchner, 2018).
This paper's title references Design and Crime and Other Diatribes, by Hal Foster (2002), which, in turn, echoes Ornament and Crime (1908) and Poor Little Rich Man (1900) by Adolf Loos (Foster, 2002). In his texts, Loos criticizes the excessive use of ornaments in Art Nouveau ("with the individuality of the owner expressed in each ornament, each shape, each nail"). They say that it is overcoming limits that would be a catastrophic loss of the objective restrictions necessary to define any future life, effort, development, and desire (Foster, 2002). The excess of information and details would not leave the human being complete but would overload him, "living life with his corpse" (Loos, 1982). "Instead of a sanctuary against modern stress, its Art Nouveau interior is a new expression of that same stress" (Foster, 2002).
The registration and analysis of every microdata apprehended to measure, label, and predict an individual builds what kind of human being? What kind of society? Can we be summed up to our data and its use? Foster (2002) uses his text to problematize the role of Design in a world of consumption and re-consumption, where everything, even genes, is designed and considered design ("total design"). Is data a digital version of Loos' ornaments? Where every small act and (even) feelings cataloged and reintroduced to individuals through various intelligent systems around them, in the name of a better, custom-made, personalized existence that would give them their optimization? Would we be forming overworked people living in their own corpses? Life control would come from social relationships and interaction mediated by natural languages or algorithms and computational systems (Bannell, 2017)? How does this affect cognitive abilities, ethical relationships, emotional abilities, and aesthetic sensibilities?
Without room for reflection, can this process not become a way of taking Foster's total design to a previously unthinkable level? Loukina, Madnani & Zechner (2019) say that the magnitude and the nature of the impact of automated scores need to be weighed against other benefits in the educational application and the consequences for the final user. Prestero (2010) sees two distinct approaches to solving problems with technical innovation: the invention approach and the design approach. First, one chooses the technology that hopefully will solve a problem. Then, the technology is fitted to the problem through an iterative series of design refinements. Finally, a specific user group or market segment for the product is sought. In the second approach, Design starts with the user and then moves towards technology. Specifying the user involves conducting direct and indirect searches to define who he is and what he wants. The problem with defining the technology before the user is that it places the burden of adaptation on humans (Prestero, 2010). By designing EdTech without a more systemic and human-centered

Sá, J. G. S., & Lemos, A. H. C. (2017). Sentido do Trabalho: Análise da Produção Científica Brasileira. Revista ADM. MADE, 21(3), 21-39. http://dx.doi.org/10.21714/2237-51392017v21n3p021039

Castel, R. (1998). As metamorfoses da questão social: uma crônica do salário. Vozes.

Barreto, R. (2017). Objects as subjects: the radical displacement In: G. Ferreira, L. A. Rosado & J. Carvalho (Eds.). Education and Technology: critical approaches (pp.143-159). SESES/UNESA. https://ticpe.files.wordpress.com/2017/04/ebookticpe-2017.pdf

Kalleberg, A. L. (2009). Precarious Work, Insecure Workers: Employment Relations in Transition. American Sociological Review, 74 (1), 1-22. https://doi.org/10.1177/000312240907400101

Williamson, B., *op. cit.*

Braga, A. A. & Chaves, M., *op. cit.*

Hofkirchner, W. (2018). Promethean Shame Revisited: A Praxio-Onto-Epistemological Analysis of Cyber Futures. World Scientific.

Foster, H., *op. cit.*

Loos, A. (1982). Spoken into the Void: Collected Essays 1897-1900. MIT Press.

Foster, H., *op. cit.*

Bannell, R. (2017). A double-edged sword. In: G. Ferreira, L. A. Rosado & J. Carvalho (Eds.). Education and Technology: critical approaches (pp.52-81). SE-SES/UNESA. https://ticpe.files.wordpress.com/2017/04/ebook-ticpe-2017.pdf

Loukina, A., Madnani, N. & Zechner,K., op. cit.

Prestero, T., op. cit.

view, with a primary focus on technology, aren't we risking putting the burden of adaptation and the burden of possible failures on children and adolescents? The same ones that will form the society of the years to come? If society is not an instant creation – once it is a construction, a transitory result, a moment in the historical process (Braverman, 1987) – what future is humankind collectivity risking to create if these paradigmatic processes are not done with proper care and planning? If human beings are not at the center of the process?
In the total design world, the designer "delights in post-industrial technologies and willingly sacrifices the semi-autonomy of architecture and art to the manipulations of design" (Foster, 2002), thus being a fundamental part of a cycle of almost perfect production and consumption that leaves little space for everything else - including (self) reflection. How can Design research reflect on that?

Design, Edtech and intelligent educational autonomous systems: are we thinking about people?

According to Buchanan (2015), what makes Design different is one of its intrinsic principles: the focus on the quality of experience for everyone. Design shouldn't just be concerned with profitability but also with improving people's lives. Design should generate high-quality products and services that would promote economic success and satisfying experiences for individuals throughout society. However, how to apply this concept in practice?
The ISO 9241-210 standard states that Human-Centered Design (HCD) is an approach to developing interactive systems that seek to make them usable and useful, focusing on users' needs and requirements. It seeks to increase effectiveness and efficiency, improving human well-being, satisfaction, accessibility, and sustainability. It also seeks to avoid adverse effects on human health, performance, and safety (ISO, 2019).
Gasson (2003) stresses that HCD seeks to find the balance between the requirements of the social system (human interaction, implicit objectives, specific and cultural practices) and the formal technical system (rules and procedures, technologies, performance indicators). Thinking about HCD in technological processes of learning and evaluation scenarios: when measuring, cataloging and trying to predict the profile and students' cognitive and emotional behavior, are designers considering the contextual issues? For example, one person's educational performance cannot be compromised by external events such as their parents' separation, financial problems, or bullying? Can't a person's performance using a smart system be compromised by the fact that the person uses a smart system? For example,

Braverman, H.(1987).Trabalho e capital monopolista: a degradação do trabalho no século XX. LTC.

Foster, H., *op. cit.*

Buchanan, R. (2015). Worlds in the Making: Design, Management, and the Reform of Organizational Culture. She Ji: The Journal of Design, Economics and Innovation, 1(1), 5-21. https://doi.org/10.1016/j.sheji.2015.09.003

International Organization for Standardization (ISO). (2019). Ergonomics of human-system interaction — Part 220: Processes for enabling, executing and assessing human-centred Design within organizations. ISO. https://www.iso.org/standard/63462.html

Gasson, S., *op. cit.*

Mayfield et al., op. cit.

Yujie, X. (2019, March). Camera Above the Classroom. Sixth Tone. https://www.sixthtone.com/news/1003759/cameraabove-the-classroom

Bannell, R., op. cit.

Luan et al., *op. cit.*

Cross, N. (2001). Designerly Ways of Knowing: Design Discipline Versus Design Science. Design Issues, 17 (3), 49-55. http://www.jstor.org/stable/1511801

Argan, G. C.,*op. cit.*

Boltanski, L.; Chiapello, E. (2009). O novo espírito do capitalismo. WMF Martins Fontes.

Foster, H., *op. cit.*

Lazar, J., Feng, J. & Hochheiser, H. (2017). Research Methods in Human-Computer Interaction. Elsevier

Mayfield et al. (2019) point out that large-scale Edtech that tracks students' activity in real time can also be seen as a surveillance tool. Evaluations suggest that when students are aware of such systems in use, they report feeling anxious, paranoid, and afraid of long-term repercussions for undesirable behavior (Mayfield et al., 2019; Yujie, 2019). Bannell addresses this issue: computer-based educational technologies presuppose that cognition is reducible to the construction and use of algorithms (Bannell, 2017). How can adaptive learning cope with thinking spontaneously in action? If computers decide what students will see based on their performance, who evaluates that performance? Based on what criteria? Does the affective data collected from learners consider cultural differences, contextual factors, teachers' observations, and students' opinions? (Luan et al., 2020). Moreover, although assessment is based on fuzzy logic, it ignores the students' feelings about their performances (Bannell, 2017). Cross (2001) proposes an interdisciplinary study of Design that, while a discipline, could be studied in its terms and within its culture itself, based on reflective design practice. Do we reflect effectively, about Design and Human Factors/Ergonomics applied to smart systems? To guarantee that they are effective and efficient is enough to improve people's well-being? How well children or adolescents would feel knowing that there is an always-on monitoring tool labeling, recording, and aggregating data about their behavior, cognitive abilities and emotional state? And using this information to predict their future selves? Argan (1993) considers only two contemporary technological systems: one from civilization and another from power. And what differentiates them is reflection and "values". Boltanski & Chiapello (2009) quote Weber when asking: without a "point of view" that implies values, how is it possible to select what deserves to be highlighted, analyzed, and described? Foster (2003) sees contemporary Design as part of capitalism revenge. For him, it does not matter if autonomy is, perhaps, an illusion. From time to time, it is useful and necessary. We need that Design and Human Factors/Ergonomics ask themselves: approaching these systems without a more macro, broader view is not risking designing tools for social control? For perpetuation of inequalities? Don't we need a broader context and approach to the smart learning? Momentarily leaving the questions aside for possible ways to answer them, Design and Human Factors/Ergonomics have tools that can help and support this broader, systemic and careful approach of Edtech. For example, to understand the impact of these new educational systems on motivation, collaboration, social participation, and trust, Lazar, Feng & Hochheister (2017) say that longitudinal approaches (case studies, obser-

vations, interviews, and data recording) might be better suited. Xu (2019) proposes an expanded human-centered AI (HAI) framework to help deliver ethical and technological solutions and explainable ones with understandable, useful, and usable AI. Giacomin (2014) states that an HCD approach on Edtech should be less concerned with functions and more concerned with allowing many individual or cultural conceptions to unfold into continuous interfaces with technology. People drive the questions, ideas, and activities rather than the designers' materials, technologies or personal creative process. The HCD take on the subject would bring a series of questions and answers that range from the physical nature of people's interaction with the product or service to metaphysics (Giacomin, 2014). The Service Design approach could also be helpful. The difference between services and products is that services are systemic and designed with multiple stakeholders. Their design process must be broader (Forlizzi, 2018). Facing these systems as services and applying a scope that seeks for sustainable solutions and optimal experiences for customers could be a way to deepen and improve the designed outcomes. Participation of students, teachers, education professionals, parents, and other interest groups in the design process is also essential.

Stakeholders need to be heard. Collective, creative collaboration, combining different perspectives, is mandatory to understand users and customer needs, on the one hand, and technologies and processes, on the other. That way, developing successful services (Steen, Manschot & De Koning, 2011). The cumulative UX notion could also suit the intelligent, autonomous Edtech scenario: experience begins with expectations, before the actual interaction, and continues after it. And it is maintained over time, as there are episodes of use and of non-use, which may span for months or years (Roto, Law & Vermeeren, 2011). Extended analysis periods could reveal the eventual cumulative impact of momentary experiences, if UX is structured in a life cycle or journey through moments of use and reflection on them for longer intervals. Roto, Law &Vermeeren (2011) point out that if previous experiences influence future ones, reflecting or recounting after a usage episode could frame the anticipations of future episodes.

Foster (2003) believes that it is time to recapture the political sense of autonomy and transgression, a sense of historical dialectic between disciplinarity and contestation. How to contest if it is the companies that hire and pay the designers? Perhaps, approaching interdisciplinary studies in a more macro, systemic way is a solution: looking for what Buchanan (2015) called the Fourth Order of Design. Buchanan divides the practice of Design into four areas of design problems which would be: communication, construction; interaction; and integration. Each of these areas relates to different issues addressed by designers over time. The first order would be Graphic Design, arising from the mass communication issues of the beginning of the 20th century. The second, the Industrial Design, a consequence of mass production processes that needed solutions for patterns, shapes and mechanisms for better functioning. And the third would be Interaction Design, a demand caused by the growing need of human beings to interact with machines, interfaces and services. Finally, the fourth-order would be Systems Design, which reflects what Foster (2003) reminds us in his book: Design today is broader than before. It spreads over several social groups and by different enterprises. The Fourth Order approach would seek an even broader vision of everything that human beings create and what they need to interact with: systems, environment, organizations, the ideas behind communication, construction and interaction (Buchanan, 2015). In this case, the ideas behind the EdTech culture. It must be an approach going beyond the design of educational tools and hardware, beyond the interaction between humans and systems. It is an approach that thinks those artifacts and software as a whole, in their possible outcomes and impact on education, children, parents, Thinking how these systems could change society for better and worse. Discussing these autonomous, intelligent solutions and preparing to design these products avoid outcomes that could cause harm. To Argan (1993), it is impossible to conceive a project idea that is not based on criticism, that is not searching for changes in anything that exists. Thinking of designing as doing projects, an approach to Design or Human Factors without some level of criticism would be effective, or just a reproduction of models planned by others? Flusser (2007) recalls that progress is so attractive that "design conceived responsibly is seen as a step backward". As he underlines, objects of use are obstacles needed to progress and are thrown out when they lose their shape. If we need responsibility when dealing with inanimate objects, what to say when the obstacles are students and teachers? The scrutiny of every small human act and feeling in the name of ultra-customization seems to speed up the total design concept. Individuals are the result of diverse and particular experiences. Without that, with trails of experiences built and optimized, what kind of individuals will we be? Foster (2003) ends Design and Crime with a quote from Musil (1995), so frighteningly current and worrying in the context of educational Big Data, that it would not be an exaggeration to close this chapter by quoting it:

Xu, W. (2021). From Automation to Autonomy and Autonomous Vehicles Challenges and Opportunities for Human-Computer Interaction. Interactions, 28 (1), 48-53. https://doi.org/10.1145/3434580

Forlizzi, J. (2018) Moving Beyond User-Centered Design. Interactions, 25 (5), p.22-23, https://doi.org/10.1145/3239558

Steen, M., Manschot, M. & De Koning, N. (2011). Benefits of Co-design in Service Design Projects. International Journal of Design, 5 (2), 53-60. http://www.ijdesign.org/index.php/IJDesign/article/view/890/346

Roto, V., Law, E. & Vermeeren, A. (2011). User experience white paper - Bringing clarity to the concept of user experience. Dagstuhl Seminar on Demarcating User Experience. http://www.allaboutux.org/files/UX-WhitePaper.pdf

Foster, H., *op. cit.*

Buchanan, R., op. cit.

Argan, G. C.,*op. cit.*

Flusser, V. (2007). O mundo codificado: Por uma filosofia do design e da comunicação. Cosac Naify.

Musil, R. (1995). The Man Without Qualities. Vintage Books

> *A world of qualities without a man has arisen, of experiences without the person who experiences them, and it almost looks as though ideally private experience is a thing of the past. The friendly burden of personal responsibility is to dissolve into a system of formulas of possible meanings. Probably the dissolution of the anthropocentric point of view - idea that for a long time considered the human at the center of the universe - has finally arrived at the "I" itself* (...) (Musil, 1995).

Conclusion

Selwyn (2011) says that digital technologies seem to reconfigure practically all social processes. Thus, many defend them as an obvious way to solve educational problems. However, as seen, some discourses and interests may be behind decisions that maybe do not enrich personal and educational experiences. Mayfield et al (2019). recommend not to assume that there is a methodological change that could fix any problem while maintaining the primacy of the algorithm. "Sometimes, machine learning will not be the right way to solve problems" (Mayfield et al., 2019). Luan et al. (2020) see a gap between current technological capabilities and their educational adoption. This fast technological progress and relatively slow educational use puts technological adoption in education under pressure.

This paper aimed not to demonize technologies or prove that they are not useful, or that humans will always be better than intelligent systems in any situation or application. As Loukina, Madnani & Zechner (2019) reminds us, at least in some contexts, automated scoring, for example, can improve overall score reliability and consistency which benefits all takers. And it is also true that humans are far from be perfect. Human scores are also likely to contain a certain amount of error and possibly even bias (Loukina, Madnani & Zechner, 2019). As recalled by Bannell (2018), Educational technologies allow greater effectiveness, expanding the individual's abilities and grouping cognitive resources. Andrade (2018) considers that technologies lead to a decline in manual and routine activities, which brings a need for abstraction to deal with complex problems in situations of collaboration and creativity. Thus, perhaps Artificial Intelligence, Machine Learning and Big Data can create an adaptable and better-shaped education for the social future and up to date for the new generation. But that does not mean that there is no need to think about or question these processes. Many companies and institutions will use their artifacts and systems with care and compatible pedagogical and human-centered monitoring. Nevertheless, the research community cannot take it for granted. We cannot wait or hope that everyone will be ethical or will adopt good practices. It is feared that these new educational configurations and technologies, depending on their use, could bring an oppressive experience for students (Boechat; Mont'alvão, 2019) and teachers.

Perhaps, time will show that many of the questions raised here were not all that problematic. Although, attention, research and care are needed more than hurry. Overreliance on technology may lead to an underestimation of the role of humans in Education. The "outcomes of data analytics and algorithmically generated evidence must be applied with caution" (Luan et al., 2020). One could say that the solution to many issues addressed in this paper would be to search for fair algorithms. But as Loukina, Madnani & Zechner (2019) reminds us, there are many different ways to formally defines algorithmic fairness. And, it may be impossible to achieve fairness according to each and every one of these definitions at the same time.

That way, it is necessary to safeguard human centrality even in a billion-dollar market that keeps growing. This paper reinforces that one must approach and think about Design and Human Factors beyond the design of interfaces and interactions of educational systems; We should think about the learning experience from the start, in a macro, systemic way, centralizing human beings in the process. Designers should participate in multidisciplinary discussions with educators, psychologists and neuroscientists about autonomous digital learning and assessment. It is also essential to invite stakeholders affected by these changes to participate, going beyond what is just stated. It is essential to pay special attention to the context around these people and propose collaborative solutions that involve everyone, going beyond educational and technological utilitarianism (Boechat; Mont'Alvão, 2019). A participatory approach to HCD can help institutions, students, parents, and teachers seek the best experience for everyone, avoiding the dangers of unquestioned or unquestionable technologies. To effectively think about people, smart EdTech needs to be used and - most importantly - designed considering all facets and complexities of the human being, especially those that cannot be measured by numbers. The next step of this research will be to conduct a field research with teachers, students, and professionals who design and plan these systems to assess these topics in practice. Are the questions raised by a systematic and human-centered approach to these systems considered when designing them? How can we visualize and prepare for possible future outcomes for people and society? The theoretical basis of this paper is part of doctoral research that will seek to ask these questions.

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Mayfield et al., op. cit.

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Andrade, R. (2018). *Apresentação. In: Tendências em inteligência artificial na educação no período de 2017 a 2030: SUMÁRIO EXECUTIVO.* SENAI.

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Homegreens:
Aquaponics and Education

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The Homegreens project aims to develop small freshwater or saltwater aquaponic systems, which can be installed in schools, serving as a pedagogical tool for the apprenticeship of subjects such as biology and sustainability to the juvenile audience. A multidisciplinary team of designers, biologists, and agronomists was responsible for the project's research. The development and installation of experimental models, for qualitative analysis of user interaction, determined the methodology layout.
This small-scale aquaponic system consists of two different grow beds, an aquarium with a capacity of 45L, a separating barrier for plants' roots, a biofilter mesh with an integrated aerator, a valve for sediment cleaning, and two tripods.
The involvement and the interaction with the Homegreens' aquaponic system provides a group learning opportunity, which contributes to environmental literacy in children with relevant values and experiences.

Keywords *Aquaponics, Education, Ecosystem, Sustainability, Design.*

Introduction

Education and pedagogical strategies for sustainability

By 2050, the world population is expected to reach 9 billion people (Touliatos, Dodd & McAinsh, 2016; FAO, 2018). In addition to this fact the emancipation of developing countries, reducing the disparity between them and developed countries, constitutes a threat to the current management of environmental resources (FAO, 2018) and contributes to environmental degradation.

Assuming the urgent need to face the challenge of leaving a more sustainable and safer planet as a legacy for future generations and recognizing that education is a priority since it has a catalytic effect on society promoting values, attitudes, capacities, and behaviors, the United Nations declared the decade 2005-2010 as the "Decade of Education for Sustainable Development" (UNESCO, 2005). However, to foster environmental ethics in children is necessary to create pedagogical methodologies aiming to obtain greater efficiency in the teaching/learning process. Pedagogical methodologies such as Project-Based Learning or PBL (Bell, 2010) present a viable alternative to traditional methodologies. PBL was inspired by the ideologies of John Dewey, a pedagogue and reference philosopher of the progressive school's movement, supported by principles that aim to provide children a learning experience based on practical activities. For Dewey, the application of these methodologies not only makes children more aware of the world, preparing them for the future but also provides them with a deeper understanding of contents (Dewey, 1986). This allows children to take advantage of their natural curiosity to explore subjects according to their interests, allowing them to remain motivated and receptive to the contents of several knowledge areas, such as mathematics, physics, biology, among others (Claussen, 2017; Blumenfeld et al., 1991).

The cognitive stimulus from these didactics contemplates the development of young thinkers, who learn to organize research and apply strategies, preparing them to identify and face real-world problems, which are constantly changing (Bell, 2010). Richard Louv also mentions John Dewey in his work – "Last Child in the Woods", as an important reference in the implementation of educational practices that promote student interaction with local ecosystems, outside the school perimeter. These activities are at the basis of environmental education principles, to which Louv draws a parallel with experimental education. In this way, the author defends the reformulation of traditional teaching through the introduction of new teaching practices that encourage children's relationship with nature and its phenomena as an essential part, not only of learning but also of their physical and emotional health balance (Louv, 2008).

Given these changes the classroom space is recognized as a potential space for intervention, where design plays an important role in the development of objects/systems, supporting different pedagogical strategies. Through this process, it is possible to analyze, identify and create tools that provide children with experiences capable of making them more aware of environmental literacy, citizenship, and social-cultural skills, among others, whose role will be fundamental in their lives.

Aquaponics as an educational tool towards environmental literacy

Aquaponics is considered an exemplary activity to achieve sustainability and its dissemination is regarded as fundamental for global awareness about the preservation of nature and its resources. The growing interest in this activity, especially within the humanitarian sphere, has encouraged research around the world (Somerville et all., 2016), to design increasingly efficient systems and achieve the sustainability goals defined by the United Nations until 2030 (UNESCO, 2017).

This is a technique considered more efficient compared to other models of food production, as it allows the simultaneous production of fish and horticultural species through the same water circuit. Aquaponics is essentially the combination of hydroponics and aquaculture (Blidariu & Grozea, 2011): hydroponics is a technique that enables the farming of soilless plants, using a variety of inert grow beds that support their development, while being irrigated with a nutrient solution providing their growth; on the other hand, aquaculture consists in the production of fish or other aquatic animals, in an isolated and controlled environment (Jensen, 1997; Blidariu & Grozea, 2011; Somerville et all., 2016). The main advantage of this farming technique is the highly efficient management of water resources, notably through the permanent recycling of water, in which the waste metabolized by fish provides a benefit to the growth of plants (Graber & Junge, 2008). It is possible to consider aquaponics as a simulation of an ecosystem easily found in rivers, which is sustained by a set of interactions among members of a specific biotic community, particularly fish species, vegetables, and nitrifying bacteria, which inhabit equipment designed according to certain specifications. The nitrogen cycle is the main biological process responsible for triggering the actions that take place in aquaponic systems. Thus, it's the process of nitrification that transforms the waste produced by fish into food for the plants. To make this possible, the water is mechanically filtered to release the solid particles metabolized by fish, passing through a support structu-

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Blidariu, F., & Grozea, A. (2011). *Increasing the economical efficiency and sustainability of indoor fish farming by means of aquaponics-review*. Scientific Papers Animal Science and Biotechnologies, 44(2),18. https://www.researchgate.net/publication/228442364_Increasing_the_Economical_Efficiency_and_Sustainability_of_Indoor_Fish_Farming_by_Means_of_Aquaponics-Review

re of nitrifying bacteria, called a biofilter, where the ammonia is transformed into nitrites. Subsequently, these turn into nitrates, which are absorbed by plants. Going through these steps, water recirculates to the fish tank completely purified (Somerville et all., 2014; Blidariu & Grozea 2011).
This way, the use of this ecosystem in indoor spaces can be an important way to communicate concepts related to the environment and sustainability to children. While observing a set of biological phenomena, children participate in its maintenance through hands-on activities. It allows them to conduct experiences intended to contribute to their awareness of environmental literacy, which involves nature's organisms and resources, leading to a systemic understanding of the world: "Environmental literacy (...) is essentially the degree of our capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems" (Roth, 1992, P14). According to Vitor Papanek: "(...) the human being shapes society and its future through what is taught to young people" (Papanek, 1995, p.235), so the dissemination of these contents is considered relevant because it contributes to the sedimentation of a chain of values, on which children establish a cosmovision.

Figure 1

Jensen, M. H. (1997). *Hydroponics. Hortscience*, 32 (6), 1018-1021. https://doi.org/10.21273/HORTSCI.32.6.1018

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Methodology

The Homegreens' aquaponic system concept was created as a pedagogical tool to promote the infant-juvenile user's learning experience and to ensure the biota's development necessary conditions. The design process of this small-scaled domestic aquaponic system was developed in five stages. The first one was the gathering of information about aquaponic farming, in which food production systems were analyzed and researched. In the second stage, users were involved in the product design process according to the principles presented in IDEO's methodologies (2015). A probe system was implemented for a year in a 1st-grade school (EB1/JI do Carvalhal, Alcobaça, Portugal, with students between seven and ten years old), which was chosen due to its contemporary pedagogical practices, combining Project-Based Learning and traditional teaching (fig. 1). The relevant data on the interaction between children and the probe system was later incorporated into the experimental models. The third stage consisted in the construction of experimental models to validate formal/functional solutions. The fourth stage focused on defining materials and production processes for the system components, and prototyping. Finally, the fifth stage consisted in installing the Homegreens' aquaponic system at the same school and collecting data through interviews, with both teacher and children, leading to a qualitative analysis regarding its performance.

Homegreens Aquaponic System

The aquaponic system final design aims to facilitate the user's daily tasks, and the understanding of the ecosystems' biological processes, as a way to promote environmental literacy in children, awakening them to sustainability and other related themes. With the implementation of the probe system at the EB1/JI do Carvalhal, it was possible to establish a set of important guidelines for the system's design, such as: simplifying its components (allowing children to operate the system easily and intuitively); creating a design capable of promoting interaction between children and living organisms (like plants, fishes and bacteria); selecting materials which make it possible to display the biological phenomena responsible for the ecosystem's activity, and developing a system in a scale capable of promoting group learning activities.
This way, the Homegreens aquaponic system includes two grow-beds, one biofilter mesh with an air diffuser, one root separator barrier, one aquarium, one valve for sediment extraction, two tripods, and one bracket to install the air pump (figure 2):
- the grow beds were developed using the raft technique, al-

lowing them to be placed, with the plants, directly on the water. Two distinct configurations were developed, one placing plants in hydroponic pots and the other placing plant along with longitudinal slots. The grow beds (which allow access to the aquarium) were made of composite cork, a waterproof comfortable to the touch material, which was important due to the context of its use;
- the biofilter mesh with an air diffuser, is designed to facilitate the device's assembly and cleaning by children. This component was also designed to communicate the presence of bacteria to children, through color changes during its use. It provides a surface for the fixation of nitrifying bacteria and is also responsible for the air's circulation throughout the ecosystem. It was produced in white PLA (Polylactic acid) filament through an additive process;
- the root separating barrier divides the aquarium space between fish and the plant's roots, establishing a balance. It was produced in Polymethylmethacrylate, better known as transparent acrylic, which allows users to visualize the growth of the roots;
- the aquarium was produced in a semispherical format, with a capacity of 45 liters, allowing children to gather around it, and making it easier to filter the solid waste produced by fish, which clusters at the bottom. This component is also made of transparent acrylic made exposing all biological phenomena.
- the sediment extraction valve consists of a device installed at the bottom of the aquarium, which exits the solid waste produced by fish. It's composed of a handle, designed to adapt to the children's hands, two elements fixing it to the aquarium, and a spring-loaded mechanism. This was produced in nylon and carbon fiber filament, through an additive manufacturing process;
- the tripods, designed with different heights and produced in black lacquered steel, were created to make assembly and transportation easy, allowing an effortless implementation in different schools;

Figure 2

- the air pump fits a bracket attached to one of the legs of the aquaponic system, made in nylon and carbon filament.

Results

Implementation in the school context

Once installed at the EB1/JI do Carvalhal in Aljubarrota, the Homegreens' aquaponic system was overseen by the 4th year class (with children aged between nine and ten), which had already cared for the probe system (figure 3). The teacher Paula Almeida was responsible for monitoring the process in both phases. During this activity, a group of plants, fish, and a set of tools were selected, to help gather data. Plants were selected for the children's familiarity with them. The chosen fish species was the Garra Rufa, due to their natural curiosity, which allowed children's physical interaction. Children conducted lab experiments to evaluate the water's ammonia and used a smartphone app to obtain extra information about the water's quality. A notebook was also developed to collect the results and help children during the ecosystem's maintenance activities.
The implementation of the aquaponic system started on the 24th of January 2020, and ended on the 13th of March 2020, due to the COVID-19 lockdown, which led to the closing of schools. In this sense, the collection of results was partially compromised since the activity period of the aquaponic system was considered insufficient. To collect data, two interviews were carried out by videoconference, one with teacher Paula Almeida[1], and another with the students[2] (figure 4).

Figure 3

[1] *Link to interview with the teacher Paula Almeida: https://www.youtube.com/watch?v=_Rvks2M4O20*

[2] *Link to interview with the students: https://www.youtube.com/watch?v=frl4_ZbYku0*

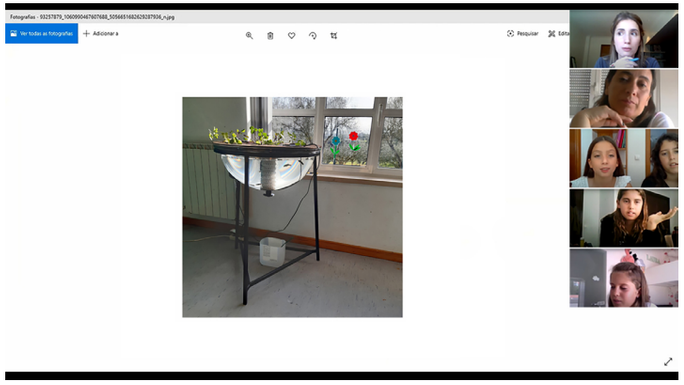

Figure 4

Through the systems' implementation, it was possible to validate the correct functioning of the aquaponic system, although formal adjustments are still needed to optimize some of the components, improving the user experience. During the interviews, the teacher Paula Almeida recognized the potential of this experience in contributing to the development of children's skills. She said that "(...) at the level of citizenship, respect for the ecosystem, it has many benefits because they (the children) knew that the plants were only well, if the fish were also well, so it is all about symbiosis, which they are part of it". It was also mentioned by one of the children that these activities are important due to the responsibility that is instilled in them: "it is more of a responsibility to have, and the children must have responsibilities to learn, which will come in handy later on". Regarding the importance of using this kind of tools in the educational context, the teacher recognizes that these activities have a positive impact on children's learning, allowing them to remain motivated and receptive, claiming that up to the 6th grade, practical contents are easily learned, while in lectures they listen for 5 min/10 min and then get distracted.
To realize the ecosystem maintenance tasks, the class was divided into four groups, each one responsible for the system for one week. The tasks were planned and divided among the children, and as mentioned by the teacher, the groups that had the opportunity to repeat the experience for the second time were already able to carry out maintenance practically autonomously. During the interviews, several children highlighted proximity and play episodes that arose from their interaction with the fish, which became possible due to the design of the system and the species' selection: "I really liked when, in the upper part

of the aquarium, in that part of the cork, there was an opening for us to give food, we put our hands there and they came to us and always moved from one side to the other (...) I liked to play with them". The size of the system was also mentioned by the children as a factor of enthusiasm.
At the end of the activity, it was possible to notice that the children were sensitive to imbalances in the ecosystem, always seeking to ensure its well-being. When the students were asked about what they liked least about the experience, one of them mentioned "the color becoming darker", referring to the ammonia test, which represented a water quality imbalance. It is also noteworthy that at the end of the experiment, the children already used some technical concepts to refer to physicochemical indicators of the water's evaluation in the ecosystem, like pH, ammonia, among others, as teacher Paula said: "some of them already know how to distinguish NO3 from NO2. The most attentive were already able to use certain terms such as pH or CO2".
This activity showed the interest and motivation of the children to participate throughout the entire experience, from the implementation phase to the process of collecting results. When the teacher was asked about what remained of the experience, she mentioned: "Everyone said they felt like authentic scientists. The motivation was two hundred percent. No one ever forgot to take care of the fish and measure the water levels."

Conclusion

In conclusion, the performance of tasks by the children allowed them to assimilate and understand some important biological concepts and phenomena. Maintenance activities, such as feeding, cleaning, annotating, and interpreting the water quality measurements, provided an understanding of the ecosystem´s health, also highlighting the importance of the children's participation in this biota's survival. The pedagogical potential of the inclusion of this tool in the school, and the relevance of the children's involvement in multisensory experiences aimed at maintaining a real ecosystem promotes learning about its balance and functioning. This strategy was important in stimulating insights in children and preteens, not only about environmental literacy but also their sense of responsibility. It creates the ecological notion of belonging to a symbiotic cycle and the consequence of their actions in the ecosystem while generating knowledge about this food production practice. In this way, this research project opens paths for future investigations, which will allow not only to evaluate and improve the performance of this aquaponic system but also to eventually scale it into new contexts and provide new and different solutions.

Social Awareness and Cultural Significance in Designing (Non) Gendered Toys

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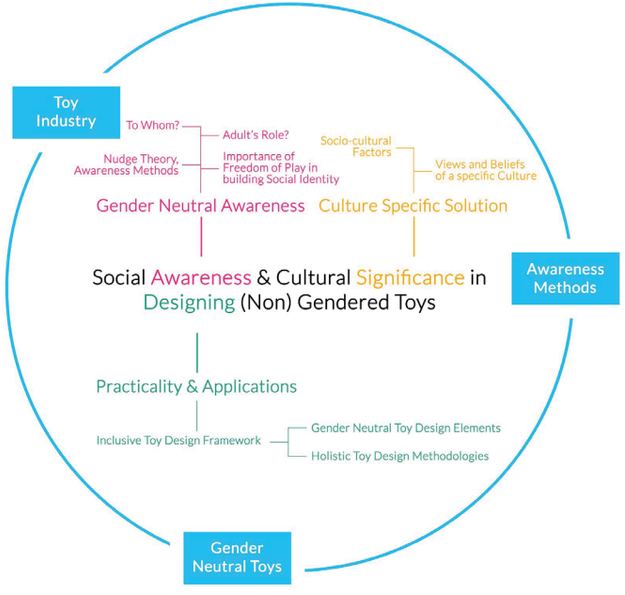
The study attempts to investigate the lack of social awareness about (non) gendered or gender-neutral toys by addressing the collaborative connection of cultural relevance in the design process of toys. According to several fields of science such as biology and psychology, gendered toy trends potentially limit children's early play experiences, resulting in gender differences in skills and capabilities between the ages of 6 and 10. To address this problem, the study explores different awareness methods for parents about a gender-neutral perspective through the implementation of Gender Neutral Play. The use of a Constructive Design Research approach allows the integration of qualitative processes, like ethnography, user studies, and gamification, to raise awareness. Different socio-cultural stakeholders are key to provide necessary information into design experiments as the Objects of Play applicable to children. The design experiments continue to evaluate, alter, and improve into gender neutral perspective towards parents. To bridge the socio-political differences of gender and promote a more holistic understanding of gender neutrality, the study proposes the development of an Inclusive Toy Design Framework as a way to improve gender neutral awareness in parents.

Keywords *Behaviour Change, Awareness, Design for Play, Inclusive Framework, (Non) Gendered Toys, Constructive Design Research*

Introduction

The study addresses the need of social awareness regarding (non) gendered or gender neutral toys and aims to understand the collaborative connection of cultural significance with the design process of toys. There is a good amount of empirical knowledge and findings on the topic, but only a few relate to its practical implications. The problem is viewed and analysed from different areas of knowledge like biology and psychology and it strongly suggests that gendered trends (Knudsen & Kuever, 2015) in toys potentially narrow children's early play experience resulting in gender differentiation in skills and abilities (Weisgram & Dinella, 2018; Li and Wong 2016; Liben et al. 2018) between the age group of 6 to 10 years old. To address this problem, the study explores different awareness methods as the base of behavior change for adults about a gender neutral perspective. The study attempts to use of a Constructive Design Research approach, allowing the integration of qualitative processes, like ethnography, user studies, and gamification to achieve the goal of creating awareness. Different socio-cultural stakeholders are key to provide the necessary information into different awareness methods through design experiments as the Objects of Play. The socio-political implications of gender vary across cultures, geographies, and demographics. To bridge these differences

Diagram 1: Different components of the central topic



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Sieczkowski, C. (2015, August 11). Target angers customers with its stores' new non-gendered policy. HuffPost. https://www.huffpost.com/entry/target-gender-biased-signs_n_55c9ffe6e4b0923c12 be0f96

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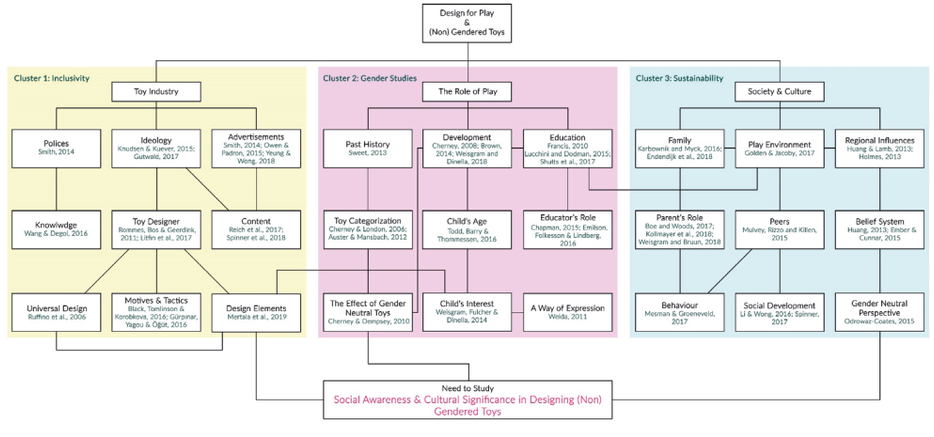
and bring about a more holistic understanding of gender, and consequently the option of gender-neutrality, the need arises for a more inclusive framework. As the following diagram ("Diagram 1") describes, the outcome of the design experiments as the design artifacts will be useful for understanding the optimal ways to consider various applications of (non) gendered perspective as the base of an Inclusive Toy Design Framework. (Non) gendered perspective is a post-human ideology (Odrowąż-Coates, 2015) that acts on human rights and dignity through equality and non-discrimination. Neutrality means equal treatment of people regardless of their gender realizing the differences and their implications for the life opportunities of individuals and any interaction between social actors. This ideology is a positive attitude towards equal rights with the potential to lay down legal, social, and economic barriers to make a more socially inclusive world. We believe that the (non) gendered perspective reflects the fundamental aspects of sustainable development (Generale, N. U., 2015) as the pivotal significance over the psychological upliftment towards Human race. The role of Design is critical in this emergent process of holistic conceptualization, as its matrices are interdisciplinary and transdisciplinary. The study proposes the concept of Gender Neutral Play using Design to create the desired social awareness regarding toys, which in turn shapes into a more holistic sphere of knowledge. Furthermore, it can influence the social and possibly a political context by inclusively combining poetic, critical, and progressive thinking, paving the path for children towards a better environment where equality and sustainability are desirable and vital traits of life.

State of the Art

Over recent years, several general and broad theories of child and gender development have been applied to gender socialization processes including biological and cognitive approaches but a handful of studies (Fulcher & Hayes, 2017; Golden & Jacoby, 2017; Dinella & Weisgram, 2018) have specifically examined in-depth the topic and mentioned the need of a holistic perspective in the process of designing and marketing of toys. It is important to understand how interconnected socio-cultural and socio-economic identities, such as race, class, and sexual orientation overlap to create unique experiences and how this relates to children's toy choices and play experiences. This study, through a Design approach, reflects on the existing cultural constraints in the adult's role in child development (Horn, 2015; Sieczkowski, 2015). The dynamics of play include a broader spectrum of development parameters in a child's life. Gender-

neutral perspective is one of them, which is not only a social attribute but a doorway to freedom in modern society (Cherney, 2008; Brown, 2014). The transdisciplinary Constructive Design Research approach of the study will try to deconstruct the dichotomy of 'pink and blue' (Cherney & Dempsey, 2010) and provide a more holistic reflection of toys in a child's life.
The empirical evidence for such dichotomy includes the actions that take place in or between members of the family (Endendijk et al., 2018), such as gendered parenting refers to parental messages and behaviours that convey information about how girls and boys are supposed to behave (Mesman & Groeneveld, 2017). Different areas of knowledge suggest that in specific regions of the world, parents treat boys and girls differently when it comes to human capital investment (Karbownik & Myck, 2016). There are multiple examples of the link between play and development suggesting that early gender-typed experiences may have long-term consequences for the development of social skills (Li & Wong, 2016; Brown & Stone, 2018). Peer relationships play a dominant part of socio-cognitive competencies for recognizing the legitimacy of challenging stereotypes, and for understanding one's own and other group perspectives (Mulvey, Rizzo & Killen, 2015). The ethnographers and social scientists had confirmed the cultural influences on parenting and children's compliance and play patterns (Huang & Lamb, 2013; Ember & Cunnar, 2015). The following diagram (Diagram 2) presents the full spectrum of a combined literature review in the field of gender-neutral development of children and establish the role of the proposed project.

Diagram 2: Relationship between the key research topics



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Mesman, J., & Groeneveld, M. G. (2017). Gendered parenting in early childhood: Subtle but unmistakable if you know where to look. Child Development Perspectives, 12(1), 22-27.

Karbownik, K., & Myck, M. (2016). Who gets to look nice and who gets to play? Effects of child gender on household expenditures. Review of Economics of the Household, 15(3), 925-944.

Li, R. Y., & Wong, W. I. (2016). ibidem

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Mulvey, K., Rizzo, M., & Killen, M. (2015). Challenging gender stereotypes: Theory of mind and peer group dynamics. Developmental Science.

Huang, C., & Lamb, M. E. (2013). Are Chinese children more compliant? Examination of the cultural difference in observed maternal control and child compliance. Journal of Cross-Cultural Psychology, 45(4), 507-533.

Ember, C. R., & Cunnar, C. M. (2015). Children's play and work: The relevance of cross-cultural ethnographic research for archaeologists. Childhood in the Past, 8(2), 87-103.

Francis, B. (2010). Gender, toys and learning. Oxford Review of Education, 36(3), 325-344.

Lucchini, N., Dodman, M. (2015). Gender and sustainability. Raising primary school children's awareness of gender stereotypes and promoting change in their attitudes.

Todd, B. K., Barry, J. A., & Thommessen, S. A. (2016). Preferences for 'gender-typed' toys in boys and girls aged 9 to 32 Months. Infant and Child Development, 26(3), e1986.

Shutts, K., Kenward, B., Falk, H., Ivegran, A., Fawcett, C. (2017). Early preschool environments and gender: Effects of gender pedagogy in Sweden. Journal of Experimental Child Psychology, 162, 1-17.

The related key agents within different literature are categorized according to three clusters: Inclusivity, Gender Studies and Sustainability with three real-life contexts respectively, such as Toy Industry, The Role of Play and Society and Culture. Socio-cultural factors like education and educators' role (Francis, 2010; Lucchini & Dodman, 2015; Todd, Barry & Thommessen, 2016; Shutts et al., 2017; Chapman, 2015; Emilson & Folkesson, 2016), regional influence and parent's role (Holmes, 2013; Weisgram & Bruun, 2018), the ideology of toy companies and the content they produce (Gutwald, 2017; Reich et al., 2017; Spinner et al., 2018) holistically connect to find the need of the proposed project. The project's scope will further explore how the ethics and the knowledge from the toy industry (Wang & Degol, 2016) can be helpful, to a greater extent, to develop gender neutral awareness within a cultural adaptation (Gürpınar, Yagou & Öğüt, 2016) including the current legal and regulatory framework (Smith, 2015).

The Objective

The complexity of the gender-typed perspective can be considered as a wicked problem (O'Brien et all., 2017) because of its multidimensional nature, which is largely affected by various agents within a culture-specific environment (Sweet, 2013; Barbaro & Earp, Consuming Kids, 2008). The role of the adults is a prevalent part of the study, not only as parents, family members, educators, toy designers, or advertisers but also as part of society in general. Different socio-cultural factors such as parent-child relationship, education, economic issues among others, should be considered in this wicked problem. From the practical perspective, the responsibility of the parents (Boe & Woods, 2017; Kollmayer et al., 2018) is very critical as the primary and most direct relationship with the children. With this in mind, the objective of the study is constructed to find a holistic solution to improve awareness to parents of Gender Neutral Play and give the children a better environment to grow up. The study aims to achieve it with the construction of design artifacts as the significance of awareness, through the activity of Play, which can be utilized by the child or both the child and the parent. Further, in the second phase, these design artifacts or the Objects of Play helps to evaluate the current situation of the available toys through tacit mechanisms to create an Inclusive Toy Design Framework as the application of (Non) Gendered Perspective and Gender-Neutral Play. Through the collaboration of both these phases, the Constructive Design Research approach enables to analyze the problem and reach a solution space that affects most of the key agents' layers.

The study will initially focus on Portuguese culture, as Portugal comes under one of the progressive countries in Europe with an improving rate of gender equality (Gender equality index 2020: Portugal, 2020). The balanced nature of the problem in Portugal is important where several opportunities in the field of gender-neutral awareness exist, contrary to the examples of egalitarian approaches.

This initiates the possibilities of design interventions in different contexts with the same cultural attributes. Further, the study attempts to understand the situation and development in gender-neutral awareness in the countries like India, where gender inequality is present and prevalent in every part of the socio-cultural scenario (Sen, 2001; Jayachandran, 2015).

The fundamental goal of the study is to conduct a pragmatic ethnography approach with selected Portuguese families as the primary focus. It includes Autoethnography (Lury & Wakeford, 2012) with the rigorous help of cultural probes or design probes (Wallace et al., 2013) followed by semi-structured questionnaires or interviews to understand the relationship between the parent and the child.

To achieve this, we will analyze how children play with the array of proposed Objects of Play, developed based on the application of the Inclusive Toy Design Framework and on prior design experiments, and then justify it to improve the awareness towards the parent. Based on this, we hypothesize that a Constructive Design Research approach can develop the Inclusive Toy Design Framework through the development of Objects of Play, which promotes awareness to parents about Gender Neutral Play and improves equal opportunity in the formative years of children within a specific cultural setting.

The Way Forward

The methodological aspect of the project is built upon the principles of Constructive Design Research (Koskinen, et al., 2012), where each layer of the process is geared and fuelled by design experiments. Through the deliberate approach of these design experiments and design artifacts, an Inclusive Toy Design Framework is proposed.

This Framework is the practical implementation of gender neutral awareness to develop new knowledge useful for the whole community related to the topic. The Research Design and Methodology (“Diagram 3”) behind the process is composed of four different layers, which are stated below accordingly.

Chapman, R. (2015). A case study of gendered play in preschools: How early childhood educators' perceptions of gender influence children's play. Early Child Development and Care, 186(8), 1271- 1284.

Emilson, A., Folkesson, A., Lindberg, I. M. (2016). Gender beliefs and embedded gendered values in preschool. International Journal of Early Childhood, 48(2), 225-240.

Holmes, R. (2013). Children's play and culture. Scholarpedia, 8(6), 31016.

Weisgram, E. S., Bruun, S. T. (2018). Predictors of gender-typed toy purchases by prospective parents and mothers: The roles of childhood experiences and gender attitudes. Sex Roles, 79(5-6), 342- 357.

Gutwald, R. (2017). Girl, LEGO® friends is not your friend! Does LEGO® construct gender stereotypes? LEGO® and Philosophy, 103-112.

Reich, S. M., Black, R. W., Foliaki, T. (2017). Constructing difference: Lego® set narratives promote stereotypic gender roles and play. Sex Roles, 79(5-6), 285-298.

Spinner, L., Cameron, L., Calogero, R. (2018). Peer toy play as a gateway to children's gender flexibility: The effect of (Counter)Stereotypic portrayals of peers in children's magazines. Sex Roles, 79(5-6), 314-328.

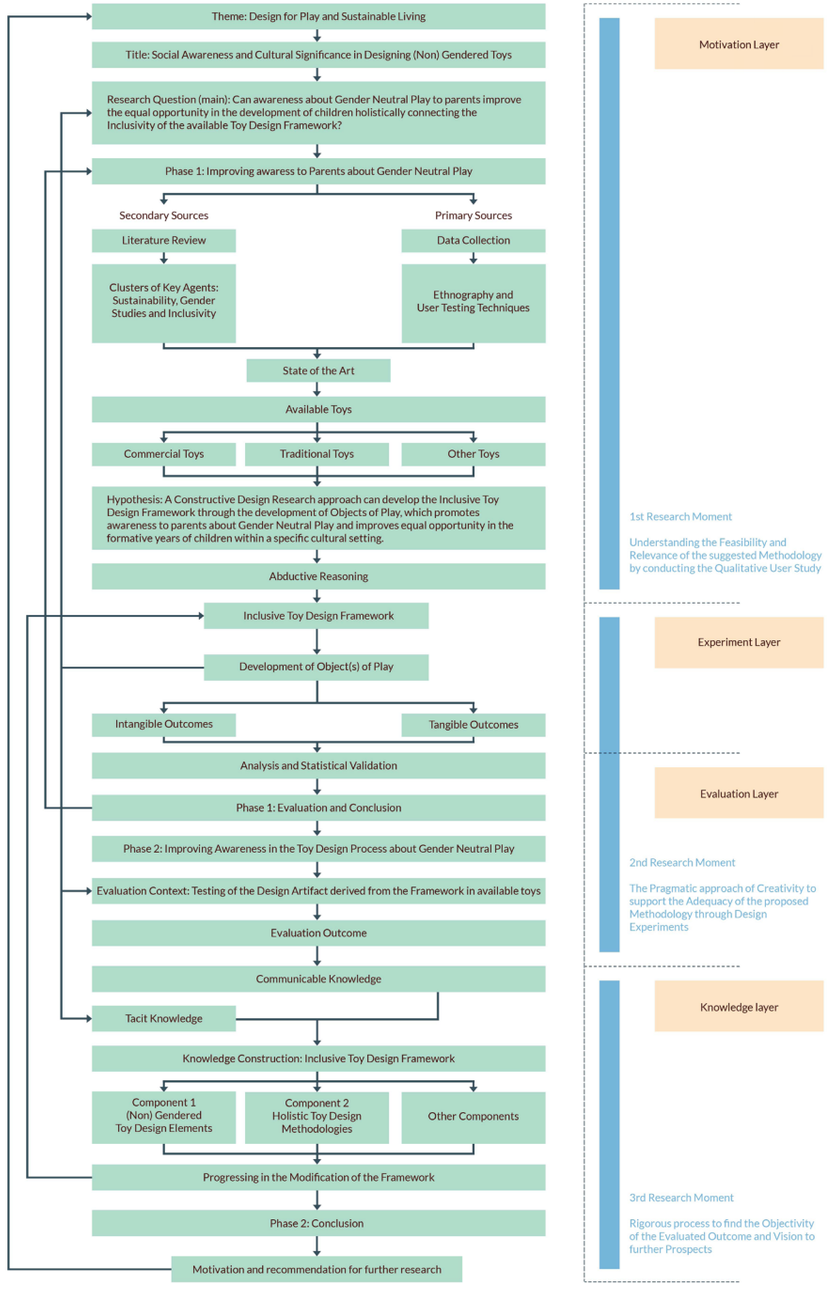

Diagram 3: Research Design and Methodology

MOTIVATION LAYER

The Motivation Layer consists of the background research with secondary and primary sources. According to the literature review ("Diagram 2"), the secondary sources are the clusters of the previously stated key agents: Sustainability, Inclusivity and Gender Studies. The study proposes the role of parents as the most crucial primary source. It intends to apply qualitative data collection through Ethnography and user testing techniques (Creswell, 2017), to understand the applicability of Gender Neutral Play. These data collection methods include the broader range of available toys within the specific cultural setting to initiate the development of the Inclusive Toy Design Framework as the central part of the hypothesis. The Motivation Layer connects the importance of awareness regarding gender neutral play among parents with the improvement of cognitive and emotional development of the children paving the path for equal opportunities.

Again, from the vast array of key agents in Diagram 2, it was determined that the best age group of children is between the age of 6 and 10. Although the concept of gender develops gradually between the ages of 2 to 6 years, in the interval of 6 to 10 years old, children become more relaxed about maintaining behaviours that are strictly male or female (Martin & Ruble, 2013). It is when children shift from preschool to primary, coming under the influence of a new environment and new peers. Another important element to understand are the advertisement techniques (Owen & Padron, 2015; Zimmermann, 2017; Yeung & Wong, 2018), as they play a key role in persuading children between the age of 7 to 8 (Carter et al., 2011), to adopt certain behaviours that are linked to predominate gender representation of their cultural context.

EXPERIMENT LAYER

In the Experiment Layer, the experiment or construction, being a product, system, space, or media, will examine the findings of the Motivation Layer to relate different awareness methods like campaigning (Let Toys be Toys, 2012), workshops, conferences (White House, 2016), protest, and further need of policy-making (Advertising Standards Authority, 2017) and broader perspective of service design within the context. The proposed Inclusive Toy Design Framework is the practical implication of this awareness, where each of the design experiments will try to enrich the framework with the help of the Objects of Play as the design artifacts. The Motivation Layer will provide adequate data through the abductive reasoning to support the creation of these Objects of Play. The focus of these experiments is to understand the various ways a toy can be gendered from different perspectives of how the designer is creating them and the user is utilizing them.

The Experiment Layer has shot term and long term effects towards other layers in the methodology. Particularly it produces the intangible and tangible outcomes to formalize the Inclusive Toy Design Framework. This framework will be further utilized in the Evaluation Layer to evaluate the current situation of the toy industry in the context of the specific cultural setting. Similarly, the Experiment Layer constructs tacit knowledge towards the Knowledge Layer to analyze the inclusivity of the framework along with the different components related to it. Finally, the Experiment Layer will help progress in the Motivation Layer to improve the gender neutral awareness among parents with the help of the Objects of Play promoting equal opportunity in children's formative years.

EVALUATION LAYER

The Evaluation Layer will act as the doorway to the applied part of the project with a specific context. The current scenario of the available toys within a specific cultural setting is the intended context, where the effect of gender-typed toys will be evaluated with the help of the design outcomes from the Experiment Layer. The Evaluation Layer relates the application of these design outcomes (Black, Tomlinson & Korobkova, 2016) towards the context of available toys and if possible, towards the toy industry; and establishes the vital factors (Rommes, Bos & Geerdink, 2011; Litfin et al., 2017) from the point of view of the toy designer, design educators and researcher for further progress in the field. The evaluation would be helpful to examine the effect of the available toys over gender neutral play and distinguish it with the help of objects of play towards children to measure the gender neutral awareness towards parents. Furthermore, it paves the path towards the knowledge generation working with the Motivation Layer to progress in the creation of the Inclusive Toy Design Framework through different tangible and intangible forms. For example, the intangible idea behind the process of classifying toys (Kawin, 1965) has a long-term effect on the overall product cycle including the selection (applicable to consumers) and the categorization (applicable to designers) of the toy. The Evolution Layer will justify this idea through the tangible forms such as different types of toys available in the toy market.

Wang, M., Degol, J. L. (2016). Gender gap in science, technology, engineering, and mathematics (STEM). Educational Psychology Review, 29(1), 119-140.

Gürpınar, A., Yagou, A., Öğüt, Ş. T. (2016). Tactics of cultural adaptation: Design and production characteristics of toys in Istanbul. The Design Journal, 19(3), 451-472.

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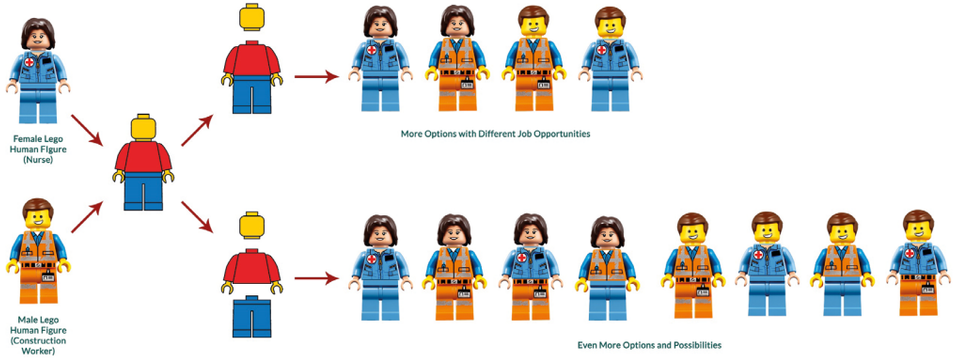
Owen, P., Padron, M. (2015). The language of toys: Gendered language in toy advertisements. J. of Research on Women and Gender, 6.

KNOWLEDGE LAYER
The success of this project will depend on the innovative tacit methodology (Bang, Ludvigsen, et al., 2012) to channel the outcome of the design experiments in the form of the Knowledge Layer, which is communicable and intelligible (Herriott, 2019). This layer is responsible for the modification and refinement of the Inclusive Toy Design Framework working with the previous design outcomes and evaluation. In addition, two components are proposed further to support the structure of this framework, as described below.

Component 1: Gender-Neutral Toy Design Elements
Within this component, the project will examine gender-neutral elements in the available toys and explore the mechanisms of deriving such features in the overall product cycle, including the design process, marketing, and advertising methods. In addition, this component will attempt to connect different critical aspects of play, such as the correct ways of classification of toys (Kudrowitz & Wallace, 2010) and the multi-layered play values in children's toy preference (Weisgram, Fulcher & Dinella, 2014; Mertala et al., 2019) with the support of non- gendered perspective. Following is an example of the characteristics and values associated with this component.

Example of Component 1, Abstraction of the Product (Toy) and Modularity: This aspect defines the open-endedness within the usability of the product, like a construction toy (Lego Bricks), to increase creative growth. Increasing the abstraction (through a modular system) means increasing the number of possible usages of the product, according to the thinking and imagination capability of the user. Using this aspect of the product, the following is an example ("Figure 1") of building the gender-neutral toy design element within the available toys. The gender-neutral element here is the dynamic job opportunities regardless of gender.
A similar example could be the flexible and dynamic aspect of a product, which can help change it according to the user's need, like the shapeless and formless nature of water. This type of characteristic justifies the open- endedness to promote free play (Gray, 2013) with the support of the non-gendered perspective.

Figure 1: Modularity as gender neutral toy design element



Zimmermann, L. K. (2017). Preschoolers' perceptions of gendered toy commercials in the US. Journal of Children and Media, 11(2), 119-131.

Yeung, S. P., Wong, W. I. (2018). Gender labels on gender-neutral colors: Do they affect children's color preferences and play performance? Sex Roles, 79(5-6), 260-272.

Carter, O. B., Patterson, L. J., Donovan, R. J., Ewing, M. T., Roberts, C. M. (2011). Children's understanding of the selling versus persuasive intent of junk food advertising: Implications for regulation. Social Science & Medicine, 72(6), 962-968.

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Rommes, E., Bos, M., Geerdink, J. O. (2011). Design and Use of Gender Specific and Gender Stereotypical Toys. Gender, Science and Technology, 3(1).

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Kawin, E. (1965). The wise choice of toys.

Bang, Ludvigsen, et al. (2012). The Role of Hypothesis in Constructive Design Research.

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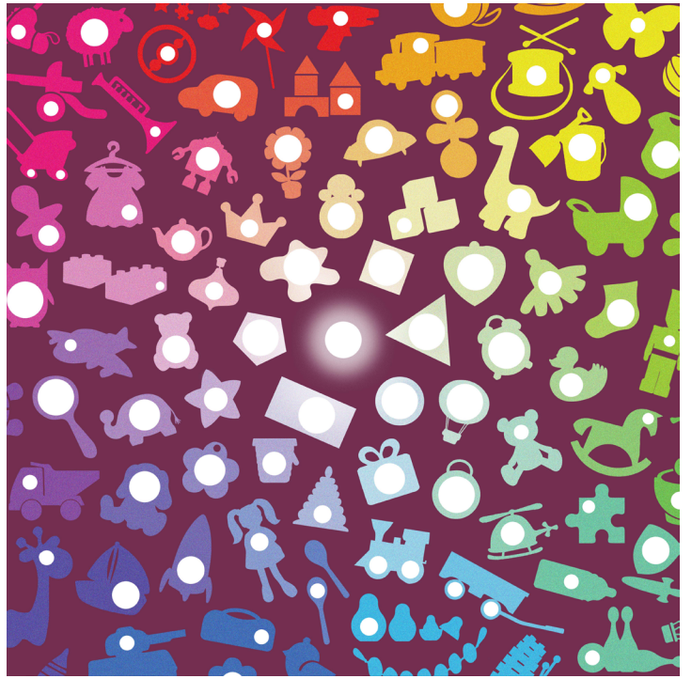
Component 2: Holistic Toy Design Methodologies
This component is a philosophical approach to relate the principle and scope of Universal Design to create the gender-neutral perspective in designing toys holistically. The goal of universal design is to enable the broadest range of users to benefit from a particular product or service (Mace et all., 1998). What separates Universal Design from other Design approaches is its focus on social inclusion (Moore, Goltsman, & Iacofano, 1992; Mullick & Seinfeld, 1997), where the design promotes the interaction

Figure 2: Universal form of toy



of multiple users. Nevertheless, the conceptual framework of Universal Design is applicable, and it's relevant to the specific nature of toy design, marketing, and purchases within the current context. For example, the Universal Design for Play Tool or UDP Tool (Ruffino et al., 2006) has successfully reduced barriers and provided developmental benefits to all children, such as equal opportunity to play together.
What is the purpose of a toy? This illustration ("Figure 2") is a critical approach to seeing a toy from the core perspectives of play and a question to find its universal form, regardless of any related properties (size, shape, color, and even gender, etc.).

Further Challenges

In the process, it is essential to pre-empt any issues that may arise during the data collection and analysis phases to act on such matters and put solutions in place. First and foremost, the qualitative reliability and validation of the project should be maintained ethically. It's our goal to implement multiple procedures like external auditors and consulting with peers and experts to clarify the researcher's assumptions and biases to the study. Secondly, the researcher must respect the participants' rights, needs, values, and desires, including the data collection procedures. To an extent, ethnographic research is always obtrusive (Harrington, 2002). Participant observation invades their life, and sensitive information is frequently revealed. This is of particular concern in this study, where the participant's position and institution are highly visible. Thirdly, the project urges the necessity of a change in society to promote equity in diversity. Hence the Design for Change (Niedderer, Clune & Ludden, 2017) approach signifies the most crucial challenge for the project, which is the longitudinal effect of the research. The researcher embraces to change certain perspectives in the form of awareness. The difficulty focuses on gender knowledge, which is very sensitive for different people. Also, it is crucial to justify how to measure the change in awareness or understanding. Even we measure it, the outcome of the study could take a longer time to be implemented, sometimes maybe generations. Finally, other critical factors that are inevitable for the success of the project include the scale of the study, access to the participants of the interviews and experiments, research techniques due to the COVID-19 situation, etc.

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Conclusion

Playing is a universal phenomenon, a basic motivation and a legitimate right of children (Gosso & Carvalho, 2013). We believe that the most important thing that this study considers is the freedom of the child. The motivation behind play should not be implemented forcefully, rather more importance should be given to a child's wants and needs. After all, according to the contemporary perspective, play is a form of expression for the child (Weida, 2011) and toys are nothing but the brushes to paint that expression. Gender-neutral awareness can be the tool to reshape the existing environment into a more inclusive world. A world that is aware of the intellectual and emotional well-being of its children motivating them to choose their path in later life.

Exploring career path of PSSD students through alumni's narrations

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Considering the fast-paced evolving discipline, which is Service Design, the scenario of the practice is in continuous transformation which translates into a complex and wide scenario for students that approach the job market. In order to tackle this issue in the course of Master of Science of Product-Service System Design at Politecnico di Milano, it has been organized a mentoring program. During the program, two events took place with the aim of exploring different job figures in the Service Design arena. This paper intends to analyze the format developed to support the conversation between practitioners and participants of the mentoring program during these events. The format intends to provide a conversation between practitioners which represent two different contexts or fields of work: in the first event, the difference between being a service designer working as a freelancer and as an employee has been considered, while in the second event the context took in consideration working in or for the public sector and working in the research sector.

Keywords *Service Design, Product-Service System Design, Learning, Mentoring, Education.*

Introduction

The objective of this paper is represented by the investigation of possible strategies to reduce the existing gap between what students learn and what they will practice in the field of Service Design. In particular, the content of this article aims to reflect on a digital experience proposed within the context of the Master course of Product-Service System Design (PSSD) in Politecnico di Milano and to consequently understand how it can provide insights to inform the discussion around the innovation of didactic models.

In this paper, it is reported the experience of two digital events held within a mentoring program in the Master of Science of PSSD. The events and their format are presented as one possible answer to address and reduce the existing gap between the academic context and the professional field in Service Design. In particular, the two events have been designed to present different job profiles, in order to generate in the students more consciousness about possible working paths. In the practice, this has been possible through the direct narrations of guests' experiences, that have been synthesized by students through a special version of the persona tool.

This paper will comprise five paragraphs. This first paragraph serves as an introduction and describes the intended objective of the experimentation. In the second paragraph, the authors will deepen the theoretical background. The third paragraph contains the methodology and the presentation of the format used for the experimentation. The fourth paragraph illustrates the results collected during the events, and in the last one, the conclusions are elaborated, reflecting on how the events might reach the aim of the experimentation; moreover, recommendations for future research are presented.

Theoretical background

The literature on which this experimentation is based is composed of two elements: on one side the evolution of the Service Design discipline, which serves to comprehend and contextualize the events; on the other side the educational aspects of the initiative.

Considering the evolution of the discipline, since its origins in the '90s (Sangiorgi & Prendiville, 2014), the Service Design discipline has fastly evolved by modifying its perimeter, in order to address the growing complexity and the new requests coming from the context in which it operates. Service Design has scaled up its focus, by shifting from Interaction to Environment and System (Buchanan, 2001); furthermore, it has been operating more closely within and across organizations and communities of users and stakeholders (Sangiorgi, 2009). The transformation experienced by Service Design is not confined to its theoretical basis and processes, but it also refers to its operational role in today's society and businesses. Indeed, more and more contexts and organizations are open and willing to enrich their practices with the ones of Service Designers, letting this discipline enter new sectors defined as "boundary areas" (Sangiorgi & Prendiville, 2017, p. 8). As a matter of fact, the discussions in the literature evidences the relation of Service Design with fields of research and innovation, such as Service Innovation (Rodriguez & Peralta, 2014; Sangiorgi et al., 2015), Service Management (Morelli, 2002), Social Innovation (Ezio Manzini & Staszowski, 2013), and with areas, such as the public and policy sector (Armstrong et al., 2014; Bason, 2016) and the healthcare sector (Freire & Sangiorgi, 2010). As a consequence of this expansion of the areas of intervention, Service Designers are asked to adapt and integrate their traditional methods, tools, skills, and knowledge with the new contexts, putting into practice different ways of being a Service Design professional. An empirical study that investigates the work experience of graduates in service design (Sun & Runcie, 2016) tries to trace the variety of working possibilities currently available in Service Design. The spectrum of the possible sectors of employment includes organizations of the private sector, design consultancies, freelance or entrepreneur options, third sector, and public sector. Beyond the academic studies, also an informal study such as the "Transforming Designers" research (www.transformingdesigners.com), started by Service Design Drinks Milan in 2017, captures the evolving and dynamic essence of the current profession of the Service Designer, through a worldwide inquiry based on interviews and a survey. This report highlighted the fact that Service Designers more and more acquire new skill sets of other disciplines, come from several and different educational backgrounds (not necessarily related to the Design field), and play a role in new occupational areas. Within this fast-changing context, Norman (2010) stated that a gap between the Design research of the academic context and the practice of the professional world emerges. Similarly, Service Design faces the corresponding issue of discrepancy between theory and practice, which translates into disorientation when it comes to students ending their educational path and becoming professionals.

This detachment between the educational world and the working context can be explained from three different perspectives: firstly, from the learner side, a transformation of its role, switching from being a student to be a professional; secondly, from a systemic point of view, an intrinsic distance between

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Morelli, N. (2002). *Designing product/service systems: A methodological exploration*. Design Issues, 18(3), 3–17.

Manzini, Ezio, & Staszowski, E. (2013). *Public and Collaborative. Exploring the intersection of design, social innovation and public policy*. DESIS Network.

Armstrong, L., Bailey, J., Julier, G., & Kimbell, L. (2014). *Social design futures: HEI research and the AHRC*.

Bason, C. (2016). *Design for policy*. Routledge.

Freire, K., & Sangiorgi, D. (2010). *Service design and healthcare innovation: From consumption to co-production to co-creation*. 39–50.

Sun, Q., & Runcie, C. (2016). *Is Service Design in Demand?* Design Management Journal, 11(1), 67–78.

Norman, D. A. (2010). *The Research-Practice Gap: The need for translational developers*. interactions, 17(4), 9-12.

the academic research and the practice, which have different purposes and aims; last and third from a discipline perspective, a distance caused by the evolutionary nature of Service Design. Considering the first perspective, the transition moment can be conceived as a liminal space during which the students enter a cognitive transformation, a process of self-definition (Rutherford & Pickup, 2015). Students experiencing the School-To-Work-Transition (STWT) encounter a change of role from students to practitioners, that is often characterized by disorientation, uncertainty, and lack of information (Koen et al., 2012).
Focusing on the second perspective and analyzing the gap from the perspective of the discipline of design, this distance can arise for different reasons. It might be a deliberated gap when the two parties - research and practice - act separately; alternatively, it can be an accidental gap, when a misunderstanding or a variation in the transposition from-practice-to-research or from-research-to-practice occurs (Norman, 2010). In conclusion the last perspective, as seen by the introduction of this chapter, the constant growth of the discipline and consequentially its application to different context, contribute to a create distance between what the working context require and what the educational context is able to provide.

Methodology and used format

The contribution is built on direct observation and on the answer to feedback surveys done around the two mentioned events of the mentoring program. They were held respectively on the 15th of September 2021 and the 14th of October 2021. The events were held online and recorded to analyze which elements were facilitating the interaction between participants and which, instead, were limiting it. The survey has been structured with a mixed approach to collect quantitative data through a set of Likert scale questions aiming to evaluate the improvement on the intended learning outcome, and a set of qualitative questions to deepen and better understand how the format performed according to the aim. In conclusion, some follow-up interviews with students who took part in the event were conducted to validate the reflections.
This paper is based on the events further described, and in particular, on the direct observations of the events by the authors taking part in them, and on the results of the survey, aiming to both value the success of the initiative and measure how much it was able to close the gap stated in the premises of the paper.
The intended learning outcomes for the experimentation aim to raise awareness in students about working life as a practitioner, in order to enable them to envision themselves and their future job.

Rutherford, V., & Pickup, I. (2015). *Negotiating liminality in higher education: Formal and informal dimensions of the student experience as facilitators of quality*. In The European higher education area (pp. 703–723). Springer, Cham.

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Norman, D. A., *op. cit*.

In particular:

- To be able to better distinguish the different job titles and working contexts in the PSSD field.
- To be more conscious of the emerging practices as a Service Designer.
- To understand and compare the main differences between working as an employee and a freelancer in the Service Design context (for the first event) and working in/for the public sector and research sector (for the second event).

In order to understand the objectives of the events, a context framing about the mentoring program results is relevant. The mentoring program aims to be a formative activity to support the academic path of the students of the M.Sc. of PSSD in Politecnico di Milano, by focusing on a delicate moment as the transition from university to the professional world. The program was launched in 2021 as a pilot project and it counted 48 mentor-mentee couples. One of the specific objectives of the program has been the increase of students' consciousness about job profiles and working contexts available to them, in order to support their career orientation. The mentioned events, directed to mentees, adhere to the program's overall direction by deepening the theme of the job profiles and, in particular, by stressing the opposition of macro-areas such as employee and freelancer, in the first event, and public and research sectors, in the second event. During the events, the knowledge about the Service Design working field has been conveyed through the stories of six guests and Alumni of the course: three employees and three freelancers joined the first event, while three Service designers working in or for the public sector and three with experiences in the research sector were present in the second event. The events were held virtually on Zoom and supported by the use of Miro, an online collaborative board. Including the guests, 40 participants took part in the events on average. Considering the event format, it is possible to distinguish three phases: a managed warm-up activity, a moment of discussion in breakout rooms, and, lastly, a reporting session.
The first part introduced the six guests while highlighting the main differences between the two categories through a playful and dynamic attitude. The second part of the event, called "Meet the practitioner", was designed as an interactive moment in breakout rooms, where each student had the chance to book and follow the presentation of one guest. The output of the activity has consisted in representing, through the use of the tool of the persona, the guests' experience. This tool has been transposed from the traditional Service Design practice to the educational context in an unedited way: it has been hacked in its

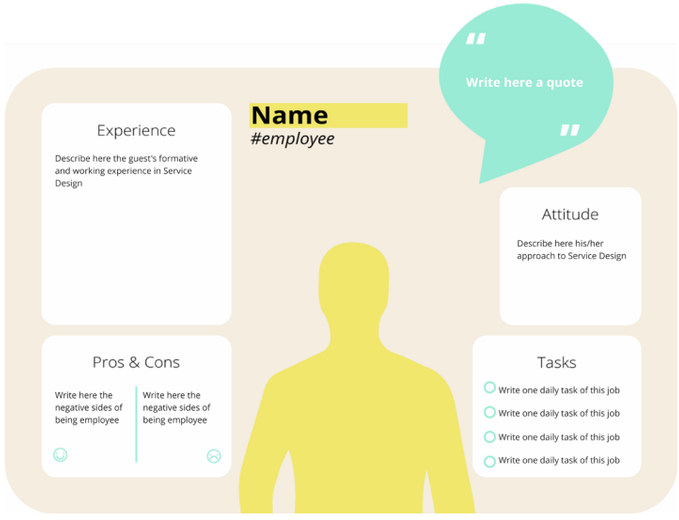

Figure 1: Persona Template on the Miro Board of the first event

meaning, aiming to generalize a single experience - the one of each guest - instead of being the container of multiple experiences as it traditionally happens in the Design practice. The tool has been provided to the students on a Miro Board (Figure 1), already organized in some sections: the experience, the positive and negative sides of the profession (as employee or freelancer; in the research or in the public sector), the tasks, the personal approach to Service Design and a motto. The profiles generated in the six breakout rooms, then, have been shared in the Zoom plenary room, in a final reporting moment.

Findings

Considering the surveys spread among participants to investigate the experience of the events, the collected answers are 17 for the first event (done all by the mentee) and 14 for the second event (among which 13 by the mentee and 1 by a mentor). According to the results of the surveys, the expectations of the students were generally fulfilled. From a preliminary question, indeed, students express their expectation to hear stories from the field of practice, able to let emerge advantages and disadvantages from being an employee or being a freelancer. Among the three main intended learning outcomes, students consider that the first event helps them more in comprehending the differences between working as an employee and as a freelancer (Figure 2), as well as the second one allows mentees

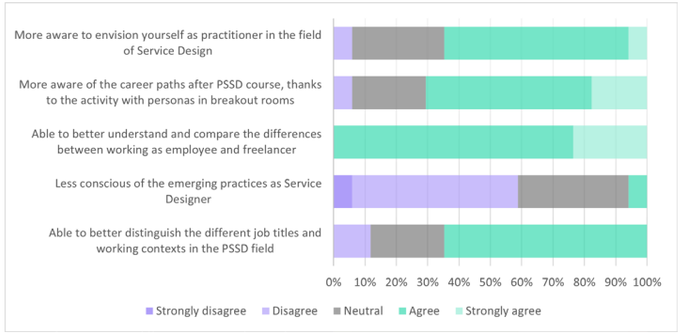

Figure 2: Likert scale of evaluation expressed by participants (Survey on the first event)

to understand and compare the differences between working as Service Designer in research or public sector (Figure 3).
The format of the events, according to students' opinions, resulted to be efficient in delivering an overview on the different profiles of the invited guest, and it has been appreciated for the possibility to deepen the discussion.
Considering the first point, the mentees, when asked about their personal expectations and benefits about each event, declared themselves satisfied because of the variety of the information they accessed in terms of job profiles and experiences. One student wrote: "My expectations are fulfilled because I expected to listen to different experiences in freelance and employee worlds and with so many guests I had a quite good overview on them"; another one reported: "This event provides a chance to see a broader kind of working experience as a designer"; a third mentee said: "There was quite a great exchange of point of view, especially because there were different experiences and opinions also among the same sector"; a fourth one answered by saying: "I appreciated hearing many people (and not just one for each category), because it made things more multifaceted". In relation to the second point, the creation of smaller groups inside the breakout rooms has represented the occasion to interact directly with the guest, in a more intimate and comfortable environment. As proof of that, one mentee said: "I was satisfied mostly because we had the opportunity to speak with one of the guests in a small group to get more insights and ask questions"; another one reported "The event offered the opportunity to enter in touch with the single guest in a smaller space, suitable also for shy people"; a third one wrote "Having the possibility to ask direct questions, in my opinion, is a great opportunity to learn"; a fourth one said: "I really enjoy the informal conversation and

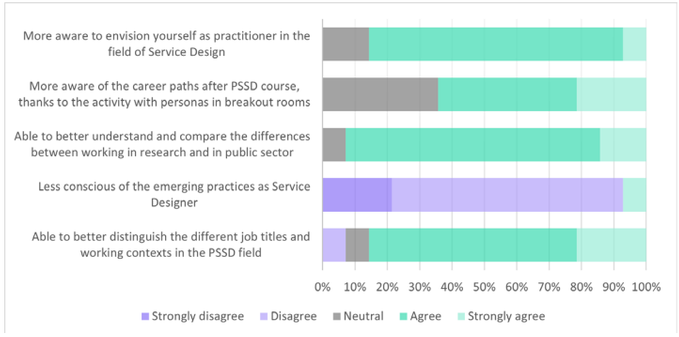

Figure 3: Likert scale of evaluation expressed by participants (Survey on the second event)

also how it can explore different pathways each time".
Considering the activity in breakout rooms, the tool of persona has been understood in its value, in terms of conversation trigger and for internal synthesis in the small group, and also for sharing guests' stories with all the participants. Mentees said: "The personas tool was quite useful to guide the conversation"; "The tool of personas is a good way to convey the information also out of the breakout room"; "The persona was really useful especially for knowing the other personas".
Furthermore, during the event, it emerged as a collective reflection that these profiles often represent a wide set of professionals. In fact, the stories illustrated by the guest described a different way to approach the work routine and the different tasks that each of them is used to carrying out during their daily job. Indeed, among the guests, we found employees with side projects and freelancers that have experience in stable collaborations within big companies and consultancies. The result is a blurred line between the two roles and, consequently, a hybridization of the professions in Service Design.
Assessing the limits of the format, contrasting opinions are expressed about having such an event in the online form. The virtual aspect has been considered in fact both as a limit and as an advantage. It has been considered difficult to empathize with the guests and have a conversation outside the proposed activity; on the other hand, it has been considered a beneficial possibility to connect immediately from anywhere.
For what concerns the tool of persona, one of the limits has been related to the duration of the activity and to its limiting of a more free conversation: students would have preferred to have more time to complete the template. Indeed, some mentees reported: "I believe that the personas activity was not that useful or that it needed more time to be done"; "I do not like the idea of using the persona, because I think it changes the focus and reduces the time we could communicate".

Conclusion

Considering the intention of the experimentation of raising awareness in students regarding how their learnings are put into practice in the working life of a Service Designer, and taking into account the results collected, the format can be considered successful in achieving the intended outcome. Although, based on the experience, we can highlight a few limits which reduce the impact of the initiative and outline some recommendations for future experimentation. The short duration of the event left small time for unstructured interaction with the guests.
The number of six guests is a small number to describe the wide panorama of the profession of PSSD alumni: although it is necessary for the time-management of the event, it provides a limited representation of the job profiles. For instance, an aspect that might be considered is the daily tasks and the practical aspects of each Service Design profile. Furthermore, the format enables students to deepen the story of just one guest. In addition, the presentation of only four areas - employee, freelancer, university, and public sector - is not exhaustive in relation to the wider panorama of working possibilities that open up for Service Designers. Based on these limits, further experimentation and research should aim to map the different practices and paths undertaken by the Service Designer to ensure the diverse representation of the SD panorama. Research in this area might seek to identify which are the elements and characteristic that could describe the profiles of the guest in a more relevant way for students, enhancing its purpose as a tool of conversation and exploration of different practice.
In conclusion the experience presented in the article can be improved, but the format used during the events illustrate a first draft of a tool to gather the experience of current practitioners, while enabling both a horizontal and vertical exploration for the participants. The horizontal exploration, consisting in listening the different story of the guest, support the discovery more opportunities in the field. On the other side the vertical exploration, consisting in the activity in the breakout room, help students in figuring out strategies to approach the job market in a more conscious way.

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Track 2
Design for Culture and Education

Long Abstracts

DESIGN AS/FOR COMMON(S): REIMAGINING DESIGN PRACTICES FOR RESILIENT POST-CAPITALIST FUTURES

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The catastrophic effects of human action on the planet are becoming increasingly evident; the term Anthropocene indicates the current geological epoch in which our species have become a primary driver for global environmental change and the main geological force on Earth. However, Williston (2015) refers to the Anthropocene as a project, going beyond its specification as a geological epoch; in that way it would be a call to place our industrialized present in a time frame that is both evolutionary and geological. In fact, many are not satisfied with the term Anthropocene, considering it as reductive, since it hides the real question that is what politics anticipate the catastrophe sufficiently so that futures stay open. Some prefer the term Capitalocene (Moore, 2016), while others choose the one of Eurocene or Technocene (Sloterdijk, 2015) — it conjures the technological revolutions of the modern age and their side effects, which should be billed to the account of the European civilization and its technocratic elite. With the concept of Chthulucene, Haraway (2016) sought to develop a "kind of timeplace for learning to stay with the trouble of living and dying in response-ability on a damaged earth" (p. 2) as opposed to the Anthropocene. Servigne & Stevens (2015) link the Anthropocene and the notion of collapse in order to make it even more tangible; seen as certain, the collapse thus loses its tragic dimension. Paradoxically, they consider that we are soon entering the era of mutual aid. The disappearance of the social order in which we live would not lead to disaster, chaos or panic, as most humans exhibit extraordinarily altruistic, calm and composed behavior after a catastrophe. It would therefore be necessary to learn to die — as a civilization —to adapt to this strange new world, have new ideas, new myths and new stories, a new way of thinking our collective existence over and against capitalism (Scranton, 2015). Numerous scholars have denounced the unsustainability of capitalism (Meadows, et al., 1972; Klein, 2014; Patel & Moore, 2017), making the future uncertain. Crisis manifestations

Keywords
Design, Commons, Anthropocene

are not only environmental but also economic, social, political, ethical etc., which combined with the dystopian imaginaries of the future, suggest the necessity of shifting paradigms beyond development and growth. In this sense the commons have been promoted as an alternative for a transition to a post-capitalist economy (Ostrom, 1990; Dardot & Laval, 2014; Hardt & Negri, 2014; De Angelis, 2017; Federici, 2019). The Common principle "ties together the anti-capitalist struggle and political ecology by claiming the 'commons' against new forms of private and state appropriation; it links practical struggles with research on the collective government of natural or information resources; it designates new democratic forms which aim to take over from political representation and the monopoly of parties" (Dardot & Laval, 2014, p.4).

In the North as in the South of the world, various militant environmental movements, defined as "neomaterialist (Schlosberg & Coles, 2015), aim to anticipate the end of fossil fuels, climatic disturbances or food supply disruptions by locally building small systems that will better withstand future economic, social and ecological shocks. In the North, Degrowth (Latouche, 2009) and Transition Town movements, started by permaculture designer Rob Hopkins (2008), are seen as political alternatives that fit this imagery of collapse. Speaking of permaculture, Centemeri (2018) considers permaculture "both as a new materialist movement and as a commons movement". Similarly, the approach of community economies (Gibson-Graham et al., 2013) challenges the conventional use of the economy as a formal system of production of goods and monetary exchange, as well as the idea of separation between economy and ecology. It promotes the economy as diverse practices rather than a single economic system, i.e., capitalism by focusing on commoning as a process. Indeed, De Angelis (2017) distinguishes between the common goods and commons; the common goods being only an element of the commons seen as specific social systems including also the commoners (social subjects) and commoning as the activity of doing in common. We can also cite the work of Bookchin (2006) on Communalism as a political alternative capable of overcoming the causes of the destruction of nature to achieve an ecological society. Instead, proposals as the green or circular economy remain within the capitalistic rationality and the logic of a universal perspective based on the promise of decoupling economic growth and ecological impacts (Valenzuela & Böhm, 2017). Movements from the global South must also be considered in the debate, including Buen Vivir (Merino, 2016), Ecological Swaraj (Kothari, 201), Ubuntu (Metz, 2011) or that of Via Campesina which defends peasant agriculture for food

sovereignty (Martinez-Torres & Rosset, 2010). Bollier (2014) speaks ironically about a rediscovery of the commons as it never disappeared for hundreds of millions of people around the world especially in the South. He joins Escobar (2015) in his assumption that the commons could be the link between all these different transition narratives and visions that try to think beyond the logic of development or growth contrasting with solutions like sustainable development or green economy. They adopt a post-developmental vision where several worlds (pluriverse) would be possible by integrating nature, rejecting the antagonism between society and nature. He echoes the work of Latour (2015) for whom the Anthropocene is a revolution that already happened, as a consequence of the Great Acceleration, the effects of which we have to face, although they are not located in the future but in the recent past. In this way, Nature is no longer an abstraction, it becomes Gaïa, an unstable being in perpetual upheaval whose manifestations are difficult to predict. He thus opposes a cold human history to the natural one that has become frenzied. It is as if we had indeed ceased to be modern and, this time, collectively"(p.87).

In the same context of the Anthropocene, design is called to reinvent itself: it is at the center of unsustainable production/consumption systems; however, in many of its contemporary forms, it aims to improve the livability of the world as a projector or corrector (Bonnet et al., 2019). According to Manzini (2014), design for social innovation could support the aspirations of highly vulnerable communities by proposing solutions to problems that neither the market nor the State have solved. Design has expanded the limits of its field of action, helping to create opportunities for development through social and political involvement of marginalized populations. The fact is that a deep understanding of the political economy of design is needed. However, design for social innovation remains intrinsically linked to market economy and the logic of commodification. In this sense some (Busch & Palmås, 2016; Nussbaum, 2010) mention the risk of falling from the dark side of the social. They state that leveraging the social level may well produce unforeseen negative societal outcomes. They criticize a certain idealism of the designer. In order to balance such idealism, designers ought to replace the "what if starting points with a more realist question of "who whom?"— i.e., who benefits from the social innovation, and who pays the price for the change (Busch & Palmås, 2016, p. 287). But design for social innovation has always been characterized within an economic and cultural context — that of the consumer economy and where social innovation has always been understood as a "humanitarian" action. Elzenbau-

mer (2013) denounces such practices, which are devoid of a political sense and take for granted the social problems that the designers want to solve, and that therefore do not question the broader global mechanisms producing them. In this context some call for decolonizing design (Escobar, 2018; Fry, 2017; Ansari, 2016) from the tyranny of cold, "Western" abstractions to initiate a real dialogue between designers from the Global North and Global South in order to develop a paradigmatic shift from a Eurocentric vision of design. Escobar (2018) suggests the concept of Autonomous Design stating that "design can be creatively re-appropriated by subaltern communities in support of their struggles to strengthen their autonomy and perform their life projects, and that designers can play constructive roles in the ontological and political reorientation of design as an element in struggles for autonomy".
In the same way Fry (2010) asks the question of how designers could be providers of care by transforming themselves into politicized change agents. Irwin (2015) proposes Transition Design, as a new area, inspired by the Transition Town movement; it promotes a design-led societal transition toward more sustainable long-term futures. The issue of imagining different futures is in fact fundamental. One could talk about speculation in design and its recent development; but who is speculating, and for whom? Di Salvo (2016) answers the question by exploring the articulation between prefigurative politics (commons movements are all about prefiguration) and design. For him in prefigurative design, "the speculation is not so much in the design itself, but rather, in the politics (...) it is not that designers are themselves called upon to speculate, but rather, that designers may be called upon to enable speculation" (p.34). In Tunisia, climate change is expected to have major impacts on the country's agriculture, economy and households (World Bank, 2013) by intensifying already high poverty and unemployment. Recent literature clearly links migration to the challenge of food security and climate change (David, 2018; FAO, 2018). Bettini (2019) speaks of (climatic) migration as a symptom of the Anthropocene; this is related to others' criticism of the lack of political will to address the fundamental problems of the Mediterranean with policies that address symptoms rather than causes (Engelke et. al, 2017).
Among the country's academics, several voices are calling for a real change in the trajectory of the economic model, to reflect on new ways of developing the agri-food system to build food sovereignty and remedy the effects of dependent (colonized) and exporting agriculture. (Schwoob and Elloumi, 2018; Abidi and Riahi, 2019). Local/territorial development is considered

here as an inclusive alternative; it is a question of rethinking cultural practices by adapting the technical aspects to the structural, physical and climatic difficulties of Tunisia, thus moving away from the methods advocated by the Green Revolution (seeds, pesticides, fertilizers). We will focus on two case studies located in southern Tunisia. The first is that of the Jemna oasis in Nefzaoua, the main date-producing region of the country. The oasis has become the symbol of peasant resistance and has been the scene of the emergence of a local and pluralist civil society, of the learning of participatory democracy and of the pioneering experience in Tunisia of the social and solidarity economy. The second one is the oasis of Chenini, located in the coastal area of Gabès, known for its pollution due to the production of phosphates, where farmers continue to perpetuate the ancestral practices of flat cultivation and water collection. This is reminiscent of the concept of autonomous design (Escobar, 2018) or diffuse design (Manzini, 2015). Considering recent developments in the field of design, we tried to question its role through the analysis and direct application to the cases of the oases practicing water and land commoning. Following the different perspectives previously cited on commoning/community economies we managed to "inhabit" the two contexts. Without the "ambition" of improving the livability of the world we carried out a collaborative design experiment rooted in the present, according the autonomist feminist line of thought.
First, we used the Ethnographic Experiential Futures (EXF) framework, combined with the Human Centered Design (HCD) approach. Then we made a parallel between the latter and the Futures Workshop (FW) technique, in an attempt to contribute to prefiguring the forms of collective action that aim to improve the resilience of the oasian communities to the near-future climate change and water scarcity issues. What is the role of (participatory) design in constructing post-capitalist imaginaries through the perspectives of the commons and future thinking? In a commons economy, the idea would be to comprehend the role of design in helping to shift paradigms from an extractivist growth economy to a resource economy; a design attached to situations instead of objects.

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INTER-GENERATION AND KNOWLEDGE TRANSMISSION. THE 'ESSENTIAL TENSION' IN THE HYBRID NATURE OF DESIGN DISCIPLINE.

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The reflection on inter-generational dynamics, and on the role of the inter/trans- actions that can be activated in design, is read in this contribution through a reflection on the notion of discipline as an instrument of inter-generational transmission of knowledge and as a tool for inter-disciplinary confrontation. This last aspect came into play in the design debate when it entered the university system.
Since then, the problem of defining disciplinary boundaries and determining its trans-actions with other disciplines - present in the university institutions and competing in the formation of the figure of the designer - has arisen. This problem for design, more than for other disciplines, is inherent to its very "hybrid nature that design shares with other design disciplines, located halfway between formalised knowledge (science, mathematics, etc.) and humanistic knowledge (Riccini, 2013," pp.1-2), or linked to the "composite nature of its own design and cultural space" (Riccini, 2013, p.2).Design was organized in Italy as a scientific university discipline only very recently, with the launching in the mid-1990s of autonomous courses of study within the faculties of architecture, with which it shared the reflection on the hybrid nature of design disciplines.
The writing of the history of this Italian process is still in progress, but it already boasts a first bibliography of which only a few references are cited, such as those to works by authors (Pansera, 2015) or collections (Furlanis, 2018), rather than those linked to the more recent debate, that appeared in the monographic issues of the young magazine QuAD (2018, 2019), aimed at launching an initial mapping of the birth of the various courses of study in design in Italy, a bibliography which forms an initial writing of the history necessary to provide a basis for the discipline of design in university courses. From the debate it emerges how the project activity that characterises the discipline places it "among the faculties oriented to some form of utility, among those, that is, that in outlining the training projects must come to terms with the implications of practical action on the criteria of teaching" (Riccini, 2013, p. 2).
On the other hand, the access of design in academic institutions highlights the need "to draw on the contribution of formalised and non-formalised knowledge as the necessary competences expand and, at the same time, specialise [...]. The increase in complexity on the one hand and the growing social role of the designer today require the contribution of theoretical, technical-scientific and historical disciplines, in continuous dialogue between design as a discipline and the areas of psychology, semiotics, histories, technology, philosophies and science" (Riccini, 2013, p. 3). Riccini insists in particular on the abandonment of the artistic or atelier approach inherited from the Bauhaus, identifying, with reference to the experience of Ulm, the central theme of the entry of new and extraneous disciplines with respect to that artistic structure, to open up to the "connection between design, science and technology, to the ability to glimpse in technical-scientific progress a powerful factor in social dynamics" (p. 3). In other words, one could say that the inter-disciplinary condition already appeared at that time as the bedrock upon which theoretical reflections on innovation processes could and should have started.
This paper therefore intends to articulate a reflection that, taking into account the debate on disciplinary divisions inherited from the structures of scientific specialisms that arose at the turn of the nineteenth and twentieth centuries (Geymonat, 1970), investigates the paradigms of innovation in scientific research, clarifying precisely the role of the notion of discipline (Kuhn, 1959-2006, pp.79-96, Kuhn, 1962-2006, Fabiani, 2006, pp.11-34). The aim is to offer some food for thought to feed the Italian debate on these issues, given the young academic age of the discipline.
Recent surveys carried out by CUID, the Italian Design University Conference, on the educational structure of Italian design courses (Tosi, 2019) show the continuous development, alongside the word design, of specifications for categories of various kinds, partly intended as fields of application, partly borrowed from the lexicons of other disciplines.
The question that arises is: what does design add or modify or innovate for itself and for those disciplines, or thanks to those disciplines, repositioning them in the comparison? Or is it a process of seduction that other disciplines exert on a discipline still in a phase of academic development, with the consequence of losing control of its own disciplinary boundaries? The question is therefore both one of boundaries and the meaning and modes of innovation in design.

Keywords
Design and education, Interdisciplinarity, Innovation and tradition, The Essential Tension, Design disciplines

Ludovico Geymonat (1972/1981) places the beginning of the 19th century lexical specialisation of individual disciplines, which is now exacerbated by the use of English, at the beginning of the 20th century. It is these languages that, according to Geymonat, have determined the disciplinary divisions.
The hyper-specialism of technocratic societies has deep roots that pass right through the construction of specific technical-disciplinary languages: "But in this linguistic technicalisation is also rooted the first and most important aspect of that complex phenomenon of 'closure' that has dangerously accompanied, for a long time, the process of specialisation.
Indeed, it was precisely the degree of seriousness that this process imprinted on the individual disciplines and the wealth of concrete results that it facilitated, that gave rise to such a dogmatic confidence in the specialist scientist in his type of work, that he did not even allow himself to consider the problem of whether it required any integration or coordination with the work of researchers engaged in other fields of investigation" (Geymonat, 1972/1981, p. 539). Faced with the awareness of the complexity of the development of the processes of specialisation of the sciences, Geymonat shows us that the question of inter-disciplinarity that design constantly maintains with other disciplines, both formalised knowledge and humanistic knowledge, cannot be treated as a simple practice, but must be fully understood in terms of both its conditions of action, potential and implications with regard to real innovation. Geymonat's critique is directed at the renunciation of responsibility that the specialisation of science has induced in researchers, a renunciation in imagining the development of knowledge within a specific conception of the world with the environmental and civil consequences that we see before us: "in recent times, scientists themselves have begun to take note of the negative effects of pure specialism.
One of the factors that has contributed most to their awareness has undoubtedly been the renewed interest that has arisen in them in methodological problems [...]. It is clear that they have favoured the birth of a new mentality, no longer aimed solely at the discovery of some particular result, but at the acquisitionof a critical increasing awareness incompatible with the basic dogmatism of the 19th century type of researcher closed within his own speciality" (Geymonat, 1972/1981, pp. 541).
Such an interest in methodological problems, in other words, favoured the possibility "of using the results achieved by one outside the field in which they had been demonstrated; of scrupulously specifying analogies and differences [...]. In this way, scientific research was thrown into an enormously broader field,

where any preconceived bias was seriously dangerous" (Geymonat, 1972/1981, pp. 541-542), dangerous not only in terms of the development of knowledge, but in general, as already mentioned, for the ethical, environmental and social consequences.
Finally, he indicates what it means to undertake interdisciplinary relations: "not in the sense that one science can use the findings of the other [we could say that design can use some finding or technological result], but in the sense that it can - or rather must - take an interest in the way the others are constructed in order to pinpoint what assimilates them and what differentiates them from each other"(Geymonat, 1972/1981, p. 543).
It is therefore not inter-disciplinarity that is a condition for fostering the development of scientific productivity, but the opening up of a field that Geymonat, himself defines as 'meta-theoretical', in which the various scientific investigations are no longer concerned with investigating the object of their specificity, but rather with investigating the internal theoretical structures of the discipline in question, and of its development paradigms "in order to be able to determine, as a consequence, the relationships existing between this structure and that of other the ories". The consequences of this different approach mean that, for the researcher, "his primitive way of proceeding, accepting the premises and methods of the theory as they had been transmitted to him by previous generations, now appears grossly dogmatic" (Geymonat, 1972/1981, pp. 543-544).
Thus, interdisciplinary confrontation, no longer understood as the simple exchange of a scientific-technical finding between disciplines, becomes a device for anti-dogmatic reflection, for challenging one's own theoretical-disciplinary structure. At the same time, however, it is clear that the methods of theory transmitted by previous generations, i.e. by disciplinary tradition, nevertheless constitute an indispensable pre-condition for triggering the anti-dogmatic tension of research. We must not be fooled by the many applied results that can be achieved with the new technologies.
The discipline of design is perhaps too young not to run the risk of conforming to the theoretical and lexical structures of the many disciplines with which it has intended and intends to dialogue from time to time, losing sight of that meta-theoretical field which, according to Geymonat, constitutes the true anti-dogmatic field of open-mindedness, within which the processes of innovation - understood not as the addition of new knowledge to existing knowledge but as a real epistemological difference - take their start.
Therefore, the aim of this paper is to provide theoretical reference tools that can also be used by design, in order to reflect on

this tension between the convergent features of each discipline, understood in its tradition of studies, and the divergent features that allow the gap in terms of disciplinary innovation: “I will then express the idea that something like 'convergent thinking' is as essential to scientific advancement as divergent thinking.
Since these two modes of thinking are inevitably in conflict, it follows that the ability to sustain a tension that can sometimes become intolerable is one of the first requirements for an exceptional quality of scientific research” (Kuhn, 1959-2006, p. 80).
The words of Thomas Kuhn, historian and philosopher of science, are taken from his book: The Essential Tension: Tradition and Innovation in Scientific Research, (1997-2006) and are reflections that he himself was to use for his perhaps best known text: The structure of Scientific Revolution (1970), in which this point of view is exemplified through the analysis of the historical development of scientific revolutions. According to Kuhn, convergent thinking is such because it “rests firmly on a consensus that is highly acquired through scientific education and reinforced through subsequent activity in the scientific profession" (Kuhn , 1997-2006, p. 81). He adds that extended periods of convergent research are necessary in advance to initiate changes in disciplinary traditions, and thus comes to define the relationship between these two poles as Essential Tension.
The fundamental role of a long period of education and therefore of disciplinary training is quite clear: “only investigations firmly rooted in the contemporary scientific tradition are likely to break with this tradition and give rise to a new one [...], very often the scientist who succeeds in doing so must simultaneously display the characteristics of the traditionalist and the iconoclast” (Kuhn, 1997-2006, pp. 82-90).
These considerations show that in "order to define a researcher as innovative, it is not enough to list personality traits, such as possessing flexibility or open-mindedness, stereotypes that do not identify the Essential Tension necessary for the production of real innovation processes. In order for design to truly speak of innovation, it must first analyse and clarify its disciplinary status, which consists of a complex system of internal confrontation within its scientific community, of a tight dialectic between teaching and research, of a continuous questioning between tradition and innovation, in the face of the complexity of contemporary knowledge development systems. This need is all the more pressing the smaller its pedagogical and disciplinary tradition.

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DESIGNING DOCTORAL DESIGN RESEARCH FOR "TRANS-ACTION": A PROPOSAL TOWARDS POST-DISCIPLINARY RESEARCH QUESTIONS FORMULATION

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In the scenario of increasingly complex, interdisciplinary and transdisciplinary problems humanity currently faces, design is either part of the problem or the solution. Due to its transformative role regarding the ways "we live and we imagine living", design plays a critical role in response to these "trans-action" challenges. Because those challenges are not disciplinary in nature, they require responses that are not confined to disciplinary boundaries. Thus, design research needs be postdisciplinary, abandoning siloed ways of thinking and bringing together knowledge from different disciplines (Wilde, 2020:171-173). In these circumstances, the role of PhD programs, as the starting point of academic research, is in "pushing the interdisciplinary and inter-sectoral boundaries of the field", by "broadening and deepening" existent collaborations while "nurturing new connections" (Voûte et al. 2020: 64). In this paper we examine how that can be effectively done at one of the most important initial stages of the doctorate, which is the formulating of research questions. Defining a research question is the essential opening challenge in any investigation not only because it is usually "a pre-requisite for dissertation proposals and funded projects application" but, more importantly, because it is necessary to "give shape and direction" to the study. While "good research questions do not necessarily produce good research", poorly conceived questions "will likely create problems that affect all subsequent stages of a study" (Agee, 2009: 431). This challenge usually starts when students are confronted with the need to convert a personal research interest into a research plan. That process requires creative and innovative thinking, while students try to find a balance between a topic that matches their and their supervisors' interests, keep them motivated and intellectually stimulated throughout the PhD course, and, at the same time, a scientifically worthy research question for the knowledge advancement in a given field of study (Mendes et. al., 2020).

Keywords
design research, design education, research questions, PhD in design, post-disciplinarity

In the specific case of design research, this initial research interest usually comes in the form of a design practice interest, doubt or wish, which is not a research question. A design question usually arises from students' "dissatisfaction in their professional practice, or from the wish to deepen one aspect that has puzzled them in their professional education" and frequently comes with the desire of designing something. On the contrary, a research question must be deliberately formulated in such a way that its outcome would be valuable knowledge (Findeli, 2010: 296-297). This relates to the eternal debate about the differences between academic design research and project design research, with huge consequences for the context of doctoral research as was brought to public attention by Friedman and Ox (2017: p.516-517): "What is the PhD in design?", "What is the nature of such a PhD for research quality as distinct from the quality of art or design practice?", "How are we to evaluate PhD projects that present (...) a beautifully designed artifact in a PhD thesis that presents false truth claims, inaccurate facts or demonstrably inapplicable research methods?". In 2000, Langrish argued that just as "battleships and forks"are not the same thing "just because they are (both) made of steel", PhD research and practice research are also not the same, just because they all called "research". Earning a PhD should demonstrate the candidate developed the necessary research skills to, in her/his turn, supervise research students. These include the use ofacademic language, reviewing background literature, mastering research methods and theory building. Higher standards and expectations for research questions, along with the supporting methodologies and methods that can address them, adequately must be set by worldwide coordinators of doctoral design programs (Friedman and Ox, 2017). After having conducted some research on the topic in the last years including someworkshops with doctoral students, we firmly believe that what they need at the early stages of their investigation work is practical, structured and explicit guidance. Following that, this work proposes a framework aiming to help doctoral students in the process of converting a design interest into an adequate research question with a focus on finding research opportunities within the current global scenario of "trans-action". We start by summarizing the characteristic features of accurate research questions, in relation to relevance, utility, novelty, balanced, narrowness and feasibility. Revisiting Langrish's metaphor, one can ask: Am I certain that the question will lead to battleships, and not to forks? Based on theory from methodologically mature academic disciplines (Agee, 2009; Richey & Klein, 2009; Doody & Bailey,

2016;O'Brien et al., 2019; Mendes et al., 2020), we characterize effective research questions as being opportune, aligning in time and content, with the target audiences' needs and study field state of the art specific, regarding the exact subject and context they address, adequately narrowed, allowing exploration without focus loss, and realistic, requiring available resources and means. Research questions possessing these qualities will provide a framework for conducting the study, giving it relevance, direction, and coherence, thereby helping to keep the researcher focused during the investigation. Superficially or prematurely closed research questions can be a wasted opportunity to find bridges between design and other important fields and to prove the unique contribution of design when dealing with complex problems. Going back to Langrish's metaphor, students can ask: What other fields are at stake, beyond military and naval construction? In what kind of issues would those fields be interested in? Alternatively: what would happen if we look at battleships as if they are another thing? Like a social isolation scenario? Or a "surviving with limited resources" scenario? What kind of questions would then arise? And who would be interested in them? In another direction: how are battleships related to what is happening currently in the world? What is changing and why? To overcome that, we propose an adapted version of the Frame Creation Model described by Dorst (2015) with potential benefits to create innovative research opportunities, putting design to work together with other academic areas. The proposal relies on Dorst's' idea of thinking around the problematic situation instead of confronting head-on the apparent problem.The 1st step, Context, consists in exhaustively mapping all the players some how involved in the situation and their divergent perspectives, interests and tensions" (Wilde, 2020). That must involve, necessarily, exhaustive literature review within academic design journals to establish the current state of the art and where within the theory building cycle knowledge about the topic from the design perspective can be found. But in the intended "global challenges" approach students are strongly encouraged to inform their work by a multiplicity of inputs beyond the discipline itself, including sustainability science, environmental humanities, economics, environmental politics, and governance (Wilde 2020).

In the 2nd next step, Field, all the potentially involved academic disciplines must be listed. At this point, the initial "apparent" problem has been diluted and probably lost within an over complicated network of connections. A panoply of related scientific disciplines, each one with its own research interests, perspectives and even privileged paradigms and methodologies are now added to the problem. A post-disciplinary approach "recognizes that in many contexts separation of disciplines is no longer useful or viable". On the contrary, "when disciplinary concerns dominate, relevant issues "may be rendered invisible" (Wilde, 2020:173). That is the moment that the students must deal with the discomfort of apparently being even more distant from finding a good research question.

The 3rd step, Frames, is the moment to play with suppositions. Strange, exaggerated, unrealistic, fanciful, inflated suppositions are welcome. Divergent thinking should be forced through exhaustively asking "what if" questions. What if the problem situation "was approached as if it is" anything else. Remote associations, metaphors and analogies can be considered not only within the boundaries of design but special attention should be dedicated to examine frame possibilities within each one of the fields previously identified. This "affords space to account for different disciplinary perspectives, practices, and values", raising "the possibility of divergent perspectives on the same material". "It better positions researchers to challenge their assumptions and embrace other perspectives" and facilitates "rapid and easy identification of research opportunities" (Wilde 2020: 192).

At the 4th step, Futures is the time for students to start to look at the frames with a critical eye. At this point, for example, literature review should be enlarged to grasp if and how those other academic fields had already studied the topic and from which perspective and with what results. That would prevent investment in questions that had already been addressed previously by those disciplines. By envisioning in what direction each frame would push research, students can select the more promising ones. By rapidly examining the resources required by each frame, students can quickly discard the unfeasible ones. Since a PhD proposal must provide an original contribution to knowledge within its academic field, the initial research question must settle right on the boundary between the known and the unknown. It acknowledges what has already been studied but finds a gap in it or offers a different angle that opens further exploration space (O'Brien et al., 2019). Thinking again about battleships, one could ask: am I asking questions addressing what still needs to be discovered about battleships? Or "to take battleships into what they can be in the future? How do those questions I am asking fit into what others have already discovered about battleships? How can others rely on my study to further investigate battleships in the future? Is there a risk that my question is about reinventing battleship wheels?

For that reason, Futures step is also the moment to clarify research's contribution to the current theoretical development

by matching the research question with the theory building cycle Cash (2018). This cycle comprises a set of fundamental steps, involving exploration, theory creation, empirical scrutiny and refinement, which incrementally shape a body of scientific knowledge. Each step accommodates research works providing distinct insights that contribute with different types of knowledge about a research topic or phenomenon. An entire section of this work is dedicated to the theory building cycle explanation. By reviewing literature from other fields where research questions formulation process is more mature (Dillon,1994; Agee, 2009; Doody & Baley, 2016; Draper, 2004) we were able to combine different authors' perspectives, and generalize the relation between theory building cycle steps, the type of generated knowledge and results, research objective verbs and the typology of research questions following classification.

Finally, at the 5th step, Integration, students are encouraged to refine research questions arising from previous step and integrate those in the broader research context by aligning each question with adequate research paradigms, methodologies, methods and techniques. For this end, we recommend the use of a Research Matrix, consisting of "a system of rows and columns into which the components of a research project fit", which facilitates the research planning, assuring its internal consistency. It is a tool that "encapsulates the research design, or what the researcher intends to do in the investigation" (Choguill, 2005: 615) when designing a research project, including decisions about "research components", such as research purpose, research questions, sampling, data collection and data analysis (Schoonenboom, 2018). We advocate that Research Matrix building should be a mandatory piece of any research proposal, just as a battleship project cannot start without previously defining technical specifications, drawings and construction methods.

To summarize, presented work proposes a structured approach aiming to assist doctoral students in (1) unveiling opportunities for post-disciplinary research addressing global challenges, (2) formulating research questions in the light of a theory building cycle (3) combining research questions with appropriated methods through a Research Matrix. How far will this help students to frame their research questions, and to what extent will it support the emergence of original and post-disciplinary research questions, still needs to be verified in the future. But in the spirit of theory building and knowledge growth that we have been advocating until now, we challenge doctoral students and their supervisors to test the model and to share their findings."

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THE PROJECT IN UNDERGRADUATE DESIGN COURSES?

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Keywords
Design education, design studio, tacit knowledge, design theory

Problem: lockdown challenged design's traditional method of education—the studio

After the Covid-19 pandemic outbreak, governments worldwide enforced extreme measures to prevent the virus from spreading; the measures included mandates to move all academic activity to remote settings. This situation was felt like an earthquake in higher-education design courses; design educators struggled to adapt a syllabus that for decades depended on the development of hands-on practical work and the sharing of a physical space.

This experience leads us to reflect on one of the pillars of design education: the design studio. It is often the case that the most important realities are often the ones that are hardest to see and talk about (Wallace, 2009); well-established everyday traditions become engrained and go unnoticed, like water to a fish. So it is with the design studio.

There is a consensus in the related literature that at the centre of design education lies the design studio; the studio is defined as the physical space where students work alongside their colleagues and under the guidance of a teacher, but it is also a unique educational format and a pedagogical idea of how the teaching/learning process of design should unfold.

The studio provides an answer to the need to teach both practical skills and theoretical knowledge. Notice that, while well-established academic disciplines are founded on theory and decades upon decades of research, design is a newcomer in academia and still holds a close relationship with practice.

This means that design pedagogy is interconnected with the intricacies of design practice. It is a reasonable expectation that a higher-education design course prepares students to understand abstract knowledge and master the skills, tools, and fundamental habits of mind to become proficient design professionals. This type of education (like other vocational training) depends on one-to-one tutorial teaching, which means teachers and students share the same space in extended classes and learning is based on practical experience. Such educational models are often described as signature pedagogies (Shulman, 2005), meaning the educational format that "organise [s] the fundamental ways in which future practitioners are educated for their new professions." (p.52). In short, the design studio educational format is founded on allowing the time and space for students to learn by doing. This is a suitable educational setting for design, where thinking and doing—theory and practice—go h and in hand. Donald Schön (1987) argued that knowledge about designing is better described as knowing-in-action. The author claims that designing is a form of artistry that develops over time and through professional work. Design artistry can be summarised as the ability for intuitive performance when facing a design problem.

Richard Sennett's (2008) concept of craftsmanship was developed along comparable lines to Schön's artistry. Similarly to what Schön proposes, craftsmanship depends on continuing involvement with practice. Over time, the practice of complex skills is engrained and readily available; in other words, it becomes spontaneous and implicit in one's actions. Both artistry and craftsmanship are consistent with cognitive science studies on deliberate practice (Ericsson, 2016) defined as the structured and guided practice to improve one's weaker areas. This focus on knowledge that emerges from experience lead to an educational format that requires students to experience project work of increasing difficulty throughout their course.

So, we gather that the design studio depends on long sessions in a shared physical space to encourage spontaneous conversations between teacher and students; these dialogues or design conversations (Ferreira, 2018a) are crucial to reveal the tacit knowledge that would otherwise remain implicit in the teacher. Design conversations (or 'crits') is the term that describes the several instances of one-on-one dialogue between a teacher and a student while working, presenting, or reviewing a design project. A design conversation applies a particular language (Schön, 1983, 1985), which is an expression of the design process, that is, it communicates aspects of designing as it unfolds. Thus, the above led many established design researchers to recognise that project experience in the design studio is the centre of a student's educational path (Salama, 1995; Green, 2005). Throughout a design course, the design studio is the gravitational pole around which the sub-disciplines gather. While the balance between studio time and lecture-based courses varies between design disciplines, design project experience is generally regarded as the essential part of a design student's education (Mcdonnell, 2014).

This setting is usual in disciplines such as architecture, product and graphic design, or fashion design (Cennamo & Brandt, 2012; Hokanson & Gibbons, 2014). Noticing this pattern, Lawson (2004) stated that this type of teaching is a global pattern identifiable across countries and design disciplines:

"(...) design education looks different to much else of what goes on in universities around the world. In fact you can go into schools of design and see a very similar pattern repeating time and again. This is true whether the school is in England, The Netherlands, the USA, Australia, Malaysia or Hong Kong. In fact it appears to be a pretty global pattern. It is true whether the school is teaching architecture, product design, interior design or landscape design. (p.6)"

Thus, we note that the design student's pedagogical experience depends on the success of these mundane everyday conversations between teacher and student; in a way, we can state that dialogue (Ferreira, 2018b) forms the backbone of the design studio educational experience. With each teacher-student interaction the students are expected to progressively build their knowledge and learn how to develop their projects by actually doing it.

Our study: an empirical study to gather if the project/design studio is (still) the centre of curricula across design courses.

The design studio is taken for granted; while it is widely recognised as a crucial element of design education—even perhaps its defining feature—the setting nonetheless lacks consistent empirical studies that support or challenge its underlying tenets.
Therefore, in this study, we were driven to explore the design community's intuition that the design studio occupies most of the student's time throughout the course verifiable empirically? If the answer is 'yes', then this should be reflected in the program of a great many undergraduate design courses.
As such, this paper aims to answer one main research question: is project work in the design studio still the centre of design education?
Depending on the results, we will then explore some of the contemporary challenges to the design studio; if the studio format should change, and if so, how.
In other words, we will reflect on the future of design education, and how it should change to keep up with the demands of the current times. To answer the research question, we will analyse the course programs of dozens of undergraduate design courses across the world. Our expectation (and educated guess) is that we will repeatedly find at least one major 'project' course per semester that will take up a substantial number of academic credits (ECTS or others) and hours-per -week. This expectation

will either be confirmed or denied by the data.
Being an international study, we anticipate the difficulty of terminology, namely in that depending on the type of course and the country where it is based, the course unit we generically designate in the literature as 'design studio' will present itself under a different name. Since we are not analysing the fine distinctions between project courses, we will note the terminological differences but categorise similar 'project' or 'studio' courses under the same label.
Therefore, the study we present is an empirical and data-driven work that applies grounded theory (Glaser & Strauss, 2006) to uncover patterns and other valuable information by delving into the publicly available course programs in several international universities. After collecting the raw data, we will systematise it into tables to allow data analysis to unfold. The analysis, in line with the grounded theory method, will follow these steps:

(1) Coding: applying open and descriptive coding (labels) to the data;
(2) Categorising: the second round of analysis identifies any clusters, patterns, or insights that emerge;
(3) Conceptualising: the emerging patterns are used to answer the research question, as well as highlighting any other insights that may emerge. While analysing, coding, and categorising the collected data, we will compare it with existing research on the design studio to identify or complement any gaps.

Finally, we will cross the factual data (course name, credits, and hours per week) with any qualitative descriptions we can find of the course content. In other words, some universities complement their course program with short descriptions of each course unit, we can use this data to conduct deeper analysis and uncover further insights.

Expected results and preliminary reflections

We can already raise the hypothesis or make an educated guess that these project-based courses are supported by a design studio pedagogical framework. While data analysis is still ongoing, the results are beginning to point to the conclusion that the design studio indeed remains as the central course unit within an undergraduate design course.
If confirmed, this is unsurprising. Change arrives slowly in academia, which is not necessarily a bad thing. The universities should be the place where well -reasoned changes are implemented with caution, not rushed to meet the most recent societal demand. The pandemic hit the world unexpectedly and the full extent of its impact is yet to be known. As such, calls for

increased offers of remote classes should be met with a healthy scepticism. Early data analysis points to the design studio remaining, for the time being, as a unique aspect of design education, indeed, as its signature pedagogy. This study presents the most up to date data on this issue, and as such, represents a relevant contribution to the field and could be the basis for further reflection on design education.
There have been recent and notorious projects explicitly aimed at radically altering what a design course looks like (e.g Splitz et al, 2021). This paper does not have the same ambition or overarching goals but offers a humble empirical contribution to the ongoing conversation.

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APPRENTICESHIP TYPE LEARNING IN THE LOCAL: INSIGHTS FROM A COOPERATIVE WEAVING PRACTICE FOR DESIGN EDUCATION

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This paper aims to reformulate the relationship between the design field and the local context as learning from the local by understanding and documenting how women in a village in Turkey learn weaving and by investigating ways to translate the obtained knowledge into the design field to generate new perspectives for design education (Figure 1).
Learning from local practices and diversifying the knowledge space of design with different ways of knowing is a growing area of design research. Designers have taken a collaborative approach to research, using methods such as participatory design and social design, which have brought new approaches to the relationship between design and the local. Latest studies have moved the role of designer from the center and repositioned it as a learner, creating spaces for differences in which the participants and subjects of the context define the scope, make decisions, and contribute with their experiences (Onafuwa, 2018). Some exemplary works have examined local practices (Reitan, 2006) or concepts (Akama and Light, 2020) to contribute to—and sometimes to transform—the design knowledge space or to study ways of inviting the equal participation of local knowledge in the design process (Reitsma et al. 2019). Moreover, there have been calls to recognize the importance of local and indigenous knowledge. Sheehan's (2011) framework of respectful design and Tunstall's (2014) concept of culture-centered innovation suggest that when design learns from and gives attention to indigenous knowledge, it gains a much deeper understanding and can develop much more diverse perspectives.
Local knowledge corresponds to the beliefs and tendencies that have emerged from the ongoing social practices of a community throughout its history. Local knowledge is embedded in the here and now—in practices, space, time, and people; it is born, produced, changed, and remains in its own context (Geertz, 1983). Local knowledge is specific to the context, specialized

Keywords
Local knowledge, weaving, learning from local, design education, experiential learning

Figure 1. A weaving scene from the village. Photographed by Author

according to social, geographical, and temporal conditions, and emerges from social practices in daily life—it is not systematic nor institutionalized. Local knowledge, with its location-specific structure, can differ from global norms and have its own logic (Canagarajah, 2002; Cleveland and Soleri, 2002). New design knowledge can be created by making use of differences and variations seen and recognized in the local context, and this research therefore aims to contribute to the field of design education by documenting the local knowledge that emerges from observing how weaving practices in a Turkish Village called Karşıyaka are learned and practiced.

For this purpose, the first author conducted fieldwork in the summers of 2017, 2018, and 2019, staying at a friend's family home an hour away and using public transport. During these visits, she spent time with different people at different looms, using the participant observation method. Participant observation removes the split between participating in and observing and generates intersubjective relations and dialogical knowledge (Yazıcı Yakın, 2019). It is said that weaving has always been a part of the village; in the past, animal husbandry was also part of the village, and yarn from goat hair was hung on trees and various fabrics woven. Saddlebags, rugs, jackets, and bedspreads were made. Today there is significantly less variety, and only bags and rugs are made (Figure 2). Moreover, the primary motivation for weaving is no longer material need—that is, the difficulty and cost of obtaining ready-made products. Instead, the focus is on the need to recognize a common social belief, specifically dowry preparation and the importance attributed to marriage. Each step of weaving has its own challenges, and tasks such as setting up the loom,

Figure 2. Some examples of weaved rugs and bag. Photographed by Author

unwinding, and weaving can only be achieved with the physical and mental effort of people working together. Weaving is usually done by recruiting five to six women from at least two or three households. In addition to physical work, the women also collaborate on a variety of other decisions, such as selection of the color pattern, purchasing the yarn, and the assignment of who will weave and when. In other words, weaving involves the activities of working together, making decisions together, and organizing at many levels.

In this article, we specifically focus on the learning process of weaving in Karşıyaka Village, trying to pinpoint its key features. We will then seek to translate these points into design—that is, the differences, similarities, and relationships will be uncovered and intertwined to determine what design education can learn from this kind of learning process. To explain the learning process of weaving in Karşıyaka Village, we will focus on the theory of community of practice (Wenger et al., 2010). Lave and Wenger (2008) consider learning to be a situated activity, which simply means that it is experienced in everyday life. This may seem like a very broad definition, but Lave and Wenger (2008) explain that there are actually no non-situated activities. The basis of this theory is that learning takes place by doing things together in a community (Reitan, 2006). When people spend time together, they share their thoughts, experiences, and advice; they help to solve each other's problems and build tacit knowledge among themselves. Both personal relationships and a common understanding of the subject are formed, and Wenger et al. (2010:4) therefore define communities of practice as "a group of people who share problems, passions, concerns about a topic and deepen their knowledge about the topic by interacting with each other." It is emphasized that learning takes place not only in institutions designed for that purpose, but also in all areas of daily life, and that learning is intertwined with daily practices (Reitan, 2006; Durrani, 2018).

Learning to weave takes place in the course of women's daily lives in Karşıyaka. The girls start to learn weaving by seeing their mothers and neighbors on the street and helping them, little by little. As they get older, they become more specialized through watching and practicing. Since weaving is generally done for dowry purposes, they help their mothers while their dowry is being made and once they have children, they weave their children's dowry as well as their own household items as the main weaver. Weaving intertwines with life as the learner grows up and accumulates daily experiences.

Due to its size, the loom is built in the street, and it becomes a center of socialization and social interaction, where conversation, gossip, banter, and visits occur, in addition to weaving. The girls' view of life is also shaped while learning to weave, and a common basis for values and beliefs is formed within the society.

In this context, Jordan's (1989) Mexican Yucatan women's midwifery and Reitan's (2006) studies in Alaska, in which Inuit women learned to sew local clothes, are instructive. Jordan (1989) researched Mayan midwives in Yucatan; for years, official health institutions had tried to teach women interested in midwifery about modern medicine, but these trainings were given in the form of oral transfer in a classroom environment, defined as the Western model, and were unsuccessful. Jordan (1989) explains in her research that the learning of these midwives takes place in the form of an apprenticeship based on imitation and repetition, and thus purely verbal transmission fails (Jordan, 1989). The apprenticeship model learning can confess differently according to the context (Lave & Wenger, 2008). The unique situation in Reitan's (2006) study of sewing practices in Alaska, weaving in Karşıyaka, and the midwifery in Yucatan can all be described as apprenticeships that take place within a local community and are all ultimately non-profit. Therefore, in this study, the approach to learning weaving in Karşıyaka is called apprenticeship-type learning in the local. Primarily through examining the intersections of these studies, we pinpoint several features that can define learning to weave in Karşıyaka.

The first feature of apprenticeship-type learning in the local is that it occurs while living daily life and is not an individual process. The girls learn to weave as they grow up, playing around, watching, and helping while their mothers and relatives weave on the street. There is no distinction here between everyday life and the learning of skills. Second, because knowledge and learning are situated, the learned knowledge is not displayed outside of its context. Going to a special education area, engaging in educational activities separate

from daily activities, and scheduling at specific times and places—as is seen in Western-type education—are not part of apprenticeship-type learning in the local.

The third feature is that knowledge is embedded in bodily performance: while the verbal model deals with the transfer of soft information, the apprenticeship model is about gaining physical skills.

Fourth, the work done in apprenticeship-type learning in the local is the driving force behind learning and overlaps with the desired result. The work is not aimed at putting learned knowledge into practice in the future, but rather the knowledge is applied while learning and learned while applying. A related feature is the lack of formal standards and assessment; competence is demonstrated by doing the job right, and there are no standards, tests, certificates, or rites of passage. In the local apprenticeship-type learning process, the relationship between teaching and learning is unclear. There are no special teaching moments, a loom is not set up specifically to teach someone weaving, and active teacher intervention is often absent in the learning process. Finally, in Karşıyaka Village, local knowledge is learned, produced, and transferred in daily life, by participating in daily life and socializing. This type of learning also has social repercussions; relationships are formed between people, and learning to weave, in addition to technical knowledge, means transferring knowledge about the values of the community, being a part of those values, and thus belonging to the community and creating sociality (Figure 3).

Figure 3. A weaving scene where young girls and their mothers by the loom. Photographed by Author

Incorporating craft methods into design education, direct experiences with real materials and production are considered an important source of innovation (Gore, 2001; Kermik, 2012; Altay and Öz, 2019). Experiential learning which the novice learns under a master through real experiences is considered an important part of the nature of design education (Gore, 2001; Tatlısu and Kaya, 2017). Looking at how craft learning occurs in different settings outside of institutions and formal education diversifies our understanding and reveals new possibilities.
We translate what we learn from apprenticeship type learning in the local from Karşıyaka weaving into four main points that could be of benefit as direct inputs into designing the educational processes for design education — learning by observing and making; flexibility of learning process and roles; cooperative and social aspect of the learning process; the role of the communal place as a learning environment.
While we all have been discovering the potentials of online technologies and new ways of interacting for post/pandemic design education scenarios, Karşıyaka weaving depicts a process in which the forms of learning and teaching are inseparably interwoven with socio-spatial aspects. These four points direct us towards designing flexible learning processes where the teaching moments blur and students learn in action in a dialogical exchange through observing and making together. During these interactions, the importance of considering the cooperative and social aspects of the learning arises where not only transfer of technical knowledge occurs but also the unique culture of education accumulates in an environment that enables students to learn from each other within a solidarity dependent process.In this paper, we will first investigate design's relationship with the local context in terms of methods and approaches as a step toward learning from the local. Then, with expanded understanding of the nature of local knowledge, we will dive into the field setting and the methods that can be adapted. Finally, after a detailed account will be given of how the learning occurs in Karşıyaka weaving, the local knowledge developed through this field research will be translated into design and these four main points will be explored in depth as insights for design education.

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MANAGING DESIGN: RESPONSIBILITIES, CONDUCT AND RIGHTS

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The Design practice has influence not only on society, but also on the environment, economy and culture as well, being it formulates innovative solutions for specific problems. Even so, this science is not recognized by its true value and potential – neither in the public sector, nor in the private sector. Furthermore, Design Management is also a component that has an essential role in the proper performance of the projects and teams. Nevertheless, Portugal has no Order for the protection and organization of the professionals; the Responsibility, Conduct and Law as a rule are not present in the course teaching plans; and, sometimes, the legislation does not acknowledge the designers' needs. To determine the situations mentioned, three data collecting moments were executed in order to understand the perception and experience of the students, professors and professionals about the topic in question. In regard to the Methodology, first an Online Questionnaire was conducted (129 participants) to collect general quantitative data, then a qualitative research with Individual Interviews (12 people interviewed) and lastly, another quantitative research with a Survey (19 answers) so that participants could validate all the data collected and potential solutions generated throughout the study. In essence, the investigation has the objective to comprehend how designers should act in terms of social, professional, ethical and environmental responsibility, which legislations do they have at their disposal to protect themselves, which conducts exist to regulate the field and what changes are necessary to make in these settings. It is expected that with this study it's possible to aid the advancement of the conceptualization of the necessary structures to support the Design' professionals, so that their contribution has a greater reach and has more recognition by the society.

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Keywords
Responsability, Law, Professional Conduct, Design, Design Management

INTER-DISCIPLINARY, MULTI-DISCIPLINARY, ANTI-DISCIPLINARY: TRANSITION KNOWLEDGES IN DESIGN EDUCATION

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Keywords
Anti-disciplinary, Design Education, Knowledge Design, Complexity, Transition

"Il design è un ingrediente fondamentale della vita e della società, anche perché aiuta le persone ad affrontare il cambiamento. Questo è il momento perfetto per dimostrare la sua importanza" (Antonelli, 2020, p. 10)[1].
Quoting Paola Antonelli makes emerge with a particular strength today, in order to indicate the challenge of which the design and the whole culture of the project today must take charge.
In fact, the modernity seems somewhat complex and dramatically problematic time in human history. The scientific disciplines and practices organizead in the system of knowledge, that have till now guided our accelerated and apparently progressive "evolution", become increasingly open and multidimensional areas of knowledge (Manzini, 2006, p.12).
This condition leads to a fundamental question: how historicized topics, specific of the different scientific areas, can continue to be deepen and developed their own? And at the same time: in the perspective of a necessary complete unavoidable reversal of trend how can they lay the foundations for a new approach to the elaboration of knowledge and project, in order to face the dimension of the issue, without falling into the contradiction of reducing its complexity, due to ideological positions or pre-existing scientific paradigms? In fact, "un paradigma può nello stesso tempo chiarire e accecare, rivelare e occultare. È nel suo seno che si trova annidato un problema centrale del gioco della verità e dell'errore" (Morin, 2001, p. 26).[2]
A first answer indicates, as necessary but not sufficient presuppositions, the clear awareness of the limits of our actions and design reflections, but also the constant practice of a "connective" dimension, in which the boundary lines amongknowledges become the real experimental laboratories for the project of the present, even before the future.
Starting from these general considerations, that want to give account above all of the urgency of a new "design hope", the paper aims to investigate how design, born as a project of

the industrial product with deep artistic sociological and even political implications, is now facing with a qualitative leap that can demonstrate its quality, as a "fundamental ingredient of life and society".
For these reasons, probably, many aspects must be considered to be added to design practice, already rich in ethical values and socio-cultural scenarios:

- on the one hand a sort of "creative activism", which feeds the ability to respond to the "daily emergency", preparing and strategically connecting the different possible disciplinary contributions, but also territorial actors, communities of practice (Wenger, 2006 p.22), and especially the users.
- on the other hand, the equally timely capacity for cultural and social elaboration, to be immediately poured into reality, even without the mediation of institutions, companies, university structures, indeed activating "from below" connections, actions and ideas, in the dimension of proximity and everyday life (Manzini, 2021, p.42)

The paper aims to demonstrate how it is up to design today the opportunity to realize itself as the project of a widespread quality in people's lives; and not only almost exclusively in the scientific and academic debate, where, after its inception (related to the quality of industrial production), since the 70s, it has strongly refocused on environmental and social issues its objectives, methods, tools and languages.
This new approach clearly differs from the recognized historical "interdisciplinarity" of design, because it is founded - according to the state of art - on a new perspective of "total interdisciplinarity" in the interpretation of complexity and in the virtuous processes of transformation of reality.
The paper also aims to verify this thesis also through an excursion on the levels of the most advanced training, in the national and international context, expecially where the training courses are proposed as "self-projecting" educational-scientific experimental fields, open to territorial realities and to the study of contexts, through the ability to connect trans-disciplinary scientific dimensions, urban phenomena, social innovation and new cultural productions.
Among the project disciplines, the design is the less scientifically formalized, because it is based essentially on experimental practices and because it constantly "records" and often anticipates the changes of a complex and evolving reality, to which it adapts or interprets.
Its peculiarity of proposing itself without a fully codified scientific status has made it a discipline "ductile, resilient, opportunist" (Legnante, 2016, p.17), therefore able to accept

[1] *"Design is a fundamental ingredient of human life and society, also because it helps people to face changements. This is the perfect time to prove its importance" (Author's translation).*

[2] *"at the same time, a paradigm can clarify and blind, reveal and conceal. The heart of the matter, the play of truth and error, is nested in its womb" (Author's translation).*

the changes, to adapt and respond in original and innovative terms to opportunities, such as to more or less contingent criticalities; but it is also a "falsifiable" discipline, precisely in the scientific sense assigned to other disciplines,precisely because the advances of research and experimentation are constantly changing their paradigms.
Historically, the schools for design education have taken up the refounding task for the discipline, precisely through the experimentation of new connections, especially between practical knowledge and the dynamics of innovation driven by the technical and scientific disciplines. The multidisciplinarity, the dialogue and production support, the effort to reorganize effective design methodologies in the elaboration of shared knowledge and methods, are just some of the aspects that constantly emerge in the reading of the histories and geographies of design teaching.
Retracing some of these experiences through the considerations of design historians and theorists, but also through some direct and current evidence of the protagonists of design culture, can certainly provide a framework of cues and references, in orderto give consistency to the hypothesis of the text and its verification.
With the annotation that the design refers and feeds on reality and everyday life (Trapani, 2018, p.150), it can be simultaneously proposed as an anti-discipline, changeable and resilient at the same time. In fact, when design works and thinks exclusively within its specific field of interest, it risks losing sight of the real object of its work and commitment. On the contrary, if it is only or predominantly expressed in social processes, it risks losing part of its complex cultural identity, and as a consequence, losing its multiple instruments of interpretation and action, its specific competence and project culture. But the semantic complexity of the term "anti-disciplinary" refers to the complex and inescapable question of the relationship between design and science, which has found an extraordinary field of experimentation in the research of the Boston Media Lab.
About the relationship between design and science, Joichi Ito, former Director of the Boston Media Lab, says that the two areas are sufficiently independent from each other, so that today we can work on both in terms of a "fusion" radically innovative and regenerative of new objectives and scientific perspectives, completely unimaginable within traditionally connected and interacting fields of knowledge:"design and science are opposed to each other and the output of one is not the input of the other, as often happens in the case of engineering and design or science and engineering. I believe that by achieving a "goal"

and a fusion of design and science, we can basically advance" (Ito,2016)
He then clarifies what it means to be placed in the perspective of "anti -disciplinare", the first word, as he says, learned at his arrival at the Media Lab:
"Interdisciplinary work happens when people from different disciplines work together. But antidiscipline is something very different; it's about working in spaces that simply don't fit into any existing academic discipline, a specific field of study with its particular words, structures and methods. [...] Maybe we can design something quite strict, quite addictive and antidisciplinary, not only to survive, but mostly to thrive".
Beyond any definition, the anti-discipline alludes to a "white space", that for the designer today represents not only the prospect of a new complex and fascinating work environment, but also the conceptual key of the relationship between science and design, that is progressively emerging as central in design-studies. In fact, the term can be proposed in the context of the link between design and science, that today is becoming particularly important, also under a philosophical point of view, as it starts from an even smaller distance between nature and the artificial, where the importance of a continuous process of integration, and even of "fusion", can be highlighted on a daily basis.
In fact, both synthetic biology, which concerns our ability to modify natural proce sses, and artificial intelligence, which develops in relation to the study of cognitive processes, face enormously complex problems, that continually transcend the boundaries between natural artificial and of course also between existing disciplines.
We therefore discover that we must depend more and more on nature, in order to be guided through the complexity and the unknowability (with our current tools) that today manifest our environmental and cultural condition.
From many parts the reflections on the disruptive intersections between design and science, or/and natural and artificial, or/and between material and immaterial, indicate therefore the relevance of a new figure of an "anti-disciplinary" researcher, ready to practice different fields of knowledge and to open new ones. A s a result, can the design training process also be transformed, as the different design, scientific and interpretation disciplines, currently coexist in a "peaceful" and organized way? Generally, schools do not foresee the real possibility that can betaught how to produce those radical overturns and upheavals of the "points of view", that today can allow to produce the desired changements.

A quick overview of the characteristics of the level of Master Degree Courses in Italy, shows the characters that seem to prevail:

- on the one hand specialist/generalist courses, which trace, although with different emphasis, the historical bipartion of design in product/visual communication;
- specialist courses, linked to specific territorial vocations or codified professional activities (such as fashion, interiors, services, events, boat design).

Other biennial courses instead aim to explore the complex processes of innovation, focused mainly on techno-scientific innovation and production processes (advanced design).
Some other courses of higher education are modelled on a methodology and vision of the project as a process of virtuous transformation, which starts from the productive systems of a geo-economic-cultural context, to extend to the whole of society (Systemic Design).
More recently, it is possible to assist to the proposal of new training courses that even more aim to widen the intersections of design with other disciplinary fields "to facilitate a deeper understanding of today's complex society, but above all to propose transformational interventions through design" (Design Academy Eindhoven, 2021).
The Master Degree GEO - DESIGN of the Design Academy Eindhoven is presented as a "platform" to explore the social, economic, territorial and geopolitical components with which design today must necessarily compare. the critical focus on industrial production school, as responsible for the current environmental and social instability, implies the intention to base the training on understanding reality, its multiple dimensions and global problems. Design must pass through, interpret and regenerate the most different knowledges " from material stories to cultural visions of the world, from humanism to ecology, from plant and animal rights to artificial inte lligence, from the core of Earth to Space".
In Italy, a first level course is proposed as an interpreter of interdisciplinary and planetary issues: the Planet Live Design, a design school based in Assisi, which offers a completely new educational path in the current academic system, with the ambition of "preparing designers specialized in the design of new, aware and intelligent ways of existence on the planet" (Università degli Studi della Campania, 2021).
In its conclusions the paper aims to synthesize how the consolidated forecasting attitude of design today becomes the ability to anticipate significant connections of the scientific fields, experiences, visions for the care and survival of the "real

world"; and it is necessary that in some way design can find new ways of multidisciplinary "fusion", then paths of complex innovation and human centered ones, first of all in schools, enhancing and amplifying the full potential of the intelligence and creativity of students to answer the colossal challenges that emerge from a pressing reality.

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QUESTIONING THE ROLE OF THE MOVING BODY BETWEEN THINKING AND MAKING

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Keywords

movement, embodied experience, sensuous body, architectural thinking, choreographic thinking, kinesthetic empathy

Context

This interdisciplinary research project examines how the interaction between the creative practices and tools in architecture and dance within educational contexts can enhance mutual understanding of the embodied spatial experience and open new perspectives on the relation between body, movement and space to nurture creative processes in both disciplines.

In the discipline of architecture, the visual experience dominates within the design tools —plans, sections, perspective drawing— as well as the thinking processes driven from these tools. The human body is in many cases in the architectural design process mainly assigned a very functional role — such as a dimensional staff or scaling bar for defining measurements (Spurr, 2009). While the embodied spatial experience, being a "total" experience, arises from the sensual body in motion (Rodaway, 2005; Noë, 2006). As such, it can be stated that the architectural design tools offer very limited possibilities to fully understand, and design embodied spatial experience achieved through moving. In an increasingly digitally connected world, an important part of the architectural design process appears to take place on and through screens or other digital tools and devices, alienating even more the human sensuous body from the design process. The recent COVID-19 pandemic even bound us more than before to screens. Also, the global lockdown literally limited people's movements, causing many to experience the space they spent their days in differently than before. At the same time, the entire social life on squares, streets, office buildings etc. fell away, with the result these abandoned spaces lost their meaning without the presence of a human body moving in it. The images and experience of these empty squares, streets, and deserted office buildings, among others, demonstrates even more importance of the moving sensuous body for design processes in which it is found to be to absent in the deployed design tools. Yet, no universal tool or approach are available to

consciously question the moving sensuous body and its embodied spatial experience during an architectural design process. Architectural creation within practice as well as education, has no architectural tools available to design for the moving body needs an appropriate language to communicate about, the totality of that embodied experience achieved through moving in space allowing to explicitly incorporate these aspects of a spatial design in the creative process. The problem described above, which is situated in the imagination - the process between thinking and making architecture. In the last few decades - even before the digital wave or the COVID 19 pandemic - the issue has been raised many times by various theorists such as Halprin (1965), Tschumi (1990), Virilio (1994), Evans (1997), Pallasmaa (2007), Spurr (2009), Sharr (2009), Scheer (2013), who all claim that the architectural design tools possess some deficiencies allow to bridge this gap between thinking and making. In approaching this problem, Halprin (1965) and Virilio (1994) suggested to invoke the discipline of dance and its choreographic tools — being dance notation systems— as a way to expand the toolbox of architects. However, decades after these suggestions were made, one can observe that within contemporary learning environments as well as established practices, still no tools are available to actively design for movement and the spatial experience it generates. But above all, the question can be asked why these suggestions found no entrance to be durable established in the field of education and/or architectural practice.
When approaching the content of the discipline of dance, several similarities can be found between the two disciplines. Like architecture, dance concerns to be a creative "design practice". Both design practices share three main components: body, movement, and space. However, unlike architecture, in dance space is created with the body in motion and space is in that case a temporary, non-materialized and constantly evolving and space as a physical and material entity seems to disappear into the background yet remaining ever present. As such, in contrast to the practice and education of architecture, the moving sensuous body has a different role as well as the various other common components. Hence, the relationship between the components, which links both disciplines in the process of creation, is fundamentally different as well as the tools they use for creation. Based on the contrasting relationship between these common elements, a parallel issue can be detected as in the discipline of architecture. In the case of dance, it is particular the materialized, built space that is the major absent, while the sensuous body is omnipresent. Identifying these parallel problems in both disciplines exposes the epistemological differences between both

creative practices, but also suggests the potential added value that either discipline can bring to the other. The goal is to provide architects and choreographers alike with an extension to their current toolbox, to enrich their understanding and consequently to allow different approaches within the respective creation processes.

Methods and process

This epistemological distinction is approached trough literature review on the one hand and active exploration within educational contexts in architecture and performance arts on the other hand. At the heart of this research is a methodology based on the Lewinian Learning Cycle (Kolb, 1984) —an iterative process in which action and reflection allow for generating new insights. That active experimentation –being the actions to reflect on— happened through the application of design tools and methods derived from one of the involved disciplines. Thus, architectural thinking tools such as “drawing” were introduced into performative learning environment, but also vice versa, choreographic thinking and tools such as movement notations are brought into architectural explorative learning environments. Based on answers to questionnaires, drawings produced by students, diaries, photo reportages, a heterogeneous set of data was collected forming the basis to determine to what extent the participants, the learners, in each of the experimental set-ups gained a better understanding of the embodied spatial experience. However, this process of gaining understanding concerns a cognitive process, which makes it particularly difficult to observe, quantify and compare it. Therefore, Interpretative Phenomenological Analysis (IPA) was found to be a suitable approach to analyse and give meaning to the collected data set. IPA is a qualitative approach, mainly known within the fields of psychology and is concerned with trying to understand what it is like, from the point of view of the participants. “The existing literature on analysis in IPA has not prescribed a single ‘method’ for working with data”. Consequently, he also argues that “there is no clear right or wrong way of conducting this sort of analysis, and we encourage IPA researchers to be innovative in the ways that they approach it.” (Smith, 2009). The interpretation and analysis of the collected data allows for a deeper understanding of the epistemology underlying these discipline-depended tools and methods. It also offers insight into which preconceptions embedded in both disciplines regarding the relationship between body, movement, and space because of using discipline-specific strategies and tools, in particular how they determine "learning" understanding and approaching "embodied spatial experience" within an educational context.

Findings and Conclusion

Concerning the acquired insights and derived understanding during the research process, neither the literature review nor the active experiments explicitly lead to a 1:1 answer to the research problem, nor these explained in what way it contributed to the overall research aims. Throughout the research it turned out that the application of discipline-depended creative tools such as plans in the case of architecture and dance notations in the case of dance implicitly impose a certain way of looking to the user—a kind of directed view on reality— which is directed by the method deployed. As such, within the domain of architecture, plan-based looking and associated thinking is cultivated by the tools deployed for designing. When e.g., architectural students were asked to render the movement of passer-by in urban environments, it appeared to require a special effort not to see the observed movement from an “architectural and plan-based gaze”. That way of looking works as a kind of automatic reflex to see the movement as a trajectory line on a plan. However, this way of representing and looking reduces the richness of movement to a single line and exposes very little about the experience that accompanies the movement it represents. Although trace maps and trajectory maps may be valuable analyzing tools in understanding how spaces are inhabited, they illuminate very little of the many aspects of movement and, above all, they disclose merely something about the embodied spatial experience. Through the implementation of dance notations another way of depicting movement was introduced, but more particularly the architectural gaze was opened up. Besides by implementing learning techniques derived from performative practices architectural learners also seemed to heighten their body awareness and kinaesthetic empathy, by actively shifting the role between performer and observer.

In the case of performance arts, movement observation by means of drawing was introduced into the corresponding learning environments. Although attending and observing other learners’ performance concerns an activity that is fully integrated into the education and practice in performance arts, the act of drawing is not necessarily an essential part of a performance artist’s education or practice. Through the interpretation on the by the participants produced drawing as well as reflections by the students on the activity, it appeared that the students became more aware of the spatial aspect of the materialized space they were moving in. As such, the activity of drawing while observing constituted a similar underlying learning principle as what happened within architectural education context through introducing movement notations: it opened up the discipline-depended gaze.

However, from the range of conducted experiments no new tool was developed for architects to actively question movement in the design process, allowing to expand the architectural toolbox, neither for performance artist. Consequently, one could question whether the problem outlined in the context is a quest of lack of tools. Based on the outcome of the experiments, it seems much more likely to be a quest of attitude.

As such, this research offers an imaginary space for sharing and accommodating this interdisciplinary knowledge and allows one to think and act beyond discipline-bound design tools and associated preconceptions. Consequently, it is not only a space for experimentation but also a learning environment stripped of its disciplinary boundaries, in which two learning principles "reallocating the gaze" and "alternating the role" prevail. Also, a hand-on booklet was produced allowing others to enter this imaginary created space and actively further expand the discourse and framework for thinking about the relationship between body, movement, and space. By doing so, the research also implicitly opens the debate on breaking down the disciplinary barriers that have been created throughout history between various creative disciplines.

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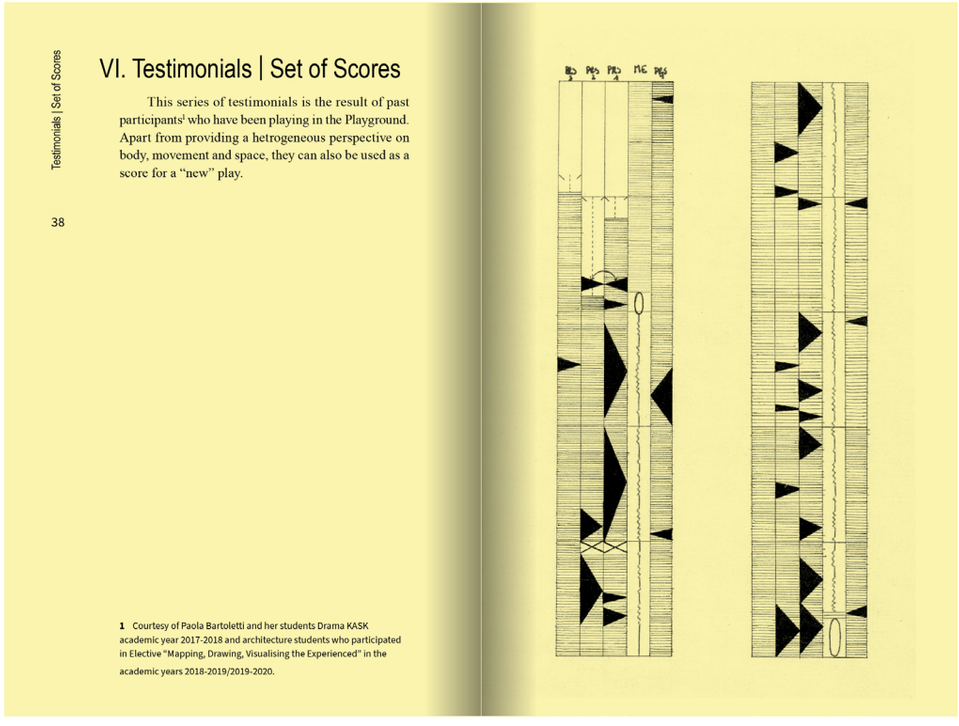

Figure 1. Extract from hand-on booklet (image by the author).

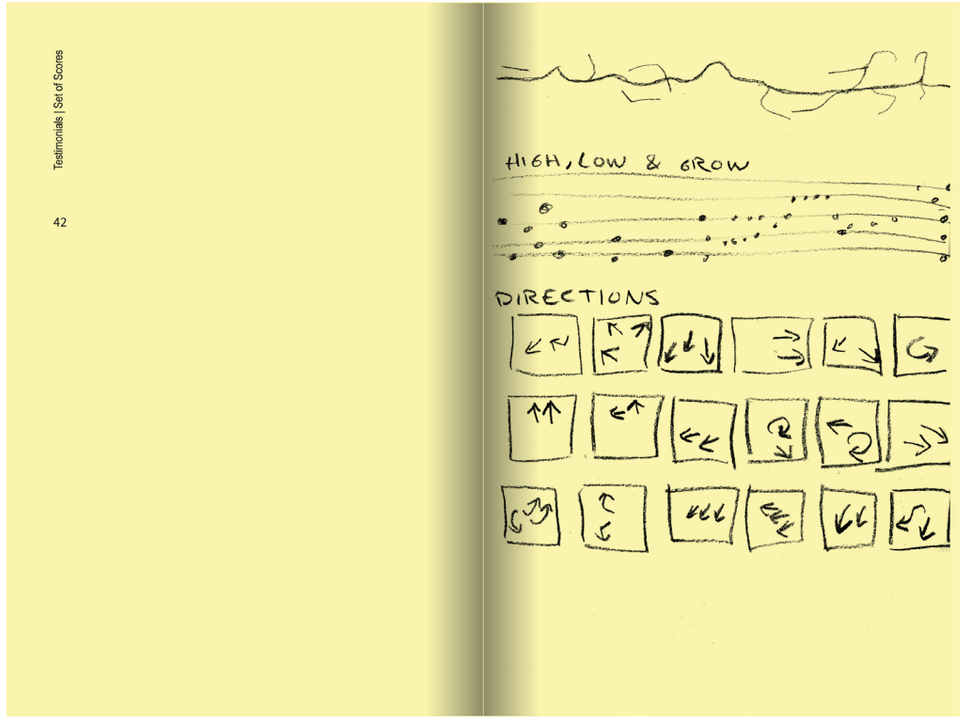

Figure 3. Extract from hand-on booklet (image by the author).

Figure 2. Extract from hand-on booklet (image by the author).

Track 3
Design for Health & Wellbeing

Track 3
Design for Health & Wellbeing

Inclusive Advertising and Representativeness of Children with Disabilities

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Consumers are influenced by advertising, and it is up to the field of advertising to play an ethical and awareness role for relevant issues such as the inclusion of children with disabilities in society. The present research falls within the scope of design and advertising, with inclusive design and activist design being among the main concepts to be addressed. The study's main goal is to understand if there is a correlation between the social exclusion of children with disabilities and the lack of representation in brand campaigns for children, as well as how design, and brands, in particular, can be more ethical and inclusive. Within the present research, a qualitative exploratory and conclusive quantitative methodology are used to determine possible factors that may be significant for the lack of representation of children with disabilities. Based on the obtained results, it is possible to state that the inclusion of children with disabilities in advertising campaigns for children influences their inclusion in society. The results also show the relevance of the issue for consumers and brands. Despite being an increasingly pertinent issue, there are still brands and companies that are not inclusive, nor do they intend to be.

Keywords *Inclusive Design, Design Activism, Ethical Marketing, Advertising, Representativeness.*

Introduction

Over the last few years, we have seen a growing number of movements calling for the inclusion of minorities. However, there still seems to be a long way to go, namely regarding the inclusion of children with disabilities. This act of understanding and taking care must start at home, in the family context, then at school, where teaching must be naturally adapted, without segregation, and finally in society. The social context itself must include these children to prepare them for community living and avoid contributing to discrimination due to their condition. It is not only up to society itself to include minorities but also to brands, which have a crucial role in raising awareness and changing behaviour.

In the reference year 2018, one million seven hundred thousand Portuguese citizens have a particular disability, corresponding to more than 15% of the population. Over time, the inclusion of people with disabilities has been an increasingly discussed topic; however, can we state that we are an inclusive society? In 2009, the Portuguese Republic ratified the United Nations Convention on the Rights of Persons with Disabilities (Pinto & Pinto, 2019). The data obtained in the Observatory on Disability and Human Rights Report (indicators from 2019) is encouraging in the areas of education, where the number of students with disabilities in regular public education grew 67% between the academic years of 2010/11 and 2017/18. In terms of social protection and independent living, new measures were introduced that are more convergent with human rights models, such as social protection for inclusion and the independent living support model. The Occupational Activity Centers and Residential Homes registered growing trends, both in the number of vacancies and in the amount of equipment. However, the number of disability discrimination complaints between 2009 and 2018 increased by 1937%, from 41 to 835 complaints, as well as the number of unemployed people with disabilities registered at job centres that increased by 41% compared to the overall population, which decreased by 38% (Pinto & Pinto, 2019).

Consumers are increasingly aware of the impact that brands have in their lives and therefore are increasingly demanding in the buying process. When people acquire products, they become part of the brand, going from consumer to prosumer (producer + consumer), which according to Motta and Batista (2013), is the idea of the consumer as producer, who influences opinions, shaping the market. It is a new kind of consumer who influences and interferes in the buying decisions of other consumers. Thus, it is increasingly essential for brands to be aware of their consumers' needs and realise that the world has changed. The importance of the inclusion of difference has never made more sense to be discussed. We must not forget that an illness, a physical condition, or a disability are not determinant factors of someone's competence or ability to fit into a community.

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Literature review

The paper stems from the research question — *Is the representation of children with disabilities in advertising campaigns of brands for children a factor that promotes their social inclusion?* To give the reader a deeper knowledge of the theme, specific concepts were addressed, such as the notions of inclusion, marketing and ethical consumption, advertising, inclusive design, as well as design activism. However, the core topics are inclusive design and activism design, which are here explored in more detail.

Over the past few years, the term inclusive design has become increasingly present in society's mindset. According to Clarkson and Coleman (2015), this concept was first used in England by Coleman in 1994. The main goal was to show the British market the potential of designing and marketing products for people with disabilities and the elderly. We have indeed never stopped thinking about the difficulties that other people may have when performing a specific task or using a service. Still, if we think about ourselves, we have certainly had trouble at least once in our lives. These difficulties result from the inability to adapt the environment to our needs. In general, today's architects and designers are used to designing for a human being stereotype, usually young, medium-sized, healthy males, and females, who can always understand how new products work. The problem arises because the human species is quite diverse, and every one is unique (Santos, 2018). According to Victor Papanek, in the book "Design for the Real World" (1971), a designer must make responsible decisions, spending less time creating ephemeral products for the consumer economy and investing more creative time generating solutions to the real needs of the 80% underprivileged on the planet. Inclusive design should be used to create solutions that are accessible to everyone, without exceptions. Early in the creative process, it is necessary to consider the potential target audience for the brand or product and that the young and healthy population will be only part of its target audience. Different aspects must be rethought to include not only disabled people but also the elderly or foreigners who, for some reason, have more difficulty handling or using a product or service. The main goal of design is to solve the users' problems, and inclusive design aims to understand the real needs of minority groups, who have been tirelessly seeking their rights as citizens to be recognised and considered over the years.

Also noteworthy is the fact that when we think about inclusive design, we are also focusing on accessibility since the person with disabilities is often prevented from acting, living, and contributing to society due to several barriers they encounter. We must understand accessibility as the elimination of architectural, physical, or even communication barriers by means of adapting products, services, or environments to meet the current functional needs. The focus is to make the environment adapt to the person's distinct characteristics, consequently increasing the users' autonomy (Gomes and Lent, 2018). Inclusive design, which can also be mentioned as design for all or universal design, seeks to avoid the need to create environments, products or services that are exclusive to the person with disabilities so that everyone can use everything without distinction. For products or services to be inclusive, it is up to the designer to implement the concept of inclusive design from the project's conception so that in the future, no adaptations will be necessary since the function of that product or service will already meet the needs of all users equally. According to Mace (1985), universal design encompasses the design of products and environments that can be used by all people to the greatest extent possible, without the need for adaptations or specialised design. universal design, or design for all, according to The EIDD Stockholm Declaration (2004), (...) *aims to enable all people to have equal opportunities to participate in all aspects of society; to this end, the built environment, everyday objects, services, culture, and information must be accessible, usable by everyone in society, and sensitive to the evolution of human diversity.*

We can confidently say that universal design, inclusive design, or design for all make spaces, products, services, and environments more accessible, safer, and convenient for everyone. Adopting inclusive design in different projects is a process of changing our outlook and breaking personal and social paradigms. It is necessary to recognise that there is a limitation. Still, it is essential, above all, to understand that it is not the fact of having a limitation that sets limits since the human being can reinvent himself. The inclusive design focuses on human abilities, not the users' disabilities. In the second layer of importance, another relevant concept is the one of activist design. This notion underlies the idea of inclusion since design involves areas from different disciplinary sectors, giving design a unique scope among creative disciplines. Activist design, when it operates through a multidisciplinary approach, manages to find solutions that can meet the needs of its users. Design's ability to operate through "things" and "systems" makes it particularly suited to address contemporary social, economic, and environmental issues. Activism is about motivating, activating, and transforming people. This means connecting with people and using knowledge networks. It is also about the role of the activists themselves regarding their motivations and intentions. A clear vision of their intentions, purposes, strategies, and the goal of activism, as well as the sustainability of the issues involved, will help identify people who can contribute to the design process (Fuad-Luke, 2009).

In addition to the intersection of both fields of design, namely inclusive design and activism design, to acknowledge how they can contribute to the inclusiveness and representativeness of children in the scope of brand advertising, it is also relevant to explore the notions of ethical marketing (Arnold 2012, Medeiros 2018), trough which is possible to understand what makes a brand ethical, as well as the possible ways how advertising can be inclusive in a society that is increasingly aware of the needs and differences that surround it.

We live in a society that increasingly advocates the inclusion of minorities, including people with disabilities, whether physical, mental, visual, or hearing, among others. But is this same society willing to include difference? There is a need to label everything that is different, and the disabled person is no exception. Disabled, needy, and unhappy are some of the adjectives used, and adjacent to this comes the preconceived idea that they will never be able to accomplish a particular task or meet certain expectations that the average "normal" human being would be able to. Everything that can divert from "normal" is automatically labelled, discriminated against, and excluded from society's norms, a society that should have the acceptance of difference as a principle. Let us not forget that, regardless of whether a person assumes that a "normal" child corresponds to specific standards and behaviours, this concept may be different for another person. This obsession with previously established standards is a perspective that doesn't allow us to see the difference and promote inclusivity. This discrimination starts in the brands' own campaigns for children. If we analyse a few campaigns where children are the protagonists, they are, in most cases, the typical western children, who correspond to the social stereotype of the perfect child. The big question that should bother us is whether, in fact, the message that brands try to communicate to their consumers is compatible with what they do to support and sustain the inclusion that they say is so important.

Considering the problem found, we have therefore sought to understand, through a survey of the average consumer, if there is a correlation between the inclusion of children with disabilities in advertising campaigns and their social inclusion, as well as to understand which consumer sectors are more and less inclusive.

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Survey to users in Design, Advertising and Marketing

The quantitative research, with a sample of 201 answers, is divided into seven parts, five of which consist of groups of questions with different objectives. In the beginning, a brief explanatory text addresses the research purpose. The 2nd part comprises a set of questions titled "Inclusive Brands", including four examples of inclusive advertisements[1]. In the 3rd part, the main topic is "Brand Perception", to understand the opinion that respondents have towards children's product brands. The 4th part focuses on the "Importance of advertising in inclusion", with questions about the importance of brands and advertising in the inclusion of children with disabilities in society. The 5th section of the questionnaire is related to the issue of "Social Responsibility and the purchase decision process" to understand how the role of social responsibility of brands influences the purchase decision process. The 6th part is concerned with the "Perception of design, advertising, marketing and communication professionals", namely if these professionals knew the term "Universal Design" and how the concept of inclusion in advertising can influence the incorporation of disabled people into society. The last part of the questionnaire is only to collect socio-demographic data.

After analysing the collected data, we can state that brands and society are now more aware of the importance of inclusion in their communication process. This achievement could be seen in the answers to the question *Over the last few years, do you notice any difference in the evolution of society towards inclusiveness?* For 16% of the respondents, everything remains practically the same. If a disabled person wants to go alone to a shop in a commercial space, he or she will not be able to do so due to the lack of accessibility. 67.5% say that there is, in fact, a more significant effort by brands to create conditions, both in physical shops and on digital platforms, that are more accessible to consumers with all kinds of limitations. And for 16.5% of the respondents, the existing changes are notorious since inclusiveness and non-discrimination are already part of the public opinion. However, according to the data obtained, there are still brands that are not inclusive and do not want to be inclusive. This question was asked explicitly to professionals in the areas of advertising, marketing, design, and communication, to understand their perception of the subject *When working with different brands, do you notice a change of paradigm regarding the inclusion of people with disabilities in different projects/campaigns?* We tried to understand if the client's brands of the companies where respondents work are inclusive because it is a fundamental point in their corporate culture or if they are only inclusive because it is a topic that is a trend and increasingly talked about. In the sample of respondents, 45.7% said that "there are inclusive brands only because it is a relevant issue for the consumer, although it is a topic that is not part of its genesis". 42.9% stated that "in fact, socially responsible brands have been increasingly concerned with including disabled people in their campaigns or projects", thus assuming their role regarding the inclusion of this minority in society. Only 17.1% say that "there are uninclusive brands that do not aim to be it". Based on the data obtained in the following question, we can state that inclusion in advertising influences the inclusion of children with disabilities in society. According to the question *Does the inclusion of disabled children in advertising directly influence their inclusion in society?* Around 61% of the respondents said it was essential because advertising can directly influence behavioural change, contributing to greater inclusion and non-discrimination. Nearly 33% said it was an important factor because advertising can raise awareness and show the reality that many of us do not know. The other response options did not obtain sufficient answers to be significant for the sample. For the respondents, the factors which were chosen as being the most important in the inclusion of children with disabilities in advertising campaigns were: (1) the reduction of social exclusion, with about 61%, and (2) the reduction of prejudice associated with children with disabilities (58%), and (3) the inclusion of children with disabilities in society (54%). We can say that a large part of the sample in the questionnaire recognises the importance of including disability in the media, namely in advertising, and associates this inclusion with benefits in the daily life of those who suffer prejudice. In the question *As a consumer, which sector, or sectors, do you think are contributing most to inclusion?* About 66% answered the fashion sector, 62%, the health sector and about 44% the toy sector. Although the fashion sector, for some years, has been the target of harsh criticism for portraying an unattainable reality for most consumers, little by little, this paradigm seems to be changing, and the proof of this is the answers obtained in this question. For marketing, communication, design and advertising professionals, the fashion sector is also perceived as the most inclusive. The following question was made according to a set of best-known Portuguese brands, to which the respondents were asked *Which Portuguese brands do you consider most inclusive?* Zippy[2], perhaps because it is better known, was the brand considered to be the most inclusive, with approximately 72%. Also important to note was the many expression of the option "other brands", around 24.4%. After counting the answers, 34 people answered Benetton. The choice of this brand is not a surprise since it has been one of the international brands in the fashion sector, making more efforts to promote diversity and the

[1] *The brands used as case studies were:*
Brand A
https://www.youtube.com/watch?v=q977nSSYXMo
Brand B
https://www.youtube.com/
Brand C
https://www.youtube.com/watch?v=2LyPOZf-6rw
Brand D
https://www.youtube.com/watch?v=2LyPOZf-6rw

[2] *Zippy is one of the most well-known portuguese clothing brand, specialised in baby and children's textiles that accompa- nies parents and children from birth to pre-adolescence* (Zippy Website, 2021)

inclusion of minorities in their campaigns. Based on the above-mentioned brands, we can state that although there are inclusive brands, they do not represent significant diversity.

Conclusion

After carefully considering the whole research process, it was found that brands already promote some meaningful efforts to be more inclusive. However, some brands are not inclusive and do not want to be it. Based on the obtained findings through the questionnaire application, we can state that the research hypotheses were verified and therefore acknowledged.

The statement that *children's brands, although insufficient in number, are inclusive* was validated since the brands that the respondents mentioned were mostly always the same, i.e., although insufficient in number, children's brands are inclusive. Regarding the assertion that *the inclusion of children with disabilities in society is influenced by their inclusion in advertising campaigns* it was also validated. Based on the data obtained, it was verified that the impact that the inclusion of children with disabilities has on society, and subsequently on the lives of these children, has an influence above all in reducing social exclusion and prejudice, in normalising disability and dissipating the stereotypes associated with disability, and, above all, in contributing to the inclusion of these children in society. Finally, the research affirmation that *the children's fashion sector is the most representative of the inclusion of children with disabilities in advertising campaign* was also possible to validate. The fashion sector was found to be the most inclusive. The brands indicated as the most inclusive were as follows: Zippy, Laranjinha, Knot, NaturaPura and Benetton, all belonging to the children's fashion sector. In general, it was understood that the public is aware of the issue. However, there is still much work ahead to include children with disabilities in society to stop being a subject left behind. We also noticed that agencies/companies/institutions are aware of the need to communicate even more based on inclusive design principles. However, there are still brands that do not want to be inclusive, do not intend to have an inclusive communication, and do not care about rethinking their strategy to be a brand for all consumers. We highlight that the inclusion of children with disabilities contributes to an increase in their self-esteem and equality with non-disabled children. When they are included, there is a greater feeling of belonging to a community. Another strong point around the inclusion principles and practices in advertising is undoubtedly the reduction of social exclusion, reduction of prejudice, dissipation of stereotypes associated with disability, and the inclusion of children with disabilities in advertising. Another advantage of including children with disabilities in advertising campaigns is the increased public awareness of the inclusion philosophy, encouraging other children and their families about the fact that disability is limiting only in certain aspects, as well as showing society that children with disabilities must participate so that we can live in a fairer society. However, the general public's misinformation on the issue of inclusion could be a threat. Although there is gradually a greater awareness, prejudice is still present in our society. As can be seen from the obtained results, about 50% of respondents had already witnessed situations of discrimination. Another vulnerability that directly influences the inclusion of children with disabilities in advertising is the fact that there are still brands that are not inclusive, nor do they intend to be. It was also found that certain agencies/companies/institutions do not follow inclusive design principles because it is not part of their internal policy. To increase inclusion in advertising, brands and their entire surrounding network must also be inclusive so that together they create strategies and communication plans that meet the needs of this minority, which in turn will contribute to raising awareness for the inclusion of people with disabilities in society. The opportunities that brands can have in their favour is the fact that it is a trendy interest, which at the business level can bring benefits if they start designing strategies and developing products or services that consider the limitations of those with any kind of disability. Despite being extremely important, the inclusion issue is also a trend, which makes brands that show they are inclusive to be well seen by their stakeholders and consumers. For brands that have not yet affirmed themselves in the business world or those that have not yet been created, it is an excellent opportunity to launch themselves in the market, having in their genesis the principles of inclusion, equality, and non-discrimination. All brands that have these principles at their beginning have a greater probability of success. Finally, one of the main risks is the lack of information and public awareness about inclusion. The lack of visibility given to the subject is a factor that has a direct effect on children's lives and their families. This lack of awareness is also reflected in brands and agencies/companies/institutions, a field that must change its mentality because advertising is a mass media that can change society's behaviour. Exclusion begets exclusion, and there should be no room for segregation of minorities and disabled people in a civilised society. Advertising is a relevant issue for a fair and inclusive society. This study contributes to the brands' point of view to understanding that inclusion is an increasingly relevant issue to consumers. In turn, the brands' posture towards sensitive themes is a factor that directly influences the purchase decision process.

Acknowledgements
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Curb the environmental impact of hospitals through the redesign of single-use procedural kits

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The current pandemic crisis has highlighted how the excessive use of plastics in hospital systems is one of the most critical issues in terms of recovery, recycling and proper disposal of the waste generated by the entire system. In an attempt to respond to this crucial question, the paper reports on research conducted on single-use surgical products, in particular on the redesign of a single-use procedural kit. The research was conducted through desk research, field research and the HCD approach. The research required a multi-disciplinary approach to develop new sustainable layouts starting with the details, requirements and needs for the design of an adaptable and versatile procedure kit were highlighted. The design solutions that led to the realisation of the prototype are: design of a biodegradable EPP tray, functional for disposal by incineration; design of a recyclable PETG tray, divided into 3 compartments. The project will reduce production costs by using less plastic material, leading to the creation of a new product/service flow; organic-based tray that minimises pollution; reducing incineration by reducing unused waste; time-saving benefits by individual packaging of additional customisable instruments.

Keywords *Sustainable Healthcare*, *Waste consumption*, *Medical Packaging*, *Procedural kit*, *Circular Economy*

Introduction

Climate change is considered unstoppable with melting glaciers, rising seas and increasingly frequent and destructive rainfall and weather events (European Commission, 2017). The issue of global health care due to the ongoing pandemic has been found to be in small part, though currently intense, threatened by the impact of medical disposables both in global hospital facilities and in the home, such as surgical masks and medical gloves. Although very different in scale, each nation's healthcare sector directly and indirectly releases greenhouse gases during the delivery of care and use of products, services, and technologies from a high-carbon intensity supply chain (Karliner, 2019). Healthcare contributes to carbon emissions through energy consumption, transport, and product manufacture, use, and disposal (Practice Greenhealth, 2019). Therefore, it is necessary to change to a healthcare circular economy by adopting new sustainable practices necessary to curb the carbon footprint produced by this sector. Considering carbon emissions produced by the healthcare sector: if healthcare were a nation, it would be the fifth largest emitter of greenhouse gases on the planet (Karliner, 2019). It is a carbon contribution equal to the emissions of 514 coal-fired power plants, or 4.4% of global net emissions (Ngo, 2020). The highest contributions to the global healthcare climate footprint come from the United States (546 million metric tons of CO2e), China (342 MtCO2e), and the European Union (248 MtCO2e) (Karliner,2019). In 2012 the National Academy of Medicine estimated the U.S. healthcare system squandered $765 billion a year, more than the entire budget of the US Defence Department (Allen, 2017). In the University of California, San Francisco Medical Center, for instance, researchers estimated that in a single year the hospital wasted $2.9 million in neurosurgery supplies alone. On wasted supplies in just one department (Allen, 2017).

Through a specific case study, this study aims to analyse the current situation in the healthcare sector, which is an influent producer of circular plastic stream waste, and to introduce possible sustainable alternatives reconfiguring inserts with macro division of items unused in a neurosurgical procedural kit.

Challenges and opportunities for a circular healthcare system

Over the years many communities worked to fight carbon emissions produced by healthcare facilities, promoting recycling, reusing, recovering and new management strategies. Healthcare Plastics Recycling Council (HPRC) has led projects to develop hospital waste diversion strategies, but single-use plastics still dominate in healthcare environments. At last count, about 2,800 to 3,500 tonnes of plastic packaging and plastic product waste from US healthcare facilities is generated daily, according to the HPRC. Most of this goes to landfill or is incinerated (Danigelis, 2020). Moreover, the ongoing health emergency has highlighted one of the critical factors in the sector: the environmental impact that determines the massive use of "disposable" products, which now are mainly based on the use of plastic polymers that are difficult to recycle and/or compostable.

In Italy, in terms of the amount of such medical waste, according to the Italian National Institute for Environmental Protection and Research, the numbers generated by the sanitation emergency would amount to a number between 150 thousand and 450 thousand tons (ISPRA Report, Waste consisting of used PPE, May 2020). Waiting to know what the final balance will be, according to Ecocerved, a consortium company of the Italian Chamber of Commerce system, in 2018 the Italian production of medical waste stood at around 180 thousand tons. Mostly, such waste is hazardous with infectious risk (78% of the total), coming from public hospitals, especially medium-large sized ones (almost 60% from public centres with at least 150 beds). At a national level, medical waste has no other destination than incineration, for 65% of the total, and activities aimed at disposal for the remaining 35%, with percentage differences between region and region (Ecocerved, 2020). From an economic point of view, operating rooms represent the greatest revenue and at the same time they are most of the waste comes and consequently "the greatest costs for disposal, accounting for 30% of the total amount of hospital waste" (Babu, 2019). Considering the collection and disposal of medical waste, there are tools that have to be disposed of immediately, while others can be recycled over a longer period of time, with the help of specialized organizations like Stryker, a recycling company for the medical industry items, or Vanguard Medical, a surgical instruments reprocessing company. Materials that are accepted by these organizations include laparoscopic devices, wristbands used for blood pressure measurement, surgical product casings and more. For supplies or equipment that are no longer useful but have not expired and are still in working order, they are collected by organizations such as Med Share who, after collecting them, distribute them to medical facilities that cannot afford to purchase these items probably due to cost (Tine Health, 2017). Hospitals implementing environmental initiatives in operating rooms saved more than $53 million in aggregate in 2018, with a median savings of over $100,000 per facility. (Practice Greenhealth, 2019).

A valuable example is the Johns Hopkins Health System in Baltimore, where the Neurasthenia Division was able to save

European Commission. (2017). Climate change consequences. Climate Action - European Commission. Retrieved from February 16, 2017. https://ec.europa.eu/clima/change/consequences_en

Karliner, J., Slotterback, S., Boyd, R., Ashby, B., & Steele, K.. (2019). Health Care Without Harm & Arup. Findings Health care's climate footprint. Health care's climate footprint (Climate-smart health care series Green Paper Number One) 10, 19. https://noharm-uscanada.org/ClimateFootprintReport

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Ngo, H. (2020). How do you fix healthcare's medical waste problem. Coronavirus has made medical waste more visible than ever, but the environmental footprint of healthcare goes much further – and reducing it could save lives. BBC. https://www.bbc.com/future/article/20200813-the-hidden-harm-of-medical-plastic-waste-and-pollution

Allen, M. (2017). What Hospitals Waste. ProPublica. https://www.propublica.org/article/what-hospitals-waste

Danigelis, A. (2020). Healthcare Packaging Manufacturers Struggling with Sustainability. Environment + Energy Leader. Environmental leader. https://www.environmentalleader.com/2020/03/healthcare-packaging-struggle/

ISPRA. (2020). Report, Waste consisting of used PPE, May 2020. Retrieved from December 1, 2020. https://www.isprambiente.gov.it/files2020/notizie/rapporto-ispra-dpi-usati.pdf

Ecocerved. (2020). Report, Production of medical waste in Italy, 2020. Retrieved from December 1, 2020. https://www.ecocamere.it/dettaglio/notizia/451/rifiuti-sanitari-qual-e-la-situazione-in-italia

Babu, M. A., Dalenberg, A. K., Goodsell, G., Holloway, A. B., Belau, M. M., & Link, M. J. (2019). Greening the operating room: results of a scalable initiative to reduce waste and recover supply costs. Neurosurgery, 85(3), 432-437. https://doi.org/10.1093/neuros/nyy275

$5 million in 2010 and 2013 for its reprocessing program. But recycling is not always applicable for all items in the operating room; especially if there is a risk of infection. Patient safety is more important than sustainability (Tine Health, 2017). The key to minimising and effectively managing medical waste is the separation and identification of waste. Proper handling, treatment and disposal reduces costs and is very helpful in protecting public health. The most appropriate way to identify categories of medical waste is to sort the waste through the use of color-coded plastic bags or containers. Using the biohazard symbol on the packaging medical waste can be immediately identified from users (World Health Organization, 2019). From the above data, a clear picture emerges that highlights the contemporary incompatibility between the health need to use disposable plastic tools and packaging and the environmental need to reduce products with high polluting potential. This poses a challenge to the Design Discipline that research must be able to face to develop new practical, real, and sustainable solutions.
The research adopted needed a multi-disciplinary tactic to develop new sustainable layouts starting from the users need (usability) and hospital needs (economic sustainability). The research work objective was to reduce the waste of the disposable surgical instruments, contained in the trays that are usually used during several surgical procedures and that are often discarded without being used completely, because they are no longer sterile and unrecoverable. For this reason, the focus has been directed towards the major users of hospital disposable procedural kits having a significant impact both quantitatively and qualitatively. The objectives have contributed to the research and the definition of a specific sector in which to investigate.

Methods

To answer to this challenge, this paper reports research conducted on single-use surgical products, particularly on the redesign of a single-use procedural kit, using the Human-Centered Design approach and through both desk research and field research (Fig. 1). Starting from an analysis of the scientific literature, aimed at two parallel aspects with a strong impact on the hospital economic system, have been tackled critical issues on surgical supplies packaging, saving on products, transport and waste production. From a quantitative point of view, a study was aimed to highlights which and how many materials are most unused in an operating theatre, where up to 70% of hospital waste is created, and up to 90% of operating room waste is improperly sorted and sent to costly and unneeded waste processing (Lee, 2012). A best practice adaptable has been described

Practice Greenhealth. (2019) Ibidem

World Health Organization. (2019) Safe management of wastes from health-care activities II. Retrieved from May 6, 2021. https://www.who.int/water_sanitation_health/publications/wastemanag/en/

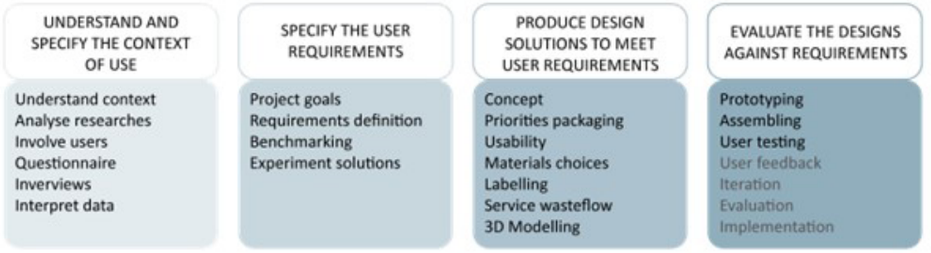


Figure 1: Design Process

Lee, R. J., Mears, S. C. (2012). Greening of orthopedic surgery. Orthopedics, 35(6), e940-e944.

Circle Economy (2015). Healthcare Plastic Waste: Analysis of OLVG Hospital Plastic Waste Streams. Amsterdam. https://www.circulairondernemen.nl/uploads/669c6eb7189f26e44986a9ef69c15569.pdf

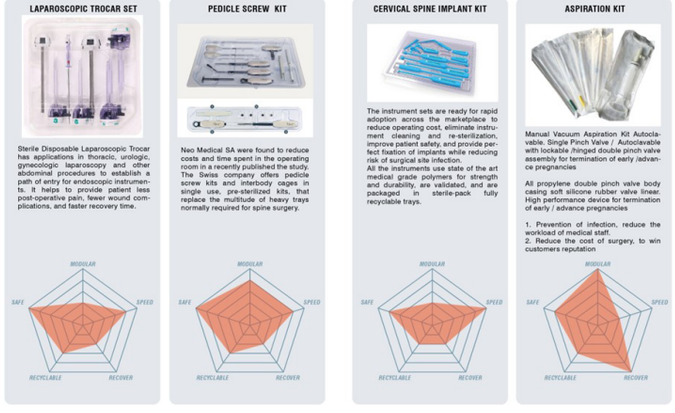
Zygourakis, C. C., Yoon, S., Valencia, V., Boscardin, C., Moriates, C., Gonzales, R., & Lawton, M. T. (2017). Operating room waste: disposable supply utilization in neurosurgical procedures. Journal of neurosurgery, 126(2), 620-625. https://doi.org/10.3171/2016.2.JNS152442

by the Nederland Circulair initiative of the Dutch Ministry of Infrastructure and Environment that contributed to the overall objective of creating a single stream of plastic packaging in hospitals by analysing the typical plastic waste streams of the OLVG hospital. “The largest category of plastic products found in OLVG hospital waste bags is single-use packaging, which accounts for more than 50% of the total plastic waste”. (Circle Economy, 2015). Moreover, from a qualitative point of view, the research paid attention to what may be the biggest economic wastes within operating theatres, identifying real waste of disposable instruments that are not always used during certain surgical procedures consequently creating a significant burden on healthcare costs. Related is a study published in the Journal of Neurosurgery, Dr Corinna Zygourakis, a leading neurosurgeon at the University of California, San Francisco, said that "accounting for the different case distribution in the 58 selected cases, the authors estimate approximately $968 of OR waste per case, $242,968 per month, and $2.9 million per year, for their neurosurgical department” (Zygourakis, 2017). Analysed the context phase, user research has been carried out with an overview of the different roles of nurses within the operating room. Subsequently, user requirements were defined, obtained by submitting a questionnaire to surgeons and instrument nurses working in the different sectors, which were highlighted all the peculiarities, both positive and negative, of disposable surgical supplies. The questionnaire was completed by 11 surgeons from different hospital departments, suggestions or considerations were asked about the issues submitted (Fig. 2).
One general surgeon, in the gallbladder procedure, advised to "open only what is necessary to start the procedure, and then the rest". Another surgeon from obstetrical traumatology suggested "bagging the disposable material individually, so that it can be opened when needed". The aim was to identify the areas of use and any waste that occurs within an operating theatre,

Figure 2: The operating block of Orthopaedics.

regarding disposable instruments that, although opened within the operating protocol, are not used, paying particular attention to those instruments that have a greater risk of falling/breakage. A benchmarking has been carried out by collecting data on the different types of packaging for medical devices and disposable instruments with the aim to highlight interesting specific characteristics, functional to develop the product (Fig. 3). The latter defined the various needs and showed how some of them respond to certain needs such as considerable waste and safety priorities. The research was then carried out in the field through visits that led to observations within the operating block of Orthopaedics. An interview with the head of the operating theatre department and a neurosurgeon trainee allowed a comparison of which procedures could be optimised and suggestions on how to identify instruments that were more or less used and more or less at risk. Prior to defining the requirements, a task

Figure 3: Scenario Analysis.



analysis was carried out to identify the sequence of actions that operators perform during a surgical procedure using disposable kits (Figure 4). It was ascertained that on several occasions the following dynamics occurred:

- Fall of a disposable instrument, leading to the opening of a second kit for the rapid continuation of the procedure
- Breakage of a disposable instrument, leading to the opening of a second disposable kit for a single instrument
- Non-use of some instruments in the disposable kit in most of the cases analysed.

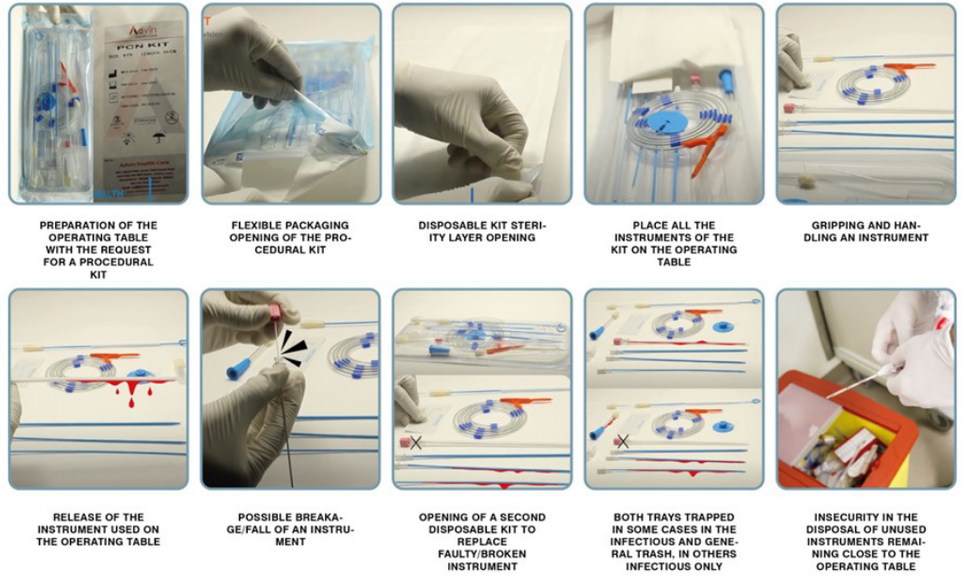
Subsequently, the following were identified specific requirements adaptable to many different procedures that can optimize the lifecycle products:

- a smart labelling that describes the proper disposal,
- the shelf-life efficiency,
- packaging choice on the number of plastic barriers needed for a specific device/tool,
- the shock resistance ensuring durability and sterility and
- a proper sizing to optimize the supply chain

Results

The design solutions that led to the realisation of the prototype were a) the design of a biodegradable EPP tray, functional

Figure 4: Storyboard.

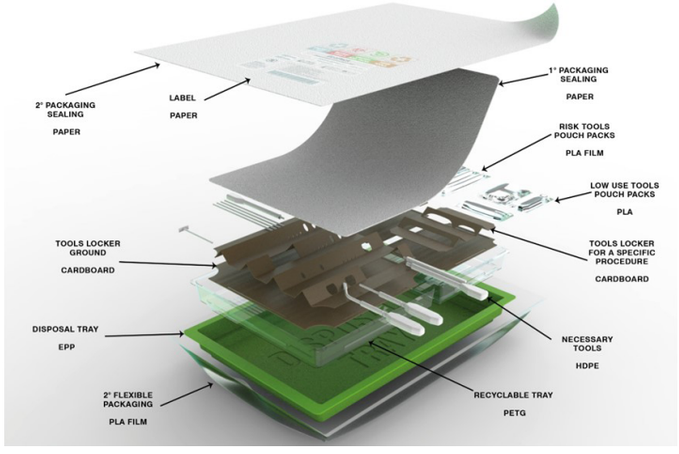


for disposal by incineration; b) the design of a recyclable PETG tray, divided into 3 compartments (Figure 5). The biodegradable EPP tray collects all the instruments used during the procedure, therefore infected, with the end of their lives being incineration. The recyclable PETG tray contains in turn three specific compartments. The first contains instruments that need to be ready to use, the second at risk of falling/breaking, and the third instruments that are not always used. Those are fixed on a cardboard layer that replaces the individual compartmentalisation per instrument, making the kit customisable for any type of single-use procedure, as well as being able to make the PETG tray sterile (Fig. 5). The design of "EcoPack" medical packaging resulted from a creation of a new product/service flow focused on:

- returning the packaging to the manufacturer of those packages by locating them in the additional tool tray, so they are not necessarily ready to use;
- reducing the amount of biohazard waste burned in the incinerator. The use of an organic-based tray aims to minimise site pollution;
- advantageous recycling for trays and procedural tools that were previously rejected in general, waste or even biohazard waste.

To validate the design proposal in terms of usability and effectiveness of the created system, some Human-centered Design tools were used such as the Task Analysis, the representation of use scenarios, and the creation of a live simulated photographic storyboard thanks to the participation of medical staff already involved in the early stages of the research.

Figure 5: EcoPack configuration.



Abdalla, Y. (2020). Value based healthcare: Maximizing efficacy and managing risk with spinal implant technology. Interdisciplinary Neurosurgery, 22, 100810. https://doi.org/10.1016/j.inat.2020.100810

Conclusions

In conclusion of the research part, a single use procedural tray was redesigned, taking as example the Neo Pedicle Screw System™, Neo Medical S.A. (Abdalla, 2020). The concept reveals a kit containing the necessary instruments, all in one package, and customisable single-package instruments. The tray is optimised by selecting the instruments used, only in special situations or overused and therefore at risk of falling/breakage. The design solutions that led to the realisation of the prototype were:

- the design of a biodegradable EPP tray, functional for disposal by incinerators,
- the design of a recyclable PETG tray, divided into 3 compartments.

The biodegradable EPP tray collects all the instruments used during the procedure, therefore infected, with the end of their lives being incineration. The recyclable PETG tray contains in turn three specific compartments. The first contains instruments that need to be ready to use, the second at risk of falling/breaking, and the third instruments that are not always used. Those are fixed on a cardboard layer that replaces the individual compartmentalisation per instrument, making the kit customisable for any type of single-use procedure, as well as being able to make the PETG tray sterile. All those points are summed up on Fig. 6. In the next phase, there was the opportunity to get in touch with a resident neurosurgeon and the head of the operating block of the hospital in Rome, who provided valuable elements for the realization of the prototype, offering his experience in the operating room and allowing me to optimize the functionality of the product made. In the opinion of many of the people involved, the feedback and interest received are likely to be developed in the next steps. The next achievable steps will be an evaluation by the room operators such as neurosurgeons and ward staff. From the evaluations received it will be possible to validate what is proposed in order to iterate the process by implementing what emerged to insure and validate the concept of the project.

Figure 6: Benefits achievable.

A Beautiful Light.
Fascination Against Depletion

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A study investigating the connection between the personal idea of beauty and the soft fascination phenomenon demonstrates that beauty can be beneficial to our mental health and well-being, as well as it seems possible to categorise some patterns crossing different cultures and countries. An experimental approach has been applied to the analysis of the individuals' beauty experience. When compared to the Goal-Directed Attention task, beauty contemplation may induce higher temporal beta power asymmetry and higher frontal alpha power asymmetry, which was demonstrated to be a signal of Vagus Nerve stimulation (VNS). We considered potential climate and culture bias in study design and conducted research across Europe, Canada, and Turkey, to gather quantitative data and look for a trend in the physiological response of people to beauty. In this study, the experimental approach had the objective to apply electroencephalography (EEG) and Galvanic Skin Response (GSR) as autonomic signal analysis to study responses to the personal idea of beauty. 154 individuals (87 women and 67 men) participated in the study, of which 137 were considered eligible. Participants were asked to: passively view 2 pictures, to look at their own beauty emblem for 5 minutes, and finally a fast recall test was performed, while an EEG per each moment and continuous GSR was recorded. Increased power in the asymmetry of the beta frequency band was found, possibly in relation to the viewings of the personal beauty emblem. The findings suggest that being exposed to an object representing the subjective idea of beauty could be linked with the involuntary attention mechanism, which is compatible with a positive emotional state.

Keywords *Aesthetics*, *Soft-Fascination*, *Restoration*, *Attention*, *Lighting*.

Introduction

In the world governed by technology, people are requested to be resourceful, social, and attentive, and incorporate a wide array of environmental cues exerting their full cognitive processes activated (Bargh, Morsella, 2008). The spaces we inhabit can either leave us feeling depleted, or recharged: the environmental cues often contribute to our cognitive overload.
In environmental psychology the word “restoration” is used to describe an automatic (Kaplan & Kaplan, 1989) recovery of attentional resources, in response to environmental cues present predominantly in natural settings. Furthermore, Attention Restoration Theory (ART) (Kaplan et al., 2001) implies that it is beneficial to seek out environments that support regeneration of directed attention, a finite resource exerted whenever we aim to stay focused and effective.
In the lighting field, the topic of Human Centric Lighting describes the use of artificial lighting sources to create visual environments that mimic the natural one. As a matter of fact, light, both natural and artificial, is a physical stimulus capable of producing visual and non-visual responses. The non-visual effects of light cover the phase shifting effects of the circadian rhythm, as well lighting impact on instantaneous changes in our physiology, alertness, performance, and mood (Campbell et al. 1995). Recent studies have confirmed that all the types of photoreceptors (Rods, Cones and ipRGCs) contribute to both visual and non-visual responses, to some degree (Esposito & Houser, 2019). In fact, ipRGCs incorporate input from the Rods and Cones, creating parallelism in terms of visual comfort, visual acuity and non-image forming effects (Schroeder, et al., 2018).
In recent years, the need of designing beyond the mandatory standards, while respecting the permeability between human beings and the spaces they are at, has paved the path for new approaches for both designers and scientists.
Interdisciplinary approach has been required. Lighting designers started to focus on both visual and non-visual comfort and visual experience through implementation of rigorous scientific evidence that falls under the current knowledge on the complex effects of light on humans (Schlangen, 2019).
Psychologists began to investigate natural spaces and search for clues that could help with avoidance of the excessive stimulation (van den Berg, et al., 2003).
It follows that one of the challenges of this study is to merge the current research findings of these two disciplines, and to transform it into a valuable design tool.

Bargh, J. A., Morsella, E. (2008). *The Unconscious Mind. Perspectives on Psychological Science*, 3(1), 73–79.

Kaplan, R., Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, New York. Republished, 1995. Ulrich's, Ann Arbor.

Campbell, S. S., Terman, M., Lewy, A. J., et al. (1995). *Light Treatment for Sleep Disorders: Consensus Report: V. Age-Related Disturbances*. Journal of Biological Rhythms, 10(2), 151–154.

Esposito, T., Houser, K. (2019). *A new measure of colour discrimination for LEDs and other light sources*. Lighting Research & Technology, 51(1), 5-23.

Houser, K., Boyce, P., Zeitzer, J., Herf, M. (2021). *Human-centric lighting: Myth, magic or metaphor?* Lighting Research &Technology, 53(2), 97–118.

Schroeder, M.M., Harrison, K.R., Jaeckel, E.R., et al. (2018). *The Roles of Rods, Cones, and Melanopsin in Photoresponses of M4 Intrinsically Photosensitive Retinal Ganglion Cells (ipRGCs) and Optokinetic Visual Behavior*. Front Cell Neurosci. 12;12:203.

Schlangen, L. J., (2019). *CIE position statement on non-visual effects of light: recommending proper light at the proper time*.

Van den Berg A.E., Koole S.L., Van der Wulp N.Y., (2003). *Environmental preference and restoration: (How) are they related?*, Journal of Environmental Psychology, 23(2), 135-146,

Kort, de, Y. A. W., Veitch, J. A. (2014). *From blind spot into the spotlight*. Journal of Environmental Psychology, 39, 14.

Kaplan, R., Kaplan, S. (1989), *op. cit*.

Haga, A., Halin, N., Holmgren, M., Sörqvist, P. (2016). *Psychological Restoration Can Depend on Stimulus-Source Attribution: A Challenge for the Evolutionary Account?* Frontiers in Psychology.

Yantis, Steven. (2008).*The Neural Basis of Selective Attention. Cortical Sources and Targets of Attentional Modulation*.

Itti L, Koch C. (2000). *A saliency-based search mechanism for overt and covert shifts of visual attention*. Vision Research, 40(10–12), 1489-1506.

Since we spend most of the time in a built environment, often in an attempt to meet the pressures of the workplace, investigation of the restorative potential of indoor spaces becomes an important research avenue. For example, in the context of the workplace, it is advised to have periodic breaks at the workstation (Tyler, Burns, 2008), and to seek exposure to daylight (Smolders, deKort, 2014). However, more research is required to understand how a built environment can provide restorative experience and mimic the innate restorative potential of nature.
A key environmental psychology concept relevant to this study, is “soft fascination” phenomenon, identified as one of the four characteristics of an environment that aids restoration of a fatigued mind. ‘Soft fascination’ was previously described as an ability of the environment or an object to capture attention in a subtle and effortless way (Kaplan & Kaplan, 1989). According to ART, visiting or viewing natural environments can have restorative psychological effects, while exposure to the built environment typically has fewer positive effects (Haga et al. 2016).
Neuroscience explains selective attention as per the process of focusing on a particular object in the environment for a certain period of time. This kind of attention allows us to tune out unimportant details and focus on what matters.
This perceptual selection could be achieved in two ways: bottom-up, involuntary, and stimulus-driven, depending on a stimulus salience, and top-down, based on the organism's behavioural goals (Yantis, 2008).
Physical salience, proposed as a mechanism of bottom-up attention, implies that objects, that are for example characterised by unique colour or motion characteristics, express high contrast which permits them to compete more effectively with other stimuli. This model of stimulus-driven capture of attention stresses the importance of local feature contrast in guiding attention (Itti & Koch, 2000). Top-down attention refers to the voluntary allocation of attention to certain features, objects, or regions in space (Pinto, et al., 2013).
Attention restoration, and soft fascination, have been previously linked with 'stimulus driven attention', and the so-called bottom- up attentional mechanism (Kardan et al. 2015), (Olszewska-Guizzo et al. 2018).
To observe neural correlates of fascination related to stimuli driven attention and to systematise physical attributes of restorative environments, we focus on recent studies that suggest that alpha and beta asymmetry between right and left

hemispheres can be valid biomarkers of attention restoration (Olszewska-Guizzo et al.,2018).
In this study, we investigate both ascending (bottom-up) and descending (top-down) attentional mechanisms: when subjects are asked to look at the image, they perform a task and voluntarily allocate attention to images (top-down), however we hypothesise that subjects' own beauty emblems capture their attention in an involuntary manner because of physical salience (bottom-up), and their associations (top-down). It was proposed that such personal associations can have additional impact on perceived restorative potential (Ratcliffe et al, 2016) and that increased beta activity over the right hemisphere correlates with attention restoration. Additionally, we consider frontal alpha asymmetry to be linked with emotion related symptoms, that is increased parasympathetic activation (Sun et al., 2017), which could be reflected by the low galvanic skin response (GSR) trend.
The greater objective of this investigation is to establish a link between the 'soft-fascination' phenomenon and artificial lighting, and an attempt to recreate outdoors' restorative potential in the context of the built environment.
In this article, the first of two experiments, is described, and it entails two hypotheses: that the 'soft fascination' phenomenon could be reproduced indoors and, secondly, that it could be linked to subjective beauty perception.
The parallelism between fascination and beauty follows the ability of the latter to have an impact on attention and motivational state.
For example, research demonstrates that beauty is highly adaptive, and the brain has evolved to activate neural networks associated with reward in response to beautiful faces (Lindell & Lindell, 2014).
We hypothesise this same that exposure to the personal idea/ concept of beauty may involve involuntary and effortless attention. This research project's vision is about bringing the fascination moment indoors.

Methods

A study to test the hypothesis about the relationship between individual perception of beauty and soft fascination has been conducted. Individual beauty perception may vary according to the season, latitude, and cultural backgrounds. In the view of this, the experiment was designed to go over the most recurrent biases in the cognitive processes: culture and climate.
Ten cities spread in nine different countries at different latitudes were selected to host the experiment sessions: Calgary, Canada; Athens, Greece; Reykjavik, Iceland; Rome and Pescara, Italy; Lisbon, Portugal; Madrid, Spain; Stockholm, Sweden; Istanbul, Turkey; Manchester, UK. Data gathering took place in a different room for each location, while following four basic parameters: minimum size five square metres maximum ten square metres; a minimum of one daylight opening; plain and white or light-coloured walls; artificial light off.
With attention being the domain' study, we evaluated the impact of biological body rhythm, which places the high alertness moment before noon (Matchock et al., 2009) which led to setting the experiment hours from early morning to lunch time, reflecting each country's custom.

Participants

A total of 154 participants were recruited among students and professionals, between 20 and 40 years old.
The following numbers of men and women were recruited in each city: Athens 3-8; Calgary 11-10; Istanbul 7-7; Lisbon 8-8; Madrid 2-11; Manchester 7-9; Pescara 10-12; Reykjavik 4-7; Rome 6-8; Stockholm 8-8. Seventeen people were excluded from the study because of the quality of the recording and or because of lack of full test completion. All selected participants had normal, or corrected to normal, vision. All participants signed the informed consent form and filled in a beauty-related qualitative questionnaire.

Stimuli

The test was divided in three moments, reflected by three different stimuli.
First one was a presentation of two images whose selection was inspired by the IAPS standardised set of pictures' method: picture of a vegetable; picture of a child.
Second moment was based on the beauty emblem the participants were asked to carry with them. The requirements indicated a visual element (e.g., An object, a picture of a person, a postcard of a town, etc.), no additional restrictions were provided.
At the third moment a list of 10 letters was presented on a screen, one at a time, randomly generated by a software.

EEG and ECG Apparatus

Subjective assessment of emotional valence is typically associated with both brain activity and autonomic arousal (Farrow at al., 2013). Quantitative data have been gathered in the quasi-experiment in nine different countries with an EEG

Pinto Y., van der Leij A.R., Sligte I.G., Lamme V.A.F., (2013). Scholte S.H.; *Bottom-up and top-down attention are independent*. Journal of Vision; 13(3):16.

Kardan, O., Demiralp, E., Hout, M.C., Hunter, M.C., Karimi, H., Yourganov, G., Jonides, J., Berman, M.G. (2015). *Is the preference of natural versus man-made scenes driven by bottom–up processing of the visual features of nature?* Front. Psychol.

Olszewska-Guizzo, A., Paiva, T. O., Barbosa,F., (2018). *Effects of 3D Contemplative Landscape Videos on Brain Activity in a Passive Exposure* EEG Experiment. Frontiers in Psychiatry, 9, 317.

Ratcliffe, E., Gatersleben, B., Sowden, P. T., (2016). *Associations with bird sounds: How do they relate to perceived restorative potential?* Journal of Environmental Psychology, 47, 136-144.

Sun L., Peräkylä J., Hartikainen K.M., (2017). *Frontal Alpha Asymmetry, a Potential Biomarker for the Effect of Neuromodulation on Brain's Affective Circuitry—Preliminary Evidence from a Deep Brain Stimulation Study*. Frontiers in Human Neuroscience. 11, 584.

Lindell A.K., Lindell K.L., (2014). *Beauty captures the attention of the beholder*, Journal of Cognitive Psychology, 26:7, 768-780.

Matchock, R.L., Toby Mordkoff, J. (2009). *Chronotype and time-of-day influences on the alerting, orienting, and executive components of attention*. Exp Brain Res 192, 189–198.

instrument to monitor the brain electrical activity and an EDA to track the galvanic skin response (GSR).
The EEG data acquisition was done with an Emotiv EPOC ® EEG Headset (Emotiv Epoc, San Francisco, CA, USA) consisting of a wireless headset of 14 channels for EEG signals + 2 channels as reference points, with a sampling frequency of 128 samples per second. The EDA data acquisition was done with eSense Skin Response (Mindfield®, Gronau, Germany) eSense equipped with two gel electrodes per participant.

Data collection
The 15 minutes attention test was divided into three different moments. Participants were initially told not to drink any caffeine-based drinks for two hours prior to the experiment and they were asked to bring an object representing their own idea of beauty with them.
Volunteers were seated and, following the wearing of the equipment, they were instructed to minimise movement during the test for a better-quality recording.

Moment 1 – Looking at two images for a minute in total. Participants were asked to look at two pre-selected pictures on the screen for a minute in total, 30 seconds each picture. The attention domain of this test is selective attention, as per the process of focusing on a particular object in the environment for a certain period of time.

Moment 2 – Looking at their own beauty emblem for 5 minutes. Participants were asked to carry with them a symbol of their own idea of beauty. The second moment of the test was to look at their beauty emblem, to test the hypothesis that beauty perception can be linked with the phenomenon of Soft-fascination, one of the four characteristics of an environment that help to restore a fatigued mind (Kaplan & Kaplan, 1989).

Moment 3 – Fast recall test. Participants were asked to look at a screen where a list of 10 letters was presented, one at a time, and their task was to remember as many of the letters as possible. As per moment 1 of the test, we are considering the selective attention, but with a dominance of top-down mechanisms, as per attentional selectivity is proven to be linked with working memory processes, as per the recall test. In the view of this, tracking this test's results was not the objective, but the act of trying to recall the letters.

Farrow T., Johnson N., Hunter M., Barker A., Wilkinson I., Woodruff P., (2013). *Neural correlates of the behavioral-autonomic interaction response to potentially threatening stimuli.* Frontiers in Human Neuroscience. 6, 349.

Kaplan, R., Kaplan, S. (1989), *op. cit.*

Data Processing and Analysis
The EEG Raw Data package was about 470 EDF files, from 80 to 300 seconds trials.
Data analysis was performed using Jupyter Notebook coding with python and specific open-source python package for exploring, visualising, and analysing human neurophysiological data. All the raw edf files were flat without annotations for bad channels or bad time span. Moreover, the data structure should be considered flat as there were no epochs, periods, events registration during the recordings.
The EEG basic pre-processing has been relevant to the manual detection of bad channels and of bad time spans. No artefacts removal has been considered useful for the purpose of this paper.
Data analysis is focused on the study within the two main frequency bands: Alpha (7.5-14 Hz) and Beta (14-30 Hz).
With collecting and analysing these data, we are assessing the ability of subjective perception of beauty with capturing attention and altering attentional deployment rapidly and effortlessly. Because of this, we checked the frontal alpha asymmetry temporal beta asymmetry. According to the EMOTIV hardware model, the electrodes of interest are (frontal) FC5, F7, F3, AF3 - FC6, F8, F4, AF4 and (temporal) T7, T8.
The recorded EEG data have been re-referenced to the average of all the electrodes before the processing.
Data has been then filtered for slow-drifts removal (low-frequency <1Hz) and a notch filter has been applied for power noise attenuation at 50 Hz.
A reference period of 10 s has been selected for Moment 1 and Moment 3.
Moment 2 was segmented in 10 second epochs for the analysis.
Band pass filters have been applied to extract the Alpha and Beta frequencies of interest.
As a result, we obtained two files per subject and per single moment, each containing one of the frequencies described above. The mean absolute power was computed for each electrode as the average of the square voltage amplitude at each time point (μV2).
Power values were log transformed to normalise their distributions, and asymmetries between brain hemispheres per EEG band were computed by applying the formula (log(R)-log(L))/(log(R)+log(L)), where R is the power of a particular EEG band on the right hemisphere and L is the power on the left hemisphere (Davidson, 1988).

Frontal Asymmetry for Alpha band and Temporal Asymmetry for Beta band have been investigated.
It is considered no-asymmetry when the relation between left and right power is equal to zero, while it is a considerable presence of asymmetry when there is a higher activity of the right hemisphere over the left one (Baehr et al., 1999).
The asymmetry between right and left hemisphere for alpha and beta frequency bands at the frontal and temporal electrode locations was checked on the total group and on each individual nation.

Correlation Analysis
We hypothesised that the experience of beauty, related to the 'soft fascination' phenomenon, would induce higher frontal alpha power asymmetry and higher temporal beta power asymmetry, when compared to selective attention moments.
Comparing frontal alpha asymmetry scores in the context of neutral stimuli (BL) from frontal alpha asymmetry scores in the context of beauty-related stimuli gives an index for the impact of the exposure to the personal idea of beauty on alpha asymmetry.
Similarly, comparing temporal beta may suggest the existence of the relation between beauty and soft fascination.
After deriving these measures for each moment of the experiment (i.e., Moment 1, Moment 2, Moment 3) separately, we expected to find an increased asymmetry in Moment 2, resulting in an association of beauty with positive emotion-related states. It followed a correlation analysis where we look at changes in skin conductivity on beauty exposure linked to stress decrease.

Results

Biomarker A - Higher Frontal Alpha Asymmetry
No significant asymmetry was shown in Moment 1 and Moment 3, which is reflected by values close to or equal to zero for the selected time segment. Analysing the entirety of the Moment 2 per participant, we see no significant correspondence between being exposed to the personal idea of beauty and an increased frontal alpha asymmetry.
The subgroups show that 3 out of 10 cities had an inverse trend - decreasing asymmetry - (Fig. 1), which results in 33.6% of the population not matching the hypothesis.

Biomarker B - Higher Temporal Beta Asymmetry
No significant asymmetry was shown in Moment 1 and Moment 3, which is reflected by values close to or equal

Davidson RJ. (1988). *EEG measures of cerebral asymmetry: conceptual and methodological issues.* Int J Neurosci. Mar;39(1-2):71-89.

Baehr E., Rosenfeld J.P., Baehr R., Earnest C., (1999). *Clinical Use of an Alpha Asymmetry Neurofeedback Protocol in the Treatment of Mood Disorders.*Introduction to Quantitative EEG and Neurofeedback, Academic Press, 181-201.

Fink G.R., Halligan P.W., Marshall J.C., Frith C.D., Frackowiak R.S., Dolan R.J., (1997). *Neural mechanisms involved in the processing of global and local aspects of hierarchically organized visual stimuli.* Brain, 120(10), 1779-1791.

Hopman, R.J., LoTemplio, S.B., Scott, E.E. et al. (2020) *Resting-state posterior alpha power changes with prolonged exposure in a natural environment.* Cogn.Research 5, 51.

Kaplan, S., & Berman, M. G. (2010). *Directed Attention as a Common Resource for Executive Functioning and Self-Regulation.* Perspectives on Psychological Science, 5(1), 43–57.

to zero for the selected time segment. Analysing the entirety of the Moment 2 per participant, we see possible correspondence between being exposed to the personal idea of beauty and a higher temporal beta asymmetry.
The subgroups show that 1 out of 10 cities had an inverse trend - decreasing asymmetry - (Fig. 2), which results in 92% of the population matching the hypothesis.

Biomarker C - GSR
No significant evidence to suggest a link between Moment 2 and activation of the Parasympathetic system, on the GSR value. On the contrary, four out of ten subgroups show an increase of skin conductance, possibly attributable to a higher stress level (Fig. 3).

Discussion and future directions

We studied how the personal idea of beauty could possibly modulates emotional processing and attentional mechanisms by analysing changes in emotion and attention-restoration related alpha and beta asymmetry,
together with the observation of the autonomic response via skin conductance.
Our hypotheses regarding frontal alpha power asymmetry and galvanic skin response were not confirmed, which invites further research in this direction, also with the evaluation of other experimental settings.
The results revealed one main finding that could support one of the hypotheses: greater beta power asymmetry, possibly directly related to the exposure to beauty.
Looking at a beauty emblem when compared to other selective attention tasks could be linked to the activation of the right temporal areas of the brain. This pattern could be associated with bottom-up, stimuli driven attention directed at the salient stimuli, which can be linked to attention restoration.
Visual information interpretation and global visual attention is in fact regulated by the right temporal areas of the brain (Fink et al., 1997), which could justify the impact of personal ideas of beauty on them.
Despite the high degree of subjectivity, the influence of aesthetics on brain and mental states could have benefits for the attempt of bridging the gap between natural and artificial environments, in terms of restorative cues.
In the lighting field, the topic of Human Centric Lighting, describing the use of artificial lighting sources to create visual environments that mimic the natural, has been presented already for several years.

Figure 1: Frontal Asymmetries, Mean 95% confidence interval.
a Athens **b** Calgary
c Instambul **d** Lisbon
e Madrid **f** Manchester
g Pescara **h** Reykjavik
i Rome **l** Stockholm

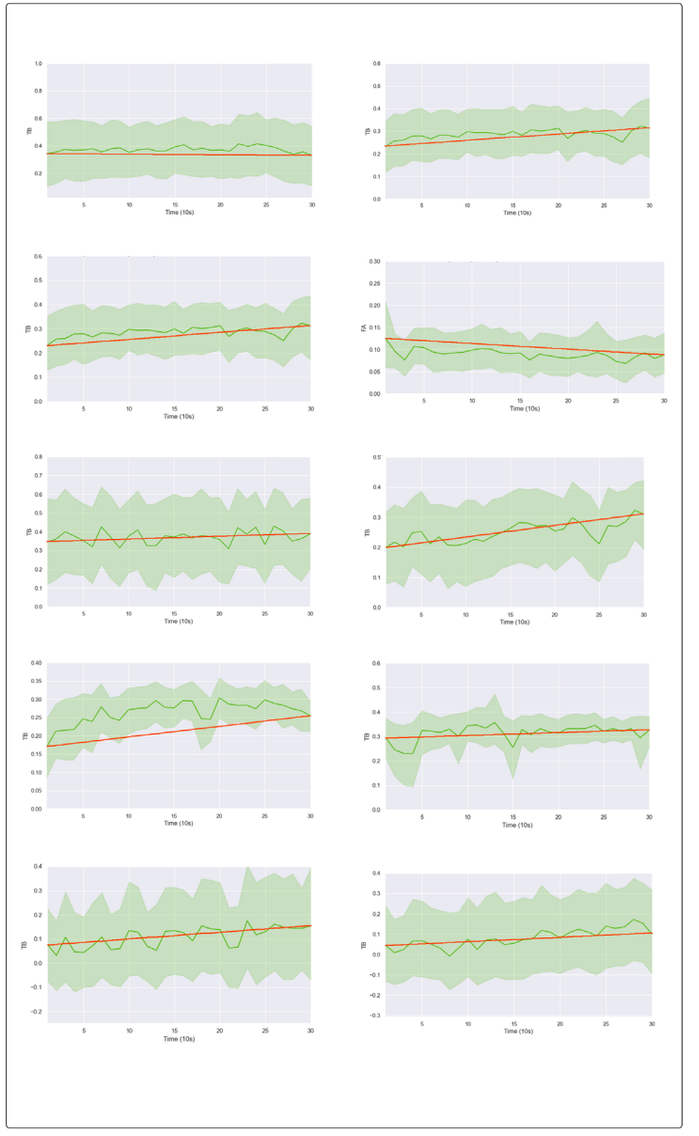

Figure 2: Temporal Beta Asymmetries, Mean 95% confidence interval.
a Athens **b** Calgary
c Instambul **d** Lisbon
e Madrid **f** Manchester
g Pescara **h** Reykjavik
i Rome **l** Stockholm

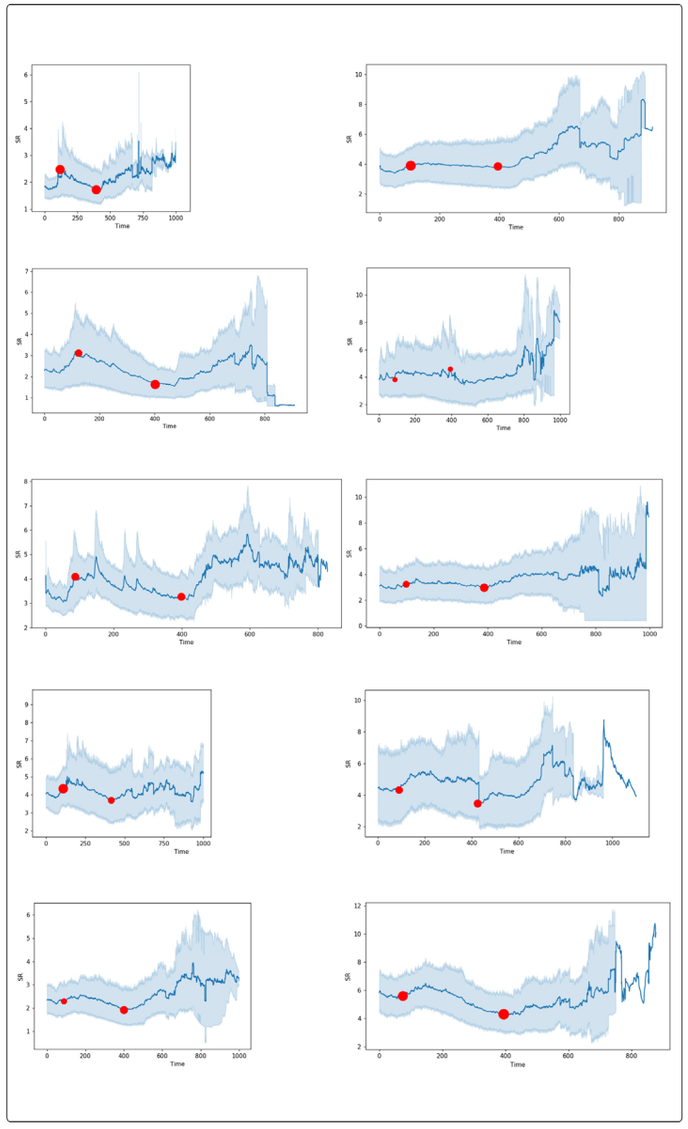

Figure 3: Galvanic Skin Response, Mean 95% confidence interval.
a Athens **b** Calgary
c Instambul **d** Lisbon
e Madrid **f** Manchester
g Pescara **h** Reykjavik
i Rome **l** Stockholm.

The next study wants to address attentional mechanisms, which fall into the non-circadian or acute non-image forming effects of light exposure. The aim is to individuate the lighting scenario that can contribute to the overall well- being of the people in a space, with maintaining the focus without depleting all the mental resources.
The presented study represents the first attempt to examine a possible relation between beauty and fascination. The overall research project intends to show evidence of indoor induced mental restoration while analysing the data gathered and will also give evidence of the positive impact of the light in the balance of the attention levels.

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Information Design in health communication: an analysis of digital and printed pieces

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This paper aims to present the partial results of ongoing research about information design applied to health communication. The following phases were observed in this investigation: a literature review on Information Design, Plain language guidelines in Brazil, and graphic analysis methods.
At the same time, it was organized the health campaigns produced by the Brazilian Ministry of Health, including both printed and digital pieces.
After gathering this information, Flu vaccination campaigns were selected, given the national coverage to be achieved and its costs to the government. From this point, a graphical analysis observed the aspects suggested by several authors and Plain language.
The results presented here are the basis for the next step of this research that consists of prototyping and evaluating new ones.

Keywords *Information in health, Health campaigns, Plain Language, Graphical analysis*

Introduction

Vaccine campaigns are a concern for countries once the COVID-19 pandemic is current in social media and broadcast. There are many messages, posts, and news about how, when, why, and where to get a shot, besides the age groups considered and the documents to be presented as part of the vaccination procedure. Even COVID-19 is the 'newest' vaccine that gets the public attention; many other campaigns occur annually in many countries to prevent flu, yellow fever, polio, measles, for example.

All these investments relate to Ottawa Charter to Health Promotion (WHO, 1986), which has the collective commitment of 194 Member States as a common goal of health for all by the year 2000. This document highlights the need to create favorable equity elements, allowing citizens worldwide to decide about their health and well-being. The UN Agenda 2030 for Sustainable (UN, 2015) reinforced the international effort to 'ensure healthy lives and promote well-being for all ages,' as its goal n. 3, among 17 others.

In this context, information materials – including pamphlets, social media, websites, applications – are essential, allowing individuals control of their diseases and treatment options as educational tools for behavior changing. (Sutherland& Fulton, 1992).

When this communication relies on written language, it can be a barrier in health information due to the eventual need for technical words. It is the responsibility of a democratic government to design, promote and broadcast campaigns from official information, informing its citizens about their duties and rights relating to health and well-being. It becomes a most significant problem when this information reaches an illiterate population. Expenses with health communication are a duty of governments. In a mid-income country as Brazil, statistic data reveal that the costs with immunization in 2018 (Brasil/ Ministério da Saúde, 2020b) were around USD 1 billion and an amount of USD 32,5 million were paid in advertising about health (Portal da Transparência Pública, 2020). Considering the country profile, among so many other problems, these are significant amounts of money concerning public investment in health.

An aspect that must be highlighted in Brazil is that the national immunization initiative considers 19 shots of specific vaccines for children from birth to 10 years old. Without them, they cannot apply for a school. Figure 1 illustrates the Children Vaccination calendar proposed by the Brazilian Ministry of Health for this age range.

Sutherland, RW & Fulton, MJ (1992). *Health promotion*, pp. 161-181. In Sutherland & Fulton. Health Care in Canada . CPHA, Ottawa.

Brasil. Ministério da Saúde. (2020b). *3º Relatório Quadrimestral de Prestação de Contas* . Brasília, DF. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/3_relatorio_quadrimestral_prestacao_contas_2019.pdf.

Portal Transparência (2020). *Publicidade de Utilidade Pública* . https://transparencia.gov.br/programas e acoes/acao/4641-publicidade de utilidade publica. Brasil. Ministério da Saúde. (2008). *Caderneta de Saúde da Criança* . Brasília, DF. https://bvsms.saude.gov.br/bvs/publicacoes/caderneta_saude_crianca_5ed.pdf

IBGE. PNAD (2019) *Pesquisa Nacional por Amostra de Domicílios Contínua. Educação* . Retri e ved fro m: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101736_informativo.pdf.

Brasil. Ministério da Saúde. (2008). *Caderneta de Saúde da Criança* . Brasília, DF. https://bvsms.saude.gov.br/bvs/publicacoes/caderneta_saude_crianca_5ed.pdf

In this scenario, this research was conducted to analyse aspects of the information comprehensibility of Brazilian Health Ministry campaigns. Considering that in Brazil (IBGE, 2019), data points out that almost 11 million citizens are illiterate (representing 6,6% of the population older than 15 years old), they cannot read or write a simple text. It is crucial to the need for accessible and comprehensible texts and simple messages, allowing these citizens – the 'readers' – information to make their decisions. Besides text, images and other graphical formats must complement written messages, improving the presented text.

This research searches answers for the following questions: if the costs of vaccine promotion are so expensive in this underdeveloped country, and considering that part of this population is illiterate, how effective are these campaigns? How can a designer's expertise aid in evaluating what is produced, highlighting paths for better communication?

Figure 1. Children Vaccination calendar proposed by Brazilian Ministry of Health, from birth to 10 years old
(Source: Brasil, Ministério da Saúde (2008), pages 76 and 77)

CALENDÁRIO BÁSICO DE VACINAÇÃO DA CRIANÇA

IDADE	VACINAS	DOSES	DOENÇAS EVITADAS
Ao nascer	BCG-ID	Dose única	Formas graves de tuberculose
	Vacina contra hepatite B[1]	1ª dose	Hepatite B
1 mês	Vacina contra hepatite B	2ª dose	Hepatite B
2 meses	VORH (vacina oral de rotavírus humano)[2]	1ª dose	Diarréia por rotavírus
	VOP (vacina oral contra pólio)	1ª dose	Poliomielite (paralisia infantil)
	Vacina tetravalente (DTP + Hib)[3]	1ª dose	Difteria, tétano, coqueluche, meningite e outras infecções causadas pelo *Haemophilus influenzae* tipo b
4 meses	VORH (vacina oral de rotavírus humano)[4]	2ª dose	Diarréia por rotavírus
	VOP (vacina oral contra pólio)	2ª dose	Poliomielite (paralisia infantil)
	Vacina tetravalente (DTP + Hib)	2ª dose	Difteria, tétano, coqueluche, meningite e outras infecções causadas pelo *Haemophilus influenzae* tipo b
6 meses	VOP (vacina oral contra pólio)	3ª dose	Poliomielite (paralisia infantil)
	Vacina tetravalente (DTP + Hib)	3ª dose	Difteria, tétano, coqueluche, meningite e outras infecções causadas pelo *Haemophilus influenzae* tipo b
	Vacina contra hepatite B	3ª dose	Hepatite B

76

IDADE	VACINAS	DOSES	DOENÇAS EVITADAS
9 meses	Vacina contra febre amarela[5]	Dose inicial	Febre amarela
12 meses	SRC (tríplice viral)	1ª dose	Sarampo, rubéola e caxumba
15 meses	VOP (vacina oral contra pólio)	Reforço	Poliomielite (paralisia infantil)
	DTP (tríplice bacteriana)	1º reforço	Difteria, tétano e coqueluche
4 - 6 anos	DTP (tríplice bacteriana)	2º reforço	Difteria, tétano e coqueluche
	SRC (tríplice viral)	Reforço	Sarampo, rubéola e caxumba
10 anos	Vacina contra febre amarela	Reforço	Febre amarela

1) A primeira dose da vacina contra hepatite B deve ser administrada na maternidade, nas primeiras 12 horas de vida do recém-nascido. O esquema básico se constitui de 3 (três) doses, com intervalos de 30 dias da primeira para a segunda dose e 180 dias da primeira para a terceira dose.

2) É possível administrar a primeira dose da vacina oral de rotavírus humano a partir de 1 mês e 15 dias a 3 meses e 7 dias de idade (6 a 14 semanas de vida).

3) O esquema de vacinação atual é feito aos 2, 4 e 6 meses de idade com a vacina tetravalente e dois reforços com a tríplice bacteriana (DTP). O primeiro reforço aos 15 meses e o segundo, entre 4 e 6 anos.

4) É possível administrar a segunda dose da vacina oral de rotavírus humano a partir de 3 meses e 7 dias a 5 meses e 15 dias de idade (14 a 24 semanas de vida). O intervalo mínimo preconizado entre a primeira e segunda dose é de quatro semanas.

5) A vacina contra febre amarela está indicada para crianças a partir dos 9 meses de idade que residam ou que irão viajar para área endêmica (Estados: AP, TO, MA, MT, MS, RO, AC, RR, AM, PA, GO e DF), área de transição (alguns municípios dos Estados: PI, BA, MG, SP, PR, SC e RS) e área de risco potencial (alguns municípios dos Estados: BA, ES e MG). Se viajar para áreas de risco, vacinar contra febre amarela 10 (dez) dias antes da viagem.

77

Theoretical framework

To set a theoretical framework for this research, a literature review was carried out in some key aspects: information design, health information, information literacy, and Plain Language.
Pettersson (2002, p.2) affirms that information design includes the research about principles for messages analysis, planning, presentation, and comprehension – its content, language, and form. No matter which media is selected, well-designed information must satisfy the aesthetics, economic and ergonomic aspects, like other content requirements. This author also affirms that the goal of a message design must be the communication's clarity (Pettersson 2002, preface).
Proper health information management can be considered a possible mechanism related to the uncertainties about a disease or a health condition (Brashers et al.,2002). The authors also emphasize that the search for information by the user/citizen is not only for a better understanding of diagnoses but also to know the risk factors to which they are exposed and learn preventive measures.
Information design has a crucial role in this perspective. Dervin (1999, p.37), when presenting her ideas about concepts of information, proposed simplifying its history considering western tradition in seven topics:

1. Information describes an order reality.
2. Information describes and order reality but can be 'found' only by those with the proper observing skills and technologies.
3. Information describes and ordered reality that varies across time and space.
4. Information describes and ordered reality that varies from culture to culture.
5. Information describes and ordered reality that varies from person to person.
6. Information is an instrument of power imposed in discourse on those without power.
7. Information imposes order on a chaotic reality."
8. In this perspective and aligned to Pettersson (2002) about informational ergonomics[1], in information design, the sender or source message's task is not completed until the receivers (or messages interpreters') have got it and understood the presented message. Considering the aspects mentioned above, it must be discussed language. It is necessary to present our basis on literacy and health literacy.

Plain Language, information design, and health literacy

Dervin (1999, p.54) finishes her thoughts about information design proposing a 'Sense making approach' that "differs markedly from others approaches is that is explicitly, and necessarily, privileges the ordinary person as a theorist involved in developing ideas to guide an understanding of not only her personal world but also collective, historical, and social worlds."
It is very appropriate when discussing health literacy. Health literacy is linked to literacy and involves people's knowledge, motivation, and skills to access, understand, evaluate and apply health information. These competencies allow people to make judgments and make decisions in their daily life regarding health, disease prevention, and health promotion to maintain or improve
the quality of life (Sørensen et al., 2012, p. 3). It is understood that health literacy is directly linked to the concept of Health Promotion (WHO, 1986).
Nutbeam (2008) proposed the distinction into three categories for health literacy:
1. Functional — basic reading and writing skills needed to deal effectively in everyday situations;
2. Interactive—basic reading and writing skills need to function effectively in everyday situations. In addition to these, more advanced literacy and cognitive skills are needed, used to extract information and derive its meaning from different forms of communication to apply this information in changing situations;
3. Criticism — more advanced cognitive skills can be used to critically analyze information and use that information to exert greater control over life events and situations.
One of the tools used to improve literacy issues, not just in health, is Plain Language. Briefly, it can be said that Plain Language is a writing technique and a social movement with strength in several countries. As a social cause, it defends the right to understand texts of public interest (Fischer, 2018). The public sector has discussed this topic in several countries in Europe, Latin America, and Africa.
In Brazil, discussion and application of Plain Language are still limited. The understanding that simple language should be mainly in the government's communications with the citizen configures its Citizenship Language nomenclature.
Only in 2020 did the Brazilian government organize national guidelines on simple language (Brasil, 2020). These guidelines followed those established by local governments and other countries that consider that simple language should be used in all forms of communication.
Grene et al. studies (2017) demonstrated that some patients with low levels of health literacy, who underwent interven-

Pettersson, R. (2002) *Information design: an introduction*. Amsterdam/ Philadelphia: John Benjamins Publishing Company.

Brashers, D. E. et al. (2002) *Information seeking and avoiding in health contexts*. Human Communication Research , vol. 28, n. 2, p. 258 271, 2002.

Dervin , B. (1999). *Chaos, Order and Sense Making: A proposed Theory for Information Design*. In: R. Jacobson (Ed.) Information Design . Cambrige, London: The MIT Press.

1 Highlighting the concept about information ergonomics proposed by Pettersson (2002, p.2): "Information ergonomics (IE) comprises research and development of the ergonomic design of man-machine systems. The design of an information system must be based on studies of the information user's aims, knowledge, experience, and way of working. (...) Information ergonomics include lighting, the design of instrument panels, video display units, characters, symbols, signals, etc.'

Sørensen, K et al. (2012) *Health literacy and public health: A systematic review and integration of definitions and models*. BMC Public Health , vol. 12, no. 1, 2012, Art. no.

Nutbeam, D. (2008) *The evolving concept of health literacy*, Soc. Sci. Med ., vol. 67, no. 12, pp. 2072 2078, 2008. Organização Mundial da Saúde (1986). The Ottawa Charter for Health Promotion , 1986. https://www.who.int/healthpromotion/conferences/previous/ottawa/ en.

Fischer, H. *Clareza em textos de e gov, uma questão de cidadania* . Rio de Janeiro: Com Clareza, 2018.

Brasil. Governo do Brasil (2020a). M*atriz para análise de um texto Linguagem Simples* . 2 p. 2020. https://www.gov.br/pt br/guia de edicao de servicos do gov.br/publicacoes e cursos/matriz para analise de um texto.pdf/.

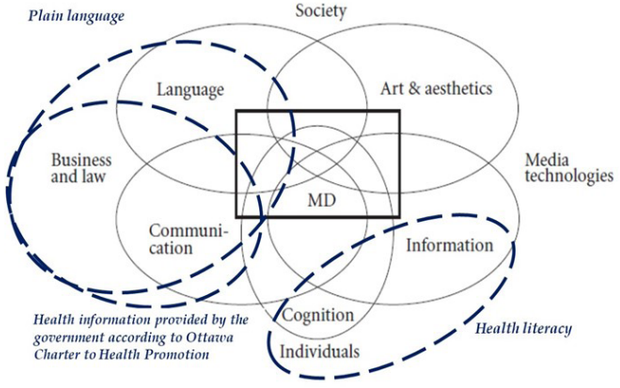
Grene et al. (2017) *Use Of Plain Language Guidelines To Promote Health Literacy. IEEE Transactions on Professional Communi cation*, vol. 60, n. 4, December 2017.

tions using Plain Language, had a better understanding of the information. The authors point out that Plain Language can increase the comprehensibility of complex health information, especially for patients with low literacy levels.
The information collected in the literature presented above - involving information design, informational ergonomics, literacy, health, and simple language follows Pettersson's (2012, p. 33) proposal on the information design model. For this author, 'the main components in the message project are the words, the graphic elements, and the form.' as presented in figure 2. These components must be used in different ways to produce, transmit and interpret messages used in different communication situations. The link among the elements is the Message Design (MD). In this research, Petterssons[1] information design model was revisited by the authors of this paper, proposing the inclusion of Plain Language, health information, and health literacy, included in figure 2.

Method

The first step of this research - a descriptive one- included the bibliographical and documental reviews. They were presented partially in the topic Theoretical framework of this abstract. This information allowed us to guide the following stages of the research, described below. Data collection on government campaigns took place in parallel with bibliographical and documental reviews.

Figure 2. Message Design model proposed by authors, in the scope of this research, from Pettersson's (2012, p.33).



Pettersson, R. (2012) *Information Design . It depends* . Viena: International Institute for Information Design.

[1]*Highlighting the concept about information ergonomics proposed by Pettersson (2002, p.2): "Information ergonomics (IE) comprises research and development of the ergonomic design of man-machine systems. The design of an information system must be based on studies of the information user's aims, knowledge, experience, and way of working. (...) Information ergonomics include lighting, the design of instrument panels, video display units, characters, symbols, signals, etc.*

Pettersson, R. (2002), *op. cit.*

Lipton, R. (2007). *The practical guide to information design* . Hoboken, NJ: John Wiley and Sons, Inc.

Data collection

Starting in August 2020, all graphic and printed pieces produced since 2013 were collected. The Brazilian Ministry of Health released 159 campaigns covering various diseases, such as cancer, malaria, flu, sexually transmitted infections (STIs), tobacco, and tuberculosis during this period. These campaigns were about vaccination and raising awareness about the symptoms and the need for periodic examinations. All the material gathered included seasonal campaigns (e.g., on STIs and Carnival), global/international initiatives (such as October Pink, World Health Day, AIDS' D' Day), and voluntary health-related initiatives (such as donations of blood, organs, breast milk).
All campaigns were organized considering their topic, period of broadcasting, and their links to official websites. After that, the second round of analysis considered those campaigns which materials were continued during the time selected - from 2013 to 2020. Table 1 exemplifies how the collected material was organized. It was observed that the graphic and digital media produced by the Brazilian Ministry of Health was available mainly from 2014 to 2020. The first point observed in the selected material was the use of images to support text. At first glance, they do not convey or help the readers understand the proposed campaign; they are just images! As mentioned by Lipton (2007, p. 174): 'Photos must mean something: Designers add pictures for many reasons, which unfortunately do not always include reader comprehension". In the case of using images, this author (p.177) proposes that "pictures must point readers into text (if they point at all). "Here, for Lipton (2007, p.177), "two Gestalt grouping principles might apply:
• Common fate. People see elements going in the same direction as being related. That suggests enough awareness of a perceived direction to follow it;

Table 1. Example of how the campaigns' material was organized. Source: Authors, 2020.

Quantity	Campaign topic	Years analyzed	Type of campaigns
6	AIDS	2014 to 2019	during Carnival
5	AIDS	2014 to 2018	World AIDS Day
7	Breast milk donation	2014 to 2020	Local, annual
7	Blood donation	2014 to 2020	Local, annual
8	Flu	2014 to 2020	Annual vaccination
9	HPV and Meningitis	2014 to 2018	Annual vaccination

• Good continuation. People see elements that are arranged in a line as a group, even if the line contain gaps. That suggests they'll mentally fill in the gap between direction and its objects."

It must be highlighted that these campaigns do not consider the ones proposed by the Children n Vaccination calendar (Brasil, Ministério da Saúde, 2008) that includes shots for: Tuberculosis, Hepatitis B, VORH (oral vaccine for human rotavirus), VOP (Oral poliovirus vaccine), Tetravalent Bacterial Vaccine (DTP + Hib, vaccine against diphtheria, tetanus, whooping cough, meningitis among other infections caused by Haemophilus influenza bacterium), Yellow Fever, MMR (vaccine against measles, mumps, and rubella.), DTP (vaccine against diphtheria, pertussis, or tetanus) and additional reinforcing shots during children, teenagers and adults lives.

Considering the material collected (that excluded all the ones mentioned above) were included seasonal campaigns (e.g., about STIs diseases and Carnival), global/ international initiatives (like Pink October - Breast Cancer Awareness Month, World Health Day, World AIDS Day), and other campaign-related to voluntary actions, associated to collective health and well-being, as blood donation, organs donation and breast milk donation). Some of these campaigns are illustrated in Figures 3 to 5.

An issue about health information and its campaigns from

Figure 3 to 5. Examples of Brazilian Ministry of Health campaigns for AIDS in Carnival (2013, left), Flu vaccination (2017, center) and tuberculosis (2019, right). Source: Brasil, Ministério da Saúde (2021)

Brasil. Ministério da Saúde. (2008), *op. cit.*

Brasil. Ministério da Saúde (20201) *In forme Técnico. 23ª Campanha Nacional de Vacinação Contra a Influenza* . informe tecnico_ campanha nacional de vacinacao contra a influenza --_30 03 2021

Ashwin, C. (1979). *The ingredients of style in contemporary illustration: a case study.* Information Design Journal , n. 1, pp. 51-67.

Borba, M. R.; Waechter, H. N.; Borba, V. R. (2015) *Contributions of Graphic Design for Effective Communication in the Health Campaigns*. In: C. G. Sp inillo; L. M. Fadel; V. T. Souto; T. B. P. Silva & R. J. Camara (Eds). Anais do 7º Congresso Internacional de Design da Informação/Proceedings of the 7th Information Design International Conference | CIDI 2015 . São Paulo: Blucher Design Proceedings, num.2 , vol.2 , p. 82 90, 2015. DOI 10.5151/ designpro CIDI2015 cidi_86

Bento, A. A.; Fonseca, L. P. (2018) *Análise gráfica da revista Bonde Circular.* In: Guilherme Santa Rosa; Cristina Portugal (orgs.) Anais do 8º CIDI e 8º CONGIC . São Paulo: Blucher, 2018. p. 1475 1485. DOI 10.5151/ cidi2017 paper14.

Mota, M. Q.; Waechter, H. N. (2019) *Design da Informação: análise de campanha de educação am biental.* In Anais do 9º CIDI | Congresso Internacional de Design da Informação, edição 2019 e do 9º CONGIC | Congresso Nacional de Iniciação Científica em Design da Informação . São Paulo: Blucher, 2019, p. 15 26. DOI 10.5151/9cidi congic 1.0029

Lócio, L. M.; Waechter, H. Nóbrega. (2019) *Reconstruindo e adaptando*

2013 and 2020 - considered in this research - is about management. During this period, the country had eight distinct Health Ministries and two interim ministers, and these changes imply management changes, according to the team involved.

In figures 3 to 5 is possible to identify changes in format and colors that identify the Brazilian Ministry of Health and federal government.

Considering all the aspects mentioned above, Flu/ influenza campaigns were selected as the first group for analysis. It was chosen once flu vaccination reaches a large group of Brazilian populations, considering children, adults, teachers, and people with disabilities, among others, which represents a high cost for the government. In 2020 during the COVID-19 pandemic) a total of 77.728.419 Brazilians received a Flu shot, and only the doses cost around 240 million dollars.

In the last ten years (2011 to 2020), flu vaccination was growing gradually, which was compatible with the expected public and the population's adherence to vaccination campaigns. In the last year, compared to the first, the number of shots were three times higher; it means from 25 million shots in 2011 to 73 million shots in 2020 (Brasil, Ministério da Saúde, 2021)

Graphic analysis

For this analysis, a Graphic Analysis Model (GAM) was proposed, based on Ashwin (1979), Borba et al. (2015), Bento & Fonseca (2018), Mota & Waechter (2019), Lócio & Waechter (2019), the principles proposed by Lipton (2007) and the Brazilian government guidelines for Plain Language (Brasil, 2020). Twenty-four pieces were analyzed, between print and digital, considering the following aspects:

• General aspects: Campaign date; Medium (digital or printed); file format and size; dimensions (height and width); amounts of columns/rows of information

• Graphic design aspects: title capitalization; typographic analysis of the title; text capitalization; typographic analysis of the text; text formatting; quality of the information in the text; the amount of information in the text; image types used; formatting between text and image; proportion between use of text and image, among other observations.

• Graphic analysis model (GAM): consistency; gamma; framework; positioning; proximity/proxemics; naturalism; Plain Language.

Concepts analyzed and used referring to the graphic analysis model considered in this research are presented in table 2.

To summarize the results of the analysis of the concepts listed

Concept Analysed	Concept used in this research
Consistency	Defined by the quantity of tools or media used to design the image. Images are considered *homogeneous* when the is no variation in the tool used for design the image. They are *heterogeneous* when a number of tools are used or when it considers verbal content in the images.
Gamma	Refers to syntactic' possibilities of the image. Image presents a *restrict* gamma when used a low variation in its syntactic structure, as the limited use of direction and line width, among others. It is considered *expanded* when it uses several syntactic possibilities, it means, presents a higher diversity in image details.
Framework	It is related to image support. The poles are *disjunctive* or *conjunctive*. It is evaluated as *disjunctive* when image is completely represented in the support, maintaining readers' focus of attention. It is *conjunctive* when the image extrapolates the support, provoking the reader to consider beyond the images' frontier.
Positioning	This concept is related to the organization of the components on the image. It presents two poles, *symmetric* or *asymmetric*. Considering the complete image, it is necessary to verify, from an imaginary centerline how image is distributed.
Proximity/Proxemics	It considers the distance among the reader and the figure that is being presented. The classification is *close* or *far*. But proximity is not only determined by image' scale, once other factors can influence this perception.
Naturalism	Analyses the images' representation as a mirror of reality. The poles are naturalistic or non-naturalistic, evaluating the verisimilitude of the physical rules of light, shadow, gravitation, proportion, among other aspects.
Plain language	Refers to clear, concise, free of jargon or specific terms, considering country's current laws.

Table 2. Concepts analyzed and used referring the Graphic Analysis Model (GAM) considered in this research.

above in flu campaign pieces, we have the following:
.. Consistency: most of the pieces analyzed (n=14) were classified as heterogeneous since different media and incorporation of verbal content in the images were used;
.. framework: most of the pieces analyzed (n=12) had all the illustration on the support, configuring its disjunctive aspect;
.. Gamma: it was found that 13 of the pieces presented diversity in the image details, being classified with expanded gamma;
.. Positioning: 12 pieces were classified as symmetrical;
.. Proximity/proxemics: in this criterion, there was a distribution between the two scale's extreme points (close and far), except for those five pieces in which the criterion does not apply;
.. Naturalism: 13 pieces presented a naturalistic aspect, that is, they present images about the real world;
.. Plain Language: 13 pieces met the criteria of Plain Language. However, eight partially met, and three did not meet this form of writing. Considering that they are campaigns aimed at the general population, it was expected that all pieces would fit this criterion.

Takeaways from graphic analysis and prototyping

These results were analyzed to propose a graphic mesh and other design aspects that allow for a better arrangement of elements and a better understanding by readers of what is being presented.

fichas: proposta de instrumento de análise gráfica. In Anais do 9º CIDI | Congresso Internacional de Design da Informação, ediçã o 2019 e do 9º CONGIC | Congresso Nacional de Iniciação Científica em Design da Informação . São Paulo: Blucher, 2019. p. 2444 2457. DOI 10.5151/9cidicongic 5.0365

Figures 06 to 11 – Original official post in Instagram of Flu campaign in 2019 (post 1, first, left), and posts prototypes proposed by authors (2 to 6).

The 2019 flu campaign, available at Brazilian Ministry of Health's Instagram and printed banners, were selected for prototyping considering changes in colours, format, and underline. For the digital campaign, five new posts and banners were designed. The prototypes for the five posts are described below:
1. The first file was the original one, without changes, used as a basis for analysis (see Figure 6).
2. The modification was carried out for prototype 1 by removing the background colour of the campaign's date and changing the font's original colour to the background colour (as shown in Figure 7).
3. In prototype 2, the yellow colour was desaturated in 37% of its original, in a change from 87% to 50% of saturation, as presented in Figure 8.
4. In prototype 3 the changes were applied by removing the textures presented in the original's background (see Figure 9).
5. In prototype 4 the change was the removal of underline; once the original post, the groups are underlined, as can be seen in Figure 10.
6. The last prototype (5) was changed to blue, a complementary colour to the yellow present in the original campaign that originally had a black background, as presented in Figure 11.

Prototypes Pre-test

A pre-test using Google Forms was conducted with 39 volunteers to test prototypes (due to the limitation of field research during the pandemic). Participants were provided with the context in which each post would likely be seen (Laughery, 2006) and then asked to estimate the percentage of people in the country who would comprehend each post's intended meaning. The pre-test also included demographic questions to check respondents' literacy level and their impressions about health campaigns from the Brazilian government. Summarizing the questions and their answers, here are some results of the posts' evaluation.

• About the posts and their information

The first question was, 'Looking at the previous posts, which would you choose as the BEST OPTION in disclosing the information? Tell us why you chose the post as the best option'. The first post 1 (the original one) was chosen by 16 volunteers, while post 6 (prototyped in this research) was selected by 12 volunteers. According to the volunteers, the reason for the choice of the blue alternative was that it has 'better contrast of colours,' 'blue background is pleasant, 'colours conveys a positive message,' among other comments.

Another question was presented in the posts about the D-day: 'Without looking back at the previous posts, can you tell what D-day is?' Here, 34 volunteers could give the correct answer.

When asked about the groups included in this campaign, Volunteers correctly selected the included options in the campaign. The exception was 26 votes placed in 'People over 60 years old'. In fact, the campaign (and posts) indicate 'People over 50 years old'. One person chose the option 'Indigenous citizens' who were not among the group to be vaccinated.

Here, the question was: 'Without looking back at the previous posts, would you be able to say which of the GROUPS are INCLUDED in this vaccination campaign? Check all the options you think are correct.'

About the question 'What are the necessary documents INDICATED IN THE POST for the person to be vaccinated? Check all the options you think are correct'; the question featured a total of 56 global votes. From this total, 31 choices were correctly placed in the vaccination booklet option, while other documents presented in the questionnaire were not in the campaign.

Regarding the question 'Do you remember having seen this vaccination campaign, from the POSTS previously presented?', 17 responses to this question indicated that participants had not seen this campaign, and 15 were not sure they had seen it prior to this survey.

Table 3. Results of the comprehension estimation results.
Note: X represents the number of the post. Results in absolute numbers (n=39)

Considering only post number X, what percentage of the Brazilian population do you believe will understand the information presented? Consider all content: date, groups to be vaccinated, documents required, and where get a shot.	**100%,** hole population	**75%,** the majority of the population	**50%,** half of population	**25%,** a small part of population	**0%** nobody
Post 1 (original)	05	21	10	03	0
Post 2.	03	17	11	08	0
Post 3	01	18	14	06	0
Post 4	05	21	11	02	0
Post 4	03	24	09	03	0
Post 6	04	21	09	05	0

• About the posts' comprehensibility

The second question was about the estimative of comprehensibility. So, it was asked: 'Considering only post number X, what percentage of the Brazilian population do you believe will understand the information presented? Consider all content: date, groups to be vaccinated, documents required, and where get a shot.' Here, 'X' refers to each post, from 1 to 6. The highest score was 75%, and the choices were distributed from all other options, as shown in Table 3.

• About health campaigns from the Brazilian government

A set of questions, present as a scale, was presented to volunteers concerning health campaigns from the Brazilian government. The results of the pre-test are presented in Table 4. It can be noticed that one-third of respondents do not follow the Ministry of Health's social networks, and almost one-fourth believes that the texts are intended to make life easier for the public. Half of the participants use more than one source, disagreeing with the statement that the website is their primary source of information.

On the other hand, the majority believe that government information on websites and apps is usually confused and hard to

Table 4. Results of the evaluation of health campaigns from the Brazilian government.

Choose an option in the scale for the following questions:	**1 Completely disagree**	**2**	**3**	**4**	**5**	**6**	**7 Completely agree**
I usually follow the information released by the Ministry of Health on social media (Facebook, Twitter, Instagram).	12	05	04	03	03	02	02
I can see in these texts that there is a concern to make life easier for users	01	04	04	05	09	06	02
When I need information about some government service, I only seek information from the agency's website.	04	06	06	08	04	01	02
Information on government websites and applications is often confusing and difficult to understand.	01	02	03	08	02	10	05
Ministry of Health's vaccination campaigns are usually very clear and objective; the entire population can understand the main information presented.	02	06	06	07	04	05	01
I don't like the changes done by the Ministry of Health's vaccination campaigns each year. They should be more alike, without significant changes.	04	06	02	06	02	06	05
Ministry of Health's vaccination campaigns are easy to understand for the entire Brazilian population.	04	03	07	06	07	04	0
I don't believe the Ministry of Health's vaccination campaign has a significant impact. They don't encourage people to get vaccinated.	10	06	04	03	03	02	03

understand. When answering about the clarity and objectivity of health campaigns, the answer varies among the alternatives. There were also observed controversial opinions about the changes, each year, considering that they should be more similar, without massive changes. On this question, with half disagreeing.
When asked about the impact of health campaigns, it was expected that the majority would agree and how campaigns encourage the population. Nevertheless, only just a bit more than half of the respondents agreed with this statement.
The final questions referred to demographic data and presented questions about the region where they live, gender, age, and education. The majority lives in the Southeast region, the most populated region in the country. The form had a homogenous division between female and male respondents, including those who chose not to respond or were non-binary. The average age present in the survey was 25,6 years old with a standard deviation of 8,7. In this group of 39 participants, the majority have an academic background at the high school level.
Once in this paper, only the pre-test results with the prototyped posts were presented; it is essential to highlight that the results of the banners pre-test were very similar, besides the differences in size and format. As pre-test and without statistical analysis, these results revealed that the original post and banner from the Brazilian Ministry of Health had a lousy evaluation compared to the research's proposed alternatives.
Regarding the comprehensibility, it was observed that both information posts and banners were poorly evaluated, and relevant information is not wholly understood or unclear for the volunteers.

Final remarks and next steps

After the analysis was carried out, it was verified that there are differences between the campaigns year by year, even within the same management. In general, even if there is no harmony or intention of graphic standardization from one year to another, it can be said that the analyzed pieces met the concepts of graphic analysis adequately.
This research proposed questions that can be discussed now. First, if the costs of vaccine promotion are so expensive in this underdeveloped country, and considering that part of this population is illiterate, how effective are these campaigns? Pre-test results indicate that maybe these campaigns are not effective, once they are not clear for those with a higher level of literacy.
Second, how can a designer's expertise aid in evaluating what

is produced, highlighting paths for better communication? The Graphic Analysis Model (GAM) method adopted proved to be efficient and effective for analyzing parts and can be used in other similar analysis processes. So, this can be understood as a contribution from information and graphic design areas to improve governmental communication.
The pre-test was valuable to consider and evaluate the strategy for the comprehensibility test. It had limitations on contacting people for the analysis of the banners. Now that it is possible to get in touch with people, it will be easier to evaluate the banners on health units, where they are exposed.
The next step is to carry out a field survey with a more representative sample and check if the differences between the original post/ banner and the prototypes are significant. A bigger sample will also support answers for the questions proposed on the scale, in which answers were not balanced among the options. The results will allow suggesting a graphic template for the following campaigns.

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Designing for a Multispecies House-hold

Development of Pet´s Habitats

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This article makes a brief presentation of the development process of two prototypes that foster the environmental enrichment of two species of companion animals: guinea pigs and cats. The prototypes Domus Petra and Locus Turi were the results of a research project carried out within the scope of a master's thesis in product design. The main goal of the project is to research how product design can promote animal welfare, health and, also, human wellbeing. There were identified cats and guinea pigs' main characteristics and needs, as well as the problems of the spaces they inhabit when integrated into multispecies households. The animal's artificial habitats were re-evaluated and redesigned to encourage the practice of normal species behaviours. The focus lays on the relationship dynamics between humans and companion animals: their practices of care; feeding; maintenance of animals and their products; ways of living together; and human-animal-objects interactions. The Domus Petra and Locus Turi prototypes seem to be usable by animals and humans, however, future improvements and developments should be considered. There is a need to explore other approaches to non-anthropocentric design practices, and other paths to include animal perspectives in product development.

Keywords *Multispecies Design, Cats, Guinea Pigs, Non-Anthropocentric Design, Habitats.*

Introduction

Human and non-human animals have been living side by side and co-constructing their lives together. Non-human species are present in urban and rural areas, inside and outside "human" houses, and far from sight in the wilderness. These "other" species are everywhere. They are part of our lives, society, and culture. We buy them, sell them, kill them, eat them, and test on them (Urbanik, 2012). We also care for them, protect them, feed them, raise them, and mourn them when they die (Nast,2006). Our human lives are profoundly entangled with those of other species. We are in a constant process of "becoming with" all of these creatures we encounter (Haraway, 2008). The process of co-constructing who we are as humans happens not only with the species we interact with in the outside world but also with those who live inside with us. "To be one is always to become with many" (Haraway, 2008, p.4).

The homes in which humans live are also places of coexistence with other animals. Pets occupy a liminal space in family households. They are individual beings, "human" enough to be cared for and adopted as family, and, at the same time, still animals easily disposable when is no longer convenient to attend to their needs (Irvine & Cilia, 2016). Today, companion animals exist in large numbers within households around the world. The way they are viewed and valued has changed considerably over the past fifty years. Despite the ambivalence in which they are seen, they are active family members who participate in family "making" (Irvine & Cilia, 2016). They reshape family routines and practices. As was mentioned by Leslie Irvine and Laurent Cilia "families are, and always have been, constituted as more-than-human" (Irvine & Cilia, 2016, p.8).

Although pets are members of multispecies households, their natural behaviours and needs diverge from those of humans. When living in spaces designed for humans, pets may have difficulty in practicing normal behaviours. They inhabit spaces that aren´t designed to fully fulfil their needs. The lack of environmental enrichment brings consequences to pets' health, wellbeing, and may cause abnormal behaviours (Young, 2003). Humans may give up on their relationship with their companion animals due to behavioural problems, leaving them in shelters (Nast, 2006, p.313; American Association of Feline Practitioners, 2004). For humans, it might be difficult to identify the origin of behavioural problems since there are usually feelings involved (Young, 2003, p.77). However, pets need more than food and affection. They need the freedom to live healthier lives and to express themselves fully by actions like running, scratching, or climbing.

Urbanik, J. (2012) *Placing animals, an introduction to the geography of human-animal relations*. Rowman & Littlefield Pub- lisher

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Wolch, J., & Owens, M., (2017). *Animals in Contemporary Architecture and Design*. Humanimalia, 8(2), 1-18. http://www.expandedenvironment.org/wp-content/uploads/2017/08/Wolch-Owens-_Animals-in-Contemporary-Architecture-and-Design_.pdf

Wainwright, Tom, (2018) *Pet-tecture Design for pets*. Phaidon

Uexküll, J. v. (s.d.) *Dos animais e dos homens: digressões pelos seus próprios mundos / Doutrina do significado*. Livros do Brasil.

Jönsson, L., (2014). *Design Events - On explorations of a non-anthropocentric framework in design* (PhD Dissertation, The Royal Danish Academy of Fine Arts, School of Design) https://www.researchgate.net/publication/317092661_De- sign_Events_On_explorations_of_a_nonanthropocentric_framework_in_design

DiSalvo, C., & Lukens, J. (2011). *Nonanthropocentrism and the nonhuman in design: possibilities for designing new forms of engagement with and through technology. From social butterfly to engaged citizen: urban informatics, social media, ubiquitous computing, and mobile technology to support citizen engagement*, 421.

Despite the struggle to satisfy their needs, pets receive different objects and products that coexist in spaces shared with humans. Designs for various pet species exist in abundance, mainly for dogs and cats (Wolch, & Owens, 2017; Wainwright, 2018). Nevertheless, not everything that is designed for animals is truly focused on them. Their needs are frequently ignored and the products don´t contribute to a substantial improvement in their quality of life. These, sometimes, add nothing other than appealing aesthetics to pre-existing product typologies. Pet products aren´t always able to satisfy the animal's needs especially when they are designed to appeal to humans and their markets (Young, 2003; Wolch & Owens, 2017).

Although environmental enrichment is already widely developed in the context of zoo animals, it isn´t fully developed in the case of pets. Generally, their environment is only enriched by interactions with human beings, or with toys (Young, 2003, p.77).

While humans should not be removed from thought when designing for animals, the latter's needs, and ways of perceiving and interacting with the world should be the starting point of project development. Designers must dive deep into animal´s worlds like Jakob von Uexküll who "traveled" through the "worlds" of other species (Uexküll, s.d.). Designing for non-human animals from a non-anthropocentric approach implies considering these animals, considering human beings, and also considering their coexistence and shared worlds. Taking a non-anthropocentric approach to design practices is not about abolishing human perspectives, but rather adding animal ones (Jönsson, 2014; DiSalvo & Lukens 2011). Designing for companion animals, members of multispecies households, is not a straightforward process: there is a need to understand their "animality", but since they aren´t wild there is also a need to understand their human companions and environments.

Strategies for Project Development

The developing process of both prototypes was inspired by practices of environmental enrichment for wild animals in zoos (Young, 2003). To this end, the characteristics of guinea pigs and cats were researched, such as: their behaviours, needs, kinds of foods, diseases, hygiene and several aspects of these species lives.

The pet's artificial habitats were looked for; along with objects, products, and materials with which animals usually interact. These objects could facilitate feeding, scratching, hiding, playing or confining them to a given area. There were established differences in ways of living among humans. In our society pets, such as dogs or cats, may have access to all or some rooms of the house. Other animal species, such as guinea pigs and other rodents,

reptiles, fish, and birds, live inside cages, terrariums, or aquariums and are limited to those spaces (Young, 2003). Differences in the way species live within households also represent differences in the way humans interact and care for them. Designing the habitat and environmental enrichment of pets in each of these contexts is, in most cases, different. While in the case of those who roam freely, most approaches aim to enrich an existing enclosure shared with humans, in the case of animals that live inside cages, there is a need to consider the entire animal habitat: enclosure and furniture. "Furniture" is the word used by Robert J. Young when referring to existing objects inside an animal's enclosure with the aim of enriching it. This "furniture" is what makes the environment interesting for the animals (Young, 2003).

Guinea Pigs

Guinea Pigs and Their Artificial Habitat

In order to develop the guinea pigs' artificial habitat, the animal´s main characteristics and needs were first identified. They are social animals that live in groups; they eat three different types of foods like vegetables, hay, and pellets; they get scared easily and need to have a hiding place; they need to drink clean water. Their enclosure must be covered with a material to allow the absorption of animal waste (Judah & Nuttall, 2008). Secondly, the problems and disadvantages of most common artificial enclosures were pinpointed. Pet guinea pigs are usually housed in small cages that lack enrichment and furniture items. Considering the size of the cages, even the larger ones are still small to accommodate two animals and their objects. Cages and enclosures delimited by mesh or bars are also unaesthetic leading humans to place them far from sight. In order to solve these problems and create a rich environment for guinea pigs, the furniture to be developed needs to stimulate the animals to search for food, as they would do in natural environments, be large enough, easy to maintain, and aesthetically pleasing for humans. Because guinea pigs are social animals they should not live alone, so the artificial habitat has to be prepared to accommodate at least two animals.

Domus Petra: Prototype Development

The furniture items were the first to be developed, creating the guidelines to the animal´s enclosure. For the animals, the furniture that is inside the enclosure with which they interact is significant. Therefore, was important to devise strategies to enrich the environment and, working from the inside to the outside, give greater relevance to the animal's interaction with the furniture. Only later would we move towards developing an enclosure capable of housing the animals, and incorporating all

Young, R. J. *op. cit.*

Judah, V. & Nuttall, K. (2008) *Exotic Animal Care & Management*. Thomson Delmar Learning.

Figure 1

these items. The furniture development was inspired by organic and natural shapes as opposed to regular ones of artificial environments. The aim was not to recreate the natural habitat, but rather develop an artificial one inspired by its irregularities. The different items were designed to foster normal behavioural practices using various foods as a way of stimulating animal action. A container for vegetables was created, one for pellets, another for hay, one vase for fresh herbs, a cover to replace the vase when it is not being used, a drinking fountain, a hiding place, and a box for animal waste.

To build the furniture items natural stones and wood logs, with proper size and shape, were collected to serve as a reference for the construction of plaster moulds, and finally the stoneware furniture through a slip casting process. This material was chosen for its malleability that allows to reproduce organic shapes, and textures. The stoneware, provides washable surfaces resistant to animal's use, and the selected geometry of furniture items combined with the material's mass prevents the animals from overthrowing these objects. Among the ceramic materials, stoneware was selected for its resistance even when not glazed. The exterior surfaces of furniture items were not glazed for aesthetic reasons, and to keep the natural expression of the stones and logs that gave shape to these items. Three different pigments were chosen to be added to the stoneware slip for colour testing. Two of these pigments were in grey shades, and the other one was brown. These colours were selected because they are earthly, and darker tones, usually found in natural environments. Different pigment percentages were sampled and

tested, namely a sample was made for each pigment using 4g, 8g, and 12g of pigment powder per 100g of stoneware powder. The brown pigment with a percentage of 8g to 100g of stoneware powder was chosen because of its proximity with the wood logs natural colour. The vegetable and the pellet container, as well as the box for animal waste, were glazed in its interior to keep these surfaces clean. A high temperature glossy transparent glaze was selected and glaze dilution tests were conducted to ensure a uniform surface coverage.

The vegetable container has five different spots to contain food, at various elevation levels, making the animals search for it and exercise. Pellet container holds this food in its interior, and guinea pigs also need to make effort to reach for it. This container was designed to be difficult to overturn. The hay container allows animals to retrieve it in two different spots, above or near the ground. The vase for herbs makes possible for guinea pigs to experience eating directly from live plants as they would do in natural environments. This furniture item is placed on the floor level and can occasionally be removed from the enclosure for herbs regeneration. For this reason, a cover was developed to be installed in its place. The hiding place has three different openings allowing guinea pigs to enter and exit through two of them, and observe the exterior by the smaller one. The drinking fountain consists of a reservoir, a pump, and a cover with a drinking spot. This drinking system offers animals the possibility of being in direct contact with moving water instead of using the conventional water bottle with a metal sphere dispenser. However, this contact occurs in a limited area in order to avoid water contamination. The box for animal waste is to be placed in the corner of the enclosure where the animals regularly defecate, and may eventually facilitate its cleaning. The efficiency of this box depends on the individual habits of each animal.

The enclosure was developed taking into consideration the size needed to accommodate two guinea pigs, their ceramic furniture, and the space for them to run. Vicki Judah and Kathy Nuttall in Exotic Animal Care & Management argue that a guinea pig enclosure should not have less than 914mm long (Judah & Nuttall, 2008, p.51). Bearing this in mind it was decided to give each guinea pig a space between 920 mm to 1000 mm in length and an area of 0,84 m^2 to 1 m^2. The enclosure development was inspired by a table typology: a simple top, with detachable legs, and six glass guards that delimitate the animals' space, but allow them to be seen. The glass guards are easily attached and removed without the use of screws or other hardware. This solution has been tested and adjusted to have suitable mechanical strength. The structure was built in pinewood, plywood, and later was varnished and painted in order to protect the surface from the animal's waste. To facilitate its maintenance a garbage bag can be fixed under the enclosure, and the waste swept into it. The fixation system is composed of a plywood hoop, a hinge, and a magnet, making the cleaning process simple to carry on. The overall measurements of the enclosure structure are 1055mm of width per 2055mm of length and 1073mm of height. The Domus Petra prototype, which includes the set of furniture items and the enclosure, can be seen in use in Fig. 1.

Cats

Cats and Their Artificial Habitat

While developing the cat´s habitat prototype, the animal´s main needs and characteristics were also taken into consideration. Cats are intelligent and independent animals, who can live alone or in groups (Edwards, 1999; American Association of Feline Practitioners, 2004, p.9). They are carnivores and natural hunters with sharp vision, hearing, and smell. Cats need to scratch, climb trees, and these needs remain even when they live indoors. They may occasionally consume grasses that are a natural emetic (Edwards, 1999). This is a normal behaviour inherited from their wild ancestors who would probably do so as a way to eliminate intestinal parasites (Hart, 2008). Cats have needs that go beyond nutrition and hydration, which include safety, physical activity, and sensorial stimulation. When living indoors cats may have some trouble in practicing normal behaviours like climbing, scratching, running, and eating grasses. When they occur, these behaviours are sometimes repressed and even punished by humans, leading to the development of behavioural problems. As it was mentioned by the American Association of Feline Practitioners "behavior problems are still the most common cause of euthanasia in pet cats" (American Association of Feline Practitioners, 2004, p.7). After identifying the cat´s main characteristics and needs, it was concluded that they also need a space to scratch, play, eat grasses, rest, and sleep when living indoors. This should be a space for them to release energies without being punished. Vertical structures within a cat´s enclosures are proper options to increase the animal´s overall space of use (American Association of Feline Practitioners, 2004; Young, 2003).

Locus Turi: Prototype Development

The developed prototype consists in a modular structure for cats that uses vertical space and can assume different sizes and configurations, in the floor or hang on the wall. This structure has a hexagonal pattern that provides cats with platforms at

Judah, V. & Nuttall, K., *op. cit.*

Edwards, A. (1999) *The Ultimate Encyclopedia of Cats – Cat Breeds & Cat Care*. Lorenz Books

American Association of Feline Practitioners (2004) Feline behavior guidelines. https://catvets.com/public/PDFs/Prac- ticeGuidelines/FelineBehaviorGLS.pdf

Hart, B. (2008) *Why do dogs and cats eat grass?* https://www.researchgate.net/publica- tion/288656215_Why_do_dogs_and_cats_eat_grass

Young, R. J. *op. cit.*

different heights allowing them to roam around and explore. The modularity is useful because it provides the possibility of adaptation to a diversity of spaces and several cats. The structure has three different modules: the basic, with a round opening for cats to pass through, and with a scratcher. Measuring 200 mm by 400 mm, the modules were made of 10 mm plywood and rough fabric for the scratcher. They were assembled by PLA 3D printed connectors with 30% filling. Four different connectors were produced: double and triple connectors, with and without wall fixation option. When the first ones were printed and tested there were found small differences between them. Some connectors worked better than others, because there were slight dimensional variations both in the plywood modules and in the connectors themselves. Some of these small variations resulted from the printing process. As more modules were assembled, the mating parts were subjected to greater pressure, making them difficult to handle. To correct this problem, a batch of connectors within 1 mm tolerance of the plywood thickness was tested. The connectors printed with the measurement of 10,5mm presented better results when assembled and disassembled. The ones with 10mm were too tight making it difficult to disassemble the structure, while the ones with 11mm were too wide making them fall out of place. The structure is complemented by accessories like vases for grasses, pillows, and toys. The pillow is made with raw cloth fabric, polyester fiber filling, and a cover that would be in direct contact with cats. This cover can be removed and washed. A sponge filling pillow with a straighter shape was also made, but the polyester fiber filling was the one chosen because it seems to be more comfortable for the animals. The pillow cover has a zippered flap to fix it to the structure, avoiding it to fall out with the cat´s movement. Four different toys were created using the same rough fabric material as the scratcher. Three of these toys have rubber bands and contain rattles, in order to get the cats' attention through movement and sound. Each toy is attached to a round plywood circle, which allows it to be fixed to the module with a round opening. The faience vase for cat´s grass can also be attached to this module. The Locus Turi prototype, which includes the structure and the accessories, can be seen in Figure 2.

Conclusion

The two developed prototypes seem to work, and after some tests, it was noticeable that the animals were able to use them. However, they were not subjected to prolonged use, which is important for the perception of problems. They are always susceptible to future changes, improvements, and developments.

American Association of Feline Practitioners (2004) Feline behavior guidelines. https://catvets.com/public/PDFs/Prac- ticeGuidelines/FelineBehaviorGLS.pdf

Figure 2

New furniture items could be developed to be integrated into guinea pigs´ enclosure, such as elevations to be climbed, and furniture built with non-ceramic materials, to be chewed and provide optimal tooth length. Likewise, other toys, and accessories, could also be developed to integrate and enrich the Locus Turi prototype. One year after the ending of the project, it was possible to conclude that the scratcher of the Locus Turi needed improvement. Although the material is attractive to the animals, its size and angle discourage its use. The recognition of this design flaw brought important insights into the reason why cats choose to don´t use some scratchers. This information brings the possibility of future product developments that better understand the needs and perspectives of cats. These product developments may also include animal perspectives by letting them show us, voluntarily, their preferences. If we give them prototypes, and furniture items with shapes, textures, colours, and materials variations, they could communicate their preferences by choosing to use some objects instead of others.
This research opens the door for explorations of non-anthropocentric approaches to design practices. Future research on this topic could work on the intersection of the fields of Design and Human-Animal Studies (HAS), and also use co-design methodologies for these endeavours. Co-design may be the path to include animal perspectives into project development and probe ways of designing with other species instead of just designing for them. Co-designing methods could also facilitate collaborations between scholars of different fields and help generate new insights.

Track 3
Design for Health & Wellbeing

Long Abstracts

KINETIC CALENDAR FOR EMOTIONAL VS PHYSICAL STRESS TRACKING IN WOMEN

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This paper presents the design research aimed at developing an integrative model to increase the self-awareness of emotional status in women. Thehuman centered design (HCD) was considered for the methodology, since this approach is now being applied also inside the health and wellbeing field, taking in consideration that physical and emotional health are affected by several interrelated factors (Bazzano, 2017).
The reason for the focusing this research on women, is the major prevalence of psychosomatic associated symptoms. The term psychosomatic refers to real physical symptoms "that arise from or are influenced by the mind and emotions rather than a specific organic cause in the body" such as an injury or infection (American Psychology Association). A common misconception is that psychosomatic conditions are imaginary, when these physical symptoms of conditions are real and require treatment.
For this reason, a qualitative analysis took place by interviewing women at reproductive age with long term physical disturbances without apparent medical causes. From that, an objective parameter such as Heart Rate Variability (HRV) was selected as measure of physical stress (Campos, 2019), being enriched with the subjective perception of emotional stress of the user and registered according to each day in a calendar, to better understand the possible relationship between emotional peaks, stress and hormonal phases.
Finally, the need for an easier reading of the contrast of these contrasting issues, is what will shape the design concept.

Keywords
Women's Health, Emotional Status, Emotional Design, Human-Centered Design, Gender equality

Introduction

The World Health Organization (WHO) definition of health is "A state of complete physical, mental and social wellbeing and not merely the absence of disease". This healthcare model includes not only physiological pathology, but also the importance of coping with psychological and emotional distress as well as social and cultural factors.

The biopsychosocial model is not only a medical care approach widely accepted in recent years, but the scientific confirmation of a holistic philosophy that searches for evidence-based medical data that includes several explanations to confirm the relationship between physical and mental aspects, with a circular causality nature, instead of visualizing body, mind and the emotions as separate entities. Therefore, it is now more than ever that user centered design can be nurtured by the spectrum of therapeutic approaches for participating in new product or system proposals, inan interdisciplinary work, hand in hand, not only with users, but also with healthcare professionals to achieve optimal health and healing. Psychological stressinvolves the perception and appraisal of a stimulus as threatening, and the consequent activation of a set of physiological reactions characterized as the "stress response" (Desmet & Hekkert, 2009). However, stress research has traditionally been oriented towards studies examining, either the cognitive processes that influence the perception of stress, or on the other hand, the body's response to stress.Surprisingly, not so much attention has been given to the relation between these two perspectives, nor to the role of the emotional perception and the stress process related with functional body symptoms associated with psychosomatic pathology. Psychosomatic pathology has a greater frequency in females (Hange, 2013), and different risk factors have been described in medical literature. Among them there is an association of sexual hormones with body symptom expressions, a higher perception of emotional distress in women, and mood swings related to endocrine patterns and the normalization of physical symptoms as expressions of emotional distress or even with long term somatization. Moreover, the possibility of measuring physiological data (thanks to wearables) and the user perceptions, gives us now the opportunity to compare the physical stress versus the emotional stress. We should remember that physical stress could be any change in the environment that puts cells or organs under pressure, such as dehydration, menstruation, training, pollution, etcetera. On the other hand, mentalstress originates in the cognitive processes of the subject, even without being aware of it. Thoughts and emotions are sometimes translated to bodily sensations (Nummenmaa, 2014) and can also turn into an almost palpable sensation of stress while other daily stimuli can fail to be noticed by the individual, but at the end of the day, all of these mental and physical processes, can have an important impact on mental health. Some examples in this wide spectrum of experiences can vary from traffic, relationships, economy, to the social environment or the predisposition to depression or anxiety amongst other conditions.

Research problem

Thanks to technological advances over the last century, people have shown improvements in health, life expectancy and, in many countries, also creating awareness of the importance of quality of life. Unfortunately, gender and social inequality does not allow most women around the world to get the full benefits ofscientific research, since around 66% of the studies have been made in male animals or in humanswithout being aware of sex differences in health (Holdcroft, 2007). This might be due to the fact that male bodies are more homogenous in shorts periods of time, since they do not pass through such fluctuating levels of hormones monthly; historically making the "genderless" research easier, faster and cheaper. Therefore, sex differences are often overlooked also inside the clinical environment.

A variety of scientific facts can be listed:

- Research now suggest that the organs of the body respond different according to birth sex, therefore women´s health should not only speak about reproduction (Wizemann & Pardue, 2001).
- There are neuronal differences in the brain, especially in the areas of the brain connected with mood and sensitivity (McKinsey, 2018).
- Women are more susceptible to some specific diseases, since some genes intumor cells are activated by estrogens.
- Women metabolize some medication at a slower rate than men, due to a different muscle-fat percentage and distribution.
- The effectiveness of a variety of symptoms and treatments can be different according to the sex, and a percentage of the response to some treatments has relation with gender (Anthony & Berg, 2002).
- 80% of the medications withdrawn from the market are due to side effects in women (Zucker,2020).

As listed, medical research suggests that genetic sex differences have influence atmany levels of biological organization, from cells to organs and from biochemical to behavior; showing the need to understand the biological and emotional differences between XX and XY individuals independent of their phenotypic gender, in order to better satisfy their specific needs for a holistic state of well-being, not only when the projects or research are focused on a reproductive system subject.

Female approach design projects are needed as women have a particular body andemotional ecosystem that need to be understood as unique to build a health care model that considers gender needs and particularities. These models also open a path for further investigation of users of the LGBT+ community,

developing products that consider the needs of people under gender transformation or hormonal therapy.

Main objective
The principal aim of this research is to develop a tool that could increase or encourage the practice of emotional self-awareness in the users, regarding the possible connection between their feelings and their hormonal cycle by having a visual and sensorial feedback that interacts with them inside their living space.

Secondary objectives
To describe the frequency of physical symptoms reported by women without any medical underlying diagnosis and to look for an association between hormone cycles and emotional stress levels.- To measure the basal level of physical stress using a wearable device (ring orwatch) to keep the record of heart rate variability parameters.-To create an app with an interface that offers an easy way to register the number of emotional peaks or functional symptoms not caused by a physical disease to combine these two inputs into a matrix in order to be translated into a visual code.

Methods

This is a descriptive, qualitative study, based on semi structured interviews done to a sample of healthy women that have suffered from physical discomfort orsymptoms related to somatization, during extended periods, in particular digestive functional symptoms, urinary symptoms, headaches and muscular or joint pain without apparent medical causes. This, in order to understand the possible needs to be addressed and to better frame the design proposal.
The second phase is the theoretical research, in which the Heart Rate Variability wasfound suitable for the project, since it's a physiological parameter that can be easily measured using available technology already available in smartphone apps (Campos, 2019) , and it can be a practical and useful way to evaluate somatic stress.
The third stage is developing the design concept that will give didactic feedback to the user, registering the number of emotional peaks or functional symptoms (not caused by a disease), around the day, like; anxiety related with abdominal functional pain, etc. and combining these two inputs into a matrix in order to be translated into a visual code.
A kinetic calendar is proposed as a suitable way to show the emotional and physical symptoms, registered daily, since it's a visual showcase of the possible transitions and severity of symptoms along the whole hormonal cycle, making it correspond to he menstrual cycle of the user, where each day representative unit, can move intoa particular position.
The continuous observation of the monthly figures or patterns that form in the calendar display, encourage the user to develop a sense of self-awareness, encouraging the understanding and acceptance not only of the physical sensations, but also to link them to their emotional reactions.
The data will remain stored inside the app, to help the user register this data for longer periods and to make available for further statistical or medical diagnoses if the woman decides voluntarily to share her information. As a further stage, a clinical analytical study will be proposed to look for statistical association between hormonal cycle and nervous autonomic response, to describe the correlation between emotions, stress levels and hormonal cycle. This study phase should be done in collaboration with a liaison psychiatrist and/or endocrinology specialists.

Conclusions

Tracking apps provide a variety of means of monitoring bodily functions and other conditions outside the confines of a medical facility and gathering data in real time as the wearer carries on his or her daily activities, since “mobile phones and wearable devices have become extensions of an increasingly diffused and smart digital infrastructure” (Ghose, 2021). However, this focuses only in the physical input, which is why this proposal adds the emotional and sensorial factors to the collected data, making it possible for the user to observe changes of colors, intensities, and shapes on the display in order to make easier the recognition of possible emotional patterns and the relation they might have to chronic pain or disturbance. The state of the art in computers and materials, as well as the interest from society in the personalization of their environments (Heidmets, 1994), opens an opportunity window for design to continue to explore the emotional field. In this case, the suggestion is to merge these efforts and multidisciplinary input, in order to propose a sort of “emotional mirror”, a display where users can leave tracks and patterns of their monthly journey for a further auto-analysis of their own physical and emotional.
Data collection and analysis must be aligned with ethical privacy policies, and only the users will be able to choose if they want to share this information with health specialists or ask for therapeutical advice for any changes in daily choices or coping behaviors, but this design proposal can help healthy people or patients to have valuable information for treatment of chronic functional symptoms related to stress.

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A PRODUCT DESIGN APPROACH TO PROMOTE PSYCHOLOGICAL DETACHMENT IN REMOTE WORK FROM HOME

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Abstract

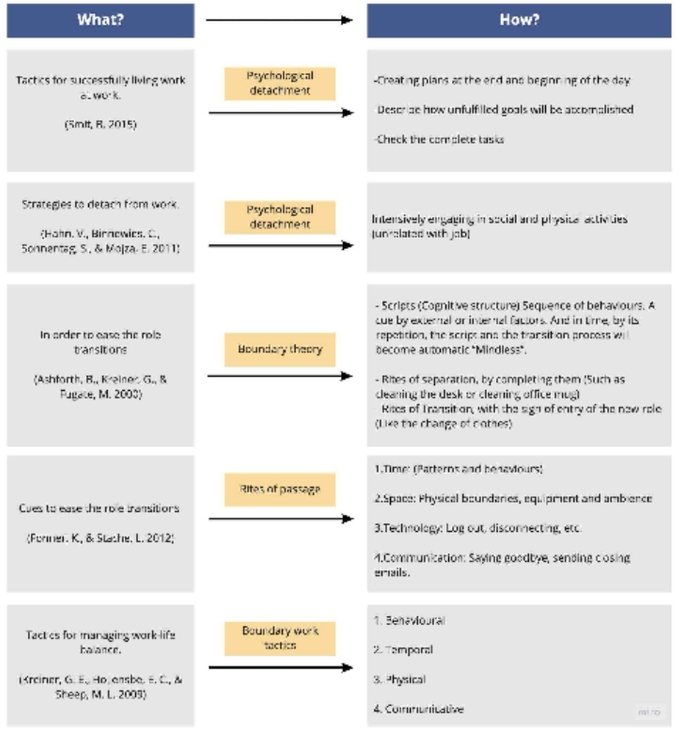
Through a series of design research methods, under the umbrella of ViP method, we developed three product design concepts intended to help people working remotely from home to attain the state of psychological detachment from work.
Potential users' perceptions about the concepts were gathered using User Experience Questionnaire. Obtained results and their implications are discussed.

Introduction

The ability to stop thinking about work or to achieve a state of mental disengagement during off hours is known as psychological detachment (Sonnentag, 2012). Previous studies have found that psychological detachment from work during off-hours is beneficial for wellbeing (Sonnentag & Fritz 2014). Well-being is a broad concept that comprises both favorable short-term affective states (e.g., enthusiasm, relaxation) and more long-term aspects of psychological health (e.g., life satisfaction, absence of burnout) (Sonnentag, 2012, p. 115). By contrast, failure to successfully achieve psychological detachment from work has been associated with several health-related problems, such as sleep disturbance, dysphoria and cardiovascular disease. Switching-off from work is therefore an important mean to prevent work-related long-term health problems (Cropley & Millward 2009). The pandemic of COVID-19 in the last two years has dramatically affected societies and the economy, contributing to accelerate the ongoing transformation in the way we work, namely boosting remote working from home. However, remote working from home has been associated with an increase in the reported cases of incapacity to disconnect from work, which has become a current major concern in terms of health and wellbeing, as shown on the report of the State of Remote Work 2021 (Buffer). Despite the existence of many studies focused on understanding how this "spillover" of work into people's lives or the inability to "psychological detach" from work has a direct negative impact on health and well-being, few studies have addressed this issue from a design perspective. Previous studies suggest that psychological detachment is negatively affected by the lack or blurring of boundaries between the two domains (i.e., work and leisure), accentuated by the scarcity of physical differentiations (Sonnentag, Kuttler & Fritz 2010).
In the case of remote work from home, the workplace no longer necessarily has a space (Physical) distinct from home, which reinforces the importance of understanding the complex relation of work-home interactions. In this context, the aim of the study described here was to explore how product design could help people working remotely from home, to achieve the process of psychological detachment from work. To do this, we investigated actionable strategies from the psychology field, framed on the spatial and technological boundary arrangements between work and home, and in people's ability to create and maintain boundaries between their work and non-work roles (Ashforth,

Keywords
Product Design, Wellbeing, Work from home, Work-life balance, Psychological Detachment

Figure 1. Summary of strategies

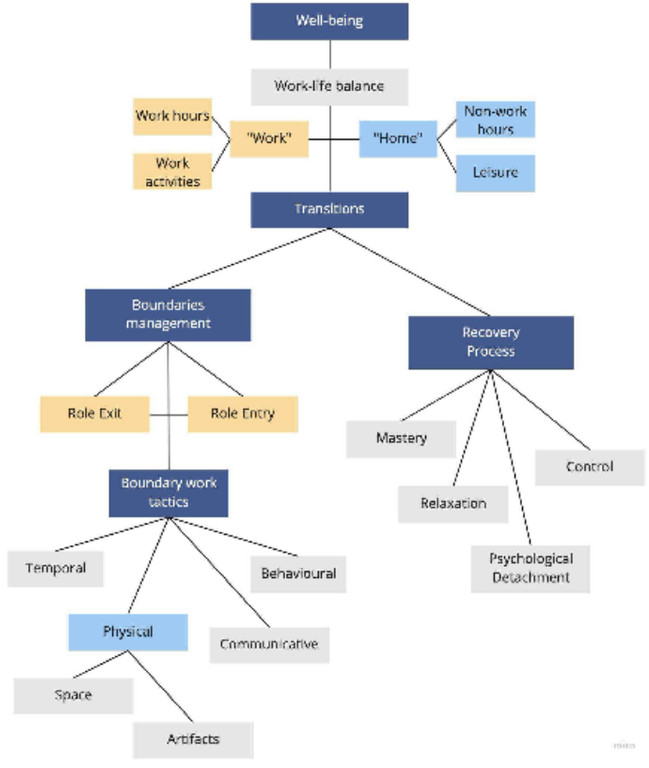


Kreiner & Fugate 2000), incorporate them in the design of artifacts which could boost the detachment in different ways.

Psychological Detachment

The term Psychological Detachment was introduced by Etzion, Eden, and Lapidot (1998) describing "the individual's sense of being away from the work situation". Psychological detachment plays a fundamental role in recovery processes that refers to the process of reducing or eliminating physical and psychological strain symptoms that have been caused by job demands and stressful events at work (Craig & Cooper, 1992). Individuals differ in the degree to which they detach from work during off-hours. It is probable that a heavy workload and high time pressure increase people's general level of arousal, such that people find it difficult to unwind when leaving their workplace at the end of the workday and instead stay cognitively busy with work-related matters (Sonnentag, 2012). In addition, the combination of a heavy workload and high time pressure implies that tasks remain unfinished when employees leave the workplace, which might increase their tendency to continue thinking about work related issues. The relevant concepts for approaching this subject and consequently developing a theoretical frame are indicated in Figure 2.

Figure 2. Revised concepts and their relationship.



Managing physical artifacts

Physical tactics are one of the boundary work tactics categories proposed by Kreiner, Hollensbe, & Sheep (2009). Artifacts are visually salient, typically tangible markers that serve as cues about a culture, a domain, or an identity (Elsbach, 2004). In her original study on boundary work, Nippert-Eng (1996) found that individuals use physical artifacts (often subconsciously) as ways to negotiate the work-home border. The power of the artifacts as cues or signals is shown in this example: "Even my two-year-old knows when I put on a collar that I'm going to a meeting".

Method

The general approach was framed by the ViP (Vision in Product Design) method (Hekkert & Dijk 2011). ViP is a method which advocates that the designer should come up with a vision o f the relationship between the user and the product, and then use that vision as the basis for your design. This means examining the underlying ideas of the project in detail before arriving at a proposal, i.e., clarify exactly what we want people to understand, experience or do. The ViP design approach is grounded in three basic principles: 1) It is future oriented; 2) Its interaction centered; 3) Its context driven.

Under this umbrella and after a systematic literature review, we conducted a series of participative methods/techniques intended to generate concepts of artifacts that could boost psychological detachment from work. In general, the study comprised five main phases: 1) Research; 2) Ideation; 3) Evaluation; 4) Prototype and 5) Results and conclusions.

The phase 1 – Research - comprised two main steps: Background research (Problem framing, Literature review, Theoretical framework) and User research (Survey, Personas, User journeys).

The phase 2 – Ideation - comprised co-ideation sessions (Workshop, Explore concepts) and concept ideation (Concepts development, concepts selection, low-fi prototypes).

The phase 3 – Evaluation - comprised User evaluation (Compare concepts), Evaluation against requirements (Select concept and refine)

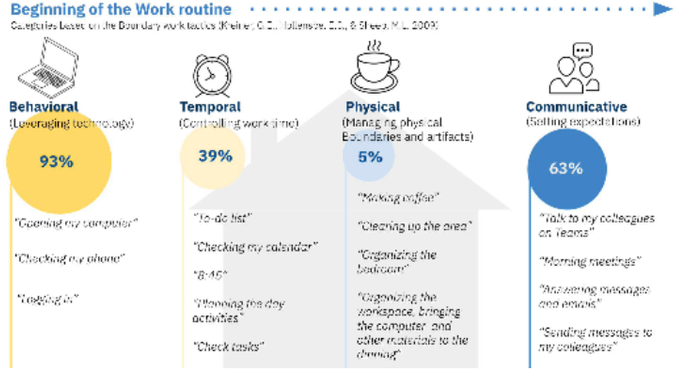
Figure 3. Strategies categories.

Results and discussion

User research - Questionnaire

A questionnaire was applied to understand which strategies were more popular to disconnect from work at the end of the day. We asked participants to identify their routines or activities that help them take their mind off work after finishing working and to explain what it was. The responses were analyzed and subsequently grouped into categories (see Figure 5). Results show that exercising is the most common strategy used for disconnecting from work at the end of the day with 34% (N=20), including going for walks, stretching, training, and playing sports. This popularity can be associated with being a highly engaging activity that requires attention and a specific set of conditions that provides transition rituals between activities. 32% (N=19) of the respondents said they did not have any routine or activity (None). The meaning of this result is somewhat unclear, since this could either refer to not having a routine because they do different stuff every day or not having recognized an activity that helps them to disconnect. Open-ended questions about how the respondents usually start and end the work routine at

Figure 4. Beginning of the work routine summary.



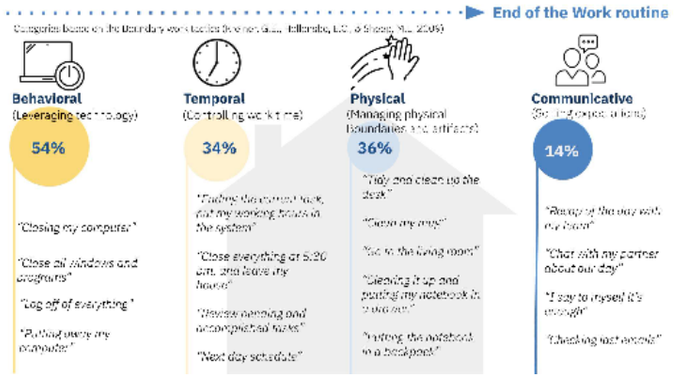


Figure 5. End of the work routine summary.

home were meant to identify patterns, and routines that help us identify the most common signifiers or transition marks between roles. The categories used to classify the answers is based on the Boundary work tactics (Kreiner, Hollensbe, & Sheep, 2009). The results revealed that the beginning of the work routine is closely related with the use of technology (open the computer and apps and log in) - 93% (N=55) and is also relevant to the communicative category (Talk to colleagues, open chats, send mails and messages), see Figure 4. The end of the routine is also related to technology - 54% (N=32). Nonetheless in this case is almost as equally important as the relevance of Time (Task and schedule) 34% (N=20) and Space (Organizing, cleaning and making changes) 36% (N=21) tactics categories, see Figure 5.

Ideation - Workshops

Workshops run with three different groups, organized according to their level of detachment, resulted in three boards filled with ideas for helping "Ana" with her problem of keeping her mind of work. After each participant explained the ideas presented on the board, they were assigned to five red dots to "vote" for their own or other participants' ideas that they liked the most to narrow down the list. After learning about routines and peoples experience of what causes poor psychological detachment when working from home and how do they manage it, we were able to identify two main components: i) Physical component: On something tangible such as time that can be measure and productivity that can be evaluated in different ways according to completing task or achieving goals, and ii) Psychological component that has to do with acting thought the fear of losing the job, or having negative emotions of performing poorly or to

simply not feel productive enough.
After breaking the continuous working without boundaries, that leads to overwork and prevents or creates difficulty to achieve Psychological Detachment of people working from home, we wondered what's behind overwork? And after the workshop sessions we were able to identify, from the interpretation of the participants' comments, the following aspects:

- The guilt factor, and the need to demonstrate that they are great workers.
- The sense of not being productive enough
- Or simply because they have too many things done for tomorrow's deadline. (Matter of organizing time and manage expectations)

Ideation – Concepts development

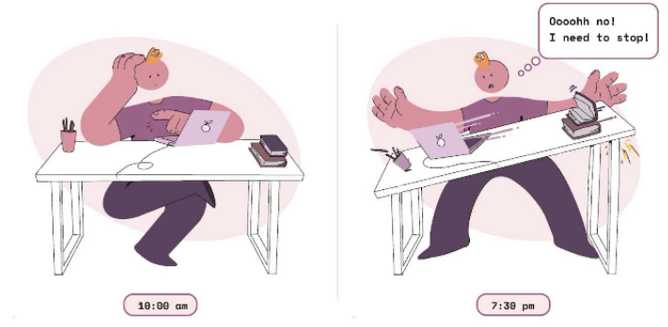
The concept development step began by collecting the three main ideas/metaphors resulting from the workshop. Three metaphors were identified as a starting point: a game, a totem, and a visual mark. Each of them include one or more elements of these metaphors and used them as a trigger for brainstorming possible artifacts according the what, why and how questions and adding the "Something on the wall" and "Something on the desk" as a strategy to simplify the options on artifacts that would take part of the limited space of work within the home and that would have a direct visual and physical relationship with the user while its performing working activities. The concepts created can be seen in Figures 6 to 8. These three initial concepts were then developed in more detail, and evolved as three design provocations, synthesizing all the previous stages of research, to receive feedback and evaluate from there.

Figure 6. Concept game

Figure 7. Concept Totem

Figure 8. Concept visual marks

Figure 9. Desk scale concept illustration



Concept 1 - Desk Scale
As a metaphor for the balance scale, it represents work / life balance. It makes the imbalance of work at home visible and physical, interfering and directly affecting work conditions when the balance goals set by the user are not achieved.

How does it work?
This desk / standing desk has the standard hydraulic system to adjust the height with an added mode that inclines the surface, which can be turned on and off when convenient (see Figure 9). The mechanism will be linked to applications such as calendar or task managers, where it recognises the number of hours of work without interruption and begins to progressively incline the desk surface creating unfavourable conditions to continue working, until the user compensates it with personal activities to achieve balance and consequently a straight working surface.

Concept 2 - Bird factor
As a reference of the cuckoo clock, the bird represents the user's personal life, which is being neglected by their work life, and shows how it's condition worsens during the working day without attending to their personal and health needs. It makes visible the long-term consequences of having an unbalanced work life and how it will negatively affect physical and mental health.

How does it work?
It will be linked to applications such as calendar or task managers, where it recognises the number of working hours without interruption, the bird's exit intervals can be configured according to the activities of the day, or scheduled times, but if the user does

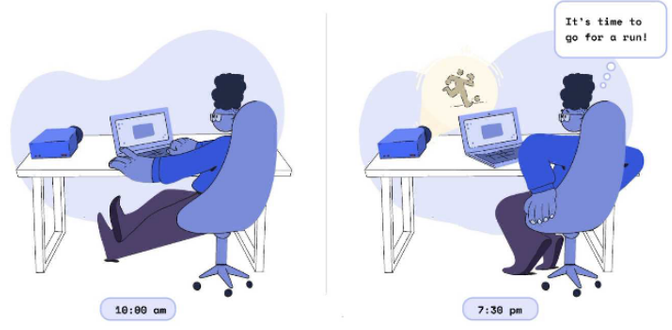
Figure 10. Bird factor concept illustration

not perform his/her personal goals the bird will begin to appear each time in worse conditions throughout the day.
From a fresh appearance and with a clear sound at the beginning of the day, to progressively deteriorate until reaching the maximum deterioration in its appearance with sound interference (see Figure 10).

Concept 3 - Time Reels
With flexible working hours, setting limits and expectations is more important than time itself. The idea is that the user has a clear vision of the "stages of each day" expressed through a clock without numbers, that indicates the day progression with colors and a certain number of marks, that will trigger the projection of videos or the so called “Reels”, that are related to the marks or personal goals set by the user as motivational tool.

How does it work?
It will be linked to an application such as calendar or task manager and will ask the user to indicate the number of hours that he/she plans to work and to set the marks or personal goals of the day; Indicating for example stretching at mid-morning and running at the end of the day, and when the clock gets to mid-morning a Reel of someone stretching will be projected on the wall and at the end of the day a Reel of a person running will be projected on the wall. This artifact will act as a reminder and motivation, projecting the user's goals and making them tangible and visual.
This will help the user to achieve their personal goals, influencing and promoting positive and healthy habits into their work routine (see Figure 11).

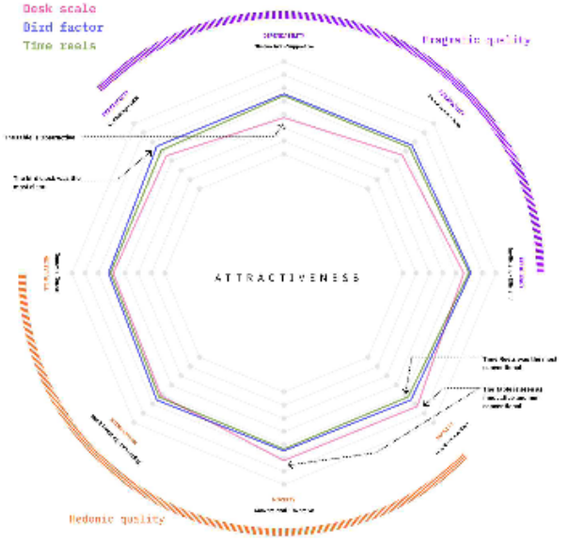
Figure 11. Time reels concept illustration



Evaluation with potential users

We received 42 responses to the concepts evaluation survey that was conducted using Google forms, and it was based on the short version of the User Experience Questionnaire (UEQ). The UEQ consists of 26 items that are grouped into 6 scales and its objective is to allow a quick assessment done by end users assessing their impression of user experience. The illustrations used (Figures 9-11) were developed to express the meaningful characteristic of each concept, including the actions taking place and the expected user reaction, placed on the assumed context of the place of work at home. Results suggest the Bird factor was the concept best rated by the respondents. Thus, this was the chosen concept to develop in further stages. As shown in Figure 12, the overall evaluation is above average (In the range of the 10% best results) same as Desk scale, with the difference of having slightly better evaluation on the pragmatic quality than on the hedonic quality. The highest value is related to Pragmatic quality of Perspicuity = confusing / clear (Mean = 2.0) and the lowest in Hedonic quality refers to Stimulation = Exciting / boring (Mean = 1.1). The Bird factor was also the concept with the most marked components previously mentioned, Physical (Visually) and Psychological (Emotionally), directly focusing on the sentiment of guilt and responsibility that appears to be present in most cases as the reason for overwork and disabling Psychological detachment, although in this case

Figure 12. Mean results of UEQ represented on a radar chart.



referring to the guilt and responsibility as consequences of their own personal life neglect.

Conclusions

In future research, beyond users' perceptions, it would also be beneficial to validate actual behaviours and long-term user-experience. A few limitations are worth noting. In the current study, due to Covid-19 related constraints, only digital prototypes could be examined. Future research examining physical mock-ups could offer additional relevant data. In conclusion, the objective of this study – to explore how product design could help people working remotely from home to achieve the process of psychological detachment from work - was partially achieved. Further, the Bird Factor concept seems well suited for promoting psychological detachment.

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SMART TOYS FOR INCLUSIVE PHYSIO-COGNITIVE THERAPY

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Introduction

This paper shows some of the outcomes of the ongoing research Pro - Ability based on the Design for wellness and for medical devices carried out at the Politecnico di Bari, in the areas of product design and interaction design.
The Pro - Ability approach, focuses on a new area of the interest of the design discipline based on the convergence and comparison of the theory and the praxis, ranging from the product and interaction design with a human centered approach, to the field of the social innovation.
In particular, the study focuses on those areas of the medical design that investigates the interaction between physical sensory experience and cognitive rehabilitation by developing physical and digital artifacts.
The clinical practice concerning the rehabilitation of pre-school and school-age children affected by autism spectrum disorders identifies therapies based on the dynamics of play (Hillman, 2018) as a valid support for emotional and social growth and for the acquisition of skills related to proprioception and fine motor manipulation (Provost, Heimeri et al., 2009).
As this research lays on such a scientific domain (from neuroscience to psychology, from informatics to ergonomics and cognitive ergonomics) the design approach used for this work is mainly based on an expert mindset (Sanders, 2008).
From a methodological point of view, in fact, the research tries to combine the human centered approach with the design + emotion one. However, the particular topic cannot be separated from the necessary comparison with the area of social sciences.
In this respect, the research required the involvement not only of the main users (children with ASD, parents, doctors and therapists) but also the involvement of social welfare associations in order to compare the topic with the challenges of social inclusion (Tosi et al., 2020).
The human centered approach of the research relates as much to the interdisciplinarity of the research as to the involvement of users in the context of the research development.
The inclusive approach of the research is expressed in the development strategy of the play-educational devices that, while focusing on the theme of the child's fine-motor development, enhance, first, the recreational-educational dynamic of the game, essential for emotional and cultural growth as well as for the acquisition of skills and abilities of social relations (Visalberghi, 1988).
This study has been carried on during the pandemic period, when the crisis has exacerbated the distress of families and individuals with autism spectrum disorders also in relation to the reduced availability of medical care. For this reason, the methodological structure has been adapted, the structure of the qualitative survey, for example, has been carried out through remote platform.
At this stage of the research, the design hypothesis has been validated by the phycologist and the therapist.
Starting from this premise, the design process has been guided by some of the protocols coming from the clinical approach: mostly, for the definition of the user, we considered such therapy practices that maximize the parental role and the sensorial stimulation through both physical and digital interfaces in the play experience. In fact, starting from a scientific state of the art in the psycho-neurological field (actually, divided on the appropriateness of the use of gaming in children (Murray et al., 2021) affected by autism spectrum disorders) this study focuses on the "physical" and "cognitive" experiential dynamics that systemizes the tactile, auditory and visual sensory experience with the dynamics of the virtual interaction.
The aim of this study, in fact, is:

- to define a critical state of the art with reference to the topic of persuasive gaming (Huizinga, 1939; Caillois, 1958) for the support of cognitive-sensorial impairment of children;
- to develop a design method for the development of devices to support the rehabilitation of children with autism spectrum disorders through an interactive analogical - digital gaming systems.

In order to validate the design inquiry, a mockup set of toys have been designed.
At this connection, an action-research approach was used to develop the project hypothesis, involving a multidisciplinary group of psychologists, psychotherapists (experts in the treatment of autistic spectrum disorders), technologists and computer engineers, parents and children (Bianquin, 2017).

Keywords
Digitalization of communication processes, translation of health information, errors in healthcare, traceability of data, incremental innovation

The role of play in the growth of children with disabilities

Autism spectrum disorders are a lifelong condition (ISS, 2011). Therapeutic interventions, especially at an early stage (Stern, 2015), can help children to acquire essential life skills and, consequently, to live a more serene everyday life.
Therapies foster the development of skills related to social interaction and allow the child to gain access to new learning experiences. The benefits and therapeutic powers of play cannot be overlooked when discussing therapy for children. These special play therapies are mainly used in children between three and twelve years of age and treat cognitive, behavioral, emotional and other social disorders (Mcmahon, 1992).
According to contemporary Infant Research studies (Lavelli, 2007) facilitating the development of game skills means intervening as early as possible for the activation of perceptual-motor, praxis and communication skills in autistic children.

State of the art

The world of tools supporting therapies for the treatment of DSA is today in continuous evolution, both from a therapeutic point of view, for the updating of the techniques adopted, and from a technological point of view, for the design and production of the artefacts and devices used (Rivera et al, 2016). In order to explore the potential of gaming in children and young people, it was therefore necessary to analyse and distinguish the therapies and methodologies most used and known for the treatment of autism spectrum disorders, through the development of a state of the art that systematises the extensive existing scientific literature in relation to the design themes of the game.
Educational treatments for children with autism consist of activities programmed by experts, the main aim of which is to improve specific skills or abilities of the child, in particular communication, social and behavioural skills. For the purposes of the present research, cognitive-behavioural and psycho-educational therapies, music therapy and psychomotricity were analysed in depth, which made it possible to highlight criticalities and compatibilities between the different areas of intervention. Among these, the best known and most experienced are: DIR - Developmental, Individual Differences, Relationship-Based (also called Floortime) (Guiot et al, 2011), Lego Therapy, Play Therapy.
The play, in fact, helps the birth of intersubjectivity, imitation and language and is based on the construction of meaningful interaction proposals, which are based on reciprocity and on the development of motor-praxis (Gison et al, 2012; Vincenti, 2015) and socio-communicative skills (among the many forms of therapy dedicated to autistic children and young people, music

therapy has been shown to increase motivation to engage in treatment, which is therefore more enjoyable (Trevarthen, 1999; Wille, 2016; Sharda, 2018)).
Increasing Ict application, from the other hands, since in the 60s started to shift the sensorial human activities in a new light, assuming the sensorial experience could be entrusted to the interaction with a computer. "These new models of sense turned sensual operations and feelings into data that had to be brought into information flows and had to produce feedback loops to improve teaching and research; it also made classrooms into research laboratories and workshops where new ways of being in the world and languages to talk about experience were configured" (Dussel, 2020). Design education strongly contributed in to define that Montessory's education model based on physical experiences during the preschooler age. Bruno Munari (Campagnaro, 2019), in its Tactics Lab for kids, defined a new sensorium that has been greater important for the educational research and for the social and psychological sciences, in which tactile and visual experiences were translated as information records and as data processing.

Research objective

General objective of the Pro - Ability research is to foster the design approach to product and interaction towards an inclusive and positive experience for impaired people.
As the research presented focuses on ASD children, it is primarily concerned with the development of a play kit for cognitive and tactile fine-motor rehabilitation.
The research starts from the definition of the state of the art in reference to the existing gaming artefact, both material and digital, particulary addressed to the rehabilitation of the fine motor and hand-eye coordination problems experienced by autistic children. A further focus was on the issues of sociability, waiting and respecting shifts with reference to the habits of these users.
The needs analysis of autistic children will address the design process, focusing on:
- the enhancement of the fine-motor ability and hand-eye coordination;
- the development of the interpersonal collaboration, for the social objectives;
- learning to respect the rules, be patient and wait your turn;
- inclusive rehabilitation activities based on play.

Methods

As this research investigated the boundary of design with medical - physiotherapeutic disciplines, computer engineering and

materials technology, a multidisciplinary approach needed.
In the tradition of the studies that are focused on person in the way in which "needs" are at the center of the Research action of Design. We have to state that this research is focused on Human Centre Design, more than on User Centre Design as far as Norman the methodological approach is not focused on "product" in itself with the necessary market implication, but it is based on the human interaction and experience, particularly in the SDA disorder, motor and cognitive impairment. As this premise has been done this study is based on an interdisciplinary team of researcher including psychologist and therapist, as well as designers, informatic engineers, and material engineers.
The extreme sensitivity of the target users required an approach as close as possible to their needs and requirements, in order to design tailor-made solutions.
The human-centred design approach, both in terms of the consolidated procedures of research, observation, analysis, design and verification, both for the involvement of the end users in every phase of the process, has been followed. In particular, in addition to the study of the state of the art and the evidence emerging from the scientific literature, user research was carried out in the field, involving associations, schools, operators, professionals and families, which allowed the observation and listening to the children, in a direct or mediated manner.

Results

As a first design outcome, the Pro - Ability research presented provide a first mockup set of toys addressed to the fine-motor skills enhancement. The needs analysis has been defined both from the state of the art literature and from the user research. Greater importance has been given to the dialogue with territorial non-profit associations. A set of five 3D printed smart toys, connected via Bluetooth to a tablet application, has been designed in order to start producing a first ecosystem for physical and cognitive rehabilitation. The proposed play set implements the Music Therapy approach and assumes as its objective the support of young users in the exercise of their motor skills.
In addition, the design of an intuitive and user-friendly graphic interface (App) has been designed.

Conclusions

The presented research combines the culture of design in the areas of product and interaction with the medical field, specializing in motor and cognitive therapy. The hypothesis of working on a set of therapeutic and playful toys affirms the need for an inclusive approach to disability.

Quantitative and qualitative surveys have outlined the specific needs and difficulties of autistic users. In particular, the study refers to motor and related cognitive skills. The advancement of research has then outlined the possibility of promoting, through play, social interaction and inclusion, opening up the configuration of new cultural meanings for the field of study.

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THE TRANSITION TO THE DIGITAL TURN. A DESIGN-BASED APPROACH TO SUPPORT HOSPITAL WARD IN REDUCING ERRORS IN THERAPY. A PROBLEM OF INTERGENERATIONAL AND INTERCULTURAL GAPS.

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Design, intended as culture and practice, has an increasingly intense dialogue with the world of health and personal care, as much in everyday public as private life.
This dialogue is ongoing on several dimensions: the more traditional and historicized one, that focuses on the design of artefacts and environments for personal care; the codesign of innovative systems, products, and services in which there is an open dialogue between designers and people with different knowledge and experience - from doctors to nurses, from patients to caregivers; and the strategic one, in which design culture is the bearer of innovation processes in the health sector (Brown, 2011; Hargraves, 2018). The Covid-19 pandemic has changed our society, especially in the field of care processes in which patients and medical personnel are involved; it has also stimulated a constructive reflection on the interdependencies between the actors in the care processes. Human wellbeing is a point of contact between medicine and design culture: both participate, act, and design to improve the person's condition (Buchanan, 2011). Among the critical transitions that the healthcare world faces soon, there is the challenge of outlining strategies to manage the transformations induced by the overbearing entry of new digital technologies, with their impacts on medical practices, methods, and cultures (Keasberry, 2017). Such a transition requires cultural, technological, and infrastructural changes that will likely require a cross- generational leap to unfold in terms of an accomplished innovation (Khan, 2021).
In this paper, we focus on analyzing a problem related to the everyday experience of patient management in the hospital environment. Starting from a small-scale project that introduces an incremental innovation, we want to highlight the goodness of a systemic, multidisciplinary and codesign approach in bringing out the width and depth of implications and impacts to be addressed in the broader processes marking the transition of hospital facilities to the "digital turn".

Keywords
Digitalization of communication processes, translation of health information, errors in healthcare, traceability of data, incremental innovation

Although there is no single meaning of the term "transition", which takes on different nuances depending on the disciplinary focus, it is agreed to use this term to indicate how people respond to change over time through active forms of personal, relational, situational, social, or environmental adaptation. The reconstruction of a valued identity is essential for transition (Kralik, 2006), as it is a definition of a stress threshold that does not hinder learning processes (Ash, 2018).
The design problem presented in this article relates to the error in the hospital environment, that can depend on a plurality of causes; the literature offers several approaches aimed at observing the phenomenon from different points of view and purposes:

- approaches that correlate error with specific types of healthcare activities (e.g., diagnostic, surgical, pharmacological, etc.) (Hauck & Zhao, 2011).
- approaches that describe error according to the nature of one's behaviour that caused it (e.g., unintentional, under high-risk or routine conditions, caused by deviations from procedures, etc.) (Farnese, 2019).
- approaches that cluster the error based on the ability to understand, comprehend, remember, and perform even complex operations (Rafter, 2014).

In other words, the error is related to interpersonal skills, competences, memory functions, and operational skills. The process of recognising, measuring, preventing, and limiting the consequences of an error is known as risk management (Filippidis, 2017). In this approach, the typical intervention methods follow the standards usually established by each National Health System (Ministry of Health, 2004 and 2005). On a territorial scale, these standards are received and modified according to the peculiar activities performed by each entity, such as hospitals. Despite this kind of adjustment and personalization, these standards base their philosophy of intervention on methods and procedures borrowed from industries or organisations (e.g., war-type) dealing with complex technological systems. For such reason, a deterministic imprint prevails, unsuitable for a hospital environment dominated by the aleatory nature connected to the human component rather than the principles of strict functionalism (Bogner, 1994).
These risk management protocols are not fully effective because they underestimate the human component and the characteristics of activities where interpersonal relationships have extraordinary importance and where the "outcome of the process" is the patient and his/her healing rather than a technological or organisational artefact.

A Human Centred Design approach was adopted to understand the human component, the real experience in the practice of care processes, and to develop new design opportunities. An initial phase of investigation, analysis and understanding of the case study is followed by an iterative phase of design, evaluation and implementation of the identified design opportunities. Although belonging to the case studies research, the methodology reconstructs events, processes and procedures, interactions, context conditions and relationships, not through direct contact with the dynamics of real life in the ward, but through retrieving documents, interviewing, and creating scenarios. Thanks to these activities, the micro-dynamics of care were outlined in their complexity and, at the same time, the experiences, difficulties, perspectives and wishes of the different actors involved were grasped. As this is a COVID-19 ward, it wasn't possible to collect direct insights from patients.

This paper focuses on the error that can arise from the complexity of communication processes within a ward, which can predispose to failures, misunderstandings, and even fatal outcomes (Baban, 2015). The complex communication intertwining between many subjects and objects makes the care activity as a whole - and the medicine dispensing, as part of the wider process - particularly complex. This results in: communication gaps; overlapping activities sometimes not accompanied by an adequate information exchange; forms of hierarchical authority; different competences and skills, introducing criticalities in the interaction between the operators, etc. In this first document-based interaction, objects do not fully play their mediating role. Within the daily work activity, we have identified a critical moment, the "handover": the precise activity through whichnurses and doctors give back events, criticalities, diagnostic interventions of which the results are expected, medicine dispensing that must be carried out outside the ordinary prescriptions, etc., passing "the baton" to the colleagues of the next workshift. In this context, all the actors and the artefacts - material and immaterial - are present, making it possible to investigate their role in the complex network of care, while identifying unexpressed process difficulties.

Gathering the documentation and interviewing the ward staff enabled us to map the daily activities and highlight the nodes where problems lurk, which can lead to errors. The analysis of the case study, viewed with the support of multidisciplinary contributions, is flanked by an initial project outcome which acts as a ""transition prototype"" (Baule, 2013), a sort of bridge-object between the habits and consolidated practices of the existing reality and their adaptation to a digital future.

In this case, the prototype does not only represent the object in its early stages of development or in the process of becoming; it has a broader social value, bringing into reality a series of ideas, methods and processes that connect the physical and practical elements to those theorised, helping to create a dialogue with the actors involved in the design process (Rosental, 2015).

In terms of design practices, this new artefact incorporates the need for multiple forms of translation (Baule & Caratti, 2016) for the purpose of:

- facilitating communicative access; preserving the characteristics of the forms of interaction consolidated in experience, in order to guarantee the familiarity of use essential in working environments with a high risk of error;
- preserving the expressive characters that belong to the different forms of communication, necessary to give the right style and communicative tone to information and texts that have different functions, addressing different actors in the process, and aiming to obtain different behaviours, actions, reactions and attentions from the interlocutor;
- activating multisensorial forms of reception able to return even fast and urgent messages, informal type communications, etc.

On the level of theoretical reflection, it focuses on cultural pluralism, in response to the needs that emerged from the interviewees. We must consider this value to bridge the distance detectable in the needs and requirements expressed by the medical staff. This distance is further emphasised by intergenerational differences and therefore by a different propensity to move towards forms of digitalisation to trace data, operations, responsibilities, etc. Working on a process of incremental innovation is a particularly suitable choice, since it emphasizes a process of smooth transition that the project aims to achieve by implementing a transformation - literally a change of form - of the existing without making clear breaks with the past (Ettlie, 1984); maintaining as much as possible cognitive and behavioural connections, linked to the experiences in use both in everyday work and personal life (Rubin & Abramson, 2018); needing forms of easy adaptation, thanks to the introduction in the digital process of elements of the analogical process considered of good effectiveness by the interviewed staff. The shift in relational content and interactions with objects and people through objects is implicit in changing the form. In this regard, a widespread feeling has emerged, namely an intergenerational and intercultural gap in accepting or rejecting new technologies for fear of changes that may affect the behaviour of individuals or the system of relationships in work teams.

This feeling has been widely framed in literature (Robson & Zachara, 2014), and concerns were also noted about the skills required to use new communication systems. One of the project's primary objectives is to "make physical" the exchange of information between the actors in the process. Emphasising the materiality of the data exchange also serves to stress the permanence of the information in the "hands" of those who have it, to keep track of and remember the information needed to guarantee the effectiveness of the therapeutic continuity. The criticism expressed during the interviews - but also the appreciation - regarding the existing documentation forms made it possible to work on "mimesis processes" (e.g., formal analogies with existing artefacts, relationship structures) meaning processes that "replicate", where appropriate, existing reality to maintain a sense of familiarity. Besides, the innovation experience shows that mimicking processes are widely used in incremental innovation processes.

The project consists of a digital platform whose interfaces and interactions have been designed to facilitate:

- the continuous access to data.
- the traceability of responsibilities.
- the comparison of data to have a constant overview of the patient condition.
- the scale-up from the individual patient to the whole ward, to provide a continuous monitoring through a visual map.
- the possibility of recording voice notes, to encourage the expressiveness of communication and to leave a trace of informal forms of communication.
- the opportunity of viewing the medical and nursing staff workshifts, to be able to use personal and non-impersonal forms of communication.

The project intends to: work on the communicative immediacy and simplicity of the interfaces to facilitate access to the use of digital tools; transfer the information from the printed page to the digital screen, trying to adhere to the users' previous visual experience (e.g., being able to see the patient's entire clinical history ""at a glance""); display the status of the requested exams (e.g., booked, to be performed, being performed, reported, etc.). The project is the first step in mapping and transferring the communication system between medical staff into digital format. Further measures will include the integration of the entire information system that accompanies the logistics of the drug. The reflections here presented are based on a thesis (Pellecchia, 2021) conducted at the Department of Infectious Diseases of Hospital and supported the Research Group Pharma Design Studies at the Department of Design of Politecnico di Milano.

This case study offered the chance to connect with healthcare staff and raise awareness of the value of design action in an institutional context often characterised by bureaucracy and hierarchies arising from clinical experience (Reay, 2016; Foucault, 2007). In a scenario of design opportunities such as the one bequeathed by the Covid-19 pandemic, in which tools, processes, and services related to health can be rethought, this paper intends proposing a reflection on the role and importance of collaborative spaces (and their dialogical nature) in which designers, medical and health personnel, patients, students can work together to address current and future issues in the field of healthcare, and codesign innovative solutions.

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SMART OUTDOORS FOR ELDERLY: EXPERT INTERVIEWS.

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Keywords
Biomimicry, Biophilic design, Biodesign, Echinodesign, Echinochess

Introduction

Researches show that daily the elderly face hazards and barriers that prevent them from being active and performing outdoor activities (Barnsley et al., 2012). While researching risky and undesirable situations that the elderly population faces within their daily outdoor activities, it was possible to find some issues that were more frequent. As an example, indoor falls are generally common in inactive older people, whereas outdoor falls are more common in healthy older people (Duckhan et al., 2013). The frequency of going out is a useful indicator for frailty for physical function and health-related quality of life among the elderly. A potential idea can reduce the burden and cost of giving care to elderly people while maintaining safety and autonomy (Yang et al., 2013).

The ambient assisted living (AAL) system is a socio-technical system that uses networked artifacts embedded in the environment to lead the flow of life to well-being (Abtoy et al., 2020). Most of the AAL system focuses on indoor environments, such as smart homes, using information from sensors in the environment and on the person (Rashidi & Mihailidis, 2013). However, if the solutions can be implemented on an outdoor scale, the elderly can also be confident to perform activities outdoors. This plays an essential role in increasing the quality of life and it does mean a longer independence of the elderly's life (O'Grady et al., 2010). In this sense, Chippendale (2017) emphasizes that the reason why the elderly seldom use public parks is not explicit. Therefore, it is crucial to understand the needs of the elderly while using outdoor spaces (i.e., public parks)as well as the reason why they are reluctant to use them. Based on the context above reported, this research aims to suggest design solutions based on the concept of assisted environment on a city scale, considering that the elderly population can experience and live in the collective and public environments (specifically in a public park) independently.

However, it is important to justify that the problem and the expert interviews are commonly used for collecting knowledge about or investigating a particular area of operation. In this sense, this paper focuses on the expert interviews of the project.

Method

The method used for this research is the expert interviews as it is a popular method when it comes to social research. The role of the expert in these interviews is fundamental, as it allows the exploratory phase of the project to be more efficient and richer in data collection than just the method of exploratory observation. (Bogner & Menz, 2009). Expert interviews were selected to reach the objective. To reach a better understanding of the needs of the user, a mixed investigation method was used, being part qualitative, and part quantitative. On the quantitative, demographic information about the experts was collected, creating a better profile to then move to a qualitative method using the interviews.

Participants

27 experts (14 men and 13 women) in architecture, urbanism, design and landscaping from Brazil and Portugal participated in this study. The experts' ages vary between 26 to 67 years old (M= 36, SD= 12,93).

Procedure

The interviews were conducted personally and virtually (using WhatsApp/ Skype or Zoom). In-person interviews took place in Brazil and Portugal. Specifically, the researcher conducted these within a cafe during periodically scheduled meetings. Various objectives were detailed to the interviewees prior to the meetings. The interviewees were informed that all information would be audio recorded. Each interview lasted roughly 25 minutes as the researcher took notes. The interviewer took note of important points that were mentioned during the interview, each interview lasted approximately 25 minutes, while the interviewer kept the notes for future analysis.

Materials

As unstructured questionnaire was used, consisting of 8 questions, and was dedicated to the following specific topics: the elderly, technology, and smart cities.

Results and discussion

The results were analyzed by finding a pattern of the most mentioned/common topics/keywords. Some results are revealed

as follows. Experts believe that mobility, which often, due to physical disability, or problems in public areas, such as holes in the pavements, roots of trees that exceeded the limits of flower beds, loose and irregular stones, can reduce the ability for circulation of the elderly. The layout of spaces requires adaptation, which at times does not happen in certain areas. This can create a high-risk situation for the elderly who frequent these spaces for both leisure and mobility. Typically, these same spaces end up being remodeled to meet the needs of the younger populations, seldom taking into account all users. By only targeting a set population, a deficiency is directed at the older population, who in turn find these spaces less attainable. The effects of this can cause the elderly to not feel part of the whole.

Problems with accessibility, security, and signage were reiterated and paralleled when spoken to the interviewees. These topics are worth noting, considering they are important and basic elements for the mobility of the entire population. When looking closer one must consider that these areas are significant due to the role they play for a group of people with physical and cognitive limitations. When these topics are inadequately designed, placed, or used they can pose greater consequences, such as a lost sense of location, risk of falls, and more serious injuries for the population at hand. An alternative to solving these problems, was the increase in technology, however, the question of the lack of encouragement and lack of familiarity of the elderly with the technologies arose. Whether due to shame, or lack of those who teach, this ends up risking the interaction with technological improvements for them, thus staying away from the whole again, entering a vicious cycle of isolation and loneliness.

Among the topics most cited during the interviews, those related to issues of urban mobility, both for the elderly as a pedestrian, and as a public transport passenger were repeatedly emphasized; The difficulties faced by them often ended up not being taken into account. Typically, when solutions are presented, they aim to serve the general population, while non intentionally setting this older generational slice of the population aside. Certain solutions typically generate more discomfort for the elderly. This is often seen when large investments, which seek to bring modern solutions by making use of new materials and technologies are used. Often, ready-made solutions from different countries are used which lack the characteristics of the location and its users. This creates a larger issue by generating greater discomfort and exclusion of these citizens from the rest of the city, either for fear of facing obstacles, or for lack of familiarity in the face of technological advances.

Technology was only interpreted as a tool which can be used to communicate and share ideas with a client or a student but was expected to be cited on the vast conceptualization of the world. It was expected to be associated with improvement for a new perception of old things, a way of helping the population and the city, rather than for helping each individual on their own. This may be based on the professional who may interpret it as a way to show a device or concept as new, or expensive, and not really worrying with how it will be applied to the end user. Nowadays the latest technology is associated with high value and innovation. Most of the experts referred to the same problems already mentioned previously, using very few examples and presenting the same concerns, this is believed to be justified by the limitation on the point of view of elderly in an outdoor environment. People don't typically see the city with different eyes, they stay connected to what they heard, or the accidents that have been noticed, but never really give the chance of getting to know what is really going on during those situations. They also mentioned the need for specific activities for the elderly target audience, where they could go out and be part of a group, such as gymnastics or specific activities, with that, their cognitive activities would be developed and they would be aging in better condition, being an active part of the city, not falling behind, thus failing to face many problems of isolation. This solution is believed to be helpful because it would reduce the fear of going out without reason for the elderly, and on top of that, it would be a motivation for outdoor activity. By doing so, the elderly could associate themselves in larger group setting, without the fear of being judged, not included or not being able to play a role on the group.

The experts were asked how could technology help elderly to solve everyday problems, and justify their answer. Regarding the responses obtained, there was no consensus on the importance of technology in solving problems that the elderly population faces on the urban scale, however most of the responses pointed out that it is extremely important to solve these problems with the help of technology, even more when it comes to issues related to their ability to move around the city and their reintegration into the daily life of the metropolises, it was mentioned that by increasing circulation and also with a greater reach of this population, previously limited to only residential neighborhoods, and with local commerce, vivacity and the feeling of belonging end up increasing, thus giving this part of the population more autonomy and independence.

Based on the given example of a smart city, the question of whether the expert could justify what was said in a previous

question was asked with the concept of smart cities being misinterpreted by most experts. The last question showed the experts the importance of adequate spaces for the elderly in a city environment. After talking about this fact, they were questioned about how they believed the urban development could be improved in order to better solve the needs of the elderly population. Among the answers obtained on question number eight, it was possible to group them into 7 subgroups to better understand and seek to express a better result.

Conclusion

After conducting interviews with experts, it is possible to gain a deeper insight into the real needs of the elderly and the importance that technology can have. Although it is rarely mentioned, in this case the technology is an implementation enabler. and adapting to these improvements for the elderly population. On the other hand, throughout the analysis of the results, there was a lack of a straight line that would lead to the problem until one or more solutions were found. Therefore, we sought to carry out more user studies to complement what was said by experts and also to understand the real problems, needs and barriers of users in the real context.

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DESIGN AS THE MEDIATOR OF NEW SOCIAL HEALTH CULTURE. TOWARDS A NETWORK TO IMPLEMENTING INNOVATIVE SPREADING CO-BENEFITS MODEL.

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Design for health emergencies, IoT for selfcare , Co-benefits belt, Health Ecosystem Model, Individual and Intelligent Protection System (IIPS)

Research and development in the disciplines of health and well-being tend to increase the quality of life. Currently, the population is ageing, rapid urbanization is occurring, and the impacts of global climate change and the rapid pace of technological development are bringing about major challenges that will affect people's daily lives. Different disciplinary fields collaborate with specialized industries using advanced technologies to collect, monitor and control data on the health of users, practices that are based on a culture that demands greater responsibility and awareness in a larger social area. Design becomes a mediator of socio-cultural enquiry processes, at the meeting with the adoption and experimentation of innovative technologies.
If society tends to be more open and to reinvent itself during periods of need or extraordinary crises, the Coronavirus-19 pandemic crisis, which manifested itself in Europe at the beginning of 2020, has determined a concrete change in the line between what is useful to do in the immediate future to provide a response to the emergency, and what could be done in the medium or long term, and how to do it in a perspective of continuous interaction for extended benefits.
Whenever a human being is faced with new, problematic, unknown and often not easily adjustable conditions in the course of its life, it is forced to "adapt" in order to survive physically and/or psychologically. Adaptation is a change of self, of the structures and means at one's disposal in order to cope with the novelties coming from the environment, generating a system of fluid relationships. It is a process that is as complex as it is frequent, but above all, it is of fundamental importance for the maintenance of an essential human balance.
Adaptation in everyday life, where problems are always new and evoke equally changeable behaviours and responses; adaptation also means responding to psychosocial conditions that arise due to sudden crises. Human health and well-being are at the core of the human experience; however, the way people think about health and well-being is constantly evolving. The general perspective would pursue the renewal of the value chain and the construction of human-driven health markets using design strategies, drawing from different fields, in the transformation of the public and private health system, taking an active role as a leader of change together with new partners in building a secure future. Design is a mediator of co-creative dynamics between the user, health system and measures for care and recovery.
At present, humans are in the process of epochal change, accelerated by technological developments and innovation, but also by contingent factors such as the pandemic. Society as a whole is being called upon to re-evaluate its approach to health, questioning the economic and socio-cultural model. An approach driven by knowledge and enabled by research, experimentation and technological innovation. The basic concept focuses on the prevention of the individual spreading to the whole of society, through effective and efficient models that consider sustainability as a reference parameter. Individuals do not operate individually but are supported by a shared ecosystem of objects and people, involving different actors, collaborating between governments, institutions, companies and organizations. The main focus of the idea is the definition of health as a state of complete physical and mental well-being exercised in a social dimension and not simply as the absence of disease.
The considerations on the duration of the initiatives to be adopted, in terms of evaluating the reactions on the immediate benefits that can be obtained in order to deal with certain criticalities, and those in the medium or long term that need to be made available, which concern the sudden change in lifestyles, lead us to take a historical perspective on the real change that is currently happening; a combination that sees the opposition between possibilities and limitations, increasingly unbalanced on the second term. Compromises, adaptations, limitations, forecasts, confinements, terms that are born to characterize the actuality, qualify the state of emergency, while capturing the deep sense of the challenge to which we are urged to respond and for which to derive consequent and shareable actions and behaviours.
We need concrete measures that not only make it easier to care for the sick but also strengthen people's ability to use their potential (e.g., by choosing healthy lifestyles) to prevent illness and injury. For many people, 'health' means more than just the ability to function or live disease - free - it also means the ability to be an active member of society and the local community.
For many people, the value of health is not measured in economic terms; rather, it is the ability to live a life of well-being.

Currently, health is largely seen as a resource for well-being. Yet it is also a social, physical and psychological resource. We see health as a holistic state consisting of functional performance, social and experiential well-being. It is clear that simply removing or reducing an unhealthy condition is not enough to improve health. The experience of health goes far beyond the absence of disease, it refers to health in different areas of life, from the place of residence to available services and lifestyle choices with a reference that relates the relationship between man and himself, man, objects and materials, man and the environment, man and social circles, and so on. New technologies will reshape the stages of care, bring cost reductions to the public sector; technology in devices, linked to wellbeing will achieve reasonable costs by increasing functional performance for humans. User Experience will measure pleasure in use for the user who enjoys technology if it really becomes part of everyday life. New players will be involved, such as app developers, telemedicine vendors and those providing solutions for healthcare environments and databases. The market will offer more everyday choices in an environment that promotes well-being.

Some of the most promising areas in the preventive health market include devices, digital platforms and apps provided by companies; promoting: self-care in the home with the setting up of the Virtual Medical Record (VMR); and in the broader context, the 'co-benefits belt' model. They encourage and assist people to engage in health awareness, healthier lifestyle habits, e.g., through constant monitoring of various health parameters or by encouraging exercise in consideration and a connected community. They also help people to contribute to the improvement of their own and others' health by playing an active role in self-care, providing devices, biomarkers or apps that give personalized information on possible risks to which an individual may be predisposed and outlining the risks involved.

Traditional healthcare providers will benefit from the new opportunities provided by the systemic design and engineering of health devices, the platform economy, digitization, computing and the sensor revolution presenting new opportunities to create open systems that prefigure a new type of inclusive healthcare system. The presence of technology used in the health sector will determine the model of the system itself; open, decentralized, a new role for the health professions. Technology in healthcare reduces costs by allowing users to take their own health into their own hands - to a certain extent - and support doctors in their daily work. It can also encourage and guide people to make sensible decisions about their own health, spreading a new culture of wellness.

The frontier of new types of markets that health is entering needs to build new partnerships and bring health experts into new environments, creating co-benefits and spreading a new value chain. Using the resources of individuals and groups is central to achieving the goal of a healthier society in the future. A healthy society maximizes its functional performance. To build healthy societies we need to promote health in everyday life; the body's relationship with the materials we surround and cover ourselves with, exercise, nutrition, low-stress levels and pleasant social interactions are all crucial to maintaining a healthy and happy life. Aspects at the heart of Design for Health: from the individual material in contact with the body; to the device that cooperates with the user; to management and education; to networking communities of users. When health promotion through different environments involves new actors, new points of demand emerge, extending the range of possible solutions and spreading a greater understanding of health problems, thus stimulating innovation that helps solve health market challenges. Health, wellbeing and innovations for the realization of a new model that brings economic benefits, consider their export in a global market. Health and well-being are human and productive goals for society and its actors. The future of health and well-being must be human-centred; this means putting people at the centre when designing prevention and treatment devices and services. In order to realize this vision at all stages of life, individuals must take responsibility for their own health and wellbeing and engage in a lifelong effort. The future roadmap for health and well-being requires the orchestration of multiple and diverse agents to form a functional ecosystem: today's scientific and technological breakthroughs can chart the way to improve the health and well-being of individuals, communities and society by challenging emergencies and systemic obstacles. The re-definition of the role of health and well-being towards an interdisciplinary approach is knowledge-driven and technology-enabled. While the pandemic has exposed and accelerated the need for change, problems persist, stemming from the inherent weaknesses of society's current approach to health, raising questions about business models, incentives and community education. The new model of the 'co-benefit belt' through design activates a process of systemic improvement and extends beyond the digital, pursuing the logic of interaction.

Innovation across health-related disciplines and technologies has the power to transform lives. Behavioural science and health expressed in quantity, combined with wearable technology and digital will shift the focus from the treatment of disease to prediction and prevention, and thus to the concrete and

lived realization of health and well-being. The case study on emergency measures gathers the results obtained following the development of the research project funded by the Campania Region, "Smart&Safe. Design for new individual protection devices" presented at the call for the acquisition of research and development services for the fight against Covid-19, constituting a substantial study of the problems related to a health emergency, compared to the existing protocols related to individual protection systems. The research proposes an update in the redesign of individual Personal Protective Equipment (PPE), to explore a new dimension of the project that highlights the transition to an Individual and Intelligent Protection System (PIIS) and therefore plural, relaunching the reflection on the contents related to the various levels of safety to be implemented during health emergencies, thanks to the development of solutions for the use of the devices themselves that determine a relational system of integrated protection. In addition, the reflection goes in the direction of developing the advanced performance of the devices, able to implement an application field based on human experience, which considers the interactions between humans, devices and the environment, and which can contribute significantly to improving the quality of life we are leading, providing tailored solutions to the environmental and social changes we will face. The urgent need for limiting measures, therefore, leads us to emphasize the role of Design as a mediator, lending itself to emergency situations, to the design of protection devices by implementing multifunctional and shared protection dynamics, intervening in rethinking the universe of devices with human-centred Design approaches, proposing strategies that translate the knowledge and experience of the most advanced research into products, optimizing methods and processes.

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TITLE: ECHINODESIGN: CASE STUDY FOR BIOINSPIRED PROJECTS

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Biomimicry, Biophilic design, Biodesign, Echinodesign, Echinochess

The context of this research considers Biomimicry and Biophilia as theoretical frameworks. In recent years there has been a growing increase in the number of projects inspired by nature, notably in projectual areas such as architecture, engineering and design, favored, among other things, by the emergence of new three-dimensional representation software with ease to configure and test complex shapes from nature. About Biomimetics, Benyus (1997) defines it as a science that studies the models of nature and then imitates them, draws inspiration from them or their processes to solve human problems, based on the triad: nature as a model, measure and mentor.
Despite deriving from the Greek word ""Biomimesis"", where ""bios"" means life, and ""mimesis"", it is considered here to be nature, living (animal, plant, fungi, microorganisms, etc.) or non-living (mineral, phenomena , principles, etc), and therefore, it is possible to replicate, through Analogy, its forms, functions, structures, principles, processes, systems, movements, characteristics, behaviors, etc., and translate such aspects into solutions of artificial systems. In this way, Analogies are related to the interpretation of references from nature, just focus on one or more of its aspects, depending on the intention of the project, with the purpose of designing bioinspired artifacts, that is, those that have reference and inspiration in nature. (Oliveira et al., 2021) Another more recent term that also contributes to this vision of using nature in projects is Biophilia, it means the inherent human inclination to join nature, which is fundamental for people's physical and mental health and well-being (Wilson 1986, Kellert and Wilson 1993, Kellert 1997). In a literal translation it means ""love of living things"" in ancient Greek (philia = love to /inclination to and bio = life). In general, Biophilia connects humans with nature in order to improve their well-being through an innate emotional connection. In other words, people feel a basic need to be in contact with nature (Wilson, 1993; Heerwagen, 2009).

One of the forerunners of biophilic design, Stephen Kellert defines a series of attributes to implement biophilic experiences in spaces. Among them, he highlights the use of natural forms, such as: botanical patterns; tree and columnar structures; animal forms (vertebrates); shells and spirals; oval and tubular shapes; arches, vaults and domes; curved organic shapes; simulation of natural resources; biomorphy; geomorphology and biomimetics. He highlights these aspects also in the 3 pillars of biophilic design, more precisely in the pillar of indirect experiences with nature, which indicates the use of shapes and geometries of nature and biomimetics, as, among other aspects, according to Keller & Calabrese (2015), technologically capturing these features of non-human nature can result in direct utilitarian benefits, as well as elicit admiration for the ingenuity of other lives and the creativity of the natural world. Furthermore, Oliveira et al. (2021) state that using such forms collaborates with well- being by direct association of these visual characteristics, familiar to the memory repertoire of users of spaces and products. In this sense, in order to translate these morphological aspects mentioned above, it is necessary to study a natural system, observing, preferably in its real habitat or through consolidated studies on this investigated system. Therefore, this research used the work of Italian biologist Valentina Perricone, who in her doctorate studied echinoderms, notably sea urchins, their morphological and functional characteristics in this interface with design, in order to favor insights and inspirations for the development of projects. She made available a material with a lot of technical information and schematic drawings of the main elements that make up these references, promoting their better understanding in strategic workshops with designers and generating several successful design concepts.

Even this theme, called echinodesign by Perricone, that is, the designs that are inspired by the echinoderms, has also been explored in some of the conceptual pavilions in Stuttgart, among them, the ICD/ITKE Research Pavilion 2011, whose biological inspiration was the echinoderm sea wafer. In this one, the analogy was through the animal's skeletal shell, which is a modular system of polygonal plates, linked together through zigzag calcite protuberances on its edges.

Likewise, the Pavilion was designed with geometrized modules of wooden sheets with zigzag connections between the modules, as in the reference. Also the ICD/ITKE Research Pavilion 2015-2016, was inspired by the skeleton of the sea urchin, whose lightness depends on the geometry of the double layer system.

In the animal, its plates are connected through fibrous elements with zigzag joints, which play an important role in maintaining its integrity during its growth and exposure to external forces. Likewise, the inspired Pavilion was also designed with a modular system and pioneered industrial sewing on thin plywood sheets through robotics on an architectural scale, resulting in a structure with organic aesthetics, extremely light and with good performance. (Soares et al., 2017) Likewise, this research aims to collaborate with Valentina's research, through a case study of the application of her theoretical studies on sea urchins in order to use them for design solutions. The hypothesis would be to investigate whether it is possible to obtain relevant insights for the design of new artifacts through their studies.

For that, there was a methodological planning composed by the steps: 1) Research and Analysis on the echinoderms; 2) Choice of the bioinspired product; 3) Research and analysis of similar games; 4) Sketches of the pieces and board inspired by the morphology of echinoids; 5) Selection of alternatives; 6) 3d modeling and 7) Game production. Although the main echinoderm research considered the study of Valentina, which presented the functional components of the sea urchin's parts and analogous functions to inspire design applications. It was also relevant to search for more images and references on google and a previous study that had been carried out in the Biomimicry course offered by the authors in the first semester of this year, whose theme for the final projects was also echinoderm.

Another important aspect to be highlighted that motivated the research is that sea urchins are abundant, especially on a beach near the author's town, Praia dos Carneiros, where there is a nursery for these animals. It is interesting to note that they are generally perceived in a negative way, as people are generally afraid of getting hurt on their thorns, and this also motivated them to use them as a thematic reference, as it allows a new, friendlier look to these important sea filters.

To increase the visibility of these references, a panel was built with approximately 74 compositions of images of species of echinoderms, highlighting their morphological aspects and also with microscopic images, which served for the analysis phase, essential for insights and sketches. Faced with an infinity of possibilities, the chess game was selected as a product to be developed with this biological inspiration. This choice was intentional because it favored the free interaction from virtual scenarios, combining cognitive development and fun.

The objective was to offer an unusual perception about these animals, bringing an unconventional theme to a traditional

artifact, providing an experience of observation and interaction with marine references while stimulating mental exercise and interaction between people. In the search for similars, 57 games were analyzed by their colors, shapes, textures and dimensions. In sequence, several sketches were made, inspired by the morphology of these echinoids. Soon after this step, guiding alternatives were selected for the development of the 3D modeling of the parts. Here it is noteworthy that the choice of design was also related to the degree of similarity with the traditional pieces, as the intention is that the new pieces would not be too different from the traditional ones so as not to hinder the gameplay. The digital modeling was carried out using SolidWorks software and the production process of the parts was carried out using resin 3D printer technology, because of the better printing resolution and so that they have more weight, durability and are perceived as having higher manufacturing quality.

The game is designed with 6 different pieces that make up the 32 pieces of the total game and the board. Below is a brief explanation of the echinodesign morphology of each of them:

The king's piece has reference in the main characteristic of the echinoderms, the thorns, its elongated shape based on the decagon is derived from the pentagonal formation characteristic of these animals. It was also based on the grooves present along its longitudinal extent of view in microscopy images. It also has the semicircular protrusions of the thorn connectors that ornament the skeletons, being an element that brings aesthetic unity to all game pieces. The queen was based on the rounded silhouette and curved shapes of sea urchins, as well as recurrent pentagonal shapes, especially in its starry variant visibly present in Aristotle's lantern, for example, which inspired the configuration of the upper part in a kind of crown. There are also the semi-spherical protrusions of the spines in their idea of grading sizes and thicknesses, as occurs in animals.

The bishop was based on the apical silhouette of the pedicel. There are also the semi- spherical protrusions of the spines. Again, the torsion gives the idea of increasing movement that comes out of a decagonal base to maintain the aesthetic unity of the pieces. The Knight is the most playful and conceptual piece, inspired by the functional characteristic of sea urchins, which are coral and rock diggers and are inlaid for protection. The protrusion of the spines in a linear arrangement on the back of the rider piece. There is a decagonal formation base as well as on the other pieces to maintain the unit, as well as the protrusion of the spines in a linear arrangement on the back of the knight's piece. The tower had as reference the tubular

feet with end in the shape of mini suction cups. There is also inspiration in the ring of the ambulacrum system and in the hemispherical protrusions of the spines in gradation as in the skeletons. The decagonal base of the piece becomes 5 columns, a reference in the pentagonal formation of the animals. In all the pieces, there was a concern that the pieces were somehow similar to the traditional pieces so as not to harm the gameplay. The pawn was inspired by the skeleton of the sea urchin, and a composition was generated that refers to the superposition of skeletons, a smaller one on top of a larger one. The development of this first piece influenced the others as they all followed the decagonal base of the top view of the sea urchin's skeleton as a training premise to translate its pentagonal formation. Also the protrusions of the thorns translate an aesthetic ornamentation that gives unity to the whole and increases the similarity with the echinoderms. The board has a compartment to store and display the pieces when not in use, it is designed to be used on the table (during the game) and on the wall (for display as a decorative piece). For this purpose, the top has a design with illustrations inspired by the skeletons of sea urchins on both sides. On one side it works as a game board and on the other side, the decorative illustration when not being played. The idea of working as an ornamental piece adds even more value to the artifact, as it brings a new function, as an art object, adding symbolic value and collaborating to prevent its quick disposal. Therefore, the choice of materials mainly took into account the durability factor, with the aim of making the game an artifact loaded with symbolic value, providing playful moments, building relationships between family members, and therefore being passed on from generation to generation. As all parts were modeled in 3D, there is also the possibility of later being printed on other materials available for this technology.

It was possible to observe that the result of the application of Valentina's studies allowed several insights into the configuration of the Echinochess game, through an aesthetics and symbolism of the animal's morphology, whether visible or microscopic aspects, translated into the 6 different pieces of the game, a coherent aesthetic unit, as if they were a ""family of objects"" belonging to the same theme, that of the hedgehog, through elements common to all the pieces, such as the semi-spheres that simulate the thorns, the composition of the pieces that intentionally have the same base constructive animals, that is, they are conceived on a decagonal base derived from the pentaradial symmetry found in the bases of components such as the skeleton and Aristotle's lantern. The colors are inspired by the color of the skeletons, mostly white; and some

details based on the fluorescence effect seen in some species in shades of blue and orange. The color choice also took into account the contrast of the complementary colors (blue and orange) to facilitate gameplay. The transposition of the forms and characteristics of these elements are perceptible through a previous communication on the theme of the game, and the degree of familiarity with the repertoire and previous experience with these natural systems that inspired its configuration. Therefore, it can also be said that because the theme is inspired by a common animal in the region, this artifact also evokes the memory of its users and, therefore, makes the theme of this animal that people tend to avoid more friendly, awakening a new look about it and favoring its usability.

This project moves between three areas: Design, as it is a product that needs to work to achieve its chess game objective, with dimensions, materials, ergonomics, etc.; Science, as it uses the knowledge and technical resources of scientific researchers about biological reference, in addition to technological resources, configuration software, etc.; and also Art, as it aims to communicate and make people reflect on the respect and diversity of nature, bringing more of this theme to everyday objects and making it more evident to the general public.

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Track 4
Design for Social Innovation, Sustainability & Circular Economy

Track 4
Design for Social Innovation, Sustainability & Circular Economy

Post Domestic Commons.

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During “pre Covid-19” era, we inhabited a constellation of spaces; then, the home absorbed our intimacy and sociality. This moment marked a turning point in re-thinking the domestic landscape that despite the social, family and gender changes in process, it still seems fixed to a traditional typology and conception that dates back to after World War II. This paper focuses on an ethnographic reading of some attitudes that emerged during the phases of forced closure and that characterized the European cities context, and precisely those places where the exchange between inside and outside takes place: balconies, windows, courtyards, common spaces of the house. Taking the interpretation made by Hall in the 1960s, the paper tried to translate the four distances of proxemics (intimate, personal, social and, public) with four spatial thresholds related to different types of scales: the window represents the more “intimate” scale, the balcony the “personal” scale and, internal courtyards refer to a “social” scale. This experimental reading allows us to reinterpret some of the in-between spaces of the home that have often received little consideration in design process to re-affirm their value, particularly from the perspective of future ways of envisioning the home.

Keywords *Domestic spaces, Interior Architecture, Commons, Thresholds*

From Domestic to Post Domestic Spaces

The domestic space re-evolution and its social and psychological effects are a complex field of research composed by multidisciplinary relationships. The Covid-19 pandemic and, in particular, how it has forced the global population to deal with the issue of housing, has highlighted many critical issues and changes that have been under way for years but that have not yet found significant project outcomes. Considering the transformations occurred during the last two years, we ask how the home has changed and how will the home be in the future? Once the epidemic moment has been taken as the point for a new and different way of thinking, let's now look at the home with a different perspective. The home, conceived as space and symbol of a social and cultural period, has been one of the fields that have undergone minor transformations in the last seventy years of recent history. Mass migration, an aging and undernourished population, changes in family structure and gender roles have characterised recent decades, highlighting how our lifestyles have altered radically (Rampazi, 2014). At first glance, crossing the threshold of any house, it still seems anchored in its traditional patterns: the separation between night and daily spaces has remained more or less unchanged; the intimacy of places of hygiene resists proposals to open them up to an undifferentiated space; the function of self- representation and affirmation with the group is still the responsibility of the living room. However, the system of internal relations between spaces, things and, inhabitants is changing dramatically, even before the spaces and things.
The word “domestic” means everything related to the home, which is intimate and familiar. Modern culture converted the anthropological foundation of living into a sociological program, generating a system of roles and competencies, which have, at their center, the image of a nuclear family based on the model of industrial society (Vitta, 2010). Among the various meanings of home there is the one linked to the symbol of the domestic fireplace but also the spatial one, whose conformation allows the development of a domestic community (Silverstone 1994). The home and the domestic project, as we know them, were born within the modern culture – mainly Anglo-Saxon culture, from which the concepts of privacy and comfort derive – centered on the idea of the family “as the germination cell of bourgeois culture” (Vitta, 2010). This idea is reflected in an organisational model of the different rooms based on a very precise apparatus of roles and competencies (Rybczynski, 1989). In the Nineteenth century, the flat became the quintessential urban typology. His design is based on the functions to be performed within precise spatial conditions that guarantee maximum efficiency in domestic operations: “In different forms, in the Victorian country house, in the Parisian and New York flat, in the Bie-dermeier comfort of the German house, the Nineteenth-century home was transformed into an increasingly complex and specialised organism, defining and identifying the different functions, separating and isolating the different protagonists of domestic life: men, women, children and servants” (Teyssot, 1986, p. 23). At the beginning of the 20thy century, the Modern movement, founder of the concept of machine à habiter, defined an idea of the home based on the optimisation of space and efficiency, to provide housing for people moving around in the recent industrial cities: “The rational approach to space planning of modernists had a greater influence on the areas of the house dedicated to work rather than to pleasure, ostentation, social relations, interiority” (Sparke, 2008). Between the end of the 20thy century and the beginning of the 21, the domestic landscape underwent radical changes, still ongoing. The identification of the home with the nuclear family has dissolved, not so much on a positional level since the home is a topographical and social reference point, but on a situational level (Vitta, 2010). The relationship between inside and outside is changing, the family unit is being broken up, domestic behavior is evolving due to the technology introduction, and uncertainties are emerging in the design culture, balanced between the confirmation of the pure functionality of the home and the offer of new housing models. Since the 1980s, the domestication of new technologies has taken over every aspect of daily life (Silverstone, Hirsch, 1992): this is a process whereby the wild is both tamed and cultivated, and it’s the point at which nature becomes culture, as Roger Silverstone says (1994). The long weeks of quarantine have spread unlimited video calls that show off the places devoted to our private sphere: we have entered the homes of many, practicing a domestic voyeurism.
The margins that configure the living space are no longer perceived and sometimes even realised as solid walls, completely isolating from the outside, but are penetrated through mobile phones, computers, and large openings. Ugo La Pietra had foreseen this in 1983 when he set up the exhibition "La casa telematica" (The Telematic Home) for the Milan Fair, where television screens colonised the kitchen, the bedroom, and the living room (Figure 1). The architect dwells on the contamination between domestic space and increasing computerisation, showing new rituals of living and observing the transition from a three- dimensional to a two-dimensional idea of the space.

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The transition from the domestic to a post domestic sphere comes from the book "Pornotopia. An Essay on Playboy's Architecture and Biopolitics" by philosopher Paul B. Preciado (2014). The author uses the term post domestic to express the image of the famous Hugh Hefner – the founder of the American magazine "Playboy" – in his bed (Figure 2). This space can no longer be defined as a bedroom but as a place where work and pleasure, hyper-connected system and voyeuristic project come together. The idea of post-domesticity expressed by the Playboy system is prophetic and anticipatory of many reflections valid also today, such as: the loss of the boundary between the public and private spheres; the inhabitants are actors and spectators of their scene; everything that until then was considered private life (domestic space, body, communication) enters the production and working process. Within the fluidity and porosity of contemporary society, even the traditional boundaries of inside/outside, public/private are dissolving: "The image of the home still reflects that of the collective culture; but since this is now marked by instability and by an indefinite and continuous change of roles, models, and figures, the physiognomy of living conveys the sense of a constant deviation from norms that are in any case transitory" (Vitta, 2010). Among the substantial changes produced by the pandemic event, there is the transformation of work dynamics, which begun a few years earlier with the emergence of teleworking, and which now, far from being regulated, seems to become a prerogative for immaterial work (Bassanelli & Forino, 2021). Forced cohabitation has led to a reclaiming of the own space: "separations that seemed to have lost their importance, in favor of functional and spatial mixes, are once again crucial, especially between individual and collective areas of the home" (Bilò, 2020). We experienced a process of resemantization of the objects that inhabit our homes: the kitchen table has become a desk for educational and work activities, a place for conversation, and a space for eating (Meloni, 2020). For the first time in a long period, we rediscovered the importance of the home, the space it provides, its comfort, and its location in relation to goods and services. The transitional house, widespread in recent years, built to sleep at night and spend a few hours during the day compared to a life spent mainly between work and social

Figure 1: Ugo La Pietra, "La casa telematica", bedroom, Fiera di Milano, 1983, (courtesy Archivio Ugo La Pietra, Milano)

Figure 2: Hugh Hefner in bed at work with array of stimulants at the Playboy Mansion in Chicago. © Playboy Enterprises International, Inc.

Preciado, P. B. (2014). *Pornotopia: An Essay on Playboy's Architecture and Biopolitics*. Zone Books.

Vitta, *op. cit.*

Bassanelli, M., & Forino, I. (2021). *Lavoro immateriale e pandemia. Dalla worksphere all'Ho-Wo in-between* [Advance online publication]. Territorio, 97, 17-26.

Bilò, F. (2020, 7 April). *A distanza di sicurezza, o della prossemica*. Il Giornale dell'architettura. https://inchieste.ilgiornaledellarchitettura.com/a-distanza-di-sicurezza-o-della-prossemica/

Meloni, P. (2020). *Spazi di vita e spazi di lavoro*. La ricerca, 19, 21-24.

activities, has shown its total inadequacy due to its often-small size and little interaction with the outside environment such as the entry of natural light and contact with nature.
The recent "post domestic dwelling" questionnaire[1], which ran from June to September 2021, covered a sample of the Italian population with a female (67.3%) versus male (32.7%) prevalence in an age range of 20 to over 50. It highlighted some substantial changes such as the amount of time spent at home, which is now more than eight hours a day (40%) or between eight and four hours a day (37.4%), whereas before pandemia only 4% spent more than eight hours a day at home. The activities that increased the most with peaks during the lockdown were smart working (52.3%) and sport (22%). The livability in the house's different rooms has remained almost unchanged: most of the time is spent in the living room, kitchen, and bedroom, and finally on the terrace or garden, for those who have one. Among the essential requests that emerge for a new purchase, the demand for outdoor space stands out (62.6% balcony or terrace, 41% garden) and the possibility of having a less hierarchical but more easily reconfigurable space (38.3%). Among the most popular common spaces to be added to a condominium are gym (36%), coworking (34%), and online shopping depot (28%). The data emerged show structuring questions of living that will modify specific spaces in the home, contributing to the satisfaction of an ever-increasing contact with the outside world.
During the lockdown period, in which we reappropriated our homes and our internal spaces, in the European context, some significant attitudes of the inhabitants emerged, precisely in those places where the exchange between inside and outside takes place. They are threshold spaces where the finiteness of existence and thought is expressed: "The threshold, therefore, in the view of architecture, is not simply the materially differentiated walking surface interposed between the flooring of two communicating spaces, but is a place where living spaces, points of view, states of mind, expectations and feelings meet and interact" (Bossi, 2016, p. 11). Thresholds as intermediate places have become meeting areas of a different sociality that can still make us feel part of our being in the world, i.e., the Buan expressed by Martin Heidegger. While on the one hand, sociality today seems to have been almost completely absorbed into the virtual, thanks to applications such as Facebook and Instagram with which we have created a psychic place of sharing that lies beyond any opposition between the public and the private (Coccia, 2021), on the other hand, it is possible to rethink living space starting from the margins of the home.

[1]The questionnaire is part of the research *Post Pa·in – Post Pandemic Interiors* https://www·dastu·polimi·it/post-pandemic- interiors/

Hall, E. T. (1966). *The Hidden Dimension*. Garden City.

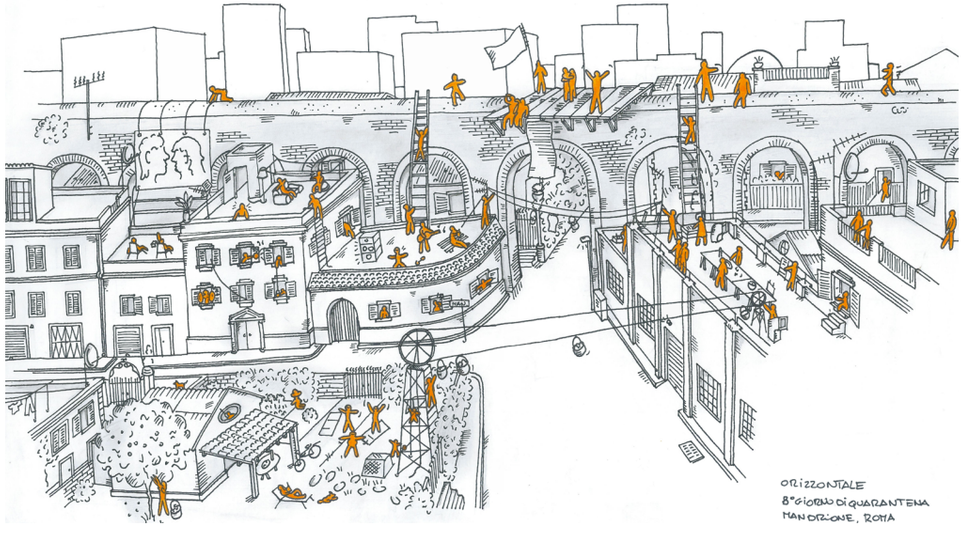
Hall, E. T. (1959). *The Silent Language*. Garden City.

Towards a New Proxemics

The propagation of the SARS-CoV-2 virus since early 2020 has radically transformed our lives: the fear of infection and the spread of the social distancing have disrupted our daily routines and altered our relationship with time and space. The proxemics, introduced by the American anthropologist E.T. Hall in the 1960s to indicate the study of human space and interpersonal distance in their nature as a sign, is an essential part of the study of the human being, and an important tool in rethinking living spaces from the home to the city. By borrowing the system coined by Hall, it's possible to identify four main spheres of distancing that mark relationships between men, which he calls the four distances of proxemics: the intimate distance – up to 50 cm – in which physical contact takes place, typical of couple and family relationships; the personal one – up to 1.2 meters – which can be individualised in the interaction between friends; the social one – up to 3.6 meters – present between colleagues or acquaintances; and finally the public one – over 3.6 meters (Hall, 1966). The recommended interpersonal distance, in Italy, of at least one meter forced rethinking of contacts that generally took place in the intimate and personal spheres to the social sphere (in other European countries it has been 1,5m, 1,8m or 2m). This paper proposes an experimental approach to the reinterpretation of some in between spaces starting from the distances defined by Hall and that interest us precisely because they are universal. From an architectural point of view, this approach can be translated into the rediscovery of all those intermediate thresholds between the public and private spheres, such as windows, balconies, courtyards, terraces and condominium staircases, which until now have been poorly used in everyday practice. In recent months these spaces have played a significant role: thanks to the possibility of transforming themselves into semi-public places, allowing the occasional extension of the private and domestic dimension into a more open one; they represent a valuable resource for the future. A change in the use of space could therefore be the main way to achieve a renewed awareness of our living together, based on forms of extended cohabitation. Hall's studies derive from Freud's theory of the unconscious. He came to define culture as communication expressed through an "invisible score" entrusted to the researcher's interpretation. This composition is made up of all the behaviors, gestures, body positions, traditions and taboos, customs, and habits of a specific population, thus defining a "silent language" (Hall, 1959). If for the anthropologist, the culture of a social group is an articulated form of communication,

among these there is also a "hidden dimension" of space in which he develops the study of proxemics as a discipline that investigates the observations and theories concerning people's use of space, understood as a specific elaboration of culture (Hall, 1965). In the course of his countless travels, he has the opportunity to observe how cultural systems can influence the use of space and communication between people. Every relationship that requires a confrontation has a meaning that changes with the distance itself, which acquires different values in various cultural models. Proxemics thus attempts to define a semiology of space through a technique of reading spatiality as a channel of communication. It recognises, alongside the three known dimensions of space, the existence of a fourth with a cultural nature.
The threshold has always been a constitutive element of architecture, as a place of passage between inside/outside and between public/private; it's a boundary that divides but also unites. It's the area that better than any other reveals the original vocation of architectural space: to welcome the body and put it in relation with the world. The home itself, as a

Figure 3: Orizzontale, 8th day of quarantine, Roma, 2020, drawing by Giuseppe Grant.



Saitto, V. 2016. Accedere. Lo spazio della soglia nella lezione di Adriano Cornoldi. In L. M. Fusco & V. Saitto (Eds.), *La qualità oikogena dell'architettura. Lo spazio della soglia*, (pp. 35-43). Edizioni Scientifiche Italiane.

Piscopo, C. (2011). Lo spazio abitato. In F. Ippolito (Ed.), *Dalla finestra. Sguardi sull'architettura*, (pp. 72-76). Il melangolo.

Forino, I. (2011). *Many Voices, One Story: Interiors through Italian Eyes*. Interiors, 1 (3), 177-198.

Forino, I. (2016). *Un'altra soglia: La finestra abitata*. In L. M. Fusco & V. Saitto (Eds.), La qualità oikogena dell'architettura: Lo spazio della soglia, (pp. 44-53). Edizioni Scientifiche Italiane.

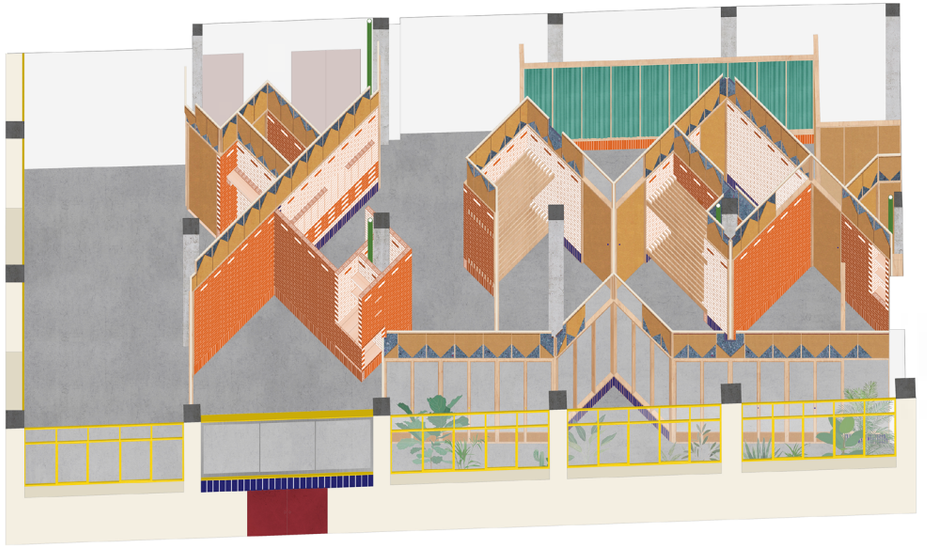
system of places in a direct relationship with each other, could be considered a succession of thresholds: "thresholds separating outside and inside, points of access to collective sites, to more private areas, thresholds to other exteriors, which can be crossed even if only with the gaze" (Saitto, 2016, p. 36). The threshold connects different spaces by placing them in relation to each other, establishing a connection of reciprocity and complementarity, which can distinguish them and not divide them. Starting from these considerations, it's possible to link the four established distances of proxemics, intimate, personal, social and, public, with four different spatial thresholds related to four types of scales: the window represents the more "intimate" scale, the balcony the "personal" scale, internal courtyards refer to a "social" scale that can extend to become "public", thanks to the expansion of space and, consequently, the greater distance that can be interposed between the various subjects (Figure 3).
In the following paragraph, these different thresholds will be analyzed through the reading of some case studies that spacing in time and geographical context. We are interested here in analyzing a way of using space and a conformation of it that arises from man's need to create relationships and ties independently of his context.

Windows, Balconies, Courtyards

The window is the element of the house that encloses and links different worlds: "The interior and the exterior, public life and private life, the building and the room, merging them in glimmers, reflections and images, in a game rooted in a universe of interpenetrations" (Piscopo, 2011, p. 73). In the late Gothic period, from a simple two-dimensional element, the window acquired a spatial value, defined as an erker: "a window slightly projecting from the line of the façade, with one or two floors, which serves to increase the living space inside as well as articulate and animate the external elevations of the building" (Forino, 2011, p. 133). This conception spread mainly in Northern Europe, where we see an explosion of covered loggias, belvederes and, erkers from the inside to the outside. The rediscovery of the bow window, which defines private areas of different sizes within the same room, dates back to the Victorian era. A different definition of this area of the home is proposed by architect Herman Hertzberger who interprets the space of an in-between: an ideal space in which to express oneself and where different worlds meet. He reinterprets traditional architectural elements, disassembling and reassembling them to create new and unprecedented combinations.

In the Montessori School of Delft (1960- 1966) the "window space" in each classroom is dedicated to activities for which more concentration is needed, such as mathematics. The environment reflects the interior of a house, with articulated and irregular spaces, quiet corners where children can work and think at their own pace (Hertzberger, 2001). In Italy, we can find examples of this relationship in some projects by Umberto Riva: in his house in Paravia street (Milan, 1966-67), the window becomes a small winter garden, a place of tranquility and health. In the recent La Nave project (Madrid 2019) by Spanish studio Nomos, the insertion of rotated boxes containing the service areas in the existing structure (a former printing works) makes it possible to create an interstitial space between the old window frames and the new interior curtain wall. In this way, the space around the functional areas becomes a social space shared by the inhabitants (Figure 4).
The window welcomes the inhabitant into an intimate refuge that is still internal. In that case, the balcony is the first element of the space that is exposed to the outside world and where the first social contacts are generated. Over the centuries, the balcony and its variants – such as terrace and loggia – have accompanied human history worldwide, not only from an architectural, constructional and stylistic point of view, but also from a humanistic and cultural one. In Ancient Greece, many private houses were equipped with these outlets to the sky: their construction was governed by specific rules and their presence was even taxed.
The Etruscans and Romans also adopted this architectural artefact, initially exploiting its function in the public sphere. While in the Middle Age, in the absence of sewage systems, the balcony was transformed into an open- air toilet; during the Renaissance, this element became a pure work of art to be displayed in society, a status symbol whose purpose was aesthetic rather than functional (Origoni C. & Origoni M., 2020). In the 1970s, Ugo la Pietra used it as a living object to represent the break between interior and exterior space through research- oriented towards expressing a renewed idea of home communication. He connotes the façade with ordinary domestic objects, such as curtains, armchairs, lamps, flowerpots, cups, and sideboards. With the beginning of the 21st century, however, the balcony space reflected changes in an increasingly capitalist and individualistic society: "The balcony was no longer seen as the place where to meet other residents, but as something private, inside your home but at the same time facing the street, where you can protect yourself from prying eyes and nasty noises: it became a synonym for privilege and splendor. In the global era, the balcony, often disguised as a bio-climatic space, is the protagonist of the advertising campaigns of the many real estate promotions that have invaded the cities all over the world, including Milan" (Origoni C. & Origoni M., 2020). While in recent years this place has often lost its value, used a simple repository for broomsticks, rubbish cans, and air conditioners; with the epidemic and the lockdown it has quickly become the last support of a new collective rituals (Bassanelli, 2020). The architects Heide & von Beckerath with ifau and Jesko Fezer2, for the R50 cohousing building (Berlin, 2010-2013) transform the balcony into a characteristic element. This object wrap around the entire building and define a shared outdoor space and a secondary circulation path between the flats. The project was created with a co-design approach and included direct involvement of the inhabitants from the preliminary stages.
Finally, court and courtyard have the social role of the first activator of interpersonal relations. The approach used by Aldo van Eyck for the design of unused spaces in the city of Amsterdam with his playgrounds: inaccessible areas between buildings, empty spaces generated by bombings during the war, traffic islands, are transformed into places for relationships

Figure 4: NOMOS Architects, La Nave, Madrid, 2018-2019, courtesy of NOMOS Architects.



Hertzberger, H. (2001). *Lessons for Students in Architecture*, 010 Publisher.

Origoni, C., & Origoni, M. (2020, 3 April). *A brief history of the balcony, from ancient Persia to the COVID-19 pandemic*. Domusweb. https://www.domusweb.it/en/architecture/2020/04/03/a-brief-history-of-the-balcony-from-ancient-persia-to-the-covid-19-pandemic.html

Bassanelli, M. (2020), Qua e là tra la città e la casa. Soglie abitate. In M. Bassanelli (Ed.), Covid Home. *Luoghi e modi dell'abitare dalla pandemia in poi*, (pp. 47-56). Letteraventidue.

and play. Inspired by Sartre and Lefebvre's realist and situational thinking, playgrounds modify people's lives and give back to the city spaces that would otherwise be unused.
The most original and significant aspect of these spaces is the network quality: they are conceived as a constellation, a pattern made up of units that arise intuitively linked to time, chance, and circumstances (Lefaivre, 2005). The Moriyama House by Ryue Nishizawa (Tokyo, 2002-2005) is an emblematic project in this sense because it conceives the diffusion and fragmentation of living spaces, generating small internal courtyards, places of aggregation, and exchange. The Dragon Court Village3 built in Aichi, near Nagoya in 2013 by Eureka Architects, is similarly presented. The overall scheme of the project cultivates a sense of belonging to a broader community, encouraging group life as diverse and public. The housing complex becomes a paradigm for a new suburban dwelling, offering a compelling and thoughtful vision of a possible future. All these case studies located in very different geographical contexts tell us ways of living some spaces of the house, on the border between inside and outside, that can be of primary relevance in the future design approach both for existing houses and new buildings.

Living Thresholds

Starting from the reading of these case studies, we can affirm that the paradigm of post-domesticity lies in rethinking living space from the marginal areas of the house, where a new model of sharing and cohabitation can be founded: from the ground floors of buildings, to courtyards, to the entrances of individual dwellings, to balconies and inhabited windows.
In the 1960s, architect Herman Hertzberger focused on the threshold as an ambivalent space that inherently possesses a degree of complexity that makes it helpful in creating spaces that can be lived in different ways, according to the needs of people. The threshold topics, of in-between space and territorial gradients, play a central role in the architect's thinking, which opposes the apparent opposition between public and private and the resulting fragmentation of the complexity of human relations. Her design as a physical element is essential in order to create a community and a social interaction, and it must be realised through architectural details with a solid formal value. These places must therefore take into account "permeable promiscuity" between people, animals, and plants. In this space, the traditional boundaries of inside/outside, public/private dissolve: such as windows, balconies, common terraces, and courtyards.

Lefaivre, LM. (2005). *Puer ludens*. Lotus International, 124, 72-85.

Forino, I. (2021). Dalla casa alla strada: Mediazioni pubbliche della cucina domestica. In A. Giannitrapani (Ed.), *Foodscapes: Cibo in città*, pp. 73-70. Mimesis.

In conclusion, our home of the future must therefore include more openings to the outside world to bring us closer to nature and animals. Common under-used spaces of building will host spaces for study and meeting, abandoned gatehouses could become spaces of compensation with the outside: a place for micro-events open to the neighborhood, or collective areas where to place other complementary functions for the house, which would be lightened, gaining space for other necessary functions (Forino, 2021). The challenge will be to transform the existing buildings of World War II, modifying their mono-functionality (only houses) and integrating different activities that cross people and different experiences such as work spaces, mini-nurseries, clinics, spaces for micro-commerce and exchange: a new urban landscape that involves a radical reform of ground floors with combined functions for sports, games and community life.

Design(ers), e-commerce, and consumerism

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This article aims at discussing and questioning the role of design and designers in promoting consumerism.
Through their creations, designers have contributed actively to induce consumers to buy more of the same using tactics like differentiation by design. Moreover, designers have not yet owned themselves accountable for the cycle of their inventions. We have used e-commerce as a background reference considering its ever-growing relevance and ease of displaying and selling a myriad of products. Distance buying in itself is not a new concept. As of the late nineteenth century, goods have been marketed in this manner. People could buy products from catalogues without having to go to physical stores. Since then, several transformations have occurred in this form of commerce. To reach our objective, we have carried out an exploratory review of the related literature. We trace a brief timeline of distance buying. We revisited some of the central design theorists to argue design, consumption, and consumer society. Finally, we propose the adoption of genuine human-centred approaches and sustainable design practices to mitigate our contribution to consumerism.

Keywords *e-commerce, design, human-computer interaction, sustainable consumption.*

Introduction

By the end of 2021 e-commerce will be a $ 4.2 trillion business (Adobe, 2021). E-commerce is an ever-booming market, 19% of all global purchases in 2020 were made digitally. Anticipating the expected 17.5% by 2021 (The Nielsen Company, 2018). Big data has enabled access to individuals' information at an unprecedented level (Lyon, 2014), fuelling almost tailor-made online offers. Designers and companies alike have access to this obscene amount of information, to build and create endless varieties of products to seduce people.

Through a brief timeline of the distance buying concept, leading to a discussion about our consumer society, this paper aims to question designers' contribution to consumerism. We have adopted a narrative literature review approach and revisited some of the great design theorists and sustainable design specialists, among others, to make our points. We do acknowledge the existence and importance of some fundamental anthropological theories of consumption and modern consumer society (Baudrilliard, 1989; Bourdieu, 1990; Campbell, 1995; Warde, 2005) that integrate the body of knowledge of this area. However, they are not part of the scope of this study. Finally, we propose that designers should be accountable for their creations and incorporate concepts such as human-centred and environmental-centred design into their projects to create purpose hoping to result in a more sustainable mindset.

In 1979, Michael Aldrich connected a television, through a telephone line, to a computer, to process transactions in real-time and thus, invented "teleshopping" (Aldrich, 2011). For the first time, a system enabled online transactions between consumers and businesses or between businesses. Since then, this form of shopping has evolved and is currently known as e-commerce, online shopping, or e-business. Before Aldrich's invention, there were infomercials. They emerged in the mid-1970s to promote the Ginsu knives sales. Consumers could purchase goods advertised in TV commercials "live" using the telephone.

However, the concept of distance buying began earlier, in the late 19th century, in 1872, in the United States with the Montgomery Ward Mail Order. Initially, it was a single sheet of paper with pictures of products for sale, which eventually became richly illustrated catalogues from which it was possible to order all sorts of household goods: furniture, clothing, equipment, among others. Its purpose was to give people who lived in rural areas access to the latest consumer novelties, albeit to the taste of those who lived in the big cities. Based in Chicago, Montgomery Ward and Sears were at the centre of the United States railroad network. The growth of the railroads and the modernization of the postal system enabled the success of distance buying. Shopping by post grew not only in the United States but also in Europe (Woodham, 1997).

The development of the internet began with military purposes. Amid the cold war, the United States sought a form of communication and data storage and, in 1958, began to take the first steps toward its creation (Arruda, 2014). In 1990, Tim Berners-Lee created the first browser using a NeXT computer, launching what we know as the World Wide Web (WWW). In 1994, the internet reached beyond the academic realm and became accessible to the public. Throughout the nineties, the ".com bubble" phenomenon emerged. A sizeable number of companies established their businesses on the network, such as Amazon, eBay, Dell, and Google, to mention a few. In the early 2000s, the bubble burst; these inexperienced players lacked well-structured business models. Some companies invested in infrastructure to support sustainable growth, others spent more than they could afford and eventually had to go out of business (Geier, 2015; Weinberger, 2016). As of the 1980s, along with the spread of information technology, computerized workstations were introduced in practically all areas that involved human activities and the study of human-computer interaction (HCI) was established. This novel way to deal with information brought new challenges to the human factors field, which also began to deal with cognitive aspects (e.g.: perception, information processing, decision-making) of tasks (Iida & Buarque, 2016). Usability emerged as a measure of how easy products are to use, whether they are software, websites, home appliance interfaces, or ATMs. In 1998, ISO established the 9241 standard - Ergonomics of human-system interaction. The standard defines usability as "the extent to which a product can be used by specific users with effectiveness, efficiency, and satisfaction in a specific context of use" (ABNT, 2002). For Cybis et al. (2010), the essence of usability lies in the agreement between interface, user, task, and environment. According to the authors, usability stems from human factors because it aims to provide effectiveness and efficiency, besides aiming at the users' well-being and health, by adapting work to humans, not the opposite. The goal of human factors is to adapt systems and devices to how users think, behave, and work, thus providing usability. (Cybis et al., 2010). A product or a service must provide interaction not only with users, but also with the task and the environment to be functional, achieve objectives, and be user-friendly (Iida & Buarque, 2016).

Of course, HCI and usability have contributed positively to the improvement of many of the existing products and services, they help people to avoid frustration and errors. Nonetheless,

Adobe. (2021). 2021 *Digital Economy Index*. https://business.adobe.com/resources/digital-economy-index.html

Nielsen, J. (2000). *Designing Web Usability: the practice of simplicity (2nd ed.)*. New Riders.

Lyon, D. (2014). *Surveillance, Snowden, and Big Data: Capacities, consequences, critique*. Big Data & Society, 1–13.

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Arruda, F. (2014, March). *20 anos de internet no Brasil: aonde chegamos?* Tecmundo.

Geier, B. (2015, March). *What did we learn from the dotcom stock bubble of 2000?* Time.

Weinberger, M. (2016). *If you're too young to remember the insanity of the dot-com bubble, check out these pictures*. Business Insider.

Iida, I., & Buarque, L. (2016). *Ergonomia: projeto e produção* (3rd ed.). Blucher.

ABNT. (2002). NBR 9241-11: *Requisitos ergonômicos para trabalho de escritório com computadores. Parte 11: Orientações sobre usabilidade*. ABNT.

Cybis, W., Holtz, A., & Faust, R. (2010). *Ergonomia e usabilidade*. São Paulo: Novatec. org/10.1177/1469540505053090

they have also contributed to higher consumption of these same products. It is agreed that one of the designers' objectives is to create products and systems which are user-friendly and intuitive. Yet is this our only role in the digital environment or any environment? Is our contribution limited to designing efficient, effective, and satisfactory interfaces?

Theoretical background

To try to answer these questions, we will now analyse which concepts (if any) have changed in the scope of distance buying, from its origins, via catalogues, to today's e-commerce.

In his book, Objects of Desire, Adam Forty (2007) dedicates an entire chapter to analyse what he calls differentiation by design. This strategy consists of creating a myriad of models of the same product to increase sales and generate more profit for manufacturers. To illustrate his point, he uses the *Montgomery Ward*[1] catalogue of 1895, which offered 131 types of pocketknives to its consumers. Further, referring to a similar phenomenon regarding the production of printed fabric, he observes that the increase in fabric sales originated from this continuous proliferation of new designs. "...design variety was a business and the key to profit, for it was the means by which they persuaded their middle-class customers to buy fabric beyond their needs. By constantly producing new designs, manufacturers were able to promote fashion..." (Forty, 2007, p. 123).

At the opening of the chapter, the author writes: "This profusion continues to this day, albeit on a smaller scale..." (Forty, 2007, p. 89), when looking at e-commerce website pages, one must disagree with Forty as of the reduction in scale: KnifeCenter.com offers in one of its categories, 4,547 models of pocket knives and H&M.com.pt 1,342 tops. These are just two instances of many other brands online. Throughout the chapter, Forty (2007) discusses the contribution of design and designers to the development of capitalism. The creation of countless varieties of the same products has instigated in consumers the desire for novelty: the more varieties, the more people covet them. An obvious example of this practice is the fast fashion industry, according to a McKinsey report, Zara offers 24 new clothing collections each year; H&M offers 12 to 16 and refreshes them weekly (Remy et al., 2016). "The design activity was of great assistance to the development of capitalism in industries that produced consumer goods, providing the variety that enabled manufacturers to constantly increase their sales and profits" (Forty, 2007, p. 124).

In 1996, two years after Jeff Bezos created Amazon, the company began using a system that made recommendations to customers based on their browsing and purchase information. The offerings were consistent with their choices and habits, the website presented personalized pages for each user. One can say that digital design differentiation started then. Amazon was a pioneer in creating demand in their customers at an individualized level (Stone, 2014). Given the success of their strategy, several other companies followed suit. In the article Design and Crime, Foster (2002) criticizes this false individualization of mass-produced goods. The author claims that this deceiving perception is one of the factors promoting the inflation of design.

"Our own time is witness to a qualitative leap in this history: with the 'flexible specialization' of post-Fordist production, commodities can be continually tweaked, and markets constantly niched, so that a product can be mass in quantity yet appears up-to-date, personal, and precise in address. Desire is not only registered in products today, it is specified there: a self-interpellation of "hey, that's me", greets the consumer in catalogues and online. This perpetual profiling of the commodity, of the mini-me, is one factor that drives the inflation of design" (Foster, 2002, p. 20).

This use of browsing data or those requested of WWW users has evolved into what is known as Big Data. The term revolves around three pillars: volume, velocity, and variety. Volume is associated with the large amount of data existing on the network, velocity in the generation of new data every second, and variety as a result of the number of sources from which data can be extracted (Tarifa, 2014). Companies use data to understand their customers more deeply and offer them increasingly "personalized" products and services. In addition to promoting leading to an increase in consumption, Big Data raises several questions around privacy. According to Bauman:

"Bombarded from all sides by suggestions that they need to equip themselves with one product or another provided by stores if they want to have the ability to achieve and maintain the social position they desire, perform their social obligations, and protect their self-esteem – as well as be seen and recognized for doing all of this –consumers of both sexes, all ages, and social positions will feel inadequate, deficient, and substandard unless they respond promptly to these appeals". "...consuming, therefore, means investing in one's social affiliation, which, in a society of consumers, translates into 'sellability': obtaining qualities for which there is already a market demand, or recycling the existing ones, transforming them into products for which demand can be continuously created" (Bauman, 2008, Chapter 2, para. 14)

In design terms, the need for constant new stimulation is apparent in how designers focus on short-term appeal at the cost of long-term function or performance (Micklethwaite, 2019). This focus results in an emphasis on "buying new" over repairing

Forty, A. (2007). *Objetos de desejo: Design e sociedade desde 1750* (Pedro Maia Soares (trans.)). Cosac Naify.

Remy, N., Speelman, E., & Swartz, S. (2016). *Style that's sustainable: A new fast-fashion formula*. McKinsey Sustainability. https://www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula

Stone, B. (2014). *A loja de tudo* (1st ed.). Intrínseca.

Foster, H. (2002). *Design and crime: and other diatribes* (1st ed.). Verso.

Tarifa, A. (2014, September). *O que é big data e como usar na sua pequena empresa* [Exame.com].

Bauman, Z. (2008). *Vida para consumo* (1st ed.). Zahar.

Micklethwaite, P. (2019). *Design Against Consumerism. In Anne Massey & D. Arnold (Eds.), A Companion to Contemporary Design since 1945*. John Wiley & Sons.

[1] *Montgomery Ward & Company, Inc. mail-order company, founded by Montgomery Ward (1844-1913), U.S. merchant who introduced the mail-order method of selling general merchandise. Source: https://www.britannica.com/biography/Montgomery-Ward*

and maintaining (Thorpe, 2012). Offer (2006) describes this immediate indulgence as "psychic" rewards. A good example of programmed obsolescence is the electronic device chargers. Their designs change constantly, forcing consumers to keep up, so much so, that the European Commission has proposed a universal charger to harness e-waste (European Commission, 2021). The advent of new technologies led to the increase of production capacity that demanded the creation of a consumer mass, which, in turn, triggered a process to normalize consumerism. People started to create their identities based on what they buy, the act of buying became a strengthening agent of their individuality. In the effort of belonging, individuals consume what is said to be in the spotlight and are always in search of something newer and more satisfying, giving vent to the market's offer by constantly consuming. In this sense social and emotional concerns, rather than rational utility concerns, often govern our purchase decisions (Thorpe, 2012). In Marx's words: "Production creates the material, as an external object, for consumption; consumption creates the need, as an internal object, as aim, for production. Without production no consumption; without consumption no production" (Marx, 2011, p. 68).
Production creates consumers and demands (Contino, 2015). This process, like a vicious cycle, generates a highly competitive market, in which designers play a key role because "as competition grew, special seductions had to be devised, and package became almost as important as the product" (Foster, 2002, p. 19). Usability is also closely linked to the promotion of consumerism and is characterized as a factor of competitive differentiation in the online environment, like a "package". According to Nielsen: "Usability rules the web. Put simply if consumers cannot find a product, they won't buy it" (Nielsen, 2000, p. 9).
Differentiation by design, according to Forty's (2007) description, as a way to promote consumption, has been cultivated since the Montgomery Ward catalogues. However, "the schematic nature of this procedure is evident from the fact that the mechanically differentiated products are ultimately the same" (Adorno & Horkheimer, 2006, p. 97). Differentiation, to instigate desire for the lifestyle of those who "come from the big city" in people from "rural areas". A demonstration of the power that the economically stronger exercise over society. Drawing a parallel, one can say it is the imposition of the dominant culture on dominated cultures. This practice becomes more evident in our globalized society, where the promotion of consumer goods reaches bigger audiences, exponentially increasing their exposure. According to Bonsiepe: "Globalization, as new economic fundamentalism, is the name for the current totalizing project – a process that, with brutality, passes over people, governments, and societies. If we use the repertoire of concepts from anthropology, we can interpret globalization as an attempt to subjugate alterity[2]" (Bonsiepe, 2011, p. 39).
This imposition of a dominant culture is what Santos (2009) calls abyssal thinking. He defines it as "a system of visible and invisible distinctions, with the invisible ones grounding the visible ones. The invisible distinctions are established through radical lines that divide social reality into two distinct universes: the universe 'on this side of the line' and the universe 'on the other side of the line. The division is such that 'the other side of the line' disappears as reality, becomes non-existent, and is even produced as non-existent. Non-existence means not existing in any form of being relevant or comprehensible" (Santos, 2009, p. 23).
This invisible distinction is the distinction between metropolitan societies and colonial territories (Santos, 2009), between dominant and dominated cultures. With the most powerful segments of industry acting as the driving springs of what Adorno & Horkheimer (2006) denominate the cultural industry, in which culture is produced to be mass-consumed. The most "prioritized" needs of society are dictated by these segments in favour of selling their services. One might say the concepts discussed apply to any medium, they are not limited to the online environment. However, the "digitalization" of buying has enabled the collection of an unimaginable amount of information by companies about consumers. Individuals are led to believe that a particular product meets their exact needs. Whereas, the "mechanically differentiated products" are in fact the same, the advantages and disadvantages presented about each product only serve to perpetuate the illusion of competition and the possibility of choice (Adorno & Horkheimer, 2006). The underlying intention to increase sales and profit remains.

Discussion

To close our discussion, it is useful to distinguish consumption from consumerism as we understand it. Our vision agrees with that of Bhamra et al. (2011) where consumption should be a broader concept, it comprehends the life cycle of a product. Whereas consumerism relates primarily to the acquisition of a product, with little regard for product use and beyond. "Consumption is not only purchasing but developing routines and rituals of use and modifying the product concretely or symbolically…consumption involves the selection, purchase, use, maintenance, repair, disposal and recycling of any product or service, as opposed to their design, production, and marketing" (Bhamra et al., 2011, p. 429).

Thorpe, A. (2012). *Architecture and Design Versus Consumerism: How Design Activism Confronts Growth*. *Earthscan Taylor and Francis*.

Offer, A. (2006). *The Challenge of Affluence: Self-Control and Well-Being in the United States and Britain since 1950*. Oxford University Press. https://doi.org/ISBN-13: 9780199216628

European Commission. (2021). *Pulling the plug on consumer frustration and e-waste: Commission proposes a common charger for electronic devices*. Press Corner. https://ec.europa.eu/commission/presscorner/detail/en/IP_21_4613

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Foster, H., *op. cit*.

Nielsen, J., *op. cit*.

Forty, A. , *op. cit*.

Adorno, T. W., & Horkheimer, M. (2006). *Dialética do esclarecimento* (G. A. de Almeida (trans.); 1st ed.). Zahar.

Bonsiepe, G. (2011). *Design, Cultura e Sociedade* (1st ed.). Blucher.

Santos, B. de S. (2009). *Para Além do Pensamento Abissal: Das Linhas Globais a Uma Ecologia de Saberes*. In Epistemologias do Sul. Almedina.

Adorno, T. W., & Horkheimer, M., *op. cit*.

Bhamra, T., Lilley, D., & Tang, T. (2011). *Design for sustainable behavior: using products to change consumer behavio*. The Design Journal, 14(4), 427–445. https://doi.org/https://doi.org/10.2752/175630611X13091688930453.

[2] *Alterity presupposes a willingness to respect other design cultures with their inherent values, and not see them with the eyes of explorers in search of the next short-lived fashion [21](p. 38).*

Now, returning to the questions of the beginning of this paper: Is the designers' role limited to designing user-friendly and intuitive products? Or does it go beyond that? We would have to say no, it is not, and yes, it goes beyond.
When designing uniquely for the sake of diversification, contributing to consumerism, objects whose designs were created irresponsibly, with a focus solely on the object, designers become "malicious conspirators who devote themselves to engineering traps" for consumers (Flusser, 2007, p. 182). Flusser goes further. "This gap of moral responsibility, resulting from the logic of the production process, will inevitably create contraptions of reprehensible morality if a kind of ethical code for design cannot be agreed upon" (Flusser, 2007, p. 202). We need to move away from designing objects that serve ends that are not fully recognized or acknowledged, and thereby do little good, or more harm than good (Micklethwaite, 2019). "Much recent design has satisfied only evanescent wants and desires, while the genuine needs of man have often been neglected" (Papanek, 1984, p. 15).
Argan (1992) calls the design culture the process of analysing, criticizing, and improving the existing, as opposed to the culture of the model, where one just reproduces a form as it is. Since design is a project practice, would not this be its role? To analyse, criticize and improve? Especially in an environment where buying can be as simple as a click on a button?
In the design culture, the critical posture must not be absent. It is an antidote to conformism, essential to escape from the trap of indifference (Bonsiepe, 2011). Design culture serves as ammunition to combat the program culture, a product of modern technology, an automatism that is alien to the human will. "Why bother designing if there are computers that organize everything for human existence?" (Argan, 1992, p. 166). In it, humans do not need to have imagination, because there are technological devices producing images and offering them to be consumed in such a quantity allowing our imagination to have an activity that is only receptive and not active. "After all, designing by introducing the necessary changes, means having the predisposition to change reality without distancing oneself from it" (Bonsiepe, 2011, p. 37). Reduced to numbers and colours, "consumers are divided up as statistical material into red, green, and blue areas" (Adorno & Horkheimer, 2006, p. 97). Perhaps designers' responsibility is this: to design critically, contributing with some solutions to curb the promotion of consumerism. Sustainable design, to be valuable at all, requires sustainable consumption. There is little merit in aspiring to create a sustainable product if its user does not recognize and act on its potential to support sustainable behaviour (Micklethwaite, 2019).

Flusser, V. (2007). *O mundo codificado* (1st ed.). Cosac Naify.

Micklethwaite, P., *op. cit*.

Papanek, V. (1984). *Design for the real world: Human Ecology and Social Change* (2nd ed.). Thames & Hudson.

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Bonsiepe, G., *op. cit*.

Adorno, T. W., & Horkheimer, M., *op. cit*.

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Micklethwaite, P., *op. cit*.

Papanek, V., *op. cit*.

Thorpe, A. (2010). *Design's Role in Sustainable Consumption*. Design Issues, 26(2), 3–16. https://www.jstor.org/stable/20749938%0A

Conclusion

Designers should be concerned with placing human beings in the centre and not consumers, by practicing genuine human-centred design, that considers context and social-cultural meaning (Gasson, 2003), or even, shifting to an environment-centred design[3]. It is an approach to product or service development that aims to make products or services environmentally, socially, and economically sustainable by focusing on the needs, limitations, and preferences of the target human audience and non-human strategic stakeholders. It involves knowledge and design techniques developed at the intersection of human-centred design, usability, ecology, and sustainability science (Sznel, 2020). As Micklethwaite (2019) argues, designing for a market or user provides an immediate focus, but this should not distract us from greater accountability to our planet's capacity. Failure to recognize this responsibility results in a design approach that can be most easily characterized as one of abuse.
Sustainability prioritizes context over the object. According to Papanek (1984), there should be an approach to design that is "ecologically responsible and socially responsive" (Papanek, 1984, p. 346). The author is a strong critic of industrial design that responds only to the demands of consumer culture and calls designers to their responsibility for their creations.
Designing for sustainability is designing against consumerism, in circumstances where most design projects are for consumerism, implementing design for sustainability is indeed a huge challenge (Micklethwaite, 2019). Thorpe (2010) argues that design is bound up in systems of economic growth and consumerism as it contributes to individualization, commoditization, and the increasing pace of immediate reward, it is woven into a social language of position and status. The author shows us these forces act as structural barriers that prevent Design from delivering any real change. However, these same forces may be read as a map of where to target collective action. Furthermore, as designers, we can provide means to foster a more conscious consumer decision-making process. Design strategies that help us meet needs with fewer purchased solutions could lead to more sustainable consumption (Thorpe, 2010).
So, if we, designers, have had such a significant role in promoting consumerism, is it not also our responsibility to contribute feverishly to its demotion? Not only that, but our designs should also consider the product lifecycle. The materials used in production, their durability, and above all plan its discard or better how it can incorporate into the movement towards a circular economy.

[3] *Environment-centred design is an approach to product or service development that aims to make products or services environmentally, socially, and economically sustainable by focusing on the needs, limitations and preferences of target human audience and non-human strategic stakeholders. It involves knowledge and design techniques developed at the intersection of human-centred design, usability, ecology, and sustainability science (Sznel, 2020).*

Design for a sustainable and circular way of producing and consuming.

A case study on creative recycling focused on social commitment to women's awareness.

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Sustainability as an approach to contemporary textile and fashion design; not only related to the environmental vision but concerning co-creative processes between new products, material and immaterial, including people, groups, communities and institutions, in an "iterative" cycle that generates a socially diffused innovation.
The emergence of measures to contain overproduction and pollution in the fashion industry, emphasizes the role of design as the main social solver, implementing shared creative dynamics, intervening in rethinking the universe of textiles and clothing with responsible and efficient approaches. Combining design with industrial processes related to textile waste, biodegradability and recyclability, means adopting concrete strategies that translate the knowledge and experience of advanced research into products; optimizing paths and processes by drawing on research, experimentation and the use of innovative technologies; considering the "new materials" as enabling factors for current and future solutions, and including people from local communities in a territorial development. Clothing education promotes the development of skills that include understanding human needs and ecosystem limits. The role of women in the awareness of the limits of the fashion ecosystem becomes fundamental, activating a collective consciousness capable of using time in a creative and recreational social dimension.

Keywords *Surplus waste, People inclusivity, Materials relationships, New economy, Social innovation*

Introduction

The transition from an economy based on a vision based on resources to one based on the approach based on capacities (Sen, 1984) determines a real break in the industrial production logic that sees in the hoarding for the exploitation of raw materials, the central node of development adherent to the mechanisms of the market. Supply and demand chase each other to maintain a production system that falters because of the natural basis on which the pace of production, supply and demand satisfaction, the transition from the economy based on a resource-based view to the capacity-based approach (Sen, 2003) determines a real break in the industrial production logic that sees in the hoarding for the exploitation of raw materials, the central node of development adhering to market mechanisms. Supply and demand chase each other in order to maintain a production system that falters because of the natural basis on which the rhythm of production, supply and satisfaction of demand inevitably depends, namely the market. Macrosystems governed by their own laws alienate the relationship between those who buy and those who sell; equilibrium shows self-determined production systems, fragmented into autonomous activities that do not interact with each other. So that marketing determines what the consumer will immediately like and according to what rhythms he will have to consume; the production-distribution-consumption model is self-feeding and represents the fashion industry. The effects of the fashion industry model are visible in the so-called waste of clothes (fashion waste), a direct consequence of the phenomenon of over-consumption. The United Nations launched in 2015 the Sustainable Development Goals SDGs, also known as the 2030 Agenda, based on 17 themes whose scope the Fashion and Textile industry cannot ignore. The United Nations itself supports the integration of the goals in this sector through a number of projects and initiatives. For example, the United Nations Alliance for Sustainable Fashion is an initiative that promotes coordinated action in the fashion industry to help achieve the SDGs and reduce its negative environmental and social impact. To facilitate the integration of the SDGs into fashion and raise awareness among key players in the fashion system, the SDGs for Better Fashion initiative was launched in November 2018, involving students, companies and consumers. The SDGs most affected by fashion are: no. 4 "Quality Education"; no. 9 "Enterprise, Innovation and Infrastructure"; no. 12 "Responsible Consumption and Production"; and no. 13 "Combating Climate Change", but the initiative aims to give recipients an overview of all 17 goals. The article focuses on the theoretical-practical implementation of #4 and #12 of the UN SDG's goals regarding quality of education and responsible consumption and production. This represents the decisive step in the responsibility assumed towards the environment which is exercised in the choice not to buy compulsively but taking into account the needs and wants expressed according to a new paradigm; the dominant social paradigm (Armstrong and Le Hew, 2011). It is understood as an indicator of social behaviour in society and plays a central role in perpetrating or maintaining unsustainable practices. Thus, bottom-up movements of consumers calling for greater production chain transparency and participation by engaging in the co-creation phase result in direct accountability in pre- and post-consumer processes. According to Armstrong and LeHew (2011), "a new dominant social paradigm (DSP) would focus on creating apparel products that are more efficient in material use, production, and consumer utility, as well as better meeting the human needs of the consumer base, which are inherently more social than material needs. Similarly, clothing education in the new dominant social paradigm would promote the development of skills that would most likely include an understanding of human needs and ecosystem boundaries, working collaboratively with the market rather than trying to dominate it, and an understanding of local culture and tradition."

Textile and Clothing supply chain

The Italian fashion system represents the textile and fashion industry. It can be divided into eight production stages of the supply chain: spinning, weaving, finishing, garment making, household linen, outerwear, underwear and hosiery, various fabrics and components (Cia Diffusione, 2009). The textile supply chain of Italian clothing is thus complex and articulated, including a large number of processes ranging from the transformation of raw materials and ending with the sale of the final product. Figure 1 illustrates the structure of this chain which is composed of several links (companies). At the beginning of the textile chain, spinning takes place, which can be defined as a succession of operations aimed at transforming a mass of textile fibers into threads.

After the yarns are produced, they are distributed to the textile industry to be used as raw material for the production of fabrics, or sent to the garment industry, where they are used as components for the manufacture of garments. The textile industry transforms yarn into fabric through weaving, knitting or a non-woven process. Then the processes of dyeing and finishing the fabrics are performed to improve the visual and tactile characteristics of the textile material. However, another option is to dye

Sen, A. (1984). *Well-being, agency and freedom: the 1984 Dewey Conferences*. Journal of Philosophy, 82 (April 1985); and Capability and well-being. WIDER conference paper.

Sen, A. (2003). *Development as capacity expansion*. In: Fukuda-Parr S. , et al. Readings in Human Development. New Delhi and New York: Oxford University Press.

Armstrong, C.M., LeHew, M.L.A. (2011). *Sustainable Apparel Product Development: In search of a New Dominant Social Paradigm for the Field Using Sustainable Approaches*. Fashion Practice, V. 3, Issue 1, pp. 29-62.

Cia Diffusion (2019). *The textile-clothing industry*. Available at: https://www.ciadiffusione.it/gesFiles/Filez/1537430803K100643.pdf. Read in: May 15, 2021.

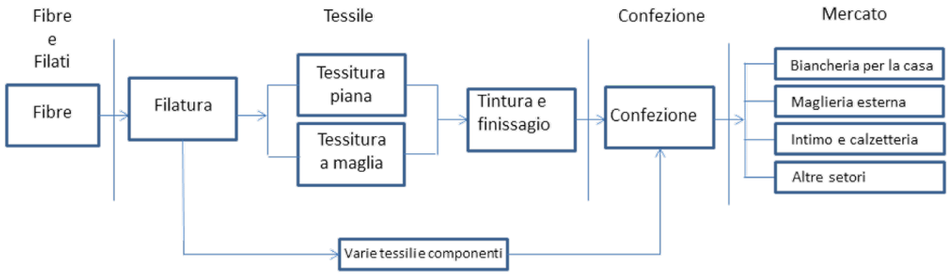

Figure 1. Clothing and textile supply chain. (Sbordone et al., 2021)

the yarns first and then perform the weaving process (Sanches et al., 2021). After the fabrics are produced, they are sent to the garment industry. In the apparel industry, the fabrics are transformed into products for the final consumers. After the final products are produced, they are distributed and sold by retailers in the vast majority of cases. Retailers are the link between producers and final consumers, making products available for consumption and use, adjusting discrepancies between consumer and producer needs for quantity, variety, time and place (Fantin et al., 2020).

Fashion System. Environmental limits and circular economy concepts

Fashion industry is one of the most important in the world, it is complex and involves other industries in its processes, making it difficult to fully compare in terms of pollution and environmental impact with other sectors. Currently, this industry is responsible for the high production of clothing to supply retail chains, which are constantly launching new products on the market. According to the Ellen McArthur Foundation (2017), the textile industry ranks 4th in raw materials and water use and 5th in greenhouse gas emissions, estimating that less than 1% of all textiles worldwide are recycled into new products. The Global Fashion Agenda (2018) estimates that the fashion industry is the 2nd largest consumer of water (1.5 trillion litres per year). So, the impacts generated by improper disposal of textile waste can cause soil contamination, because textile materials have different origins, which can be natural or chemical, with different biodegradation periods, making them unsuitable for disposal (Fletcher and Grose, 2011). Faced with such a scenario and in an attempt to solve these environmental impacts, it is necessary to look for solutions for the textile, clothing and fashion sectors that can subsidize not only new production and consumption

Sanches, R.A. , Duarte, A.Y.S. , Sbordone, M.A. , Ranzo, P. (2021). *Tecnologia da malaria: processos e principais produtos*. Modapalavra e-periódico, v. 14, p. 51-72

Fantin, V. et al. (2020). *Sustainable and circular design, production, distribution and consumption systems* - Textile - Clothing - Fashion ChainPosition paper. Available at: https://www.react-project.net/wp-content/uploads/sites/41/2020/05/5-ICESP-Position-paper-filiera-tessile-e-moda.pdf. Read in: 10 May 2021.

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Ellen MacArthur Foundation , op. cit.

Fletcher, K. (2014). *Sustainable fashion and textiles*. 2nd ed. London: Routledge

Sanches, R.A. (2011). *Comparative study of the characteristics of mortars produced with sustainable fibers for fabrication*. São Paulo, Escola de Artes, Ciências e Humanidades, Universidade São Paulo. Tese de Livre-docência

patterns, but also more efficient textile waste management systems, involving people and the whole society in the concretization of actions.

Studies conducted in recent years show that for the sustenance of the fast fashion model, the production of clothes has doubled in the last fifteen years and the average number of times each garment is used has decreased by 36% (Ellen MacArthur Foundation, 2017). Still, according to the survey, 73% of textile waste is burned or buried in landfills. About 12% of textile waste goes to recycling: most is crushed to fill mattresses, used to insulate or clean cloths. Less than 1% of waste is used to make new clothes. Based on production systems of linear economic orientation (extraction-transformation-use-waste), the fashion industry is a major contributor to large-scale consumption, abuse of natural resources and disposal of solid textile waste (Fletcher, 2014; Roy Choudhury, 2014). Solid waste can be defined as any material, substance, object or waste resulting from human activities in society. According to Legislative Decree n. 152/2006, waste is classified according to its origin, in urban waste and special waste and, according to its hazardous characteristics, in hazardous and non-hazardous waste. Urban waste is classified as waste coming from households, street sweeping or cleaning of green areas (art. 184, c. 2) and special waste is classified as waste coming from industrial, agricultural, craft, commercial and service activities (art. 184, c. 3). In the clothing industry, the last phase of the production process, textile waste generated by companies is characterised by knitted fabrics, flat fabrics, non-woven fabrics, threads, yarns and waste accessories. Therefore, they are classified as special and non-hazardous (Duarte et al., 2020). The raw materials used by the garments are generally flat fabrics and knitwear that can be of natural origin - made from fibers obtained from renewable sources that rapidly decompose in the environment - or of chemical origin - produced from natural polymers (man-made fibers) renewable raw materials that rapidly decompose in the environment or from synthetic polymers (synthetic fibers) non-renewable raw materials, mainly petroleum-based, and take decades to decompose in nature (Sanches, 2011). The disposal of these wastes does not mean that they are no longer of value, but that they are no longer needed by those who disposed of them so they boast the possibility that they may become useful again in other processes, for other people, in their original or transformed form. However, in addition to the problems mentioned, all the material derived from the overproduction of the textile and clothing chain industries usually ends up in landfills, but is also disposed of in bulk in the environment. Improper disposal

causes climate change, disrupts water and its cycles, chemical pollution, loss of biodiversity, excessive or inappropriate use of non-renewable resources waste generation, adverse effects on human health and harmful social effects on communities.
The circular economy model is not new, it dates back to the period before the industrial revolution, when the culture of consumption was not so massive. It is based on the reduction, reuse, recovery and recycling of materials, in a sustainable cycle from production to the reintegration of the raw material for the manufacture of a new product (Avila et al., 2018). In the '90s this model is strengthened, there is absence of the waste of materials or products, the destination and recycling of waste is defined at all stages of the production process - from product design to post-consumer disposal. Just Pearce and Turner (1990), define it as a model based on nature itself, which is achieved through innovation, design and processes that aim to reduce the consumption of raw materials, energy and water. Again, it is Morseletto (2020) to give a more contemporary definition, in the sense of economic model that aims at the efficient use of resources by minimizing waste, reducing the exploitation of primary resources and the closed cycles of products, parts of products and materials within the limits of environmental protection and socio-economic benefits.
Directive 2018/851 regulates waste management, such as non-generation, reduction, reuse, recycling, treatment of solid waste and final environmentally appropriate disposal. According to the directive, consumers, producers, importers and all those involved in the production chain have a shared responsibility for post-consumer disposal (EPR - Extended Producer Responsibility), which must be carried out in a conscious and sustainable manner. Also in Europe, the European Commission has adopted a new action plan for the circular economy that includes an EU strategy for textiles, with the aim of developing innovation and promoting reuse in the sector. It was in 2021 that the European Parliament voted on the new action plan for the circular economy, which includes stricter rules on recycling and binding targets for 2030 on the use and carbon footprint of materials.
For the transition from the linear to the circular economic model in the textile and clothing supply chain, action is needed in all its links and the first link of textile fibres is one of the biggest challenges in the sector. In this regard, it is believed that the apparel industry discards two types of waste, those resulting from cutting operations (smaller fabrics) that can be assembled or be transformed into new raw material (fibres/filaments), reintroduced into the textile supply chain for transformation into new products; and those from larger fabrics that are used in the manufacture of new products (Fiorani, 2006). The challenge is to re-evaluate the leftovers by consumers, thus spreading thoughts that lead to actions that avoid the removal of other raw materials from nature.

Industrial processes for materials possibilities
From Directive 2018/851, it appears that companies and consumers in the chain are responsible for the logistics of collecting and disposing of post-consumer products. Therefore, companies in the textile chain are responsible for the destination of materials that have not been used in the manufacture of their products, which are classified as industrial post-consumer. Reverse logistics can be defined as an economic and social development tool characterized by a set of actions, procedures and means designed to allow the collection and return of solid waste to the business sector, for its reuse, in its cycle or other production cycles, or other ecologically appropriate final destination (Crepaldi, 2014). Reverse logistics is understood as the management of discarded goods, from the point of consumption to the point of origin, bringing the possibility of reusing these materials and / or products; its strategic goal post-consumer refers to the logistical complex of the value of the product that is no longer needed by the consumer, or still have a use of discarded products, for having reached the end of your life and industrial waste (Leite, 2009). In this way, it can be said that the objective of reverse logistics is to further enhance the value of a material/product that has been used for commercial reasons, processing errors, manufacturer's warranty, product malfunction, problems caused by transport products, among other reasons (Santana, 2018). The author divides the reuse of reverse logistics materials into three subsystems: reuse, remanufacturing and recycling, including a part of post-consumer products that will not be reused (dismantling), since they are worn and degraded, so they would be properly disposed through landfills or waste-to-energy plants. Some of the products that are reused in the processes can be cleaned and left in a used condition, but they do not receive repairs or any kind of increase. Remanufacturing aims to rebuild products with the same purpose and nature as the original product. So, in general, some parts of the products are reused and some are replaced. Recycling can be understood as the process of reusing waste, discarded by companies/consumers, to transform it back into raw materials and give rise to a new product. In this way, both materials discarded by packaging and consumers can be recycled, using the circular economy model and reverse logistics, and turned into new products.

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Santana, M. R. (2018) *Reverse logistics and your organizational importance and environmental sustainability*. Multidisciplinary scientific journal of knowledge core. year 03, Ed. 06, vol. 04, pp. 36-51

Social innovation from fashion design approaches

The industrial processes related to textile waste, the biodegradability and recyclability characteristics are flanked by the design of the same materials to re-introduce them into new processes through well-defined actions. A fundamental role in the life cycle of fashion products is covered by planning and design. It is in this phase, in fact, that the most important decisions about the future of each product are made, including its "end of life". Fashion designers are increasingly faced with crucial questions as some products may be designed to be disassembled at the end of their life or recycled in closed-loop mode, while other products may be designed to last. Following the principles of sustainability, designers must choose materials that lend themselves more easily to recycling and reuse, such as polyester (100% recyclable), avoiding materials that are more difficult to recycle, because for example they contain dyes or mixes of other fibers (cotton is one of these) and try to extend the time of use of fashion products: the factor of "end-of-life delay" is, in fact, the key element to prevent the increase of textile waste. design focuses on the use of easily recyclable materials, the use of local resources to reduce transport and - specifically -suggests to design taking into consideration the end of life of a product. Design, thanks to its intrinsic critical capacities towards the systems of activities and actions of everyday life, is able to introduce radical innovations in the world of production, capable of guiding innovation strategies in different areas (Ranzo, 2017). Precisely, the urgency of containment measures to over-production and pollution in the textile and clothing system has led to the re-evaluation of the role of Design as the main social solver, lent to emergency situations, sustainable design, implementing shared creative dynamics, intervening in rethinking the universe of textiles and clothing with responsible and effective innovation approaches.

These innovations "happen" on various levels, for various applications, among new material and immaterial products, among individuals, groups, communities, associations, but also institutions, spreading values that influence the lifestyles of society. The result is a reflection on the design capacity that involves multiple actors and is extended to the whole society, seen as a large laboratory where social forms, solutions and new meanings are produced, where social innovation is created (Manzini, 2015). In the fashion system and in the specific sectors of textiles and clothing, it is necessary to promote strategies that, thanks to design, translate into products the knowledge and experience of the most advanced research; that optimize paths and processes drawing from research, experimentation, tools

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Manzini, E., & Coad, R. (2015). *Design, When Everybody Designs: An Introduction to Design for Social Innovation* (Design Thinking, Design Theory). The MIT Press

and the use of innovative technologies; that consider materials (recovered, regenerated and reused), enabling factors for current and future solutions, and including people from local communities in a territorial development. Thus social innovation would be realized, through the co-creation of processes in which relationships and interactions take place, between sectors, materials, activities and people; the same dimension of co-creation is circular, individual project capabilities emerge to reintroduce themselves into the process in a continuous challenge between definition and implementation of concrete strategies that respond to important environmental, social and economic challenges.

Methodology

Desk analysis. REMIDA. Creative recycling centre

Fashion research is implementing new business models and technological innovations to reduce the impact on the environment. The circular economy can generate value from the recovery of waste and generate new social dynamics if combined with quality training and education; among the themes of the SDGs, in particular point 4 and 12, concern precisely training and the logic of consumption and production. The case study we are analyzing focuses on the recovery of textile scraps that are reintroduced into a creative recycling circuit, giving new life to materials destined for the landfill through socio-cultural projects of sustainability, creativity and research, promoting the idea that waste is the bearer of an ethical message, capable of stimulating reflection, offering itself as an educational resource, escaping the definition of useless waste in favor of waste understood as an object capable of generating integrated creative processes involving people and materials; a type of remanufacturing based on the processes and logics of design that pursues innovation while also recovering ancient local manufacturing traditions and thus enhancing the value of people, products and processes that are triggered between them. REMIDA was founded on December 2, 1996 in Reggio Emilia and is managed by the foundation Reggio Children Centro Loris Malaguzzi. The heart of its research is matter, as an industrial product and as waste, as an artifact, as a subject to be investigated or as an object of relationship. Around this experience was born the REMIDA network, which today consists of 15 centers in the world, including 9 in Italy inspired by the same philosophy that brings the culture of creative reuse of recycled materials. Embodying the concept of extended circular economy, REMIDA is the symbol of 20 years of commitment to promoting perspectives through new models of thought and new practices that respect man, the environment and the planet, a decisive change in a lo-

gic of sustainability between man, object and environment, from the recovery of waste materials, to their valorization in products to the creation of new communicative and creative possibilities.

On field analysis. REMIDA Napoli

REMIDA Naples is the association identified as a case study, as well as the space within which it was possible to translate social and environmental responsibility into concrete results. S'ARTE. Progetto sartoria Remida Napoli constitutes the applied case (next paragraph), a transversal project that involves materials, people and training, in the realization of social change through co-creation processes. Born in 1999 in agreement with the recycling centre based in Reggio Emilia and Reggio Children, it is a cultural project that carries an ecological, ethical, educational and economic message that promotes the culture of creative reuse of recycled materials. It invites people to investigate and experiment with waste materials in order to give them a new life, a new value, contrasting the culture of disposability with the culture of use and reuse. It is not a simple place connected to the services already existing on the territory, but it is characterized as a real service, an important resource for the requalification and enrichment of the educational proposals offered to citizens. The concept of sustainability represents an idea, a way of producing, an opportunity that we can seize to rethink, review and plan the actions that shape the future. Everything starts from the materials collected and proposed, which do not come from landfills or even from bins, but are "new stuff", scraps and production errors, waste and stocks no longer saleable, so their supply represents a fundamental area of development for the project, both concretely, for the material as a resource, and ideally for the relationship that establishes with the productive world, thanks to which it makes sense to talk about waste as a source of research and knowledge. Today the association is engaged on two fronts, on the one hand the FACE project that involves many families, with the aim of combating school dropout and educational poverty, through courses dedicated to children in the range 0-6 years and their parents, exploring waste materials, including light, sounds and composition, exploring a new narrative of the material that unleashes the power of imagination; on the other hand, the experimentation of new relationships of human interaction through a tailoring space, a meeting place for women in difficulty who, through training courses and workshop experiences based on craftsmanship, use and design waste materials with a view to discovering, promoting and enhancing both the products they make and providing them with a space in which to grow, learn new skills and professional knowledge, thus reducing work disorientation pearcce (Robeyns, 2005). Finally, the project S'Arte (the applied case), in collaboration with the University of Campania Luigi Vanvitelli, extends eco tailoring to a space of co-creation based on the circular value chain of people and materials, in which women aged between 18 and 40 who are currently unemployed are involved in the creation of a social cooperative. The project, which will have its own recognizability thanks to the creation of an identifying brand, presents itself as a combined and multidisciplinary experience of centres, associations and private individuals (Remida recycling centre in Naples, Remida recycling centre in Reggio Emilia and other partnerships); it is supported by the high university training in Fashion Design and Textile Design which accompanies the women towards an advanced and innovative process, from research and stylistic definition, to colour paths, to the finished product ready for a new life; the same research activity is focused on the prevailing themes in the textile and clothing sector with a planned use of resources up to the realization of efficient products; it is an accurate and defined project of transversal research that tries to reinvent materials, technologies, women, in a scenario that adopts sustainability, generates innovative approaches and models of relationships and integrations that can be an example in the fashion system, with co-creative processes that can constitute the idea of a widespread laboratory in a wider social dimension. Strengthening them, in the "construction" of solid foundations in the cultural, social and entrepreneurial spheres for better future prospects.

Robeyns, I. (2005). *The capability approach: A theoretical investigation*. Journal of human development 6, 93-114

S'ARTE. Progetto Sartoria REMIDA Napoli

S'ARTE. Applied case

The S'Arte project has several approaches to achieve concrete objectives of change. The essential predisposition to address the issue of resource use especially in the Textile and Clothing industry is due to the consideration of textiles as a sector that constitutes a fertile ground for a project that can be an example of promoting social innovation: focuses on tackling social and gender inequalities in the area by including people living in different conditions; it uses innovative learning and professional research and training paths that draw on design for fashion and textile design, or rather design that mediates the transformation of production systems and processes; applies these concepts to available resources, especially in the textile and clothing sector (deadstock, textile surpluses, disused products, regenerated materials, seizures and confiscated materials), which, thanks to creative recycling and design techniques and methodologies, can be designed to last. Not only inclusion, cutting-edge training

Figure 2. S'ARTE logotype. (Sbordone et al., REMIDA Napoli, Università della Campania, 2021)

and the development of local relationships for widespread workshops, the project also seeks to inspire women to achieve their goals, through design challenges spread among organizations and associations working in the field.
Brand identity (Figure 2). The project to define the brand identity of S'Arte was developed by implementing a series of strategies in collaboration with a team of professionals with different skills. The first phase of the project included a general brainstorming from which some fundamental concepts emerged on which to build the brand identity: social tailoring, creative recycling, ethical value, social inclusion. The concepts that emerged make it clear that at the basis of S'Arte there is a need and a desire for recognition of a reality that not only concerns creative recycling and social recovery but also people and materials in the circular value chain. The message it speaks of is a profound one with an ethical value, a message full of meaning, a general exhortation to study and training. These initial considerations refer to the position that S'Arte chooses to take in defining itself, as well as being evaluations that have emerged from a series of initial research carried out to better understand the situation in our area."S'Arte" is the expression of an ethical vision aimed at promoting the concept of a co-creative dimension dedicated to the enhancement of the relationships between people and materials, combined with technological progress, sustainability and research. S'Arte is a strong and sincere brand that addresses the public in a clear and direct way. The communication is aimed at those who want to be part of it by starting paths together, but also, and above all, to all those who decide to use the products made in the project. S'Arte, therefore, concentrates all its energies in a collective promotion of a dimension that adds to the recovery of materials the regime of relationships with other materials, with innovative production technologies and with different skills of people coming from different realities; a dimension in which attributes are defined to the product that often have a non-quantifiable value, a system of processes that occur

in a laboratory that can be called a widespread laboratory in an amplified social context. S'Arte wants to be a symbol of identity and affirmation of human capital and that allows the enrichment and consolidation over time of established realities.
S'Arte naming comes from the combination of tailoring and art, key attributes of the brand identity. Visually, the reference to art is strong, given by the colours and the characteristic material elements. In S'Arte the apostrophe after the S marks a truncation that best highlights the word art, as well as being a valid typographic character. It is a figurative brand containing word elements, composed by logotype, pictogram, payoff.
Logo was born from the design of the character through a zigzag of colour and the use of a linear sewing machine. This first phase defined the material and irregular imprint that best distinguishes the brand from others. In a second phase followed the digital characterization of the font with a graphic-structural intervention. Payoff Progetto Sartoria Remida Napoli emphasizes the brand's mission with precise concepts: a new extended sartorial project, made of people working together and for other people, even if connected to the macro-project in which REMIDA is rooted (Figure 3).
Pictogram, given by the apostrophe, is fundamental in the representation of the brand; it is expressed in an articulated graphic proposal that conveys a sense of balance and strength, as well as being a distinctive sign of the brand itself.

Figure 3. Brainstorming between Remida Napoli's women and fashion designer experts from Università della Campania. (Sbordone et al., REMIDA Napoli, Università della Campania, 2018-20)

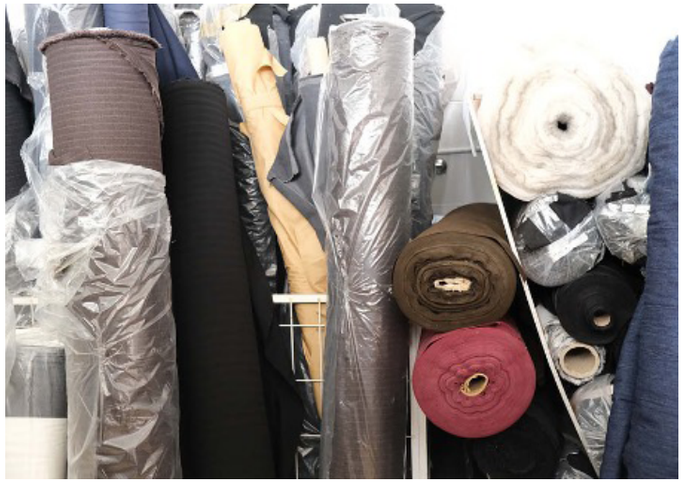
S'ARTE. Discussions

The planned opening for the downstream discussion of the methodology followed (on the field and fashion design) focuses on:

materials - the S'ARTE project draws on the 200 companies involved in the REMIDA Centre who donate waste, imperfect materials, stock funds or excess production destined for disposal, which the Centre itself recovers and in part distributes to schools and structures with socio-cultural aims, and in part uses for its projects. The design process starts from the meetings of the people involved in the tailoring with the expert designers who will support and guide them through every single phase. Given the material surplus, it was possible to choose from the various types of waste those most suitable for the type of reuse for the realization of the final product: scraps of men's fabrics, noble scraps of a company and warehouse stock were selected for the development of collection garments; excesses of trimmings, lace and trimmings have been selected for the creation of decorations that characterize and complete the outfit; zips and various plastic scraps have been selected to reuse them in new garments with the same function, reinforcement, button, closure and opening. Other materials come from seizures of warehouses run by the Camorra and thus become a common good to re-emerge from illegality and become materials for common use (Figure 4);

upcycling - the culture of mending, upcycling and reinventing garments is a practice reintroduced in creative recycling

Figure 4. Recycling materials. (Sbordone et al., REMIDA Napoli, Università della Campania, 2018-20)



systems to promote processes of safeguarding the planet. Sustainability, creativity and research promote social messages capable of stimulating reflection, education and training, overturning the definition of useless and waste, for a strategic reuse in view of new organizational forms of cooperation, sharing and reorganization of resources. Precisely the conditions of reusing, regenerating, repairing, reconditioning, recycling, re-functionalizing are made possible thanks to the management of the process of design and planning of the individual parts. Men's fabrics are thus used to dress women's bodies, transformed into models that challenge conventions: from pinstripes to grisaille, from lace to embroidery, the garments play with volumes, soft widths and cuts that derive from the personalised mapping of the body; coloured zigzags decorate the hems and mark new lines on the garment. The result is a continuous dialogue between manual skill and theoretical reflection, according to a process of constant learning. Colour palette is dominated by tones ranging from brown to grey to black with red and white declinations to underline the role of women, their position in a society increasingly made up of antagonisms. Moreover, the color path identified is the result of an inverse process given by the scanning of the material (in), sampling, conversion of colors through conventional color systems and then digitization.

Body Mapping as Body Positivity - body positivity was born a few years ago, created to promote acceptance of all body types regardless of size, race, gender or physical appearance to break down socially imposed standards of beauty, to strip away prejudice and value the individual. The women of S'Arte themselves "recreate" the social fabric in a multitude of visions and values based on identity and new beauty. As an active part of the S'Arte project, the women themselves are models through their silhouettes, defining new models and building their own models (Figure 5). In the first phase, the women were studied by taking anatomical measurements for each one in order to develop a body mapping that allows an easy approach for an ad-hoc design. United in the diversity of professional skills and bodies, they are now a symbol of true social and shared value.

Prototyping-Lab - the modelling process involves the construction of the prototype that supports the stylistic concept of the materials recovered and the techniques adopted. The process involves women and their production skills, integrating knowledge and visions, traditions, with a view to innovation. The prototyping process used is based on a strong root of innovation and experimentation, starting from the body

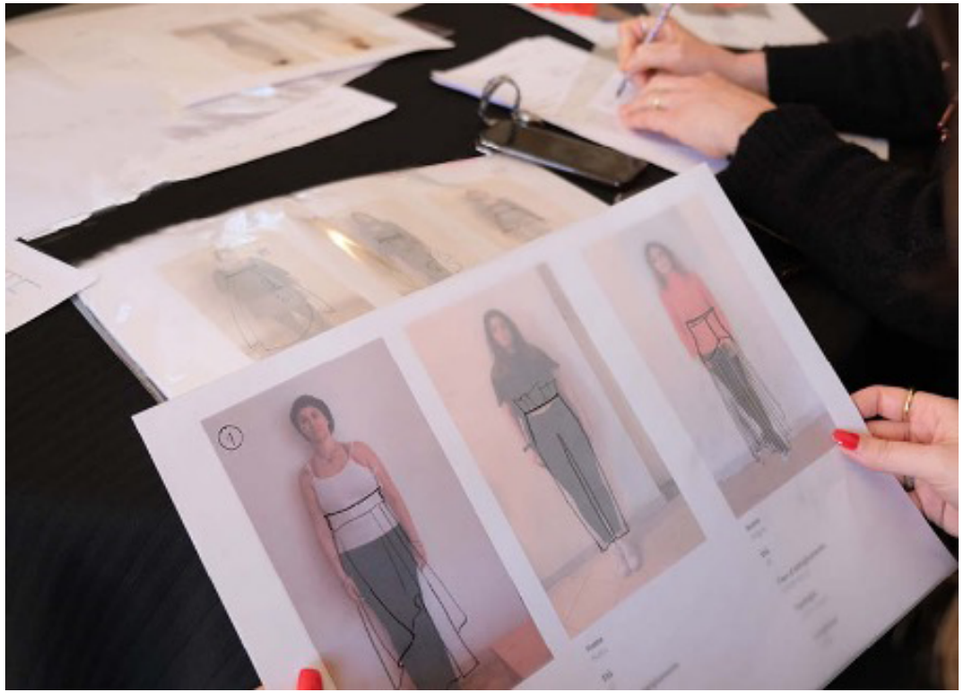


Figure 5. Bodymapping process on women's body. (Sbordone et al., REMIDA Napoli, Università della Campania, 2021)

Figure 6. Prototype definition and sewing process. (Sbordone et al., REMIDA Napoli, Università della Campania, 2021)

mapping identified on the body of each woman in tailoring to create models that are declined in new silhouettes, configure the collection, and in which each model maintains its point of recognition. From a primary model sketched through conceptual sketches, we move on to the modeling of the fabric on the body with the moulage technique, thus defining lengths and volumes (Figure 6). The creative, design and prototype phases that each institution has to go through in a unique way, constitute a process that takes into account long and laborious steps, the combination of different techniques, partial realizations, continuous verifications: in this phase advanced training courses are carried out concerning the hybridization of traditional techniques with digital and innovative ones, an increasingly guided practice to the project is undertaken, triggering creative-prototypal techniques that will flow into the final models.

Communication strategies - the S'ARTE project concludes with the S'ARTE show event (Figure 7,8); for the occasion, several communication strategies were developed to reinforce the concept of ethical and social fashion:

- communication for the promotion of the event (physical and streaming on social media): the communication strategy includes, in the first phase, the creation of an editorial plan for the promotion of the event on social media (Facebook and Instagram). The digital content was created specifically to be distributed on the two social networks in parallel in order to ensure a coherent and consistent strategy. The promotion, cadenced through a well-defined calendar, was initially accompanied by published content that did not provide detailed information about the event, making users feel expectant and curious. Gradually more and more information was provided through a programme divided into various stages: publication of images of materials, short videos, women at work, activities and more detailed information, alternating with the S'ARTE logo; this was followed by more dynamic and detailed content, including informative posts, countdowns with the days remaining until the event; thought was also given to creating gadgets for participants to extend the value of the event;
- communication of product packaging for sale (packaging and tags): the communication strategy involves the creation of packaging using recycled materials, for the packaging and sale of the garments made. These are equipped with rectangular double-sided tags, bearing the brand name and technical notes describing the materials and the production process.
- digital communication, social media and Interaction Design (likes for monitoring the satisfaction of followers and custo-

Figure 7. A woman of S'ARTE shows her model during final fashion show event. (Sbordone et al., REMIDA Napoli, Università della Campania, 2021)

Figure 8. Shooting from final fashion show event (Sbordone et al., REMIDA Napoli, Università della Campania, 2021)

mization service): the communication strategy involves the publication of images of the product after the purchase, in order to generate reactions and then monitor the level of user satisfaction. In addition, the direct interaction of customers on the various social channels allows to have the technical support of the S'ARTE women with the possibility to customize and reinterpret the models.

Conclusions

Empowerment and inclusion facilitate the process of self-determination to gain awareness of oneself, one's potential, one's actions to be part of the resulting decision-making process. Between cutting-edge training and development of local relationships and widespread workshops, the project seeks to inspire girls and women to achieve their goals, through continuous design challenges, dictated by the materials and the approach to Design itself. The new role of women in the awareness of environmental limits and the consequences of overconsumption and waste of fashion requires a collective consciousness capable of using time in a creative and recreational social dimension. And all these theoretical principles and concrete actions feed off each other once of innovation that generates socially widespread change.

Çeyizlab: Imagining the transformation of a Pre-wedding Ritual in Turkey

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Trousseau – "çeyiz" in Turkish – preparations are a significant part of wedding rituals in Turkey. The process of preparing çeyiz starts when a daughter is born and continues till marriage. Therefore, we – two design researchers – were set on a journey to go back to our roots and discover what this process entails, how it changed in time, and where the change is leading towards. We talked to women from different age groups, asked them about their çeyiz, created a manifesto to trigger critical reflections about this ritual, and ignited a conversation within ourselves: What was çeyiz, what was it turning into, and how can we envision new scenarios with this meaningful but transforming ritual? We listened to its wisdom then created a manifesto and used it as a conversation starter. This project is partly speculation of what a traditional ritual might transform into and partly a criticism of how we as a community can spark change in our perception of values.

Keywords *Speculative design, tradition, sustainability, trousseau.*

Introduction

Trousseau making – "çeyiz" in Turkish – and gift-giving to the bride before the wedding is a prominent part of Turkish culture. It has long been performed to support newlywed women in their freshly starting lives after marriage. Çeyiz is the total sum of artifacts that the bride fashions for herself and families, neighbors, and at times friends of newlyweds offer as gifts before the wedding ceremonies in Turkey. Items in çeyiz are collected way before the wedding and accumulate over tens if not dozens of years, those even become a family heirloom. The idiom goes 'when a daughter is in the cradle, her trousseau is placed in the wedding chest'. There are different rituals that were generated around the preparation and collection of çeyiz. Besides, çeyiz is a collective archive of decorative or functional artifacts, mostly hand-crafted textiles that also create an informal economy for women crafting from home. It embeds tangible and intangible values that pass from one generation to another in the family. The preparation of çeyiz items involves both the family members and becomes a collective activity embracing different participants in direct or indirect relation with the bride. Thus, it becomes not only a family heritage but a collective creation of a set of artifacts, a sort of home-based archive for hand-crafted objects embedded with various stories. These artifacts consist of handmade textiles, crocheted doilies, knitted socks, towels, kitchenware, and small electric appliances. All these items unfold the transactions between old and new generations (Samli, 2011, p.6). As many traditions face it, trousseau making is undergoing a transformation due to the changes in women's place in society, consumer culture, and globalization. With this research project, we aimed to open a debate about how trousseaux in Turkey are transforming contemporarily and how design might shed a light on this inevitable metamorphosis through reimagining and speculating about its transformation in the future.

What is Çeyiz?

Çeyiz is described as 'the goods and devices which are given to the bride' in the Turkish Dictionary (TDK, 2021). It is an age-old tradition that has similar occurrences in different cultures (e.g., Mediterranean and Eurasia) (Samli, 2010, p.62). Today, çeyiz still consists of crocheted doilies, knitted socks, headscarves with needlework, a variety of textiles, and small electric appliances (Hart, 2010; Samli, 2011). Hart (2010) writes that the items that are present in çeyiz especially in the rural areas are not aesthetically pleasing for her; however, we still see these goods in the chests of rural and urban living women in Turkey. Although this gift-giving ritual was perceived as a support for newlyweds, it also is considered a symbol of abundance and status (Yalcin Usal, 2010; Nutku cited in Nas, 2018). Like most traditions, çeyiz is undergoing a change due to socioeconomic and technological advancements. Samli says "Begun at a daughter's birth, the time-honored çeyiz historically embodied a girl's labor, worth, and only possible future as an adult: marriage" (2010, p.6). After women started to find their places in the workforce more often, the effort and the crafting that go into preparing çeyiz items has declined dramatically (ibid.). Women either started paying neighbors or acquaintances for crafting or purchasing the çeyiz contents from local and global retailers. Çeyiz can be seen as a matriarchal practice that is based on "subsistence and cooperation" (Wörer, 2019, p. 192) circulating as a gift representing a form of care in an interdependent society. However, its contemporary transformation is leading to become an accumulation of artifacts for solely furnishing and decorating one's new house or to disappear. It loses its meaning as a convivial care practice and becomes partially a means of feeding the globalized industrial capitalism.

Our methodology

At the beginning of our research, gaining perspective about what çeyiz means, how it evolved, how people are perceiving çeyiz, and what çeyiz could become were our objectives. We initially asked: 'Can we create new scenarios through the existing transformation of çeyiz and turn those scenarios into opportunities for fostering our bonds, rejuvenating the lost values, and above all, changing our perception from consumption to taking "care"?' Since the main function of çeyiz is providing support for the bride, can this support be seen as a new type of care that goes beyond the personal to collective, from monetary to social and convivial? The first step was to organize online discussion groups with women of all ages. Our participants were urban living, working women between the ages of twenty-three and sixty-five from Turkey. Later, we have conducted duo-ethnography sessions since we- two design researchers from Turkey- have çeyiz prepared for us. In parallel, we started a literature review about çeyiz, its cultural indications, and its roots. Then we interviewed an expert on cultural heritage to gather her views on çeyiz. With thematic analysis, we have found emerging themes and those lead us into writing a manifesto. Writing the manifesto was a part of the research process in which we reflected on the outcomes in a collective way. The collective writing process allowed us to formulate words and terms in a form of a manifesto, which can be also seen as an analogy to a design brief that is often the main starting point of a design process.

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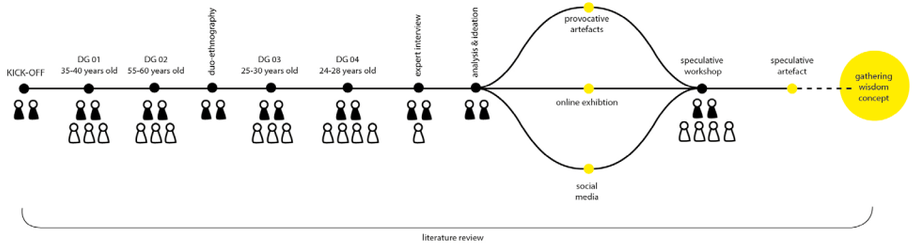


Figure 1: Research Process

The manifesto of çeyiz was our first provocative artifact and we brought it to life by embroidering it onto a 130 cm textile with a digital embroidery machine (Figure 3) and with a short movie in which the manifesto was speaking for itself wholeheartedly. In parallel with the creation of the manifesto, we started a social media account for çeyizlab and used the platform to reach a wider audience to share our results and connect with them. We used #çeyizlab to collect çeyiz examples from a bigger sample of people. Later, these examples were placed on cards to build an archive of çeyiz (Figure 4). Our growing archive with the manifesto paved a path for looking more into the future of çeyiz and a desire to imagine what the future holds for both çeyiz and women in Turkey. Our last activity was an online speculation workshop which gave rise to the idea of an online platform for collecting and sharing feminine wisdom.

Online Discussion and Duo-ethnography Sessions

As a first step, we conducted online discussion groups, an expert interview, and duo-ethnography sessions to investigate the actual state of çeyiz (Figure 1). According to Samli "as a physical object that contains women's labor, their skills, and tastes sewn into contents, the çeyiz is an object of collective memories" (2010, p.20). To explore the state of these collective memories five discussion groups of fifteen participants were carried out with women from Turkey who live in urban areas. Open-ended questions lead the conversations to comprehend the participants' perspectives on çeyiz and how it changed over time. In these sessions, participants introduced some items from their own çeyiz and these items became "boundary objects" (Star & Griesemer, 1989) which brought different participants in contact with each other through the embedded stories. The same method was used also in the online duo-ethnography sessions in which we interviewed each other by using items from our own çeyiz. This gave us the possibility to shift from a third-person perspective to the first-person perspective on the topic, merging our subjective point of view with the objective ones. Although this may seem as a critical point of the research, on the other hand, it provides a ground in the imagination process to have a collective vision. Moreover, the online sessions also included one expert interview which gave us an indepth understanding of the history of çeyiz. By analyzing our research outcomes, various themes emerged (Figure 2):

Tangible/intangible values. Although çeyiz is tangible and it consists of cumulative artifacts for supporting the bride, it has many intangible values that are related to family heritage such as family stories, memories, and emotions. Even after years, women remembered how they felt when they were collecting all these items, who helped them, and how they were full of hope for their future. Young women repeatedly mentioned the importance of having a piece from their ancestors in their çeyiz and older women were keeping or gifting some items for their daughters'/ daughter inlaws' çeyiz to leave them a keepsake. The item with intangible values is generally one or two pieces that the person kept separate from other items of çeyiz, sometimes putting them into a frame on the wall, sometimes embedding them into an item of special clothing, etc.

Meaning-function paradox. Items of çeyiz are meant to be functional objects; however, decorative aspects took over in time reducing the actual aim of supporting women. Most of our participants mentioned how absurd they find the wedding chest to be shown to the visitors after weddings. Moreover, some of them do find these decorative items useless and out-of-fashion.

Stories. Each item in çeyiz regardless of being a family heritage or not has a story behind it. Some of our participants remembered their time and the hardship they faced for preparing certain amounts of knitted socks or not being able to finish a crocheted bed cover in time. Even the tablecloth purchased from a globally renowned brand goes through several family members and that's woven in çeyiz stories. As the items embed stories in them, they are strongly linked to personal memories that are associated with various emotions feelings, ranging from regret to affection.

Concepts and terms. There are many terms and concepts within the tradition representing facts and concerns related to the role of women in society. For instance, çeyiz is considered a matrilineal tradition, and fathers are not generally included in the process of preparation or purchasing. Other common concepts were the wedding chests (çeyiz sandigi) and the chest stains (sandik lekesi) which came up in most of our discussions.

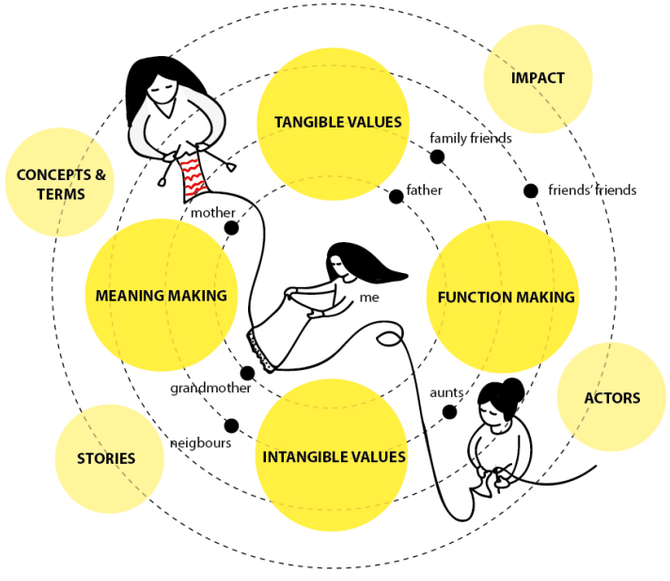
Actors and community. In the preparation phase of çeyiz many different figures can be involved, ranging from family members to neighbors, from home-crafters to international brands. The

Samli, S, A., *op. cit.*

Star, S. L. and Griesemer, J. R. (1989) '*Institutional Ecology, `Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology*, 1907-39', Social Studies of Science, 19(3), pp. 387–420.

majority of people we discussed the process of preparation for the trousseaux mentioned their close family being involved in the whole process such as their grandmothers, sisters, aunts, and close neighbors. Only one person mentioned their father crafting a souvenir for their trousseau and another one talked about their mother inheriting a craft object from her grandfather.
Impact on women's lives: Most of the çeyiz stories we listened to include many peculiarities that give shape to women's lives, how they position and define themselves in society. These stories are also full of hope and desires for a better future both for themselves and the women that they care about.
Our findings indicate that the memories, stories, experiences, and familial heritage associated with çeyiz have a significant place in Turkish culture, nevertheless due to mass production and modernization, this tradition has been losing its meaning and degenerating. With this research, we found out that the types of items included in çeyiz have not changed much although people's lifestyles, needs, and society transitioned dramatically. These artifacts have been described as useless and overly fashioned items of vanity by the participants, moreover for some participants çeyiz does not exist anymore. For instance, some crafted items have been replaced with mass-produced products or even monetary exchange. Our analysis showed us that the

Figure 2: Emerging Themes



Gümüş Çiftçi H., & Uğur Yavuz S. (2021). *çeyizLAB: Crafting a Speculative Manifesto: Video Article. FormAkademisk* - research journal of design and design education, 14(2). https://doi.org/10.7577/formakademisk.4409

Jewitt C, Price S, Steimle J, Huisman G, Golmohammadi L, Pourjafarian N, Frier W, Howard T, Ipakchian Aska-ri S, Ornati M, Panëels S and Weda J (2021) *Manifesto for Digital Social Touch in Crisis*. Front. Comput. Sci. 3:754050. doi: 10.3389/fcomp.2021.754050

Ashby S., Hanna J., Matos S., Rodrigues R. (2018) *Words in Freedom: A Manifesto Machine as Critical Design*. In: Cheok A., Inami M., Romão T. (eds) Advances in Computer Entertainment Technology. ACE 2017. Lecture Notes in Computer Science, vol 10714. Springer, Cham. https://doi.org/10.1007/978-3-319-76270-8_38

Raby, F., Dunne, A. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming*. United Kingdom: MIT Press.

Auger, J. (2013). *Speculative design: crafting the speculation*, Digital Creativity, 24:1, 11-35

participants had the desire to make their çeyiz more functional and/or more meaningful by embedding the intangible values in çeyiz preparation process. Additionally, our target group was repelled by the fact that the concept of çeyiz is solely materialistic with none or little emotional value.

Manifesto of Çeyiz - A Provocative Artifact

Inspiration from our participants and the analysis of the research enabled us to create a "Manifesto of çeyiz" which functions as a provocative artifact embedded with "the stories, memories, and desires of the women" about çeyiz and opens a discourse around the transformation of this ritual (Gümüş Çiftçi & Uğur Yavuz, 2021). A manifesto generally stands for a collective vision, will for change, and a statement, a declaration of a group of people to define their new aims and motives. It can be seen as a medium "usually in response to a crisis and is an urgent call for change articulated through an eye-catching list of challenging and provocative statements" (Jewitt et al, 2021, p.3). Writing a manifesto can enable groups of people to "rationalize their feelings in such a way as to be able to externalize problems" (Ashby et al, 2018). Our manifesto uses what-if questions as tangent points to construct a collective desire for the transformation of çeyiz tradition. According to Dunne and Raby what-if scenarios are:

> *Related to counterfactuals but more forward-looking...They allow the author to strip narrative and plot right down to basics in order to explore an idea. (2013, p. 86)*

Therefore, the manifesto asks questions such as: What if çeyiz is digital? What if çeyiz is not only matrilinear? What if çeyiz is not gender-biased? What if çeyiz supports women not only to decorate their homes but also to help them to be empowered in their society? What if çeyiz is a seed of life, love, and humanity? Finally, what if çeyiz becomes the voice of women? What if questions opened a new path for our research to generate "speculative futures and alternative presents" (Auger, 2013). Dunne and Raby also add:

> *But we are designers, not writers. We want to build things that create similar levels of reflection and pleasure but use the language of design. How can we do this? What happens when speculations move from behind the screen or from the pages of a book to coexist in the same space as the viewer? (2013, p. 86)*

Therefore, with this project, our aim is to turn speculations into artifacts belonging to alternative presents that can provoke debate and critical thinking. We refined our research question as "how can we create preferable and meaningful futures for çeyiz items by turning the existing transformation into opportunities for rejuvenating the lost values and generating new ones to re-

flect on the existing?" As çeyiz is generally consisting of crafted textiles, the textile itself became a means to give place to the manifesto. The written text was embroidered with a digital embroidery machine, which also represents an in-between stage: transition between hand-made and mass-produced. The embroidered manifesto was then filmed and shared with the public through digital channels, such as a digital exhibition and social media. Although the language of this manifesto was predetermined and inspired by the conversations from our discussion sessions, we deliberately chose to use a more inclusive approach. The manifesto was embroidered on a 130 cm long, white textile with red thread (Figure 3). Below is how the manifesto asks selected what-if questions:

> *I, çeyiz. I have an old, tired soul which has accompanied many women in the past. Today I am still alive, but a bit different. I am in a transformation, changing as women who are exchanging me are changing. I am crafted, bought, exchanged, shifted from one hand to the other, used, put aside, kept in drawers; while witnessing many stories, stories of women, stories of their society, and how the society is shaping them. Now, I am here to ask questions to whom would like to re-discover me, to know what I am, and what I am becoming. Here is my manifesto, for the change I am in, and for the change I bring, to whom prepares me, keeps me somewhere in their cabinets or will own me one day in the future: What if I am not a burden, an accumulation of useless artifacts, a must-do, but a joyful ritual to make you connect with your past, present, and future? Embed your stories into me, give me meaning. Leave your future messages and hopes inside me. I will for sure carry them to the next generation for a better future. What if I become the voice of women? What would you like to say to me? What would your message be for the others? What if I am not gender-biased anymore? Why does not a father prepare me for their children? Why am I not given to a son? What if I support women not only to decorate their homes but I also help them to be empowered in their society? What kind of support do women need today? Can I really help them? What if I am a seed of life, love, and humanity? What if I flourish in time and feed others? What if you do not craft me, but grow me in time? Slow and with care. What if I am not passing from a mother to a single daughter, but I become a big collective archive owned by everyone? Can I become a museum of women's solidarity? Last but not least, what if I disappear? Do you really need me? Can I exist also in an intangible way? Or have I already disappeared?*

To contain the textile manifesto, a wooden box was constructed symbolizing a prominent part of çeyiz rituals: the wedding chest (Yalcin Usal, 2010).

Yalcin Usal, S., *op. cit.*

Figure 3: Manifesto Hanging on a Wall

Museum of Çeyiz - A Collective Archive

A "Museum of çeyiz" was our second outcome which contains the present, past, and future çeyiz items, answering the question: what if çeyiz becomes "a collective archive owned by everyone?" This question led us to imagine a digital archive of women's çeyiz items that embed a story. This museum is a digital initiative and via a social media account, we started collecting photos and stories of çeyiz items from people by asking them the same question as we asked in our previous discussion groups: "What are your most liked/most disliked çeyiz items? And why?" The growing number of items both give us the chance to determine the similarities and disparities between women's bridal trousseaux and a range of transitions over the years. We collected them in a format of a card (Figure 4).

Future of Çeyiz - Çeyiz Hacking Kit

One of the insights we gathered from the museum of çeyiz One of the insights we gathered from the museum of çeyiz was the need of transforming the items and adapting them to today's lifestyles. For instance, some participants turned table clothes into decorative elements for their daily garments or transformed them into functional objects that can be used in the kitchen. Being inspired from these personal initiatives, we created a kit for hacking çeyiz to transform existing çeyiz items into new functions, forms, and appearances. In our research, we listened to stories of upcycling, reusing, and repurposing çeyiz items over and over. We also heard most women mentioning a phenomenon called chest stain (sandik lekesi in Turkish) which is caused because of being kept in chests for long periods of time and is impossible to remove. One of the hacks we proposed was covering these stains or making them more visible with embroidery (Figure 5). The stories from our discussion groups indicated an

Figure 4: Museum of çeyiz - cards

inclination towards mass-produced houseware items being preferred over crafted ones. Therefore, this kit is intended to allow women to refashion their mundane çeyiz items and personalize them with some easy techniques to give the outdated bridal trousseaux a more contemporary look and function.

Future of Çeyiz - Speculation Workshop

To generate future items for the museum, we conducted an online speculation workshop for which we use the çeyiz manifesto as a design trigger to create future scenarios about the ritual with an international group of people to open our discourse to a larger community. In the first part of the workshop, we explained what çeyiz is, how the items that belong to çeyiz are prepared. After that, the manifesto video was screened to start a discussion. At the same time, we opened the stage to our participants to share similar rituals that they know of or have in other cultures. These included seeds given to women as a heritage for their wedding, dowry given for both men and women, or gifting mythological figurines to the bride.

The internationality was a key aspect of the workshop to add different perspectives, since the çeyiz tradition has many similar forms among other countries, especially in the Mediterranean region and in Middle Eastern countries. During this workshop, the participants - after getting the notion of what çeyiz is and how it's used- imagined future scenarios for çeyiz with what-if questions posed in the çeyiz manifesto and designed possible artifacts/services that would exist in these scenarios. They discussed what if çeyiz transforms into a different form, meaning, or being, while the outcomes become the collective memory belongings in the "Museum of çeyiz". Participants first imagined a world that we would live in the future, then they created a

Coulton, P., Lindley, J.G., Sturdee, M., Stead, M. (2017). *Design fiction as world building*. In: Proceedings of Research through Design Conference 2017. UNSPECIFIED, GBR, 0-0.

Bowles, C. (2020). *Future Ethics*. Now Next press, UK.

Figure 5: Çeyiz Hacking Kit

speculative scenario. According to Coulton et al. (2017 p.5) "creating the world is the principal task of the designer when creating a design fiction". Speculation - moving in time for generating possible futures - becomes an opening for the transition between the existing and the desired, and even the non-desired. Therefore, the first activity was to describe the world we would live in and decide in which year we would be. The second task was to create a scenario of a çeyiz ritual based on the "what if" question and situated in the imagined future world. Then, the last task was to visualize these scenarios by doing quick sketches or using the collage technique while imagining an artifact that is part of the scenario. The imagined artifact acts as an anchor point to make the future scenario more tangible and understandable. These artifacts became a part of the archive cards of the museum of çeyiz.

Future of Çeyiz – Wisdom Gathering Platform

As we - the two authors- also participated in the speculation workshop, we have built a dystopian world in 2050 - working as a "powerful cautionary tale(s)" (Bowles, 2020, p. 27). Dependency on technology and the loss of materiality were our initial concerns in this future world. We started our speculation with some questions: Does marriage still exist? What if we adopt robots as children? Would çeyiz be prepared for a robot? Would it be a software? As a result, our future scenario was a digital archive that contains tacit knowledge about life, relationships, household, recipes, and childcare. Starting from this dystopian future scenario, we imagined an artifact like an AI-powered smart speaker decorated with hand-made lace to show the severe possible transformation of çeyiz that still keeps its decorative feature but adapts to the new technological developments

(Figure 6). After the workshop, we continued with the scenario of the digital archive and "backcasted" (Santer, 2019) this dystopian future into a possible and preferable form in the present. What if çeyiz becomes an online platform - not a tangible wooden chest containing crafted items to support a woman- but an intangible container of women's wisdom that is open to everyone? We decided to host this idea on an online platform in which women's avatars can interact to share their wisdom with the next generations (Figure 7). The platform becomes a place for kinship in which women can meet and exchange their knowledge -tacit and embodied- and support each other through this collective wisdom. However, it is also a reminder for us that technology might not be the answer to all social problems. Thus, we provide a "functional fiction [that] can pull new technological developments into imaginary but believable everyday situations so that we can explore possible consequences before they happen" (Dunne & Raby, 2013). In order to check the possible impacts of technologies, the Tarot cards of Tech (Artefact, 2017) tool that helps to find out the impacts of a technological idea by asking questions about scale, disruption, usage, equity, and access can be used. For instance, applying some cards to "the wisdom gathering platform", we can ask these critical questions: can the platform exclude anyone, and how can it be inclusive? Or can it delocalize çeyiz and bring other cultures to be part of it? Can it cause a total disappearance of çeyiz ritual that is connected to craft practices and informal economies? Or can it be used as an instrument to boost new craft practices and communities to emerge? The platform can be a place for "meaningful encounters" to give rise to "regeneration of communities" (Manzini, 2019, p. 26-27) for creating resilient futures for çeyiz ritual, empowering collective support, and generating new craft practices.

Figure 6: Speculation Workshop Outcome_ the mock-up of an AI-powered smart speaker connected to a collective digital archive of knowledge.

Santer, S. (2019). *The Reality Apex & The Four Lens Future Scenario Compass*. Retrieved on 30.11.2021 from: http://santer.com.au/the-reality-apex-the-four-lens-future-scenario-compass/

Santer, S. (2019). *Futures Thinking & Design Thinking*. Retrieved on 30.11.2021 from: https://futurehumanbydesign.com/2019/09/futures-thinking-and-design-thinking/

Dunne, A and Raby, F., *op. cit*.

Artefact (2017). *The Tarot Cards of Tech*. Retrieved on 23.11.2021 from: http://tarotcardsoftech.artefactgroup.com/

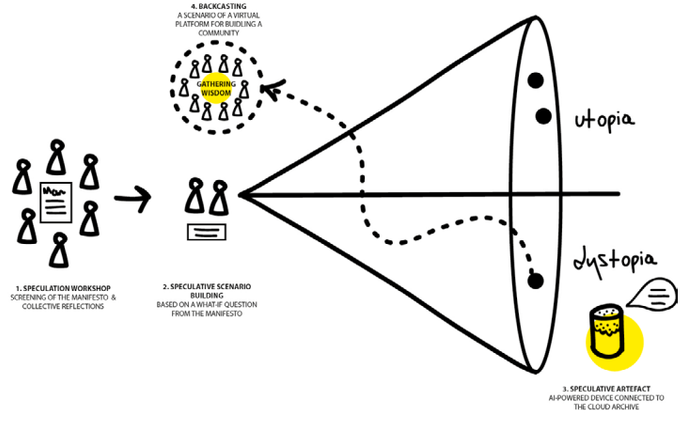
Manzini, E. (2019) *Politics of the Everyday*. Bloomsbury Publishing.

Escobar, A. (2018). *Designs for the Pluriverse Radical Interdependence, Autonomy, and the Making of Worlds*. Duke University Press.

Reflections

This paper addresses the results obtained from our research project and reflects on how a traditional ritual can be speculated to create more interconnected, resilient, and sustainable futures. Our findings show that a design process that is enriched by collective reflections can bring alternative visions for an ongoing social and cultural transition and show how we can "design for the pluriverse" (Escobar, 2018) to remake worlds to unlock their unsustainable knots. The paper draws on the research and design process in which speculation stretches the meaning, value, and function of a traditional ritual to shed light on an alternative direction of an already existing transformation. Artifacts, such as the manifesto, the museum of çeyiz, the çeyiz hacking kit and the AI powered speculative device serve as props to trigger critical reflections, gather multiple points of view, and speculate on possible futures of a traditional ritual that is entangled with societal issues. By envisioning a new form of this tradition, the entanglements can be unraveled by bringing critical reflections on women's kinship starting from a Turkish tradition and going beyond its situatedness. Therefore, the project provides a territory for transnational and trans-generational exchange through the speculation of a local tradition.

Figure 7: Generation of the "Gathering Wisdom" scenario during the speculative workshop (illustration adapted from Dunne & Raby' (2013) diagram of the future cone and Santer's (2019) diagram of "Comparison of time-scales and activities between Futures Thinking and Design Thinking processes".



Track 4
Design for Social Innovation, Sustainability & Circular Economy

Long Abstracts

DOMESTIC SPACE: CONNECTIONS AND RELATIONSHIPS IN CONTEMPORARY HOUSING AT THE TIME OF COVID-19

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Keywords
Affordable housing, Living space, Housing dimensional requirements, Crowding index

Introduction

The COVID-19 pandemic has forced the population to rethink the way of living and the approach to the living conditions, as well as the everyday way of living their own home and the domestic space. The pandemic has further exasperated the already present "desolate poverty" of the domestic space which characterises most of the Italian public housing heritage, which was erected in the second post-war building reconstruction.
The typological-functional-distributional model inherited from that period has responded to Italy's specific demographic demand of that time: lack of housing for the population, mainly composed of large households (on average with two parents and not less than three children, usually accompanied by a grandparent). This was a common and homogeneous demographic condition in the demand of housing for almost the entire Italian population. Therefore, the response was fairly uniform and homogeneous. Contextually, the freedom derived from the typological construction model induced by the application of reinforced concrete (hence the independent frame structure), saw its first experimentation applied to the economic and popular buildings for the enclosures of wall of totally prefabricated systems or mixed systems with the alternation of traditional wall and prefabricated elements. The solutions adopted, both the distributional-functional and the outer shells, were summarised within small operational manuals [Di Biagi, 2001] and were missing a contextualisation within the urban environment in which the buildings were located. All this has characterised the majority of the constructions in the peripheries of Italian cities, a model currently in severe crisis and undergoing a deep rethinking.
We find ourselves today before a crucial matter in the management of the "housing problem". The contemporary house requires the meeting of several and various demands and related needs.

To summarise some of the changes, we could identify among the needs the increase of the population lifespan and the consequent increase of people with functional disabilities. [Chiarantoni, 2017]; the diversification of the social needs, due to the demographic changes and consequent family changes; the differentiation of the world of work. This not only imposes a different pace of life, but usually leads to an unprecedented rate of commuters, which leads to some components of the family residing in another city for most of the week. [D'Alessandro & Raffo, 2011]. Furthermore, the all-Italian condition of leaving the nest in adult age creates the heavy discomfort of inadequate housing in terms of living space and the impossibility to meet the privacy needs; to which are sometimes added the hygienic conditions caused by the unsafety of the overcrowded housing. Lastly, in addition to all this, there are problems stemming from the climate change and the increasingly growing demand of higher performance energetic systems. The residential buildings considered represents a serious problem also and especially from the point of view of energy consumption point, both in summer and winter times.

Problem under study

The Paper begins from these premises and deals with the matter of the quality of the domestic space in the perspective of a renovation of the relevant public residential housing heritage existing in Italy. The Covid-19 pandemic has significantly reformulated the time and way of use not only of the dwelling, but also its spaces, the relations, and interconnections among them. The contemporary city, with its population and society, can be assimilated to a continuously evolving organism, subject to continuous changes due to the economic, social and space-time conditions of the places where the individuals who belong to them reside. The undisputed protagonist of the society is the family: habitual and privileged resident of our cities. As Giuseppina Sacco states [Sacco, 2002] the term family presumes a group of people living together, an aggregate which is formed, transforms, and divides itself giving birth to a familiar structure. From this, other familiar relations originate as well as the relationships that begin between groups that were once separated. It can be stated therefore that the “traditional” model of family, based on the spouses and the centrality of the children, has radically changed.
The starting point for the analysis of what was mentioned above are the demographic and economic changes of the Italian population and the consequences on the housing quality demands [Lodi Rizzini, 2013].

As stated by the European Housing and Health, in terms of living space, the dwelling should be large enough to comfortably accommodate people of different ages and should guarantee a sufficient space to meet the privacy needs of its occupiers [WHO Europe, 2007].
Hence, the main problem lays in the change of the demand of housing, which is not as homogeneous nor standardised as in the past in terms of functions, domestic spaces, and the users. There is an important circumstance associated to this: in order to design and develop the domestic space, it is necessary to understand the needs and wishes of its users. These, however, cannot easily imagine a response to their needs which is effectively innovative since they lack the competences which would allow them to find new solutions [Pirinen, A., & Tervo, A. 2020]. Studies on the human behaviour have found that the existing housing heritage mostly determines what is possible and therefore what is desirable by the laypersons [Clapham, 2005]. For this reason, the research is based on the construction of a more cogent quality of housing through strategies of action on the public residential housing in the Italian panorama, which include their maintenance by means of the readjustment of the existing building. This is a concept that can be summarised as Re-generate & Re- live. In this process the relationship among the spaces of the house and the external spaces takes a fundamental role.
In the Italian economic and popular buildings of the 70s in fact, the external spaces (such as balconies, porches, and spaces of outbuildings) have been neglected too often, becoming in some cases completely absent. Therefore, starting from a detailed analysis of the public building heritage, the idea at the basis is founded on building on the built, operating on existing building frameworks and avoiding further consumption of land and high production of waste material to be disposed.

Methods or procedures used

The study focuses on the analysis and the comparison between the standard of the Italian normative on housing (D.M. of the 5 July 1975) and the population living within a complex of economic popular buildings located in the city of Bari. The interest of the study is to detect the idiosyncrasies between the surface of the housing and the effective residents, highlighting the phenomenon of overcrowding in contrast with that of underuse of the house. The analysed data have been classified on spreadsheets, compared, and discussed through the statistical demographic analyses.
The collected data focus on the following fundamental points:

- living characteristics, based on the average size of the dwellings;
- characteristics of the building, connected to the building type;
- housing degradation, connected to the state of conservation of the building;
- demographic characteristics of the dwellers, divided by age, sex and relationship.

Following these, there is an analysis of:

- minimum and maximum size for the dwellings
- average living space per dweller
- overcrowding conditions for the dwelling
- under sizing conditions for the dwelling

The analysed data will be compared with those of the Italian normative. The data from the city of Bari were selected from the database of Bari City Council and are referred to a bank of data from 2010 to the following decade. The results obtained from the analysis of overcrowding will be compared with the European data from the Eurostat database of the European Commission. The latter regard the "statistics on the living conditions" and refer to the latest data available.
The limit of the data from Eurostat lays in the fact that they are aggregated by country and rarely report the figures for less extended geographical areas. If we focus the attention on the Italian case, we can state that the data are aggregated for the main Italian cities, in which all the urban data is assimilated with the sub-urban data, compromising the final data. The case study chosen is a compartment of public residential buildings of a quarter of the city of Bari.

Summary of the major findings or results of the study

Setting up the research in this way allows the acquisition of deep quantitative and qualitative knowledge of the typological-functional and typological building characteristics of the compartments of economic and popular buildings located in the peripheral areas of the city of Bari. The paper reports the analyses of a specific building compartment. The multiple aspects emerged, which relate the families (in a wider sense) and the consequent living condition, contextually involve the quality condition of the domestic space, its liveability, and the condition of energy consumption, which noticeably influences the dwelling's conditions of indoor wellbeing. Therefore, the relationship between the total surface of the dwelling and its users requires a thorough revisitation, both in terms of surface per person and in terms of relation among the domestic spaces. This is why we moved from thinking and designing solutions which would involve the remodulation of the dwellings surface in view of a social mix

(with dwellings surfaces varying between around 45,00 sqm to around 100,00 sqm) to the structuring of a different economy in the organisation of the domestic space. All this presupposes a deep renewal in the Italian normative apparatus. In fact, the number of components of a dwelling appears to be extremely variable in the lifespan of a family as for times, ages, and sex of its components. This circumstance imposes a series of analyses and reflections on the aggregability of the environments and the functions since, as it has been remarked many times, it is not always possible to find a unique solution while dealing with diversified users in terms of age, sex, and variability in time. Therefore, we try to define a possible relationship between the sizing of the environment and the relation between the various domestic spaces in function of possible family configurations.

Conclusions

As previously highlighted, over the last years, the awareness of the importance of the dwelling's quality has noticeably grown [WHO Housing and Health Guidelines, 2018]. The recent Covid-19 pandemic has highlighted the absolute need to rethink the living spaces focusing on some elements which would give a more adequate response to the contemporary way of living. The definition of an adequate domestic space to the current needs and to the rapid demographic changes is an extremely complex matter which is also intertwined with obsolete normative parameters. A possible solution proposed in the research illustrated in the paper is to provide case studies of technical building solutions able to overlap and integrate with the existing buildings and allowing the users to remain in their dwellings. Moreover, it is fundamental to have the right configuration or re-configuration of the external space. In the economic and popular buildings existing in the city of Bari, very often the limit between the domestic space and the external one (balconies or porches) is inexistent or insufficient. If present, it is abusively closed to widen the domestic surface and it is ascribed to variable functions.
These spaces need a significative reconfiguration with the aim of enriching the life of the domestic space and at the same time propose a more efficient energetic consumption of the buildings. In this direction, the reconfiguration of the threshold spaces of the house might propose solutions which are deeply rooted in a Mediterranean idea of dwelling.
These spaces, if well-articulated, can protect the dwelling from the winter cold and especially the summer heat (consequence of the climate change and main problem of the Mediterranean countries).

The transformative actions researched and only briefly mentioned in the paper (since it is still under study) are aimed at actions on the building heritage which do not involve as unique solution its total demolition.

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MARINE PLASTIC POLLUTION, DESIGN & CIRCULAR ECONOMY

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Keywords
Circular Economy, Marine plastic pollution, Ocean literacy, Sustainable consumption, Sustainable production

The specific objective of this study is to demonstrate the Blue Circular Postbranding Project's blue circular economy model, involving all essential parts. The focus will mainly be on the collectors, and transformers of the marine waste, that collaborate with the project, being crucial in the process of integrating a practice of blue circular economy in Portugal.
The Blue Circular pb Project (BCpbP), together with its partners, has a performance scheme that comprises the stages of marine garbage collection, transportation, dismantling, recycling and creation of new products. BCpbP is a pioneering blue circular economy initiative. On the one hand, we aim to tackle the excessive consumption of goods and reduce unnecessary waste while promoting awareness of environmental education with our partners. On the other, we wish to remove tons of end-of-life materials and products from the ocean, namely fishing nets and marine litter, to create new and sustainable products.
The type of investment deal we are considering are grants and angels' investments. BCpb project is an innovative approach in the country. We aim to set-up a robust supply chain that, through a wide variety of stakeholders, from fishermen and respective communities, to companies, research units and NGOs, can produce such yarn so that we come up with a truly unique product fully made in Portugal. Marine plastic pollution is an emerging environmental and socio-economic problem originated mainly from terrestrial sources that severely impacts the marine ecosystem and also undermines the livelihood of biodiversity. Plastics permeate the entire width and depth of seas and oceans, both close to well-developed coastal areas and in the most remote locations, decreasing the economic and social value of the oceans, especially in terms of fishing productivity and tourism (Fadeeva & Van Berkel, 2021). Marine can be defined as ""any persistent solid material, manufactured or processed that has been discarded, abandoned and eventually reaches the marine or coastal environment"" (Watkins et al., 2016).

Global plastic production in 2017 was about 335 million tons (Plastics Europe, 2018) and 2014 estimates predict a doubling of global plastic production in 20 years (Ellen MacArthur Foundation, 2016). Marine plastic pollution has consequences on the environment and biodiversity, as well as on industries such as tourism, shipping, and fishing, and represents a potential risk to food security and human health (Barboza et al., 2018).
The 2030 Agenda for Sustainable Development galvanized the unanimous global commitment to address the unsustainable use of plastic and MPP. Sustainable Development Goal (SDG) 14, Life Under Water, perseveres to conserve and sustainably use the oceans, seas, and marine resources for sustainable development. Some of the guidelines included in this objective 14 are the prevention and reduction of marine litter; limiting the impact of fishing on the marine environment and adapting fishing to the protection of species; promoting the protection, restoration, and sustainable management of marine and coastal ecosystems, as well as marine biodiversity; foster the local development of coastal communities; increase scientific knowledge, develop research and marine technology capacities, between others. The goal 14.1 deals specifically with marine litter by 2025: preventing and significantly reducing marine pollution of all types, in particular, from terrestrial activities, including marine debris and pollution of nutrients.
With regard to objective number 12, it aims at sustainable production and consumption and comprises numerous orientations, among which, the development of the circular economy with a focus on dematerialization, collaborative economy and sustainable consumption, product design, efficient use and enhancement of resources; the change in production and consumption models; the increase in global and sectorial collection, recycling and recovery rates for the different materials that make up waste; the promotion of public, ecological and sustainable purchasing practices, among others.
A circular economy can be defined as an economic model that aims at the efficient use of resources by minimizing waste, which strives for a long-term value retention, based on reducing the need for primary resources, and producing products within environmental protection limits. A circular economy model has the potential to lead to sustainable development, while decoupling economic growth from the negative consequences of resource depletion and environmental degradation (Morseletto, 2020).
The European Union's Circular Economy Action Plan (European Commission, 2018) commits the European Commission to help reduce the impacts of marine litter, while increasing the value of materials in the EU economy.

A future Strategy on ""Plastics in the Circular Economy"" is expected to become one of the main carriers for dealing with marine litter in the EU (Brink et al., 2016), using and complying with the SDGs, namely numbers 12 and 14.
Portugal is a country with a long maritime tradition and with a continuous process of extension of its continental shelf, however, in order to guarantee the sustainability of the oceans, it is necessary to implement mechanisms for cleaning the coast, as well as, the reuse of the collected materials, giving them a new purpose. BCpbP aims to remove fishing nets and marine litter from the ocean with the support of the fishermen, local authorities & associations. Our project woks in collaboration with the ""Fishing for a sea without litter"" project, from the national authority on port infrastructures (Docapesca Portos & Lotas) and the non-profit/non-governmental organisation Portuguese Association of Marine Debris (APLM). Docapesca provides bins to fishermen for their boats. The materials are collected and brought to land. Waste will be analyzed, cleaned, and separated by our partners, who are specialists in waste management and plastics. Fishing nets and plastics will be sent to our industrial partner, which will then be used to produce new products.
BCpbP's goal is to set-up a robust supply chain that is capable of (1) creating value from waste while facing the ocean as an opportunity, and (2) promoting sustainable Design alternatives to current consumption patterns, while promoting awareness on the sustainability of the oceans. The project is in line with the 'European Strategy for Plastics in a Circular Economy', which aims to transform the way plastic products are designed, produced, used, and recycled in the EU.
We believe that litter is a Design error and that linear models will be replaced by circular economy initiatives, particularly Cradle to Cradle. We are strongly committed to conscious consumption and deeply motivated to push recycling and especially upcycling initiatives forward, so that fewer resources are used. BCpbP sees waste both as a valuable opportunity for the socio-economic development of poorer communities along the coastline, and as an eco-solution to the massive issue of marine pollution.
Blue Circular Postbranding Project started as a pilot-project in Ericeira, we already expanded the project to Cascais, and hopefully in other locations, in order to scale up by collecting more waste and reaching larger audiences. The project covers different knowledge fields, from Design to Marketing & Communication to Industrial Engineering and Textile Manufacturing. It is guided by scientific standards towards innovative, sustainable and commercially viable social and environmental solutions.

We are committed to reaching a solution that, through R&D, is capable of transforming disposable materials into recycled yarn, without lowering both high- quality manufacturing standards and aesthetics.
BCpbP's products will surely fill a gap in the market as there is no such initiative in Portugal. As soon as the yarn is produced, we will be able to sell our yarn to our competitors, as we will invest greatly in the label ""made in Portugal"", so that consumers choose to buy products fully made in the country for a similar price. In addition, we will be able to advance our own products as we already have the much- needed materials.
The project is at a pre-commercial phase. We have received funding by A2S, a local organization funding sustainable development programs, and MAR2020, though it is only for low-scale operational costs. As the project and the beneficiary are aware of the importance of disseminating the results, some tasks to be carried out will be on the agenda that will respond to this objective.
The main outputs of our project are both scientific and commercial. The scientific outputs will be in maritime affairs and will promote R&D in ocean-related areas, such as: ocean literacy, best practices' handbook, BCORP certification, blue circular economy workshops, academic conferences on the economy of the sea, scientific articles in the fields of Design, Textile engineering, etc. We aim to promote knowledge sharing in academia on environmental & ocean-related issues and sustainable practices in order to reach sound scientific results and relevant tested hypothesis, while sharing the results with local communities and the general public through mass media. Through our network of colleagues and academic institutions we will be able to challenge current consumption patterns, promote the conservation of the oceans and the cultural heritage of the Portuguese communities along the coastline.
In addition, we will set-up a laboratory so that collected materials are studied. Once our supply-chain is established (i.e. from recovering materials to separating, converting and manufacturing them, to designing new products), and our yarn made from marine debris is consistent, we will create a social and environmentally conscious start-up in order to commercialize our products: shoes, boots and fishing utensils for fishermen, surfing articles, etc.
In order to be able to respond to the amount of the collected marine waste, it is necessary that there are brands that can manage the sustainable consumption of a technology that transforms disposable materials into reusable raw material, without renouncing to quality and design.

Zouri is a Portuguese eco-vegan footwear brand that arose from the desire to make an active contribution to environmental protection, namely to the problem of plastics in the oceans, having therefore showed interest to join forces with the Blue Circular pb, assisting in the reception, dismantling, recycling and producing new products, in this case, shoes.
Our acquired knowledge in Marketing and Communication will let us reach out to different targets through multiple strategies (B2C, B2B – NGOs, industries, etc.; others – digital marketing). The SOSTAC methodology will allow to develop the cardinal points of the communication proposal of this project with the purpose of a call up to this environmental cause.
In short, the synthesis of promoting this cooperation between entities and the joining of efforts, allow a better understanding of the problematic theme of plastics in the ocean and the desired mitigation of them. Furthermore, this union is also the starting point for the blue circular economy approach, which is absolutely necessary to resolve the issue of excessive consumption of goods.

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CRITICAL TRANSITION. MERGING APPROACHES TOWARD SUSTAINABILITY

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Design for sustainability

We live in times of the "great transition" (Manzini, 2015, p. 2) – Western societies are beginning to realize that there is need for change in order to save the planet and maintain our well-being. However, despite the raising societal awareness and even actual transformations on the ground, design professionals largely avoid considering design as an agent capable of contributing to this change, and instead continue to support unrestrained consumerism (Fry, 2017, p. 99). There is no consensus on pre-requisites of sustainability and respectively – on how to design sustainably. The most popular definition in which sustainability is linked to economic growth (Brundtland & Khalid, 1987, p. 54) is criticised because of that, but also because it is anthropocentric, and because it fails to recognize the current inequality in wealth and general living conditions in its claims about the future generations (Fry, 2009, p. 42). With the intention to seek ways in which design can contribute to systemic and definitive change towards sustainment, a new approach to designing was conceived in 2015 by a group of likeminded scholars at the School of Design, Carnegy Mellon University. This new approach, named Transition Design, acknowledges that we live in transitional times, and believed that design has a key role to play in these transitions (Irwin, Kossoff, & Tonkinwise, 2015, p. 4). It is seen as four interrelated and mutually reinforcing areas of knowledge, action and self-reflection: visions; theories of change; mindset & posture; and new ways of designing. Another, more established design approach, called Critical design, emerged in the 1990's at the Royal College of Art, London. Although not intentionally related to sustainment, it also aims at challenging narrow assumptions and preconceptions, and disrupting the status-quo. By use of fictional and provocative design proposals in form of objects and their use scenarios Critical designers attempt to raise awareness, expose bias and provoke discussions on the role products play in everyday life (Raby, 2008, p. 94).

Keywords
Critical design, Transition design, Change, Sustainability, Mindset

Although seemingly different, these two design strands present meaningful overlaps. Transition design framework proposes Critical design as a tool for visioning; however, it is possible to identify some other similarities, too. This paper exposes how both seek for alternative values and imagine other ways of living in this world. Both also aim at acknowledging the existing societal complexity and diversity without being judgemental and biased. Further, there are also similarities in the mindset and posture that Transition and Critical designers assume. They remain open to ambiguities and uncertainties of real-world situations, embrace 'strangeness', and move away from seeing people as obedient consumers. This allows to propose that merging Transition design and Critical design approaches might increase their efficiency in inducing change.

Learning for and through design

Critical design was largely conceived and developed in an educational 'safe space' – open for experimentation and free from market constraints. Its products are recognized as providing new knowledge 'in themselves' – "a kind of tacit knowledge creative professionals possess which cannot be separated from their perception, judgement, and skill" (Seago & Dunne, 1999, p. 16). Critical designers seek for new ways to expand design's innovative potential, even if it entails unorthodox methodology, such as 'design-centred' approach (as opposed to 'user-centred'), "as a way to help potential users see possibilities beyond those they already know" (Dunne & Gaver, 1997, p. 362). Critical practices are being used to build intellectual basis for design, and to promote its theoretical development through and from within design practice (Mazé & Redström, 2009, p. 28). If situated in educational context, Critical design approach gives future designers the opportunity to consider our world through different paradigms.

Future visions

Transition design framework already includes indications to Critical design approaches as possible tools for 'Visioning' – one of the four areas of knowledge, action and self-reflection (Irwin et al., 2015, p. 8). Scholars behind the Transition design conception are convinced that uniting different parties under shared future lifestyle visions can be a much more powerful motive for change than the traditional design approaches, which would focus on forecasting possible technological solutions (Irwin & Kossoff, 2017, p. 10). Another kind of visions that are suggested as potentially useful and stimulating are the ambiguous or even the clearly dystopian Critical design proposals: they "can serve

as measures against which to evaluate design moves" (Irwin et al., 2015, p. 8); and as "cautionary tales warning us of what might lay ahead if we are not careful" (Dunne & Raby, 2013, p. 73). Critical design also offers space for debate about how things might be fundamentally different. Critical artefacts help to suspend disbelief, as they are grounded in reality – in how people are and behave, – but they propose other values, which are communicated through these objects. This approach is accordingly called value fiction (Dunne & Raby, 2001, p. 63), and it has been acknowledged as potentially useful in shaping policy planning, market economies and cultural imaginaries, by means of preferences, norms and ideals embedded in these scenarios.

Alternative values

The objective of the Transition design visions is to suggest alternative values, in order to fundamentally challenge existing paradigms, and envision new ones (Irwin, 2015, p. 231). It is clear that technologies will not 'save the world,' and hence it can be more productive to address our way of being in this world, our values and expectations, instead. But this is also one of the greatest challenges, as we all, including designers, are strongly conditioned by the dominant paradigm, to the point that we are not even aware of that. Our values are also shaped by our personal and collective histories, memories and experiences, and this context influences our understanding of reasonable and fair expectations.

This resonates strongly with the basic principles of Critical design, which is aimed at challenging dominant ideologies: it acknowledges that all design is ideological unless the designer deliberately takes a critical stance towards the status quo. Critical design therefore is aimed at providing critique of the dominant ideologies and exploring alternative social, cultural, technical or economic values (Dunne & Raby, 2001, p. 58). Furthermore, it is an emancipatory act, rather than ideological, because Critical designers "attempt to liberate themselves from all ideologies, as these impede seeing beyond what currently exists, in the conviction that this is the only possible, viable or right way to be" (Jakobsone, 2019, p. 566). Critical design poses critique of design that enforces and works 'in service' of any imposed ideology (Mazé & Redström, 2009, p. 30). Designers practice Critical design as means of developing a personal understanding (Malpass, 2012, p. 163). The ideological awareness, along with its emphasized focus on futures have been recognized as some of the most valuable qualities of this practice, which would benefit considerably any kind of design approach if adopted as part of a critical mindset (Jakobsone, 2017, p. S4254).

Critical design proposals offer alternatives to the current way of being, thus allowing us to relativize the present reality and consequently to think more deliberately about our own existence and agency (Jakobsone, 2019, p. 566). All that suggests that Critical design can be proposed as a method or tool to be implemented in the framework of the Transition design approach, both for learning to reconsider one's own values and place in this world, and for creating compelling alternatives for public engagement.

Mindset and posture

One of the four elements in the Transition design framework is named 'Mindset and Posture'. It "calls for self-reflection and a new way of 'being' in the world" (Irwin, 2015, p. 235). This excerpt shows strong similarities with what was discussed before, but also with Critical design literature in general, which tackles extensively the same issues, and urges designers to adopt a critical mindset. The dominant mindset (as opposed to the new mindset of Transition design approach) is described as striving for predictability and control. It views chaos as problematic and attempts to 'fix' it by design solutions that are pre-conceived and implemented in a top-down manner. Ambiguity and uncertainty are also considered undesirable and seen as a problem to be addressed. In contrast, the new mindset or worldview is intended to remain open and willing to acknowledge that the perceived chaos might also be an essential characteristic of the system and contain 'seeds' for the solution. It also needs to embrace ambiguity and uncertainty as possible sources of new ideas and ways of acting (Irwin, 2015, p. 236).

Similar attitude is present also in Critical design, which is defined as "a response to the fact that design views its users and consumers as obedient, largely uniform, and predictable whereas nearly every other area of culture acknowledges people as complicated, contradictory and even neurotic" (Raby, 2008, p. 95). Ambiguity in critical practices is considered to have advantages: it allows designers to engage users without constraining how they might respond and to enable them to find their own interpretations (Gaver, Beaver, & Benford, 2003, p. 233). Critical designers conceive fictional products that embody "understanding of the consumer/user as a complex existential being", and that accept "how people really are rather that how they are supposed to be" (Dunne & Raby, n.d.).

Considering the aforementioned, Critical design's mindset and approach is very similar to that of the Transition design, and a designer who has exercised the former could relatively easily embark the latter, contributing to the 'great transition'.

Goals

Transition design and Critical design both have approaches that are fundamentally different from those of the traditional design practices. Instead of studying the context in order to offer the best solution within the given situation, they are set to change the society's attitude to the current state of affairs. Central to the Transition design is the notion of 'wicked problems' – ill-defined societal problems that rely upon elusive political judgement for solution (Rittel & Webber, 1973, p. 160). Although this concept has been known already since the 1970's, design and design education has not been particularly engaged in understanding these problems, nor the dynamics of changes within complex systems in general (Irwin, 2015, p. 242). As a result, designers fail to grasp the extreme interconnectedness of smaller problems, which they approach as isolated cases, eventually causing much more serious problems elsewhere.

Meadows's study "Leverage Points: Places to Intervene in a System" (1999) provides a simplified and useful insight into how systems function and how can changes in systems be induced. According to this study, one of the most effective ways to change the system is to address its goals. However, according to Rittel and Webber, the scholars behind the concept of wicked problems, setting goals can be one of the most challenging tasks of planning (Rittel & Webber, 1973, p. 157). Wicked problems involve whole societies, and different stakeholders often have conflicting agendas – solution to someone's problem causes new problem to someone else. Therefore, participative design processes are necessary to find compromises and to develop visions that work for everyone (Irwin & Kossoff, 2017, p. 9-10).

As discussed in the previous sections, visioning is an integral part of Critical design, and the purpose of these visions is the provocation and the debate it initiates. In contrast, Transition design aims at setting common goals for societies that are facing wicked problems and it implements visions in formulating these goals. It is thus possible to suggest that the two approaches might benefit from each other also in this higher goal setting endeavour.

Critical designers have tested and analysed tools and methods for creating plausible and engaging visions of alternative worlds for almost three decades now. These methods have been successfully implemented also in participatory design processes, in combination with role-play, fore- and backcasting. It can hence be concluded that Critical design approach could become an instrumental part of Transition design during the participative engagement with stakeholders, whether it is to discuss possible futures or to investigate their values and beliefs.

Both applications could add another critical dimension to the process of goal-finding.

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BEHAVIORAL PACKAGING: A BRIDGING DEFINITION BETWEEN DESIGN FOR SUSTAINABILITY AND DESIGN FOR WELL-BEING

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This paper provides a critical overview of Design for Sustainability (D4S) and Design for Well-Being practices as, today, sustainability, human behavior, and well-being are inextricably bound. The research was conducted as part of the Master Degree thesis in Industrial Design at the Politecnico di Bari, discussed in 2020, during the early first Covid-19 pandemic period.
Design for Well-Being can be defined as an integrative and interdisciplinary practice that operates in a complex environment of different and, in many cases, contrasting professional values, methods, roles, and responsibilities. When we talk about Well-Being, we refer to a central value in the design of technological artifacts, especially in the design of consumer products. Projects, in this perspective, must become socially advantageous, by making collaboration with technical, commercial, and administrative partners a key requirement for conscious design. On a more practical and operational level, designers (and industrial designers, in particular) have a potentially important role in developing and designing more sustainable products. Furthermore, designing for wellness and sustainability can engage a variety of sustainable behaviors from the end-user.
Design for Sustainability (D4S), on the other hand, is an eco-design concept that has evolved to include both the social and economic elements of production. It integrates the three pillars of sustainability - people, profit and planet - and meets consumer needs in a more holistic and sustainable way. Companies that incorporate D4S into long-term product innovation strategies strive to alleviate negative environmental, social and economic impacts along a product's supply chain and through its life cycle. From this perspective, design is not just about giving shape to something, but it is a tool for transformation that must consider social and ethical points of view, maturing an ecological conscience.
The research methodology is that of Critical Design, investigating the impact and possible consequences of new technologies and policies, as well as social and environmental trends on a global level, and the definition of new goals and areas of interest for designers. The objective is to provide to the various players in the supply chain useful ideas and indications for an innovation that is focused, in a synergic way, on economic, environmental, and social aspects aimed at stimulating the social sensibility of all citizens.
The case study concerns the design of a kit for the self-production of cosmetics with a sustainable approach. In particular, the term ""self-production"" designates multiple activities based on individual work without the use of machines - even the simplest - using their own labor and continuously acquiring new knowledge and new skills. Thus, users experience what they make and they are no longer just players in the purchasing process, but they become the last key link in the production chain.
The need of returning to ancient ways for satisfying needs related to survival is due to the fact that technological development, the increasing use of machines to automate even the simplest operations and, above all, the unlimited use of fossil fuels are drastically damaging the biological mechanisms of plants and animals, the climate and the health status of entire populations. From this point of view, it is necessary to understand the essential role that the philosophy of self-production can have immediately, by educating people to use only the objects that are strictly necessary and introducing the concept of ""limit"" towards the planet, which the capitalist system cannot actually respect. The process of self-production concerns the cosmetic product, as the cosmetic industry is one of the significant economic fields that has attracted a wide range of players due to the rapid growth rate. However, only a small percentage of companies use sustainable packaging.
The research aims to explore the heterogeneous state of the art, ranging from kit design to Do-It-Yourself (DIY) cosmetics, to bio-based materials and plant-based packaging. The tools used are, in summary, the analytical study of sources and technical data, the cosmetic market research, combined with bibliographic research in both scientific and humanistic domains to support the design hypotheses.
The activities were supported by a Pharmaceutical Company (research partner), with the aim of developing a concept of bio-sustainable packaging to combine the design of materials to human behavior in the context of recycling. The research objectives are twofold. From the entrepreneurial point of view, the objective is to make company the reference point for DIY cosmetics with its sustainable philosophy and the quality of raw materials.

Keywords
design for sustainability, design for well-being, behavioral packaging, diy cosmetics, product design

The second objective concerns the intention to change the way we interact with the packaging product. As a ""container"" of elements, it can be a resource at all levels, not only because we can recycle it but also because we can replant it. In this way, we would give back to the environment a part of what has been taken away and we would simplify the life cycle of the product. From this point of view, packaging becomes not only the distinctive element of the company compared to its competitors but, above all, it produces conscious purchasing behavior, educating citizens about good environmental standards and respect for the environment.
Promoting a change in behavior towards sustainability by acting through materials in product design is a virtuous objective. In addition, the impact of materials for sustainability may depend on the usage phase of consumers, whose responsible behavior becomes a necessary condition towards the systemic circularity that makes materials effectively sustainable. This social action is made possible by the use of packaging that we define as ""behavioral"". In fact, sensory, aesthetic, and functional attributes, can guide users in the correct use and recycling.
Since there is no well-established literature that draws a connection between D4S and Design for Well-Being, the research within this thesis explores the integration of these two disciplines at an ""early stage"". Despite the behavioral packaging concept, the concept testing and development were severely limited by Covid-19 and the impossibility to test the material hypothesized at the laboratory level. The only experimentation carried out concerned the extraction of natural dyes from vegetable waste, in a domestic environment, to demonstrate how dyeing scrap cardboard can be done through this technique.
Thus, product culture, generally considered a fundamental means for economic growth, sustainable development, and business competitiveness, incrementally represents an intangible capital, part of the products, production processes, and consumption, mainly due to the intellectual activity of people and the creativity of designers.

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SUSTAINABLE DEVELOPMENT GOALS ENABLED BY ADDITIVE MANUFACTURING: A DESIGN PERSPECTIVE

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Additive Manufacturing, 3D Printing, Design for Sustainability, Circular Economy, Sustainable Development Goals (SDGs)

Nowadays, human activities strongly affect the global environment at different levels and, consequently, the future of the planet. Due to the noticeable impact of the human-induced changes, the current geological era has been renamed the "Anthropocene" (Lewis & Maslin, 2015).
One warning alarm is represented by the increase of the material output from human activities, namely the "anthropogenic mass", which will exceed the living mass present on Earth in the next few years (Elhacham et al., 2020). It means that new models of sustainable production and consumption have to be investigated in the short and mid-term since the current exploitation of natural resources is overcoming the real possibilities of the planet. For these reasons, the concepts of sustainability, sustainable development, and circular economy have been assuming a crucial role for a broader audience of stakeholders that aim to reach the transition toward more sustainable models such as industries, researchers, and policy-makers (Korhonen et al., 2018; Reike et al., 2018; Sauvé et al., 2016). In particular, new sustainable practices and initiatives have been encouraged and implemented in the last years. In 2015, the United Nations (UN) defined 17 Sustainable Development Goals (SDGs) to be achieved by 2030. These goals were meant to facilitate the transition toward more sustainable paradigms from an integrated perspective that involves the environmental, social, and economic dimensions (Stockholm Resilience Centre SRC, 2017; United Nations, 2015).
Within this context, the design discipline represents a key aspect of facilitating the sustainable transition. In particular, the research area of Design for Sustainability aims to increase the awareness of the new generation of designers on these topics, developing new connections and transdisciplinary tools for the practitioners (Camocho et al., 2018; Gazıulusoy & Erdoğan ÖztekıN, 2018). At the same time, digital technologies have shown the potential to significantly contribute to this transition

and the achievement of the SDGs (Dantas et al., 2021; Mohammed Ali Berawi, 2019; Schroeder et al., 2019). In particular, Additive Manufacturing (AM), also known as 3D printing, seems to foster the development of new strategies that involve sustainability and circular economy since its use gradually changed. 3D printing is increasingly considered a proper process available for the users rather than a prototyping tool for generating new products (Agrawal & S., 2019; Attaran, 2017; Despeisse et al., 2017; Dreessen et al., 2016; Rayna & Striukova, 2016).
Despite this current situation, the role of AM in the achievement of the SDGs has not been clearly defined, especially considering the field of Design for Sustainability. Only a few works focused on the potentials represented by AM at the intersection with design and circular economy (Diegel et al., 2010; Sauerwein et al., 2019). From literature, the development and the use of new materials also influence the transition toward more sustainable models of production and consumption. New hybrid practices and professional figures have been emerging to implement new sustainable models, namely the Do-It-Yourself (DIY) materials approach and the material designers, respectively (Clèries & Rognoli, 2021; Rognoli et al., 2015). In the light of the above, new synergies can be detected at the intersection of design, materials, and AM for new circular economy models (Romani et al., 2021), but there is no clear evidence of their contribution to the achievement of the SDGs.
This paper focuses on the interconnection between AM and design for sustainability for the transition toward more sustainable ways of living from an environmental, social, and economic point of view. In particular, the goal is to review and examine the role of accessible AM technologies in achieving the 17 United Nations (UN) Sustainable Development Goals (SDGs). Afterward, it also detects the main aspects of AM technologies related to the SDGs through the analysis of the most relevant case studies from the practical context.
This paper addresses the following three Research Questions (RQs): (i) How can accessible and low-cost AM technologies foster the SDGs?; (ii) Which are the main aspects related to AM that contribute to achieving these SDGs?; and (iii) Which is the role of design in this sustainable transition enabled by accessible and low-cost AM technologies?
First, a preliminary literature review was conducted on Scopus to better understand the theoretical framework related to the interconnection between AM and design for sustainability. The 17 UN SDGs were then analyzed and selected, focusing on the specific targets and indicators that AM can influence. These two steps were also helpful in defining 8 key aspects related to AM

that mainly contribute to SDGs achievement (explained in the paragraph hereinafter). More in detail, these key concepts can be defined as transdisciplinary aspects where AM plays a crucial role in the practical transition toward more sustainable models. Afterward, a deeper analysis was done by selecting the most relevant case studies from the practical contexts from 2015 to 2021, which means from the designers and practitioners ongoing projects and activities. To this end, the main repositories and blogs related to design practice and 3D printing technologies were searched (i.e. 3dprint.com; 3dprintingindustry.com; dezeen.com; designboom.com;). After a first screening based on the 8 key aspects, a deeper analysis was performed by checking the completeness of the information on the websites of the specific case study. The 17 UN SDGs, the 8 key aspects and the selected case studies were then described and combined in order to create three different matrixes for the data analysis. In particular, these matrixes aim to underline the interconnections between:
1. The 17 UN SDGs and the 8 key aspects.
2. The 17 UN SDGs and the selected case studies.
3. The 8 key aspects and the selected case studies.
In the end, these results were discussed to address the RQs considering the three dimensions of sustainable development, and some future perspectives were briefly depicted.
According to the analysis, accessible AM technologies can be linked with the UN SDGs, especially considering the activities related to the design practice. As a matter of fact, a possible interconnection with AM was found for 15 of the 17 SDGs: SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 10 (Reduced Inequalities), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life below Water), SDG 15 (Life on Land), and SDG 17 (Partnerships for the Goals). In particular, the extrusion-based AM seems to be more used than the other 3d printing processes to create new design projects and strategies for achieving the SDGs, i.e. some FFF (Fused Filament Fabrication, also known as Fused Deposition Modeling) printers (Suárez & Domínguez, 2020). This category ("Material "Extrusion" AM) is based on the extrusion of a specific material through a nozzle that selectively reproduces the desired shape layer-by-layer (ASTM International, 2015). Its spread in the sustainable transition can be related to its capability to foster new DIY and bottom-up initiatives from local

scales and communities, the reduced costs compared to other AM technologies, the possibility to use local resources for new closed loops, and the implementation of new circular economy strategies. Despite other projects involving different AM technologies linked with the SDGs, this paper focuses on the accessible and low-cost extrusion-based AM since its potential can be related to a more significant number of SDGs.

In detail, 8 key aspects were detected as practical interconnections toward more sustainable models, which means: (i) Democratization of technology, open innovation, and frugal innovation (Albert, 2019; Boisseau et al., 2018; Gibson & Shukla, 2016); (ii) Personal Fabrication and Do-It-Yourself (DIY) practices (Rayna & Striukova, 2016; Rognoli et al., 2015); (iii) Distributed Manufacturing, local scales, and communities; (iv) Assistive Technology, Bioprinting, and Medicine (Buehler et al., 2015); (v) Mass Customization (Da Silveira et al., 2001; Mourtzis, 2018); (vi) the spread of Fablabs and Makerspaces (Prendeville et al., 2016); (vii) Circular Economy enabled by AM (Recycling, Reuse, Repair, Repurpose) (Romani et al., 2021), and (viii) Ecosystems restoration and preservation ecosystems through AM.

These aspects were then linked with the selected 15 SDGs considering the three dimensions of sustainable development, namely the environmental (Biosphere), social (Society), and economic (Economy) aspects (Stockholm Resilience Centre SRC, 2017). These interconnections were also explained through the selected case studies. In short, they can be mainly linked as it follows:

1. Democratization of technology, open innovation, and frugal innovation with the biosphere (SDG 13 and 15), the society (SDG 1, 2, 3, 4, 5, and 11), the economy (SDG 8, 9, 10, and 12), and SDG 17.
2. Personal Fabrication and Do-It-Yourself (DIY) practices with the biosphere (SDG 13), the society (SDG 1, 3, 4, 5, and 11), and the economy (SDG 8, 10, and 12).
3. Distributed Manufacturing, local scales, and communities with the biosphere (SDG 6, 13, 14, and 15), the society (SDG 1, 3, and 11), and the economy (SDG 8, 9, and 12).
4. Assistive Technology, Bioprinting, and Medicine with the society (SDG 3);
5. Mass Customization with the society (SDG 3, SDG 11) and the economy (SDG 10).
6. The spread of Fablabs and Makerspaces with the society (SDG 4, and 11), the economy (SDG 8, and 12), and SDG 17.
7. Circular Economy enabled by AM (Recycling, Reuse, Repair, Repurpose) with the biosphere (SDG 6, 13, 14, and 15), the society (SDG 11), and the economy (SDG 8, 9, and 12).

8. Ecosystems restoration and preservation through AM with the biosphere (SDG 6, 14, and 15).

To sum up, this paper aimed to connect AM and the design discipline considering the environmental, social and economic aspects of sustainability for new models of living. This review paper is particularly meant to link the 17 UN SDGs and AM through the lenses of Design for Sustainability discipline, focusing on the roles of design and AM. Therefore, the main aspects of AM technologies and connections with the SDGs were detected thanks to the review of the most relevant case studies searched within the design practice. Accessible AM technologies can stimulate the development of a holistic approach to accomplish the majority of the UN SDGs, giving a concrete contribution to the transition toward more sustainable models of living. This can be done by defining several strategies based on the combination of the different key aspects explained before. To this end, there is an increasing interest in AM technologies such as the extrusion-based processes since they may be seen as accessible enablers for new projects and bottom-up or DIY initiatives, especially for local communities and developing countries. Furthermore, a significant role is represented by the development of new materials, which allows new strategies based on the recycling and reuse of waste and local resources for AM. Within this general context, designers can be considered facilitators who take advantage of AM only "on-demand", which means just when and where needed. For these reasons, AM can be seen as a tool to foster a behavioral change toward more sustainable ways of living. Although some UN SDGs show more synergies with AM, other transdisciplinary strategies may be developed in the future to achieve all the SDGs, including SDG 7 (Affordable and Clean Energy) and SDG 16 (Peace, Justice and Strong Institutions). Moreover, they would be used not only by the design practitioners but also by all the stakeholders actively involved in achieving the goals and fostering the sustainable transition, among which the end-users for self-productions and cocreation activities.

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Track 5
Design for Digital Interactions And Communication

Track 5
Design for Digital Interactions And Communication

Phygital: A tool for the development of tradi-tional craftsmanship between Egypt and Italy.

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This research is a part of Phd project, it aims to identify ways to transfer the material and tangible culture of traditional crafts from one place to another, and to achieve that has become an increasing necessity, especially now after the spread of the epidemic and the consequent restrictions on movement and travel, which led us to increasingly combine the tangible and the intangible Concrete through physical and digital integra-tion. In the so-called (Phygital) where the user or receiver can experience even from a distance, different thoughts and feelings are expressed through digital devices, even from a distance, moreover, this study also mainly aims to exploit developments in the field of design And production in one of the world's most im-portant countries in this field in Italy to develop the materials used in the traditional crafts of Egypt and the forms used to identify and evaluate new materials including design tools and digital fabrication. Where the research aims to develop the topic at a theoretical level and also to develop it at a prototype level where a comprehensive digital tool is provided (rich with additional contents such as videos in which interactions with materials are visualized at a perceptual level, images and stories of the main characters, specific information on material samples, and so on).
This research project proposes a contemporary reinterpretation of the languages and memory of the Egyptian tradition in the field of material culture (particularly the focus on traditional materials and techniques), through the use of digital fabrication techniques. Where the method identified is "phygital", which takes place through the interaction of immaterial, physical and digital culture. In this context, the theme of the territories of the Mediterranean countries takes a central role in the changing world of globali-zation, providing a range of opportunities to experiment with the use of new digital technologies, and local craftsmanship can be reconnected with design. By finding a new way of transmitting culture and verifying the point of view on a theoretical level, finding a way to integrate and compare local and global traditions, traditions, innovation, craftsmanship and design.

Keywords *Phygital, Traditional Craft, Cultural exchange, Digital Experience.*

Introduction

In Egypt, the problems in traditional crafts appeared many years ago while it has more than 28 different crafts in that filed but it is suffering from that repetition and lack of development. and the Egyptian community full of these products and this traditional art and craft now is trying to survive and one of the survival, the solution is search for new tools to develop these crafts, on the material, process beside the collaborative with the designers and also After years of strong closure, we also see today the opening of borders by design towards the artisan world.
Which today appears to be essential given the potential wealth and memory, source of stimuli and resources useful for renewal and reconversion of the notions of tradition, territory and localism, still preserved in it and this is all the more significant from the moment that globalization imposes us as an exclusive value not so much knowing where objects were created, but for who they are carried out. A change in the supply chain, material and intellectual, which therefore affects not only the processes of "know-how" the project and the product, but includes the dimension of the "manufacture" as social background, matrix of knowledge, a phenomenon of multi and multi-integration intercultural, reorganization of the production environment and the urban space itself. On the other hand, the craft industry no longer adheres to preconstituted formulas, freeing the entrepreneurial culture from the rhetorical enclosure of the factory for assimilated to an open culture that pursues an economy based also on the ability of individuals to produce work. Here because the artisan territory is not represented as the sign of unfinished modernity - although with different practices depending on of places of origin, has always contributed to the formation of structures and production processes, as an area composition in which collaborative communities, creative economies, supportive relationships, shared experiences, collective projects coexist, promiscuous geographical and cultural.

Context & Background

Crafts in Egypt

The traditional craft in Egypt has a history of development. The craft began and developed to its zenith during the Islamic eras that passed through Egypt. Egypt has always had its own character in design and manufacturing, different from the rest of the countries in the region, where it expresses its local culture, and crafts became of strength and cohesion until each craft represented a sect. It has what manages its affairs and organizes them in what resembles labour unions in its current term. The collapse of crafts began in Egypt when the Ottoman Sultan Muhammad Ali took power and wanted to build the capital of the Islamic caliphate in Istanbul, so he sent the great craftsmen and their assistants to Istanbul, thus he had emptied the craft of its skilled makers and dismantled the craft sects. This was the beginning of the phase of the decline of the level of craftsmanship in Egypt.

Figure 1: Examples of Egyptian traditional crafts with different materials

Context & Background: Relation between Egypt & Italy

Some economic data can help to understand the importance relation between Italy and Egypt, on Cairo - 2 March 2021: The commercial office of the Italian Embassy in Cairo said that the value of Egyptian-Italian trade hit €3.390 billion during the period from January to October 2020, compared with €4.34 billion in the previous year. the commodities which are imported by Egypt included machines, mechanical devices, electric appliances, spare parts, mineral oils, chemicals, iron and steel, medical appliances, textiles, automobiles and furniture along with transport vehicles among others. Beside that Italy is the fifth trade partner to Cairo while it came first as a trade partner to Egypt in Europe in 2019 according the Egyptian Central Agency for Mobilization and Statistics (CAPMAS),As many as 1,424 Italian companies are operating in Egypt, placing Rome at the fourth place in the list of countries which have direct investments in Egypt till the period ending June 2020, The total Italian capital that has been pumped into the Egyptian market reached dollars 28.2 billion till June, 2020, adding that Italy is investing in Egypt in the fields of oil and gas exploration, industry, services, tourism, financial and banking sector, construction, agriculture, information technology and real estate.

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Mancini,M.(2021)*Design culture of playing. The musical instrument industry: an important culture of made in Italy.* Cumlus Conference Proceedings Roma 2021 Volume #2

https://www.milandesignagenda.com/exquisite-italian-craftsmanship-world/

https://www.facebook.com/mishka.handcrafts/about/?ref=page_internal

https://www.mobiquity.com/insights/the-future-is-phygital

http://www.matto.design/it/the-material-side-of-design/

https://www.auraltextiles.com/

www.matto.design

https://www.researchgate.net/figure/2-A-design-workflow-of-phygital-heritage-identifying-the-context-deciding-on-the_fig16_333943167

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https://www.egypttoday.com/Article/3/99208/Italian-embassy-Trade-with-Egypt-hits-%E2%82%AC3-390B-in-9

On the other hand, they have similarity of the mentality of the culture background which that feature of many Italian enterprises is the small dimension. Sometimes factories are family-owned and it was the default in Egypt that the members of the family taught the new generation and at some point, the craft became the name of the family. and also, some of the first educational missions that Egypt sent to Europe under Mohamed Ali were headed to Italy to learn the art of printing. Mohamed Ali also engaged a number of Italian experts to assist in the various tasks of building the modern state: in the exploration of antiquities, the exploration of minerals, in the conquest of Sudan, designing the city of Khartoum and drawing the first survey map of the Nile Delta.

Context & Background: Phygital: New life after the pandemic
After the covid-19 pandemic, the concept of 'phygital' has been proposed in business studies to depict the "symbiosis of physical space and virtual space". Phygital is that one niche where ideas are a never changing affair. With emerging technologies, organizations are inclined towards breathing life into ideas in multiple ways for example one of the cases we can follow and build in our research is the Integration of Social Media (A Brazilian multichain retail store put forward a brilliant instance of a phygital experience, by creating digital images of particular items that were liked by people online. Such an approach is beneficial towards empowering consumers with information prior to their purchase). Also, Virtual or Augmented Reality (VR & AR) – that can make the product true without making it in reality just give the consumer to imagine the product in his place or his space that can encourage the consumer to take the decision to buy the product.

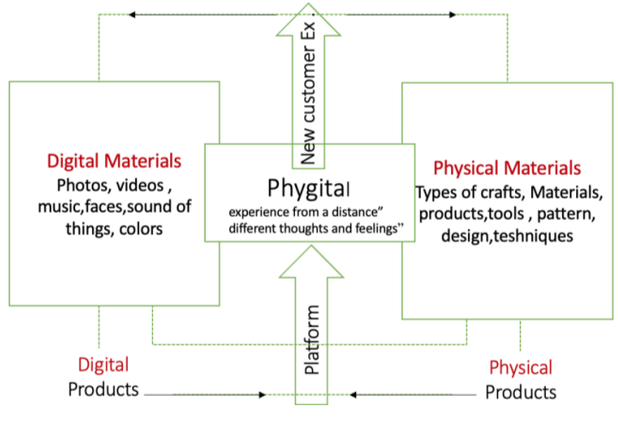
Approach & Method

The research adopted an analytical methodology, to reach to next step of investigation of understanding the materials and techniques of the traditional crafts and the cultures in Egypt related to these crafts, after collecting the data could analyze and sort the materials and tools that still exist in Egypt then making the digital library and kind of platform which can help the designer and users to have experienced through the plat-form can take their feelings and emotions. So, the research begins with defining the state of art and craft in Egypt then explaining and defining when the problems happened, then classify the category of the producers as makers, artists & designers and classify the products on the level of materials and tools and types of crafts then analysis the data to show the state of the craft now and where it reaches and find the potentials of the development. by presenting Egyptian case studies trying to add some new values to the crafts rule.
Made investigation and research about the types of the Egyptian traditional crafts (materials, processing, the potential to develop, products (Hand-Made Kilim - Achim Furniture - Women Accessories - Copper Products - Glass Products - embroidery products - wood products - Tableau - Tents - Seashell - Lighting Units – Handmade Carpets - Ceramics - Furniture - Leather - Trays And Wood Works - Sinai products - wicker products artists trial in this filed) in a theoretical way and the practical filed. And after that on the Practical side we started to focus and select 2 typical materials of Egypt, a sort of material palette, and next step we imagine structuring the research in the following phases: 1.design and development of the pilot. 2. development of additional contents (sounds, words and images) to be study in the pilot at lab to make a protype through sketching, lab study & pilot study.

Expected Results

The final results will expect in the wild development is evaluating the phygital prototype in the real world after making a polit through the collaboration The activity will be carried with the support of the technicians of the research center and Saperi & Co. (ROME. Italy) with crafts workshop and designers from Egypt that can make development of additional contents (sounds, words and images) to be included in the pilot (at Saperi & Co) then when place the pilot online. We will make survey about the user experiences that can on how they connect, explore, buy , use to merge how this platform makes an effect to develop the crafts in Egypt.

Figure 2: Explain the map of the research and the expected result



Acknowledgements
To My Mum's Soul (Amina Ismael).

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Design Research in the path towards the Understanding of the Connection between Visual Information and Musical Perception in Young Children

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Music is part of early years curriculums and is recognized as an important expression to develop children's attention, orality, reading and even counting or other mathematical logics. However, when we look at the access to musical literacy there's still a social-economic gap in terms of access to young children formal learning of music. Being accessibility and equality important issues when it comes to education, graphic design can support this gap by acknowledging the already known alternative methods to learn music and combine them with visual perception knowledge towards the understanding of visual perception in early years. The goal of this article is to elaborate a research plan to develop an alternative iconographic system for improving musical literacy in pre-schools, using graphic design as the main subject.

Keywords *Graphic design research, Visual perception, Musical perception, Gestalt laws, Children musical literacy.*

Introduction

Music is a subject recognized as one of the most ancient forms of oral culture. Sharing stories and prays by singing was a reality in every culture and it was first developed by listening, to only gain a visual perception around the 8th century. It was mainly in the XX century that Musical Literacy started to be included in schools curriculums.

The purpose of this research is to gather important information about visual perception of preschoolers as a path towards the development of an alternative iconographic system for music literacy in early years. It intends to connect Gestalt Principals, Visual Perception and Musical Perception in early years, and to combine key information towards the development of this research.

Even though we recognize auditory perception to be fundamental in Musical Perception we are, for the purpose of this research only gathering information on its visual perception.

Bruno Munari (1981), designer and theoretical, stated ‹‹Designing is easy when you know how to do it››, recommending to gather an understanding of how things are done by carefully analysing what has already been done.

Having this in consideration, there are some key information we need to carefully analyse in the matter of our research.

We should consider the main problem: Musical notations are the symbols musicians have to know in order to read a musical sheet, and even though musical sheets are known to be a universal language, the grand majority of us don't know how to read them.

We could learn it but if we think about preschoolers, the process of learning to read a musical sheet becomes an almost impossible task, due to the need for learning (reading and counting know-how are implied) which makes their experience manly based on listening: ‹‹A crucial problem facing our conscientious elementary music teachers is how to teach successfully the skill of reading music at sight›› (Kyme, 2014).

This has opened a path towards inequalities in learning which follow some of the children throughout their lives, both in inclusiveness and social/cultural disadvantages.

If the only way to learn how to read music is from formal music lessons, this becomes an accessibility issue, and if it is indeed related to development and self-experience, it also becomes an inclusiveness issue.

Literature Review

Even though music is part of the early years' Portuguese curriculums nowadays, the methodologies used are based on nursery rhymes, circle times, and other specific activities (such as 'tidy up', per example) where music is used as a meaning to an end and not as a discipline per se.

Even though these tasks and this use of music are obviously correct for what they are entitled to, we believe music should be part of the curriculums as a subject itself. In a recent report from 2006, about music development in early years childcare, several educators and practitioners were questioned about music presence in their daily basis work with children.

> ‹‹*(...) most strongly endorsed beliefs by early childhood and care educators included the concept of music as: (a) an essential creative outlet for young children; (b) a useful tool for the social inclusion of children; as well as (c) a method by which to bolster children's emotional development (i.e., self-esteem and self-confidence) in a fun and non-threatening space. Slightly less strongly endorsed were the utilitarian and adaptable skill aspects that music has to offer*›› (Barrett et al., 2019).

This shows us music has an interesting and unquestionable role in early years education. However, in the same research, it was also gathered information about musical training by the educators and most of them didn't have formal musical training, even though most of them reported they have non-formal music-related activities such as learning to play a musical instrument or singing in a choir.

> ‹‹*Cumulatively, the current study findings indicate that there is enormous potential within this population for further professional learning and development targeted at music and its conceivable wider benefits in young children's learning and lives*›› (Barrett et al., 2019).

This means, there is a strong interest from early years practitioners to be engaged in more formal activities surrounding music and engaging children in these activities, by also considering its benefits.

Even though this study gathers information from the Australian reality, we can look at this information and consider it to Portuguese reality due to similar practices in childcare when it comes to musical expression.

So, what if, as graphic designers, we could make the learning of musical reading more accessible for both practitioners, children, and families, by developing an alternative iconographic system for music literacy in early years, which would be complementary to the formal musical sheet but could live independently of it and still support children visual perception of music, by including notes, tempo, and rhythm meanings?

Munari, B. (1981). *Das Coisas Nascem Coisas*. Edições 70, Lda.

Kyme, G. H. (1960). *An Experiment in Teaching Children To Read Music with Shape Notes*. Journal of Research in Music Education, 8(1), 3–8. https://doi.org/10.2307/3344231

Barrett, M. S., Flynn, L. M., Brown, J. E., & Welch, G. F. (2019). *Beliefs and Values About Music in Early Childhood Education and Care: Perspectives From Practitioners*. In Frontiers in Psychology (Vol. 10, p. 724). https://www.frontiersin.org/article/10.3389/fpsyg.2019.00724

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Musical Literacy Methods

Kuo & Chuang (2013), stated the relevance of music notation as a guide to play music - either for professionals or amateurs - that include visual and audial characteristics; this has supported music play throughout the centuries:

> ‹‹*In the early music notation stage, music notation was a simple style that did not include any writing notation. The earliest music notation was found as an oral record of a human's impression from approximately 1800 B.C. (Gaare, 1997). In the 8th century, the neumatic notation (Randel, 1986) was developed in Europe. (…) The neumatic score was the basic element of Western and Eastern systems of musical notation prior to the invention of the five-line staff notation*›› (Kuo & Chuang, 2013).

As mentioned by Munyaradzi (2014), several educators, inspired by the needs and as a way to develop lots of special schools created to support children whom were sadly colateral damage to the Wars, developed different pedagogies, specially during the XX century. This also included Musical Literacy methods. The majority of this new methods intended to make music literacy accessible to all children. In Kodály method, like stated by Smuta (2017), musical training should be accessible to everyone independently of the economic reality. In Suzuki method both children, parents and educators work together following the same curriculum and theoretical books towards children music learning. Other methods, based on visual strategies were developed: some with hands signs (e.g. Kodaly and sound-painting) , some uses numbers and letters (e.g. Galin-Paris-Chevé system and Western diatonic scale mainly in Anglo-Saxon countries), other using shapes (e.g. shape-note singing), and some using colours (e.g. colour-coded notation). In this last method, as stated by Rogers (2015), the color supported visual memory making it easier to internalize when compared with other alternative notations. All this information gathered is essencial to build an efficient alternative iconographic system. It is relevant to look at this methods as complementary and not single procedures; if we consider only colour-coded notation, we will easily have a problem if we are dealing with a colour-blind child, per example. Or, if we only consider Kodály method, are parents from low income ready to support their children in this learning skills? Even when not developed specifically for children, like sound painting or shape-note (that are methods mainly used to support singers), can some of this techniques be important for the development of the alternative iconographic system we intend to create?

> Critically analyzing all this methods, and although we need to consider all this alternative ways to learn music notation towards the development of this research, is fundamental to conclude ‹‹(…) many creators of music education theories felt that music, movement, exploration and improvisation are integral to a young child's learn, and they music be allowed creative expression. (…) We now know that music education need to be linear, as some felt, but rather authentic, and relatable.›› (Subramaniam, 2019).

Children's Visual Perception

To do this research, we need to consider that the visual system and therefore visual perception develops during the first 7 years of life.

> ‹‹*[The] development of the visual system immediately starts after birth via visual stimuli and interactions with the environment, which concomitantly occur with the child's global development (…) The anatomical and neurophysiological integrity of this system is essential for the occurrence of the maturation process, which differs with age and is interdependent of genetic, cognitive, and environmental aspects*›› (Zimmermann et. Al, 2019).

The visual perception is not equal to every child such as any other development feature: every child will develop at its own pace and time, but the development of the eye perception from the two eyes[1] should be fully mature by 5 to 6 years old. We also need to consider:

> ‹‹ *(…) visual experience is dynamic. It is, perhaps, first of all, an interplay of directed tensions. These tensions are not something the observer adds, for reasons of his own, to static images. Rather, these tensions are as inherent in any percept as size, shape, location, or colour. Because they have magnitude and direction, these tensions can be described as psychological "forces"*›› (Arnheim, 1974).

Other key elements for our project are 'attention' - children attention and visual perception are invariably related due to brain development - and, as pointed by Ammawat et. Al (2019), 'name speed' which is ‹‹(…) the capability to respond orally to letters or digits, which involves recalling the verbal representations of abstract visual stimuli. Likewise, reading recruits the same cognitive, linguistic, and perceptual processes as naming speed›› (Ammawat, et. Al, 2019), which several studies proved to be related to reading skills and figure perception, and non-symbolic or concrete properties such as colour, shape, texture, and sound. It is, therefore, relevant to consider the different stages of visual perception development as it is more complex than it could seem at a first belief; it is not exclusive to the child, but it is also dependent on the conditions of the environment:

> ‹‹*Objects in the world are defined not only by differences in luminance contrast but also by differences in their reflectance of*

Kuo, Y. T., & Chuang, M. C., *op. cit.*

Munyaradzi, G. (2014). *Analysis of Applicability of the Suzuki Method in Zimbabwean Music Education : A Case of Primary Schools in Masvingo Urban*. 3(6), 38–42. https://www.longdom.org/abstract/analysis-of-applicability-of-the-suzuki-method-in-zimbabwean-music-education-a-case-of-primary-schools-in-masvingo-urban-2437.html

Smuta, A., & Buzás, Z. (2017). *Aspects of Kodály's Music Pedagogy*. Polgári Szemle, 13(Special issue), 357–370. https://doi.org/10.24307/psz.2017.0321

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Arnheim, R. (1974). *Art and visual perception - a psychology of the creative eye*. University of California Press. https://doi.org/10.1007/bf02719925

Ammawat, W., Attanak, A., Kornpetpanee, S., & Wongupparaj, P. (2019). *Pre-schoolers' visual perception and attention networks influencing naming speed: An individual difference perspective*. Heliyon, 5(10), e02587.

[1] *‹‹The occipital cortex integrates the stimuli received from both eyes into a unique visual perception. Completing its functional maturity between the ages of 5 and 6 years, this sensorineural mechanism is called binocular fusion. The perceived and unified images are evaluated regarding their form, colour, light, and relative location based on the surroundings raising awareness of the object's spatial location (…)*›› (Zimmermann et al., 2019).

a range of wavelengths of light (chromaticity). In addition, objects are rarely stationary but move across the retina, as a result of motion of the object, or self motion. Thus, in order to interpret the visual world, infants also need to perceive motion and colour›› (Slater, et al., 2010).

By acknowledging these characteristics of development we will be able to consider our public perception with more understanding of their needs.

Now, it is important to consider the problem we are focus on. If our main research project stands for visual Musical Perception in Early Years, we need to gather information about how it works: Many authors have studied the relation of children with music, their own interpretation of musical notations, and their ability for creating and develop their own songs; the work of Margaret S. Barrett give us relevant information about this matters and we need to give it an extra focus due to the inputs she gathers throughout the last 30 years of active research. ‹‹Children have an immediate interest for their own compositions, as they evolve from their own experience›› (Barrett, 1997) as through children's experience we will be able to gather shapes and possible patterns for the development of the iconographic system. From previous studies, Bamberger (1982) showed young children tend to develop figurative representations of music, giving their representations familiar shapes, while ‹‹Davidson and Scripp (1988) suggests that children use five distinct types of notation: pictorial; abstract patterning; rebus; text; and combination (...)›› (Barrett, 1997). More than understanding the complexity of children's musical notation, we should value their creative thinking and development and, for it, it is essential to understand their natural creative abilities when it comes to music and songs: ‹‹Invented song is an individual and social music-communicative phenomenon that is most pronounced in the musical behaviours of children aged approximately 18 months to 7 years, and has been the subject of a number of research studies that have sought to interrogate its role in young children's musical and singing development›› (Barrett, 2006); and how amazing would it be if they could actually play their own creations on a musical instrument and recognise what they're playing with or without formal music training?

Gestalt Principals

Being visual perception one of the main themes of this research, Gestalt principles are also to be taken into consideration throughout all the iconographic system development; the word 'Gestalt' itself means something 'placed' or 'put together in German, making the name a redundancy of the meaning itself. ‹‹The Gestalt psychologists believed that the organization of visual perception is the result of neural activity in the brain which, in turn, depends on electro-chemical processes. These physical processes obey the laws of physics, and are a fundamental characteristic of the human brain›› (Slater, et al., 2010). The Gestalt principals were introduced by Wertheimer (1923) and were further developed by both Köhler (1929), Koffka (1935), and Metzger (1936) and are designated as:

- Figure/ground articulation: which states figure and background are elements that work independently from each other;
- Proximity: elements are perceived as grouped if they're close to each other;
- Similarity: elements tend to be considered groups if there's a similarity between them;
- Continuity: alignment is key to understand units as one group;
- Closure: if the elements become part of a close figure, the human brain tends to assume it a group;
- Symmetry: symmetrical units will easily be considered as common forces;
- Convexity: convex patterns will tend to be perceived as figures;
- The Law of Good Form: elements are grouped if they're part of a pattern that is as simple, balanced, orderly, and balanced as possible;
- Common Fate: states elements tend to be perceived if they're moving together.

In later additions to the theory, Palmer (1992) added the 'Common Region' principle: It states elements which are located within the same closed region are commonly assumed as a group; and, together with Rock (1994) the 'Element Connected' principle: if elements are connected by other elements, they are also perceived as a group. In conclusion, ‹‹A Gestalt is an integrated, coherent structure or form, a whole that is different from the sum of the parts. Gestalts emerge spontaneously from self-organisational processes in the brain. Gestalts result from global field forces that lead to the simplest possible organization, or minimum solution, given the available stimulation›› (Wagemans et al., 2012).

Having all this information gathered, the goal is to develop an ethnographic research next to children so we can elaborate and evaluate the iconographic system. However, we can now take some theoretically based conclusions to take to the field.

Slater, A., Riddell, P., Quinn, P., Pascalis, O., Lee, K., & Kelly, D. (2010). *Visual Perception*. In Wiley-Blackwell Handbook of Infant Development, Second Edition (Vol. 1, pp. 40–80).

Barrett, M. S. (1997). *Invented notations: A view of young children's musical thinking*. Research Studies in Music Education, 8(1), 2–14.

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Wagemans, J., Feldman, J., Gepshtein, S., Kimchi, R., Pomerantz, J. R., van der Helm, P. A., & van Leeuwen, C. (2012). *A century of Gestalt psychology in visual perception: II. Conceptual and theoretical foundations*. Psychological bulletin, 138(6), 1218–1252. https://doi.org/10.1037/a0029334

The Research Plan

> ‹‹*Music literacy is traditionally defined as an acquired musical knowledge and a skill to translate notation into vocal sound (reading/singing) and sound into notation. (…) The term 'functional music literacy' is defined by Jorgersen (1981) as the minimal level of musical skills which enables students to function with musical materials.*›› (Smuta, 2017).

Our iconographic system will be developed next to the children, with the children, and for the children. Having all this in consideration, it is important to clarify this iconographic system it's not being develop as a substitute of the current formal musical notation, but as an additional - and to use Smuta's designation - 'functional' method for exploring music literacy in early years.

Methodology

Qualitative Research.

Development of an Ethnographic Research in pre-schools. Interviews will also be hold during the process.

Subjects

Universe of 100 children, from 3-5 years old, with different social and cultural backgrounds, with and without music expression access are the main public of the research project. Music Teachers and Early Years Educators will be considered for the complementary interviews.

Sampling Procedure and Planned Measurement

The research project is divided in four stages:

- Stage 1 | Finding Shapes, Drawing Music: We will develop some activities with the children, and collect the different drawings and self-notations made by the group. From this, we will deep the first icons by comparing the collected material and analyze it considering the gathered information in the State of Art.
- Stage 2 | Learn the Symbols: With the first icons in place we will pre-validate the system next to the children by the development of several ludic activities we will understand the acceptance of the icons and what improvements are needed.
- Stage 3 | Music Play with Symbols: Back to schools, children will be divided in two groups: Group A - free will - and Group B - guided. We will create a basic melody, inspired by nursery rhymes (so it can't be played my memory) and this melody will be taught to the children. This stage will be recorded, so it can be also validated by others specialists.
- Stage 4 | Through Symbols We Play: This is the last phase of the research project. Maintaining the groups of stage 3, we will evaluate if the children can remember the melody they learned before, if they can still relate the icons with the musical notes, and understand the applicability of this icons in digital platforms to see if they are accepted just the same, or if adjustments are needed. From this stage, we will take our conclusions and close the iconographic system.

A log book will be part of the support materials and pictures and sounds will be collected along the project. It is important to mention stages 2 to 4, can be repeated until conclusive results are gathered.

Conclusions

In resume, ‹‹Gestalt principles were held to apply to perception generally, both visual and auditory; and the Gestalt psychologists were well aware of their possible application to music›› (Temperley, 2001), and we can use this knowledge to add value to our research results.

Music takes an important place in the early years' education and children are actively interested in activities involving music, singing, and even creating their own songs and compositions. There is a gap in musical literacy which can be reduced with Graphic Design as a possible answer to it; as Designers, we have the responsibility to adapt the 'known' so we can make it more accessible to everyone, no matter the background or the special needs.

The following steps are to visit preschools, establish groups of work, and start developing the alternative iconographic system. The continuous evaluation of the system will be fundamental to achieve results that will guide us towards their validation next to the target audience. If the results turn out to be positive we will be closer to develop new paths towards music literacy in early years, supporting not only children's learning, but also engaging their educators and, possibly, their families.

Smuta, A., & Buzás, Z. *op. cit.*

Temperley, D. (2001). *The Cognition of Basic Musical Structures* (Massachusetts). The MIT Press. https://doi.org/10.1353/not.2002.0116

On the relationship between User Experience and Blockchain Technologies

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Blockchain technologies have been around for more than a decade; however, their usage continues to be limited outside of cryptocurrencies. Some argue the reason may be that most blockchain-based systems still treat design in general, and user experience (UX) in particular, as afterthoughts. Although there is growing technical literature on blockchain solutions, few academic works focus on the role of UX. This paper takes this gap as a starting point; it shows that a considerable obstacle for broader adoption of blockchain-based services is the intrinsically financial, transactional, nature of the technology. Furthermore, it contends that it is unlikely that user experience by itself can magically increase the adoption of blockchain technologies, but that it can contribute by making it as "invisible" as possible. This article is not—nor claims to provide—a comprehensive account of the relationship between UX and blockchain but add to the growing interest about blockchain in design scholarship. This approach is deliberate, for the discussion here presented is an initial step for stirring conversations on the topic and carrying out more research about it.

Keywords *Blockchain, Complexity, Human-centered design, User Experience.*

Introduction

Blockchain technologies have been around for over a decade now, and they show no sign of going away. The high prices of Bitcoin[1] and other cryptocurrencies, along with the popularisation of NFTs[2] (Non-Fungible Tokens) have been drawing considerable attention over the last couple of years, even from people who would typically dismiss these technologies. Nonetheless, despite the buzz surrounding Bitcoin, blockchain is arguably not just about speculating with digital assets. Blockchain-based systems may be used wherever a distributed, secure (i.e., tamper-resistant), trustworthy solution for permanently recording transaction data (i.e., a "ledger") is required. Bookkeeping, handling personal medical information, rights management, managing supply chains, are some often-cited instances where this type of technology could be employed (Griffith, 2018). Consequently, several high-profile companies across various economic sectors, from retail to transportation to entertainment, are presently researching and investing in the development of blockchain applications. The technology, many of its advocates argue, will dramatically change entire industries. However, this assertion raises the question, of why blockchain has not yet become ubiquitous. A partial answer may lie in the fact that most blockchain solutions still treat design and user experience (henceforth UX) in particular, as mere styling. Blockchain remains a polarising subject, people will either passionately defend it or coldly dismiss it (Frederik, 2020). Comparisons with the dot-com bubble of the 1990s are frequent (Bellaj, 2017). Some (Ito et al., 2017) have argued that blockchain will do for finance what the internet did for media industries (e.g., on- demand streaming). Although there has been a recent surge in academic literature on blockchain, most of it is composed of technical papers, introductory books, white papers, web articles, and Medium posts accompanying product launches. Partly, this has to do with academic skepticism and contempt about blockchain's potential applications and partly because the blockchain crypto community has been traditionally developed outside academia. Satoshi Nakamoto's white paper was not peer-reviewed; the system was not conceived first and then implemented. Academic literature on blockchain technologies and User Experience is even more scarce. And the few writings about blockchain and design take either one of two positions: (1) UX is UX regardless of the technology or; (2) blockchain is a radically new technology and, therefore, there are specific challenges associated with it, which can be overcome through UX. This paper takes the above situation as a starting point, it shows that a considerable obstacle for broader adoption of blockchain-based services is the intrinsically financial, transactional, nature of the technology. Through examples and a literature review, this paper seeks to clarify (a) what are some of the main obstacles that, from the point of view of UX, prevent blockchain from being widely adopted, and (b) to what extent UX could remedy this situation. The first section provides an admittedly oversimplified overview of blockchain, along with a succinct non-technical description two main types of consensus algorithms. Section two summarizes the main features of UX and Human-Centered Design (HCD). Section three discusses some of the main obstacles identified and points to some potential ways to overcome them. This article is not—nor claims to provide—a comprehensive account of UX and blockchain's relationship but contribute to the growing interest about blockchain in design scholarship.

Understanding blockchain

When talking about blockchain technologies it is important to bear in mind they are not only about Bitcoin or even just about cryptocurrencies. That Bitcoin takes the center stage in these discussions is understandable since, it is by far the highest priced cryptocurrency available (one Bitcoin is approximately worth ~50.000€). As we will see in the following paragraphs, Bitcoin was indeed the reason why the first Blockchain was launched a little over a decade ago, nonetheless, both the notion of cryptocurrencies and the cumulative technologies that enable them date back at least a couple of decades before.

David Chaum, an American cryptographer and computer scientist, introduced the concept of cryptocurrencies in the early 19080s (Sunyaev et al., 2020). His original goal was to create an "anonymous and secure digital voting system" with blind signatures that would allow users to remain anonymous.

Each user would have a public and a private key to identity them and, in theory, this would make their transactions untraceable. Anonymity, continues to be one of the promises of cryptocurrencies and the reason they are the preferred currency for illegal activities such as ransomware. However as shown by the recent scandal with Colonial Pipeline Co.[3], anonymity is not guaranteed.

What we now call blockchain technology was initially developed by Satoshi Nakamoto[4] between 2007 and 2008. In late October of that year, they[5] released a white paper (Nakamoto, 2008) in the then recently acquired domain Bitcoin.com, describing the protocol for Bitcoin, the first genuinely decentralised[6] cryptocurrency based on blockchain. In January 2009, Nakamoto released the code as open source. By December 2010, after maintaining the software along with other developers and building an active

Griffith, E. (2018, February 25). 187 *Things the Blockchain Is Supposed to Fix*. https://www.wired.com/story/187-things-the-blockchain-is-supposed-to-fix/

Frederik, J. (2020, August 21). *Blockchain, the amazing solution for almost nothing.*

Bellaj, B. (2017). *The Blockchain mania and the dot-com bubble! In Medium*. https://medium.com/@badrbellaj/the- blockchain-mania-and-the-dot-com-bubble-adc4885dd66b

Ito, J., Narula, N., & Ali, R. (2017, March 8). *The Blockchain Will Do to the Financial System What the Internet Did to Media*. https://hbr.org/2017/03/the-blockchain-will-do-to-banks-and-law-firms-what-the-internet-did-to-media

[1]The combined market volume of cryptocurrencies currently stands close to USD 2,13 billion (long scale) (Coinmarketcap, n.d.).

[2]"NFTs are blockchain-based tokens that securely map ownership rights to digital assets. Analogous to owning a physical work of art (...) NFTs provide a way to represent ownership or possession of digital assets such as art, music, games or collectibles." (Ante, L. (2021). Non-fungible token (NFT) markets on the Ethereum blockchain: Temporal development, cointegration and interrelations. http://dx.doi.org/10.2139/ssrn.3904683).

Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system* [White Paper].

Sunyaev, A., & Sunyaev, A. (2020). *Internet Computing (pp. 237-264)*. New York, NY, USA:: Springer International Publishing. *https://doi.org/10.1007/978-3-030-34957-8*

[3]After the Colonial Pipeline Co. paid a ransom due to an attack made by hackers, the US Justice Department recovered approximately $2.3 million in Bitcoin by "following the money". This incident prompted the creation of a digital extortion taskforce to avoid future scams, that will assure that "new financial technologies that attempt to anonymize payments" won't be a cover for illicit transactions or other criminal behavior. The happening proved that blockchain transactions can be tracked and that the claimed anonymity is not guaranteed. (Perez, E., Cohen, Z. & Marquardt, A. (2021, June 8) First on CNN: US recovers millions in cryptocurrency paid to Colonial Pipeline ransomware hackers).

[4]The consensus is that Satoshi Nakamoto is a pseudonym for the person or group of people who developed Bitcoin. Some of the people who are thought to be Nakamoto include American cryptographer Nick Szabo, and even the late mathematician J. Nash.

[5]The authors agree with Narayanan et al. (2016) about Nakamoto likely being a single person. However, in line with the contemporary shift in pronoun usage, the plural has been adopted.

community through extensive email exchanges and forum posts, Nakamoto disappeared adding a lasting aura of mystery to the technology in the process.
As noted earlier, conceptually speaking Blockchain is a new technology; however, most of its crucial components (i.e., hash functions, Merkle trees, proof of work, and smart contracts) originated in the technical academic literature of the previous three decades (Narayanan et al., 2016). Moreover, to those unfamiliar with Nakamoto's white paper, it may come as a surprise that the term "blockchain" is never mentioned.
Nakamoto's innovation did not involve creating any specific component of blockchain. But instead had to do with the intricate way in which Nakamoto successfully combined existing technologies (Narayanan & Clark, 2017) to implement a functional, purely distributed peer to peer system capable of maintaining integrity (Drescher, 2017). Even the concept of digital cryptographic payment systems had a rich and long history before Bitcoin (Brunton, 2019; Narayanan et al. 2016). This is not to say that Nakamoto's achievement was not groundbreaking, to the contrary, understanding where blockchain's components originate can ease the way to understand the technology as a whole and, more important, it can help us understand its potential.

Proof of concept

Bitcoin was initially conceived as a proof of concept (POC) for peer-to-peer digital cash capable of circumventing the double-spending problem.[7] But blockchain technology can be more broadly understood as a system for disintermediation that monetizes the validation of peer-to-peer transactions. The technology relies on economic incentives to ensure that data stored in a public, global, distributed data structure, or "ledger"— accessible to and collectively maintained by agents who have no reason to trust each other — is correct, secure and, more important, immutable. Blockchain allows transactions to be appended sequentially within evenly sized data "blocks" depending on the ledger's rules—hence the term "blockchain" —but does not allow to remove or alter them in any way. Whatever gets written in the blockchain stays there permanently. Furthermore, it allows obtaining a cryptographic digest of the ledger at any given time in the form of a short string of symbols (Narayanan & Clark, 2017). Which means that not only it is possible to know the state of the blockchain (e.g., to verify if a given transaction was recorded) without having to download the whole ledger, but this information also mathematically confirms the data has not been tampered with. The monetization of this mechanism to guarantee the integrity and immutability of the ledger is the reason why Bitcoin and virtually every subsequent cryptocurrency exist in the first place.
In the twelve years since Bitcoin was released, blockchain technology has evolved considerably, particularly in the way consensus is achieved. Nakamoto's implementation is currently regarded as first-generation blockchain (BC1), whereas the most recent systems are described as third generation blockchain (BC3).
Both BC1 and second-generation blockchain (BC2) use "proof-of-work"[8] (POW) as their consensus mechanism. POW relies on an algorithm that randomly appoints one or more nodes in the network that will use their own computing resources to validate a given transactions so it can be included in the ledger. The selected node or miner passes those transactions and variable data through a mathematical ("hash") function to generate a unique fixed-size output. This output must satisfy the increasingly difficult conditions determined by the ledger's protocol.[9] By solving this "puzzle" the miner will generate a new, unique validated block that will be then signed, broadcast to the network, and appended to the ledger. As a "block reward", the miner receives a predetermined amount of newly minted cryptocurrency; and this information is also appended to the generated block (Academy, n.d.-b; Judmayer et al., 2017).
The chances of a node being selected as miner are directly proportional to its computational power, since nodes that can complete more hashing functions per second can validate blocks faster. In the early days of Bitcoin, virtually anyone in the network could compete evenly with other miners. Nowadays, however, competition has become fiercer thanks to increasingly powerful computing systems. Eventually, miners came to rely almost exclusively on Application-Specific Integrated Circuits (ASIC): hardware designed specifically for mining cryptocurrency (Narayanan et al., 2016). The high energetic cost[10] of running these systems and the low marginal gain that individuals mining by themselves can achieve, have led miners to organize "mining pools" (Academy, n.d.-a) where block rewards are distributed amongst participants.

POW

Unlike BC1 and BC2, BC3 relies on a "proof-of-stake" (POS) mechanism. POS does not rely on computing power but on the willingness of nodes to assume risk. The POS algorithm selects a node (called a "validator") that will "vouch" for the transactions thus earning the right to "forge" a block, sign it, broadcast it, and append it to the ledger. To be eligible as a validator, a node

Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and cryptocurrency technologies: A comprehensive introduction*. Princeton University Press.

Narayanan, A., & Clark, J. (2017). *Bitcoin's academic pedigree*. Queue, 15(4), 20:20–20:49.

Drescher, D. (2017). *Blockchain basics: A non-technical introduction in 25 steps*. Apress. https://doi.org/10.1007/978-1- 4842-2604-9

Brunton, F. (2019). *Digital Cash: The Unknown History of the Anarchists, Utopians, and Technologists Who Created Cryptocurrency*. Princeton University Press.

Academy, B. (n.d.-b). *What Is Proof of Work (PoW)?* Retrieved January 17, 2021

Judmayer, A., Stifter, N., Krombholz, K., & Weippl, E. (2017). *Blocks and chains: Introduction to bitcoin, cryptocurrencies, and their consensus mechanisms*. Morgan & Claypool Publishers LLC.

Narayanan, A. *op. cit.*

Academy, B. (n.d.-a). *Mining pools explained*. Retrieved January 17, 2021

[6] *It is essential to distinguish between decentralised (how the network is governed) and distributed (the architecture or topology of the network).*

[7] *That is, digital falsification and forgery.*

[8] *The original idea behind POW was deterring spammers by forcing the sender of an email to compute a unique mathematical puzzle for each mail. For a single message, the computing cost is negligible, but it becomes unbearable for a large number of messages.*

[9] *POW manage the difficulty of hashing new blocks dynamically, according to the computing POWer of the network to ensure that blocks are not generated too fast and, therefore, maintain the security of the system. Whenever blocks are consistently being generated too fast (i.e., the hash rate is high), the difficulty will increase and vice versa.*

[10] *This is a strong point of criticism against POW. Three years ago, the annual energy consumed by the BTC network stood close to 70 TeraWatt per year, enough to power a small country* (Buck, O. (2018, November 9). *The staggering environmental cost of blockchain).*

must stake a certain amount of currency—usually in the form of the token (usually a stable coin) used by the network. Here, the chances of becoming a validator are directly proportional to the amount staked. While each POS algorithm may have its own rules, the same principle for guaranteeing the ledger's integrity apply: should a validator approve a fraudulent block, it will lose the stake deposited and could also be penalized in other ways. Moreover, validators can only withdraw their stake after a given amount of time to allow the network to verify that no fraudulent blocks were appended to the ledger. Finally, it is important to note that in the case of POS algorithms, block-forging does not necessarily imply the minting of new coins; hence validators are rewarded with a percentage of the transactions' fees. The use of POW and POS algorithms are not the only things that distinguish the three generations of blockchain. Other significant aspects include the use of smart contracts (introduced by BC2) and the programming languages used to deploy them. The combination of these aspects directly affects the architecture of different systems and, therefore, their flexibility, scalability, and vulnerability. Hence, the way a blockchain system is designed, directly impacts what is possible to do with it, the type of products that can be developed, on top of it and, consequently, the complexities that UX design will have to face. Having established an admittedly oversimplified account of blockchain technology, we can now turn to the role that UX and Human-centered Design (HCD) should ideally have in the adoption and use of technologies.

User experience and Human-Centered design

contribution in the realization, practically 'on demand' and in
According to his own account, Don Norman came up with the term "User Experience" (UX) in the early 1990s while working at Apple's Advanced Technology Group (Buley, 2013; Merholz, 2007; Norman et al., 1995). In his view, UX would better describe what designers were concerned with when developing digital objects and services, and that was not adequately captured by terms such as "usability" or "User Interface Design" (UID). For Norman, user experience implies focusing on "the quality and enjoyment of the total experience" -Norman (1990/2013, pp. 5–6) that a given product elicits. That is, designing products that not only satisfy technical and ergonomic requirements but that also are "delightful" to use because designers have taken into account "the aesthetics of form and the quality of interaction". To achieve such delightful and enjoyable experiences, Norman argues, designers should start by understanding human needs, capabilities, and behaviors and only then focus on the technical requirements. In other words, designers should follow a Human-centered Design (HCD) approach instead of a technology-centered engineering approach.

Unlike User Interface Design and Interaction Design (IxD), which are "artefact-driven" areas of specialization within digital design, HCD is best understood as a transversal holistic method or (Wallach & Scholz, 2012) that recognizes design products and, particularly their interfaces, as sociotechnical intersections. As systems where many things, such as "people, machines, tasks, groups of people, groups of machines, and more" (Norman & Draper, 1986, p. 5) converge. HCD has a relatively long history and, therefore, many variations, but they all share the same components. Every HCD approach begins by analyzing user behavior through interdisciplinary research, combining qualitative and quantitative data; they all conduct iterative prototyping and testing and, more importantly, recognize the user as a stakeholder with valuable tacit knowledge (Göransdotter & Redström, 2018). Empathy for the user is what, according to HCD, allows designers to shape systems that are usable (easy to learn and use); genuinely useful (make a task or activity easier, efficient, or possible for the user); and delightful to interact with (offer pleasant experiences) (Cooper et al., 2014; 1985; Norman, 2013). Designing adequate user experiences thus implies understanding not just the technologies, but mainly the people who will use them, the context of interaction, and the deep entanglement between human behavior and artificial devices. In so doing, designers play the role of mediators between people and technologies. Hence, UX is not just about designing concrete objects but rather it is about shaping the conditions (be them technical or contextual) that may elicit a positive and complex response from users. In this sense, designers nowadays are more like applied behavioral scientists than like applied artists (Norman, 2010b), which means that traditional skills such as drawing, and modelling need to be supplemented with sufficient knowledge of scientific methods and human behavior. Furthermore, as Norman (2013) argues, technological changes usually outpace design, and there are always new applications, new forms of interaction, and new technical challenges. It follows that, design approaches that privilege technical aspects over people are bound to become obsolete. Focusing on users' needs allows designers to understand what should be communicated to the user and when, about the state of a system independently of the technology. This knowledge allows designers to make products discoverable and understandable. Nevertheless, doing so requires the proper application of principles such as affordances, signifiers, constraints, mappings, feedback and, more

Buley, L. (2013). *The user experience team of one: A research and design survival guide* (Revised and Expanded). Rosenfeld Media.

Merholz, P. (2007, December 13). *Peter in conversation with don norman about UX & innovation*. Adaptive Path. https://adaptivepath.org/ideas/e000862/

Norman, D. A., Miller, J., & Henderson, A. (1995). *What you see, some of what's in the future, and how we go about doing it*. Conference Companion on Human Factors in Computing Systems - CHI '95.

Wallach, D., & Scholz, S. C. (2012). *User-centered design: Why and how to put users first in software development*. In A. Maedche, A. Botzenhardt, & L. Neer (Eds.), Software for people: Fundamentals, trends and best practices (pp. 11–38). Springer. https://doi.org/10.1007/978-3-642-31371-4_2

Norman, D. A., & Draper, S. W. (Eds.). (1986). *User centered system design*. Lawrence Erlbaum Associates.

Göransdotter, M., & Redström, J. (2018). *Design methods and critical historiography: An example from swedish user- centered design*. Design Issues, 34(2), 20–30. https://doi.org/10.1162/desi_a_00483

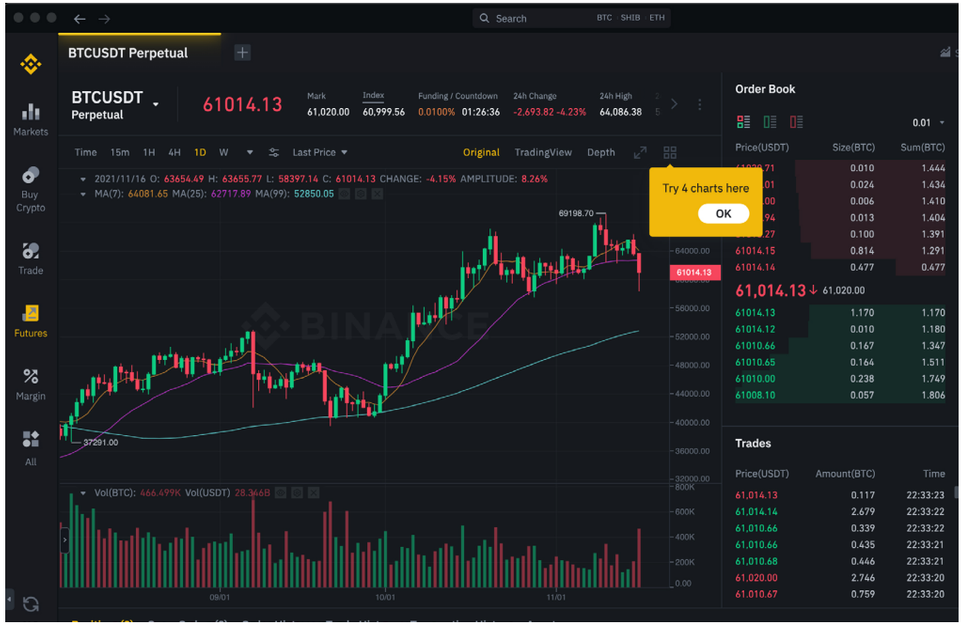
Cooper, A., Reimann, R., Cronin, D., & Noessel, C. (2014). *About face: The essentials of interaction design*. (4th ed.). John Wiley & Sons. (Original work published 1995)

Norman, D. A. (2013). *The design of everyday things* (Revised and expanded edition). Basic Books. (Original work published 1990)

Norman, D. A. (2010b, November 26). *Why design education must change*. Core 77. http://www.core77.com/posts/17993/why-design-education-must-change-17993

important, conceptual, or mental models (Norman, 1990/2013). Proper conceptual mapping is fundamental because software-based technologies are necessarily complex; their behavior depends on the interaction of many components and have a broader range of context- dependent states. Consider, for example, that a hammer does not have modifier keys to alter its behavior. In comparison, a touchscreen can trigger a multitude of different actions depending on the gestures used. However, from the point of view of HCD, even if a device is complex, using it should not be complicated (Norman, 2010a); meaning, difficult to understand. A complicated system makes users feel helpless, powerless, and frustrated because its behavior seems arbitrary and incomprehensible. Complicated systems result from poorly managed affordances and signifiers. An affordance is the relationship between an object's properties and an agent's capability to interact with it, which determines "just how" that object could be used (Norman, 2010a, pp. 10–13). Affordances are not fixed properties, but relational attributes. An adult and a child can use a heavy chair for sitting on, but only the adult may carry it from one room to another. An affordance may exist

Figure 1: Binance dashboard with po-pup.
Note: a pop-up acting as a signifier to inform the user about an alternative layout available.



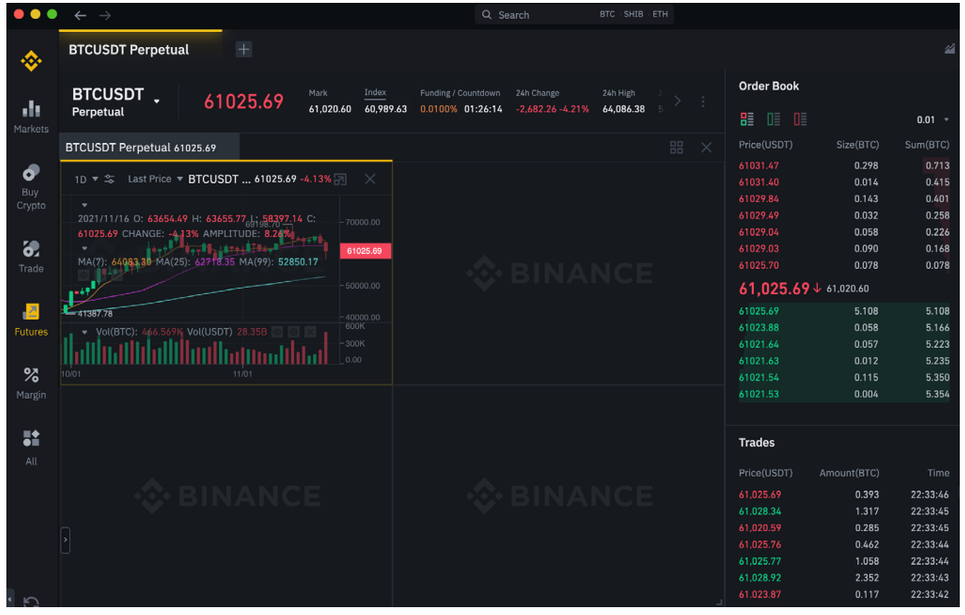
Norman, D. A. (2010a). *Living with Complexity*. MIT Press.

even if it is not visible, that is where signifiers come into play. Signifiers are means to communicate (visually or otherwise) to the user which actions a given object affords. For example, icons and labels appearing on a smartphone's interface communicate to the user what she can do with a given application; they are visible indicators for its appropriate intended use. In summary, an affordance "tells" what actions are possible, whereas a signifier indicates where those actions happen.

In a system in which affordances and signifiers are well managed, every given action's result is appropriately communicated to the user; this is called feedback. Feedback should be immediate and informative but should not get in the way nor irritate the user. If we take the Binance[11] interface as an example, we notice a rollover popup that acts as a signifier that informs the user that she can change the layout to display four charts instead of one (Figure 1). After clicking on it, new empty screens appear leaving the user adrift (Figure 2). An experienced user could play around in the dashboard until finding a way to use the rest of the charts in a convenient manner, whilst newcomers can become confused and frustrated for not receiving sufficient instructions about how to navigate the interface.

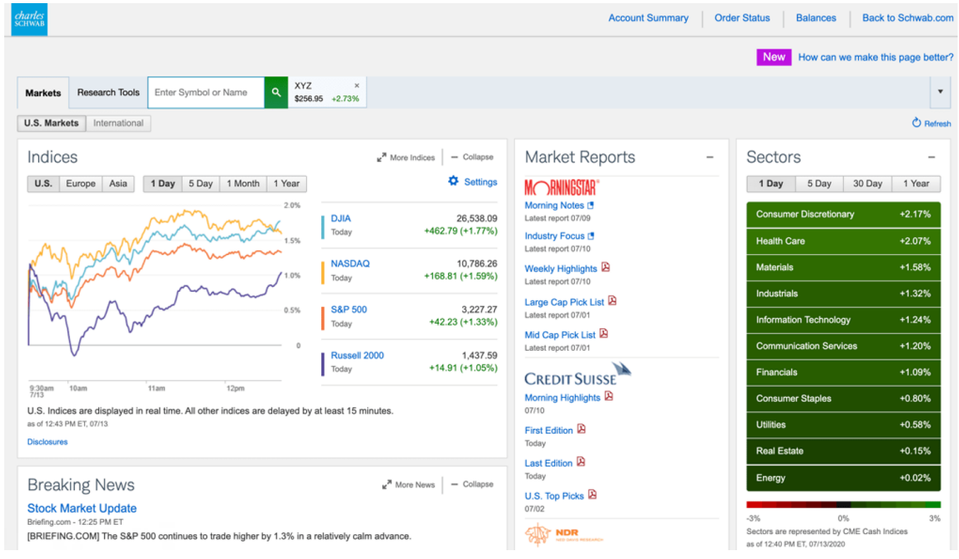
[11] *Binance, a cryptocurrency trading Exchange platform, was founded by Changpeng Zhao in China. It was relocated to the Cayman Islands due to the increased regulations on cryptocurrencies by the Chinese goverment. (Conway, L. (2021, October 27) What is Binance coin? Is it a good investment? https://www.thestreet.com/crypto/defi/what-is-binance-coin-is-it-a-good-investment).*

Figure 2: Binance dashboard lacking signifiers.
Note: after clicking on the pop-up, no further instructions are given to the user.



Managing affordances, signifiers and feedback is not enough to make technologies less complicated. According to HCD, designers should strive to achieve a proper balance between the underlying structure, behavior, and limitations of a system, and the ways users conceive it. That is, a compromise between the "implementation model" (i.e., the existing system's logic) and the "user's model" (how users picture it) through a less complicated "represented model" of the system (Cooper et al., 2014) materialized in the User Interface (UI). A represented model does not simplify a system's complexity; it makes it understandable (Norman, 2010b). However, designing a proper represented model is not easy, for it implies dealing with the so-called "Tesler's law of conservation of complexity", according to which the usability of the UI is inversely proportional to the complexity of the system's back-end and vice versa (Norman, 2010a; Saffer, 2010). It follows that in many ways, HCD is about managing complexity, and complexity is one of the most salient aspects of blockchain technology. However, the interface issues explained above did not originate within the blockchain ecosystem, but they were rather inherited from traditional financial products, such as stock tracking applications designed by and for a very niched segment of the population. Previous knowledge and training were required to operate such complicated interfaces, hence designing a facsimile for blockchain products opposes the core intent of this decentralized technology. An illustration of the early products being imitated is Schwab's platform displayed below, where it becomes apparent that current solutions are based on previous designs, that were lacking of a good User Experience in the first place.

Figure 3: Schwab.com: online trading platform. Note: clear similarities with current blockchain products are found in traditional financial solutions.



The obstacles and what UX can do about them

Understanding blockchain technologies requires a minimum of "financial literacy". On the one hand, as suggested before, blockchain is an umbrella term for a growing number of cryptographically-based back-end technologies that, as of today, have been implemented almost exclusively in financial applications. Their decentralized ethos forces whoever comes into contact with them to confront their conceptual models about value, consensus, money, and trust. These properties are perhaps the most salient obstacles against a broader adoption of blockchain technologies.

Current advocates of blockchain technologies are technically-minded, not user-centred. They tend to relegate design to an afterthought. They tend to be male, early-middle-aged, with backgrounds in engineering and software development, financially-literate, and with libertarian sympathies. Explaining and convincing people outside the above description about blockchain's benefits implies bridging this cultural gap. Moreover, since design is often relegated to styling, it is no wonder that usability in blockchain implementations tends to be sub-par and the technology at large is pervaded by technical and financial jargon that is incomprehensible to regular people.

Most current blockchain applications fail to convey a value proposition beyond speculation with cryptocurrencies. The so-called current "Cambrian Explosion" (Hudelson & Storus, 2017) of crypto coins is mostly driven by opportunist speculators jumping onto the bandwagon of Bitcoin's success. Moreover, Bitcoin's reputation as the currency of choice for the Silk Road darknet market and most ransomware attacks continues to make those unfamiliar with blockchain—even those with high technical training—uneasy. To their eyes, cryptocurrency markets appear to be little more than sophisticated Ponzi schemes. Furthermore, blockchain is frequently touted as a revolutionary solution for its own sake.

An example of an application built with a lower entrance barrier regarding knowledge in finance is Wirex, a "digital payment platform with a mission—to make crypto and traditional currencies equal and accessible to everyone" (Wirex, 2021). While the application's overall design is accessible compared to similar

Cooper, A., *op. cit.*

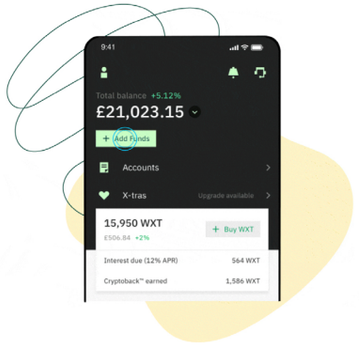
Norman D. (2010b), *op. cit.*

Norman D. (2010a), *op. cit.*

Saffer, D. (2010). *Designing for interaction: Creating innovative applications and devices* (2nd ed.). New Riders.

Hudelson, B., & Storus, M. (2017, August 7). *Blockchain and Design. Medium.* https://medium.com/hackernoon/blockchain- and-design-4ae7ae1694bc

Wirex (2021) https://www.linkedin.com/company/wirex-limited/



1. Get your account address

In the Wirex app, go to the cryptocurrency account you'd like to transfer tokens to and click 'Add Funds'. Choose the token you wish to send to your account. You'll be able to see your account address, QR code and other info like limits and rates.

Figure 4: *Wirex* get your accound address. Note: instructions from the Wirex's website on how to add funds to your account.

2. Initiate a crypto transfer

In the external wallet or crypto exchange, choose the token and enter the amount you'd like to send. Then, copy and paste your Wirex account address or scan the QR code when asked for the destination address. Finally, click 'send'.

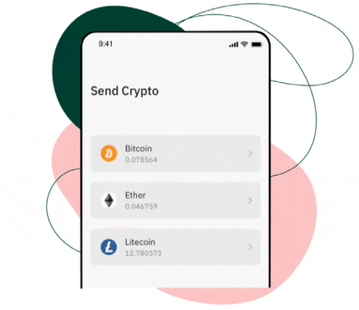
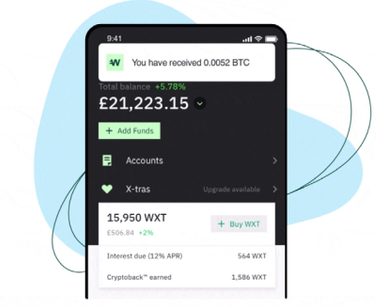


Figure 5: *Wirex* initiate a crypto transfer. Note: instructions from the Wirex's website on how to transfer crypto currencies.

Figure 6: *Wirex* receive funds. Note: instructions from the Wirex's website on how to verify that you received your funds.



3. Receive funds

That's it! The tokens should be in your Wirex account within 15 minutes.

Wirex (2021). [Wirex: Get your accound address] https://wirexapp.com/crypto-transfers

Wirex (2021). [Wirex: Initiate a crypto transfer] https://wirexapp.com/crypto-transfers

Wirex (2021). [Wirex: Receive funds] https://wirexapp.com/crypto-transfers

Atchley, D. (2018, February 5). *UX design for blockchain is still UX design*. https://medium.com/tandemly/ux-design-for- blockchain-is-still-ux-design-2a3e1dd15a99

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Norman D. (2010 a), *op. cit.*

products— which allows less financial-savvy users to use the service—the reputation of cryptocurrencies along with the novelty and lack of confidence on electronic banking solutions hinders the products success.

Given the above obstacles, it is unlikely that UX by itself can increase this technology's adoption. First, there is no one-size-fits-all approach in design, nor guarantee that a given solution will work. Each challenge is different, as every implementation of any technology brings constraints and possibilities. Nonetheless, there are some aspects with which UX can genuinely contribute to make not blockchain itself, but systems relying on that technology more appealing. And it can do so, paradoxically, by taking the focus away from the technology itself. As we should keep in mind that blockchain itself is not the product but the infrastructure that allows genuinely distributed solutions to be developed (Atchley, 2018).

The literature on UX and blockchain (Portable, 2019; Vishmidt, 2018) usually contends that users do not need to know about or even understand the technology. Users, we are told, rarely care about how back-end technologies work—we use HTTPS and AES encryption every day, and most of us do not know how they work. This assumption is in line with the HCD principle of understandability (Norman, 2010a) previously outlined.

In blockchain, as in every software-based system, features and nuances that have a substantial impact on the implemented model do not necessarily have to be communicated to the user; only when these features have a measurable/visible impact on the represented model and, therefore, on the users' experience. As a rule of thumb, users' cognitive effort should always be reduced to the minimum. That is true for technologies for which it is still possible to establish a clear distinction between implemented and represented model but should be even truer for blockchain-based products.

Blockchain is still far from being a mainstream technology integrated into widespread consumer products the way HTTPS is, for example. Albeit there seem to be many potential applications, in its current state and despite the publicity it has gained, it is still challenging to deploy blockchain-based systems that are not intrinsically related to finance (i.e., cryptocurrencies). Although in theory, it is true that blockchain and crypto markets do not have to be the same, in practice, it is not easy to separate them. Current tendencies to expand the use of cryptocurrency through NFT's and games that reward users with crypto coins might seem like a viable solution to increase the number of users, but the volatility of the currencies combined with the frisky nature of gamified experiences only seem to increase the percep-

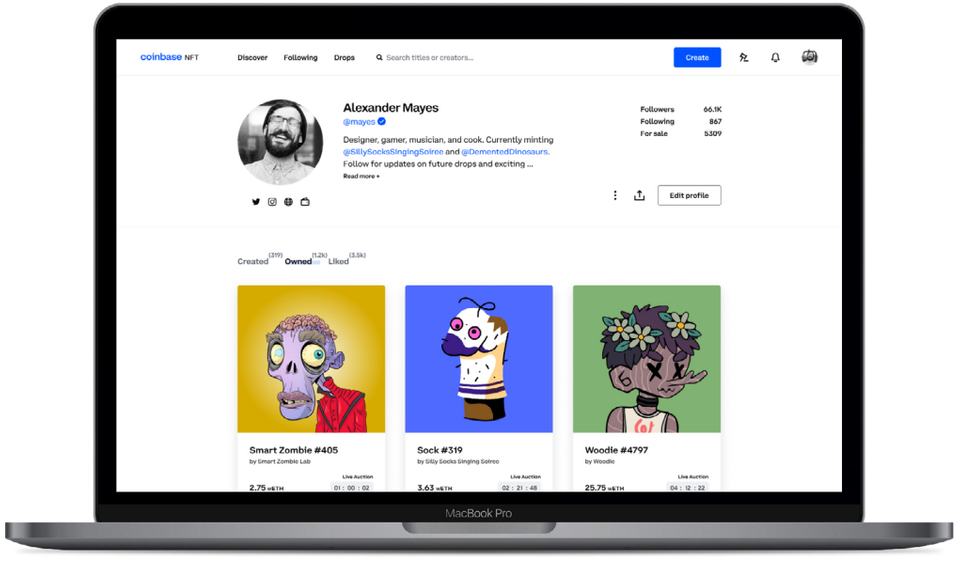

Figure 7: coinbase NFT prototype.
Note: mockup of the new digital marketplace by Coinbase.

tion of blockchain technologies as a niche hobby. We might speculate that in time, NFT platforms could move away from gamification, and morph into a Social Media experience. One example is Coinbase NFT, which characterizes itself as a "digital marketplace" for people to mint, collect, discover and showcase NFTs (Coinbase, 2021). Coinbase adopts many design patterns from Social Media platforms, which might ease the transition for users, and allow late adopters to become familiar with the technology faster.

Many technologies intended for keeping track of information and which could be potentially replaced by blockchain, are still quite efficient, so there is no need to blockchain them. Blockchain needs maturation before being able to revolutionize transactions at a broader scale. However, to do so, it does not have to become "sexier", but rather "boring". More importantly, instead of retrofitting blockchain into already functional systems, developers should implement it to address problems that other technologies have not been able to tackle. What should gain focus are the products that could be developed on top of it. This, however, means that designers should gain a deeper understanding of the technology; and not just UX designers but product designers with strong HCD mindsets. This is what we mean

Coinbase (2021) *NFT Waitlist* https://help.coinbase.com/en/nft/launch

Coinbase (2021, October 12) [*Coinbase NFT prototype*] https://blog.coinbase.com/coinbase-nft-is-coming-soon-join-the-waitlist-today-for-early-access-cc7bac29fd72

Saxena, S. (2021, October 12) *Coinbase NFT is coming soon: join the waitlist today for early access* https://blog.coinbase.com/coinbase-nft-is-coming-soon-join-the-waitlist-today-for-early-access-cc7bac29fd72

Glomann, L., Schmid, M., & Kitajewa, N. (2019, July). *Improving the blockchain user experience-an approach to address blockchain mass adoption issues from a human-centred perspective*. In International Conference on Applied Human Factors and Ergonomics (pp. 608-616). Springer, Cham. https://doi.org/10.1007/978-3-030-20454-9_60

when we argue that UX will not solve blockchain's limitations by itself.

Gaining a deeper understanding of the technology also means reframing how we think about various aspects of services. For example, we rarely conceive experiences provided by services as situations that are ultimately governed by contract relationships. We rarely understand service and product design from a legal standpoint. Doing so would give designers powerful insights about how to best design blockchain products, given that, for example, smart contracts are fundamental for the operation of BC2 and BC3 blockchains.

Numerous aspects need to be considered if we want people to embrace blockchain technology, as we need to improve the design of the blockchain products, but also consider other factors that might influence resistance against this technology. For instance, Glomman et al. (2019) suggest that users are lacking the motivation to change products, because they feel satisfied with their current choice. Therefore, learning a complicated new system is not a feasible option for them. In addition, the onboarding process in blockchain- based systems tends to be complicated, as existing services are built for and by a very niched section of the population with existing knowledge of finance and computing.

Blockchain by itself is not sexy; but it is not the designers' job to make it so; their job is to make products and services based on it sexy. By attempting to make the technology itself more palatable, e.g., using the system's internals as selling points, the technology will remain too visible. The problem with this approach is that is akin to selling the virtues of a smartphone's camera to a broad audience not by talking about image quality but by describing the mechanics of the algorithms in charge of auto-exposure.

As long as blockchain's technical features continue to be the focus, products built on it will remain far from the "do not make me think" paradigm of UX. As long as the only product available are systems for speculating with crypto coins—no matter how "killer" a given wallet app might be—the technology will remain constrained to a niche.

Concluding remarks and future work

This paper started by asking what are the main obstacles—from the point of view of UX—preventing blockchain technologies from being more broadly adopted and to what extent UX could remedy this problem. We saw that a good user experience has to do with how usable, useful, and delightful the interaction with a system is. Furthermore, those three aspects have a lot to do

with the understandability of the system's represented model, which implies good management of affordances, signifiers, and feedback; but most of all, a deep understanding of users' genuine needs and capabilities. Good UX, in short, is about shaping technology for people and not the other way around.

Blockchain technologies have been here for more than a decade, but they continue to be far from mature. While in theory, they can be implemented wherever data records need to be trustworthy, distributed, private, and immutable; in reality, they continue being a niche solution waiting for a problem. Part of it has to do with their intrinsic transactional/financial nature. Moreover, blockchain technologies are still back-end technology, not a service or product in their own right. For most advocates of the technology, this is well known, but it is still difficult to understand for the uninitiated.

This paper claims that it is unlikely that user experience by itself can magically increase the adoption of blockchain technologies, but that it can contribute to do so by making it as "invisible" as possible. That is, by helping to shift the focus away from the technology and towards the products and services that can be built on top of it. This is not (just) the job of "user experience" in the abstract, but of service and product designers with both a human-centred mindset and, more important, sufficient understanding of the technology itself.

In this sense, blockchain represents a challenge and an opportunity for innovating product and service design and rethinking the tools of designers themselves. Since blockchain is not just about the interaction between humans and complex software-based systems, but about the role of finance in contemporary life, monetization, privacy, immutability and trust, and, more importantly, about value.

As it stands today—i.e., a niche back-end technology that requires at least basic understanding of cryptography, programming, and finance that is mainly used for speculation with cryptocurrencies—blockchain faces a strong translation challenge not only in terms of implementation but also in terms of a value proposition. To outsiders, blockchain appears unimaginative and, at best, suspiciously linked to "funny business" (in the words of the head of the President of the European Central Bank) (Shalvey, 2021).

So far, this paper has been discussing the relationship between blockchain and user experience in abstract terms, that is, without referring to case studies. This approach is deliberate, for the discussion here presented is an initial step for stirring conversations on the topic and carrying out more research about it. Blockchain is seemingly here to stay, and interest on it will continue to grow, bringing more problems along the way, for this technology challenges our mental models about value and money, and about who gets to participate in the fast-developing world of digital finance. The more this world develops the clearer it becomes that designers willing to work in it require specialized knowledge and tools and new perspectives from which to approach it, for example, understanding that every service implies at its core a contractual relationship. Designers often neglect this legal perspective, but blockchain makes it explicit through the concept of digital contracts. To build understandable blockchain-based services and products, designers should accept that understandability should be expanded to finance and security. Ultimately, both designers and non-designers should accept that the key for broadening the use of blockchain technologies implies coming up with solutions that are specifically suited for it and not continue trying to retrofit blockchain into already functional systems. In other words, innovation through blockchain should be about innovating in blockchain.

Shalvey, K. (2021, February 10) *ECB president Christine Lagarde says it's 'very unlikely' that central banks will hold bitcoin in the near future* https://www.businessinsider.com/christine-lagarde-central-banks-unlikely-to-hold-bitcoin-soon-2021-2

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Lazio Making Network.

Digital skills for resilient cities and communities

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Great part of the scientific community agrees to consider the pandemic sanitary emergency as a ground experimentation to test resilience responses to the Global Climate incoming emergency as well as global economic crisis we are already experimenting. While the global isolation, maker spaces, Fablabs, and DIYers workshops were extremely active, proving the community resilience response capacity to disasters. The role covered by the global Maker community and the Digital fabrication technologies in the most diffuse and DIY declination, developing the social response to the sanitary emergency, is considered in this study as evidence of the relevant role of the Maker spaces network in determining the potential resilient response of territory. This study, suggesting a long-time scenario in which the local networks of digital fabrication SME, makerspaces and Fablabs work as an infrastructure, entrenched in the territory, affords the Lazio region case study as existing bottom-up Makers Network in order to develop the guidelines of a digital tool of coordination to improve its potential of social resilient response, stimulate social innovation actions, shared economies, and daily good practices of DIY resilient citizenship.

Keywords *Co-Design, Resilience, Making, Mapping, Digital Design.*

Introduction: pre-crisis maker economy landscape

While the people's participation necessary to determine a resilient approach is directly proportional to the stage of emergency (Folke et al., 2010) neither the social distancing, imposed with different ranks by governments as response to the virus pandemic spread in 2020-2021, could deny the social resilience response. Lockdown periods have weakened worldwide several bottom-up initiatives of local diffuse production of PPEs and sanitary supplies, actuated by the global maker community, early reacting to the deficient mass production and distribution. Maker Community response to the COVID-19 has been diversified and locally effective, with association and volunteer's task forces specifically created to address the necessity of new sets of primary goods that before the crisis were not considered for common people's use; finally proving the resilience potential of diffuse production widely theorized in response to the 2009 economic crisis (Anderson, 2014).

Most of the scientific literature is concordant with recognizing in Making Practices (MP), intended as the combination of digital fabrication technology and Open Design, a revolutionary potential to define more resilient development models. This potential was welcomed as a response to the 2009 financial crisis, and has been theorized in models of diffuse capitalism, such as the third industrial revolution, and social innovation (Rifkin, 2011). Models whose applications have been progressively substituted by remediation practices as in the case of industry 4.0 or redirected toward less open practices as urban living labs.

In this study, we will refer to the whole of DIYers workshops, Makerspaces, Hackerspacse, Fablabs and digital fabrication SME, starring the community response to COVID 19 as Making Network (MN) and the Digital fabrication technologies in their bottom up and DIY declination that make it possible as Making Practices (MP). Founding on those pillars the bases of a long-time scenario where policies of MP education and MN support could create an infrastructure of mediation between people and institutions to improve territorial resilience.

A pre-pandemic overview on the maker economy was showing an extraordinary proliferation of the MN. Metonymically referring to the Fablab sub-set, the network was reaching double its global number of Making Laboratories (MLs) each year and half until 2017 (Gershenfeld et al., 2017). Under a EU focus that trend referred to the whole of Fablabs and Makerspaces has passed its peak in 2015 (Rosa et al., 2017) and, as confirmed by further studies (Malakuczi et al., 2020), it has been decreasing in 2019. However, this transformation could be related to a progressive evolution of the MN itself towards more economically sustainable models. This evolution aims to a pursue a qualitative rather than quantitative one, related to the projects developed within the MN, leading the Research to wonder how the general context of the Makers reality is evolving, which no longer stands out only in the Fablab or Hackerspaces network, but extends to private companies, corporate initiatives and ML of a hybrid nature.

According to the Science for Policy JRC, stable policy and practical solutions to address new work challenges are more marginal in politics than in media coverage (Rosa et al., 2018). Local and regional Public Administrations (PA) assume the role of fostering Maker economies with specific policies and programs to consolidate existing bottom-up communities or to seed them creating top-down public living labs of entire networks, thus elevating a new infrastructure model demonstrated in examples such as the Barcelona Ateneus de fabricació to a European level.

In this context, the traditional entrepreneurial system found its weakness within a system that it has suffered, and it is still suffering from the effects of the pandemic. This increasing instability assumes an important role in the study of those systems, natural and social, which evolve in a non-linear and unpredictable way (Gandolfi, 2008), under the pressure of the interactions. The global emergency has broken into a crisis process that has already been underway and has dramatically accelerated its times. The problem of the future will not be that many people in industrialized societies will have difficulty in finding a job, but rather that the job itself or most of the jobs as we perceive it today will simply no longer exist (Daclon, 2020). This event constitutes an "historic" opportunity to envision solutions to all these long-term challenges in the form of what Schumpeter (1942) called "creative destruction". By making a parallelism between the integrated business system (Chandler, 1962) and the pandemic scenario, if we consider the phenomenon of distributed production based on participatory planning close to the community of makers, we see that also in this case a paradigmatic reversal takes place, in which the ways of "doing business" have adapted to these upheavals.

Makers are certainly not new figures, but during the very early stages of emergency they have earned a leading role thanks to an approach based on the use of widespread and low-cost technologies and in particular by relying on the very potential of the community and tools of participatory planning, that is, on the sharing of information and good practices. At the forefront of the health emergency we are experiencing, the community of these digital artisans has made an important contribution in the realization, practically 'on demand' and in a very short time,

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Chandler, A. D. (1962). *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*. Beard Books Inc.

of medical devices, from masks to breathing valves, recovering a part production capacity blocked due to factory closures or dispersed elsewhere due to globalization.

Territorial perspective: Lazio Case study

While on the one hand the pre-pandemic scenario has been characterized by a global trend toward neoliberal globalization generating two opposite political reactions: reacting anti-globalism and altering globalism for sustainability. On the other hand, this last altering-globalism whole of movement after lockdown experience has been fostering the large wave of social innovation from the reinforced social role of technology in supporting hybrid communities in the physical space. Such hybridization requires focusing on re-placing technologies "that re-create or reinforce the connections between people and physical places thanks to digital spaces" versus displacing ones "that moves people and their relationships out of physical places towards only digital spaces" (Manzini & Menichinelli, 2021). On that line, this research focuses on the physical territory, by affording the case study of the Lazio region territory to include several different productive contexts with a common PA and policy, to address the role played by the enabling technologies as a social mediator in which it is possible to recognize new ways of networking, transfer knowledge, developing competences even within a global crisis.

The study has been developed on 2 layers of investigations:

Mapping Makers Entities: to obtain an overview of the MN and MP in Lazio, showing number, localization, openness, and specialization of Fablabs, maker and hacker spaces, MP SME etcetera we have developed data mapping based on their web retrieved information and surveys.

Understanding Maker Community: in order to verify and evaluate the actual status of each maker community, in relation with their territory a ground investigation has been developed with a key person interviews campaign.

Due to the specific social distancing restrictions imposed during the pandemic, the field research on the Lazio region territory had been forcedly mediated by old and new telecommunication technologies. Despite the prominent role covered by technologies as subject of investigation and prevalent medium, the method of research itself looks at urban anthropological observation study as references, prioritizing, whenever possible, personal contact, networking and direct witness in order to not fall in tautological medium response.

Manzini, E., & Menichinelli, M. (2021). *Platforms for re-localization. Communities and places in the post-pandemic hybrid spaces*. Strategic Design Research Journal, 14(1), 351–360. https://doi.org/10.4013/sdrj.2021.141.29

Figure 1: Mapping Maker Entities_ Geolocalization of MP in the Lazio region territory: (right column) Entities classified as Pub-O, Pub-R, Priv-O. (left column and bottom) services and technologies offered, access and sharing policies, network of appartenance and projects practices of each entity.

Mapping Maker Entities

The mapping process has been developed through direct investigation on the digital presence of the MLs and community contained in the Lazio region perimeter, verifying, and completing data collection by keeping direct contact with each entity registered, by mail and telephone call and prioritizing interviews instead of proposing surveys.

More than 50 entities have been identified, analyzed, and classified referring to their managing model in Public or Private depending on technologies and machine sharing, and referring to their audience in Open, Referred or Close depending if are or not accessible to all public or only referred public. In this stage of research Close entities and Private Referred entities has been considered not pertinent, focusing the study on the 3 remaining categories: Public Open laboratories (Pub-O); Public with Referred Access laboratories (Pub-R); Private Open laboratories (Priv-O). Six categories of investigation have been recognized

in this context: range of services, technological implant, level of openness and sharing of projects, internal assets relative to customers care and involvement in projects developed within the structure and inclusion or relationship with a specific business network. The Research identifies a technologically up-to-date manufacturing infrastructure, which, however, seems to carry out activities more often below its potential.
The overview on mapped data is starred by the Fablab Lazio diffuse workshop, which is characterized as a network of public workshops distributed in all the region, complementary in tool's supply and similar for service offer. Remapping this set of data as one entity it is possible to identify a substantial undiscrimination between public and private entities not event in the access policies, suggesting a possible migration of managing from public to private models. Focusing on technological supplies, 3D printing is confirmed to be synonymous with digital fabrication present in 100% of entities, meanwhile big size CNC fabrication is missing, in a general low characterized MLs environment having only 1 wet lab and 5 textile labs. Focusing on service's offer, education is transversally offered in public and private structure while design service characterizes private ones. The shown access low discrimination is reinforced by general tendence to booking practice, decisive in the loose of those places' meeting and sharing role. The missing physical sharing does not look to be offset by digital sharing, underlining open innovation as a critical question confirmed by Network data that shows several isolated realities overlapped with missing project's policies.

Understanding Maker Community

In order to understand the Lazio Maker Community and evaluate its social value, skills and proximity impact, the researchers have developed an interviews campaign with those figures that for their profile resulted to be more relevant over their community and local activities. The 6 responders equally cover private and public sectors, representing 3 public Fablabs: a national foundation, a regional network of MLs, and a local Fab Lab; and 3 SME: a start UP, a 3D printing filament producer, and a 3D printing service. All responders, but the regional network coordinator, have design or art studies background and all cover responsibility roles in their laboratories. Interviews, that averagely last 2 hours each, have been carried on according to anthropological investigation methods, and ground theory, characterized by low structured questions - giving the opportunity to reach a topic throughout conversations - and holistic evaluation (including non-explicit commented context). Through

an informal chat, the topics of which were prepared directly by the interviewees verticalized on the theme:

- The role of the MP, between education and collaborative learning
- The role of MN and Community profile
- The role of Open innovation and Open-source sharing activities
- The PA role and MN challenge
- The digital manufacturer's future

In order to understand who, the users are, the interviews deepened in laboratories' audience selection and control management, confirming the progressive "closure" of the public ML toward more referred access models, based on project's selection by economic development potential. All the entities, but the startup, were actually born with educational vocation, and due to the pandemic restriction had to shift to services offer to find economic sustainability. Meanwhile public laboratories have shifted to schoolteachers training and research support instead of direct digital alphabetization, confirming the role of training courses in the economic model of all Maker laboratories.
Deepened in the community profiling: public ML profile their users as under 35 years old, with an academic background, while private ML are not able to profile or identify the territorial provenience of their customers, but the startup that affirmed to be still building its client base. Has been registered a diffuse miss use of characteristic sharing platform, in favor of professional relationships networks, based on person-to-person meeting and events of most famous global networks, or door to door relationships for SME. Focusing on open innovation role: public MLs affirmed that they do not open the design, sometimes justifying the practice with the necessity of protection of possible patents, while private MLs recognize OI as a necessity to allow SME development, but do not usually share design anyway for third party interests. All public MLs recognize the fundamental role of PA, sometimes affirming not to imagine a sustainable model of management without such support, improvable with a better communication of call and founding opportunities. Private entities complain of a delay in formal identification of digital artisan professional profiles.
Finally, responders have widely welcomed the idea of a digital tool to improve the maker's community network. This tool should include the possibility to look for professional collaboration, specify specialization of tools and skills for synergic production and project development, find call and funding chances, show events, and network opportunities, and promote the making culture to the general public.

These interviews highlighted 4 main problematic areas, two has been explicitly expressed by interviewer:

- laboratories founded by public institutions are shifting their cultural objective: from spreading digital culture and open innovation to economy booster and project incubator, with an increased focus on intellectual property. Meanwhile private institutions founded with educational objectives are obligated to Service practice for economic sustainability;
- furthermore, despite the differing opinions on the issue of the role covered as a "digital manufacturer", they commonly seem to still be economically indecipherable: that is, digital manufacturing has not yet found a stable and consolidated economic model within these spaces.

While other came from a vertical interpretation:

- a widespread misalignment between digital and physical identities: person to person design development is not corresponding with Open-Source design and sharing practices. It is not possible to define a proximity client's environment, even if the commercial network is mostly based on door-to-door relationships;
- regardless of the physical territory, there is a robust community characterized by strong, interdependent personal and professional relationships that do not correspond to a synergic vision of a new production/distribution short chain model. In fact, digital craft is not considered as a relevant alternative for mass production among the interviewed MLs.

To sustain MLs as spaces in which the sharing and co-design practices of the consolidated digital community come physically, new governance models are necessary. Development referments such as incubators and accelerators, active “for” and “with” local communities, acts in order to let those realities achieve economic and social goals (Smith et al., 2016).

Conclusion: Guidelines for a digital tool

The analysis has brought out needs, potential resources that if put in a systematic, and taxonomic way to understand them could benefit from the MN of competences the Research aims to build. Design as discipline becomes a transversal and transgenerational tool capable - and therefore responsible for - of educating citizens that assume the role of prosumer, capable of finding and producing solutions for the society itself. In order to do that, in the wide pool of tools, skills and competences originated inside the urban context, it becomes clearer the need of a systematic and taxonomic way to understand the potential on which to design those solutions.

The project, assuming a long-term scenario in which the local networks of digital manufacturing SMEs, makerspaces and Fablabs can act as an infrastructure rooted in the territory, investigates the current condition of these laboratories within the Lazio Region as an effective network of production in order to provide useful data for the establishment of guidelines that can be implemented for the coordination of an intrinsic creative potential as a resilient social response capable of stimulating social innovation actions, shared economies and good daily practices.

The digital tool in question is designed to act as a multi-sided platform for comparison and visualization of collected data. Acting like a map with individual nodes representing georeferenced MLs within the area, linking to each of these one of the values investigated and reported at the end of the map.

Starting from the investigations conducted for the establishment of a multi-sided platform that can facilitate the interconnection of these production centers. This tool aims to adopt a different research system that will not only return a clear picture of the technological and disciplinary system of the activity of urban MLs , but will stimulate the establishment of thematic bridges guided by the identification of specific practices initiated in the individual creative spaces. A "search for projects" that hopefully will be able to open up the possibility of setting up community-supported projects that hopefully will generate a response on two levels:

- Bottom-up: for which the community can express specific needs and ask other MLs to participate in the development of a specific project;
- Top-down: for which the PA, having a clear picture of the potential and the "project trends", will be able to realize its initiatives in proposals that can respond in a timely manner to the needs of the community itself.

This platform is currently under development and mainly aims to test and quantify the intention to network regional MLs. Different realities currently collaborate, design, and create within the region, but the different visions of doing business and of one's role as fabricators within the public affairs, keep the individual realities from opening up to each other unless they are previously dictated most often by personal contacts. Therefore, the goal is not to assume that it would be possible to create new networks and facilitate the way for connections to be created, but instead, that it is only necessary to put structure a playground for a possible network, that would more likely establish by itself, since the main characteristic of these transformations is that they are unpredictable and spontaneous.

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Dialogue between brands and visual arts.

The effect of Branding Art strategy on the public

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Brands and visual arts are a fascinating combination when articulated in the form of a Branding Art strategy. Although this association dates back to the 19th century, only the fashion segment has been able to produce substantial bibliography on the phenomenon thus far. This article aims to understand the effect of Branding Art on consumers accustomed to the traditional language of a large public brand outside of the fashion industry. To this end, the methodology adopted consists of a literature review, case studies and a two-stage field research (the first qualitative and the second quantitative) specific to the McDonald's fast-food chain - a well-established brand that, despite its traditionally led language, has recently launched Branding Art initiatives. The survey results served as the basis for an in-depth interview with a marketing director in order to understand Branding Art as a brand strategy. From the inputs of this interview, articulated with the research, resulted in a recommendation, although embryonic, of possible guidelines that justify and guide this strategy. In this context, this study seeks to analyze the effects and values perceived through the implementation of this branding strategy, thus contributing to a largely untapped field of knowledge.

Keywords *Branding, Branding Art, Visual Art, Visual Culture.*

Introduction

A concept was recently developed that encompasses the world of brands and the visual arts; called Branding Art, which refers to the "integration of a brand in the contemporary art system" (Reguera, 2012, p.1). It is a voluntary articulation that ends up defining fundamental aspects of a brand's image and strategy. Art, presenting itself in different ways, invades the field of brand communication and vice versa.

Although the term Branding Art was coined in 2012, this relationship is not particularly recent. In the last years of the 19th century, and until just over the second decade of the 20th century, the world of arts and brands walked together, so that several artists worked on communication pieces for companies (Díaz Gutierrez, 2010). Some schools stood out in this process, such as Expressionism, Surrealism and Pop Art.

In the 70s, however, a split occurred and communication ceased to be a matter of a person or an artist and became the exclusive property of the agencies' creative departments, coordinated by an artistic director (Díaz Gutierrez, 2010). Here, the fashion segment is excluded, which has always been very close to the world of visual arts, having not suffered this rupture. However, in the 2000's, we observe a new rise Branding Art manifestation has as a communication strategy from high-profile brands, many of them outside the fashion world.

Although individually the two universes have a wealth of bibliography and research conducted, there are few academic productions that relate them. Studies bearing in mind the consumers point of view and the impact of artistic languages usage in brands of massive range are still scarce. This research is specifically focused on the Branding Art strategy with the aim of exploring it from the point of view of consumers in high- profile brands, excluding those that are part of the fashion segment. From this perspective, case studies and qualitative and quantitative statistical research will be carried out. The qualitative stage will raise hypotheses to be evaluated in the quantitative stage. Thus, the aim is to answer the following research questions:

- What is the perception of traditional consumers about a brand that does not belong to the fashion world and uses references from the art world in its language?
- What values are added to the brands that promote this dialogue?
- Do these initiatives arouse public curiosity to seek more knowledge about the arts world, ultimately resulting in an educational role for the brand?

The elucidation of the above-mentioned issues will serve, therefore, to reach the broader objective of this article, which is, to explore this field still little explored by the academy: the relationship between the world of brands and that of the visual arts. The specific objective of the project, therefore, is to understand how Branding Art strategy is perceived by the public that is not used to this branding language. Thus, we seek to understand how the insertion of visual arts in the field of branding can affect consumers and what uses they can make from it. To dissect these questions, a brief analysis on Branding Art was conducted, using McDonald's as an example of a brand that uses art in some forms of advertising. Statistical research, both quantitative and qualitative, was carried out, aiming to define respondents' perceptions about two different communications approaches done by McDonald's.

The usage of Branding Art and its importance for the brands

From a theoretical and academic point of view, the Branding Art phenomenon is a response from the field of brand communication to the high competitiveness of brands in a context in which functional differences are of little significance (Herdero & Chaves, 2016). Thus, companies are forced to innovate in their brand language and references to the visual arts begin to emerge. In general, it is assumed that the use of references to the visual arts within a brand language context aims to add cultural value to a given product or service, generating luxury status for the brand (Herdero & Chaves, 2016). The incorporation of value to certain products and services brings them closer to something that already has well-established values, such as the visual arts; this proximity, therefore, produces the perception that these articles share the same status and meaning (Alberdi, 2002 as cited in Herdero & Chaves, 2016, p.100). In fact, there are some studies that already prove that visual art positively influences the perception and evaluation of products or brands that use it in their communication.

Marilson Kulak (2013) performed analysis that led to similar results. The author examined several printed communication pieces, aired between 1999 and 2012, which established a dialogue with artistic movements. The results obtained from the research demonstrate that, if on the one hand advertising uses the authenticity of works of art to promote its brands and products and raise its cultural value, on the other hand, it ends up producing a wide dissemination of works and artistic movements. There is, in this sense, two movements: brands that appropriate the artistic language to add value, differentiate and innovate, and, on the other hand, this movement increases the dissemination of works and artistic movements in society.

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Case Studies

To find the answers this study aimed for, three case studies were analyzed: Lego, Perrier, and McDonald's. They were chosen because they have brand communication initiatives that are inspired by the visual arts.

The Danish toy brand, Lego, stood out for carrying out a campaign in which it represents famous paintings from history with "Lego" pieces (Figure 1). The French sparkling water company Perrier, on the other hand, has its history crossed by the arts, with several initiatives in terms of product and communication. In terms of communication actions, the 2009 Melting Campaign stands out, a project inspired by Surrealism to create melted environments, where the only object kept intact were Perrier bottles (Figure 2). Below, the campaign headed by Lego (Figure 1) and Perrier (Figure 2).

Figure 1: Pieces from the Lego Masters campaign.
Adapted from Adsoftheworld. Retrieved from: adsoftheworld.com/media/print/lego_masters.

Figure 2: Melting Campaign by Perrier
Adapted from Adaddictive. Retrieved from: https://adaddictive.com/perrier-melt/

This article will deep dive in more details about McDonald's case since It was precisely this McDonald's brand French Instagram page that was the starting point for the development of qualitative and quantitative research.

McDonald's is a brand currently present in 199 countries, with more than 33,000 restaurants and is the largest fast-food chain in the world, being considered one of the greatest symbols of capitalism and the North American lifestyle. Such a large and powerful company naturally has a very creative team to work on the brand and its communication pieces. Over the years, some initiatives that made use of elements from the art world in their brand communication stood out.

One particular action took place in Sweden, in 2019, with the objective of promoting the new Big Mac Bacon. The campaign, coordinated by advertising agencies NORD DDB Stockholm, PR and OMD, envisioned the creation of a series of billboards using classic paintings. Works chosen for the action included Da Vinci's Mona Lisa, Vincent Van Gogh's well know self-portrait, and the iconic American Gothic, by Grant Woods; all paintings were displayed in their original versions, with the discreet addition of a piece of bacon (Figure 3). McDonald's is an interesting case of a two-way street; as can be seen, the brand makes use of references linked to the world of visual arts in its campaigns, but it is also used by artists in their productions.

Figure 3: Campaign to publicize the new Big Mac Bacon. McDonald's
Adapted from Chicago Business. Retrieved from: https://www.chicagobusiness.com/marketing-media/mcdonalds-added- baconmona-lisa.

This is the case of Banksy, an artist who has used fast-food brands in his works, but with a negative connotation. The artist, famous for his social criticism, often associates elements of McDonald's, such as the Ronald McDonald mascot or the well-known drive thru signpost, to the capitalist system to reveal his responsibility for wars and current social inequality (Figure 4).
In 2016, the brand management in France decided to launch a specific Instagram account for the French public. The action was carried out in an unusual way: instead of following in the footsteps of other countries, or even the brand's global account, which makes extensive use of product exposure, it was decided to contextualize the brand and its products in various situations that refer to popular culture or the visual arts, as highlighted in some examples of posts below (Figure 5).

Figure 4: Banksy's works criticizing the capitalist system
Adapted from Ad News. Retrieved from: https://adnews.com.br/banksy-provoca-mcdonald-s-em-nova-escultura/

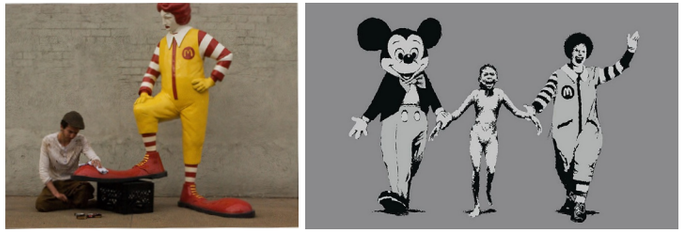
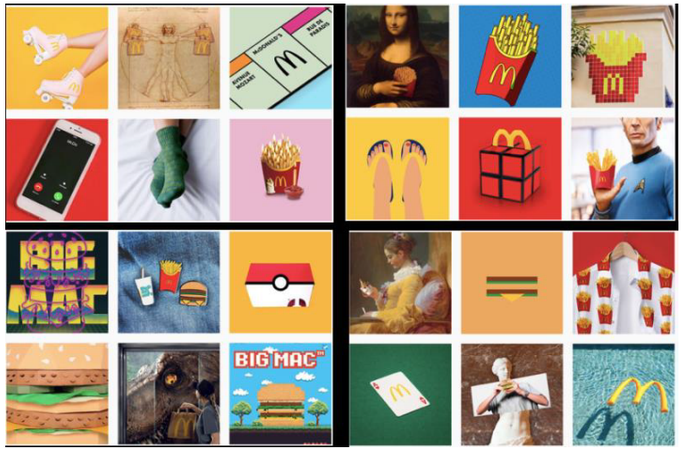


Figure 5: The brand's French Instagram page
Adapted from Instagram. Retrieved from: https://www.instagram.com/mcdonaldsfrance/?hl=en



Nascimento, L. (2020). *Diálogo entre marcas e artes visuais: O efeito da estratégia de branding art no público* [Master degree dissertation]. IADE – Universidade Europeia, Lisbon, Portugal

Survey

Frame and Methodology

To accurately analyze the perception of consumers about the use of art in a brand's communication, a statistical survey was conducted in two steps: a qualitative in death questionary followed by a quantitative questionary. It happened between January and May 2019 through online questionaries targeting lusophone audience. The conducted survey consisted of comparing two Instagram pages of the McDonald's brand: one with traditional advertising language and the other with a notable allusion to elements from the field of visual arts. McDonald's was chosen due to its closeness to the consumer's imagination and since it is a brand identified by consumers as anchored in a traditional advertising language. The full research can be found at Nascimento (2020) master thesis and this article will point out the highlights of it.
Statistical research was carried out through the comparison and analysis of two sets of images; the first set was taken from the brand's international Instagram and is enhanced by a more traditional branding language focused on the product and stimulating consumption; the second set is inspired by the universe of pop culture and visual arts to develop communication pieces, such as those selected from the French Instagram page of the fast-food chain. The two sequences were shown to the Portuguese-speaking public, online, using a Google Forms platform. The population of respondents is predominantly Brazilian, but there are also Portuguese respondents and those of other nationalities. A survey took place in two phases, one qualitative and the other quantitative. In both phases, an assembly was presented simulating the McDonald's Instagram pages, North American (C1) and French with artistic inspirations (C2).
As can be seen in Figure 6, the C1 contains product-oriented photos; the C2, on the other hand, has photos that allude to the visual arts and were chosen based on the biggest engagement rate from French McDonald's page in Instagram (at the date of the survey). On this page, the following works were represented: Vitruvian Man (1490) by Leonardo da Vinci, also author of Mona Lisa (1503); A Girl with a Watering Can (1876) by Auguste Renoir; American Gothic by Grant Wood; and A Young Girl Reading (1770) by Jean-Honoré Fragonard. In addition to these, respondents could also see the statue of Venus de Milo, which is in the Louvre and dates from the 2nd century BC, the statue of Apollo de Belvedere, which dates from the same century and is now kept in the Vatican Museum and, finally, images that allude to the Dutch painter Mondrian, in the style of Pop Art and an illustration of still life whose author was not possible to identify.

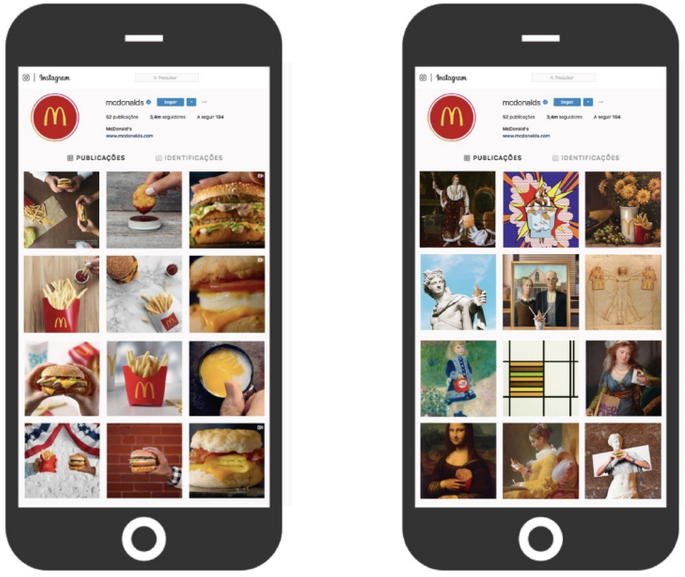


Figure 6: Comparison between north American (C1) and French Instagram account. Adapted from Instagram. Retrieved from https://www.instagram.com/mcdonaldsfrance/?hl=en; https://www.instagram.com/mcdonaldsfrance/?hl=en.

It is important to point out that respondents were not informed about the source of the original images. The fact that C2 was extracted from the brand's French page, is in the French language and has a limited number of followers, indicates that it is not disseminated worldwide, especially by Portuguese speakers; these have the brand's own Instagram pages, which, by the way, are much more similar to the institutional version than to the French one. The objective of the qualitative questionnaire was to raise some possibilities to be evaluated in the quantitative questionnaire. It was applied in January 2019 and had 12 Brazilian respondents. From it, a series of characteristics of the McDonald's brand were raised to be evaluated at a later stage.
The quantitative approach was developed from the inputs produced by the qualitative questionnaire; its objective was to analyze and deepen some questions raised by qualitative research. Furthermore, the quantitative questionnaire sought to identify the respondents' preference about the indicated sets and, more broadly, to verify what effects the insertion of artistic references can produce on the consumer.
Its application took place between February and May 2019 and had 151 respondents.

Both questionnaires provide a common section for understanding the educational bias that can be derived from this dialogue between brands and the visual arts. In this part of the questionnaires, there is a quantitative dimension, as the number of known references among those presented is questioned, and a qualitative dimension, as the respondent is encouraged to name the references he knows. This block concludes by asking whether the respondent, faced with images endowed with unknown artistic allusions, would feel encouraged to research more on the subject. Finally, the questionnaires collect demographic data from respondents, such as age, nationality, educational and academic background, in order to verify whether there is a tendency to respond to any specific segment. In the case of nationality, although it was initially intended to draw a parallel between Portuguese and Brazilian respondents, this analysis proved inconclusive due to the disparity in the number of responses; the number of Brazilians interviewed was almost five times greater than that of Portuguese.

Qualitative survey results
The qualitative research took place online through the Google Forms platform, with 12 respondents of Brazilian origin. Nearly two-thirds of the sample declared to be between 25 and 30 years old and have completed or ongoing higher education, which demonstrates a sample with a young and educated profile. The backgrounds are quite diverse, including three Marketing professionals and one respondent for each of the following areas: Law, Economics, Hospitality, Architecture, Engineering, Finance, Communication, Psychology and Social Sciences.
In relation to C1, which has the traditional configuration of the brand, two universes of responses stood out, one in relation to content and the other in relation to form:

- Regarding content, two biases were verified: on the one hand, there is an allusion to a commercial character, with quotes such as “product-oriented”, “commercial”, “advertising”, “product photos” and “McDonald's photos”; on the other hand, the action is taken into account, such as “stimulates action”, “juicy”, “let it go”;
- Regarding the form, there is a consensus about the organization of the photos. Terms such as “coherent”, “organized”, “repeatable”, “clean” and “solid” were used.

The same question was asked in relation to C2 and the results can be expressed in two large groups of answers:

- The first refers to a surprise factor, not expected, when mentioning terms such as “innovative”, “original”, “daring”, “differentiated”, “concept”.

- The second concerns the attractive content presented, characterized as “fun”, “artistic”, “creative”, “entertainment”, “interesting”.

When asked what they thought of McDonald's using artistic references in its communication with consumers and if this changed their perception of the brand, there was almost a consensus that this initiative is welcomed and this would represent a positive change in the way it the brand is seen.

- *It changes my perception in a positive way, as it shows a sense of humor and originality*. Respondent aged 18-24, higher education in communication
- *It makes the McDonalds brand cooler and more modern*. Respondent aged 25-30, postgraduate in economics
- *There is a positive change in my perception of the brand. I can see the brand more intelligently!* Respondent aged 25-30, Master of Laws

Respondents were also asked about their preference for Instagram pages and there was a large split in responses. On the one hand, 33% of respondents said they prefer more traditional content, as they consider it more relevant and consistent with the brand, in addition to arousing the desire for consumption. On the other hand, 50% say they prefer the second, as it is more original and creative, with more pleasurable content to access. 17% of the participants said they had no preference for any alternative, especially considering that it would depend on the occasion.

- *Although I really like the originality of the second Instagram, I still prefer the first one as it becomes cleaner and the exposure of the brand and its products is more prominent*. Respondent aged 25-30, postgraduate in marketing
- *The first one, because I like to see the food up close, details*. Respondent 25-30, higher education in social sciences
- *2nd, because the playfulness of brand insertions makes social media content more interesting*. Respondent aged 31-35, higher education, professional experience in marketing management
- *The second, because it's a more interesting and creative Instagram in the long run*. Respondent aged 25-30, postgraduate in digital marketing

Quantitative survey results

The quantitative research was carried out between January and May 2020 and, like the qualitative research, it was applied online through the Google Forms platform. At this stage, the survey had 152 respondents, with representatives of all age groups, but with a concentration in the range of 25 to 30 years, followed by range from 18 to 24 years. Together, these two subgroups

account for more than 70% of respondents, indicating a predominantly young sample.

The investigation phase begins with exposure to respondents on the two pages C1 and C2 (Figure 6), just as in the qualitative phase. As already indicated, C1 contains images of the classical approach and C2, images with references to the visual arts, making use of the Branding Art strategy. Respondents were not informed about the origin of the images they viewed. From the adjectives used by respondents in the qualitative research phase, three specific attributes were selected: interesting, fun and creative. Those adjectives had essentially been used to describe the experience with C2. In the quantitative stage explored here, respondents were asked to indicate, between C1 and C2, the set of images that best suited these selected attributes. The results confirmed what was raised in the qualitative stage, that is, C2 appeared, again, as the predominant reference in relation to the three adjectives. The term fun, for example, had almost 85% of consideration; and creative, in turn, surpassed the 90% mark.

An attribute that did not appear in the qualitative phase, but that the literature review revealed to be of great importance was the possible premium or luxurious aspect that a Branding Art piece would have compared to the same stimulus without artistic connotation. When asked which Instagram is more premium, 61.2% of the sample claimed to be second, also following what other studies that tried to explore the art infusion process suggested. This percentage is quite similar to the one that characterizes C2 as “interesting” (61.8%). This means that both premium and interesting features, although associated with the Branding Art process, are not as definitive as the “fun” and “creative” attributes, with 84.9% and 90.8% of occurrences.

The next section of questions specifically addresses the perception of C2. The objective of the question is to understand the possible changes in perception from the use of Branding Art and to verify if the public's curiosity is stimulated in the sense of researching and knowing more about the references used.

First, it is asked how the use of artistic references in C2 alters the respondent's perception of the brand. Almost 54% of respondents said that the perception is changed in a positive way, 32.2% consider that it does not change, while less than 14% believe that the perception of the brand is changed, but in a negative way, indicating a low rate of rejection of the Branding Art strategy. In addition, respondents were encouraged to answer the reason for the previous choice, openly. All 152 answered this question, which will be analyzed separately, according to the previous choice, starting with the least expressive group and ending with the most significant:

▪ For the 13.8% who considered artistic references in the brand's language as a factor that negatively alters the perception of McDonald's, the use of this strategy sounds like a lie to consumers, as they are accustomed to a product-focused bias, which is well accepted. Running away from that would be like breaking your promise.

- *Because I don't think it has to do with the company so it would be like an opportunism*. Respondent aged 25-30 years, Brazilian origin, high school and acting in the audiovisual field
- *Try to go down a path that is unrelated. As a fast-food brand, I hope to see something related and not relate this theme to paintings, stories or others*. Respondent aged 25-30, Portuguese origin, higher education in architecture
- *It lies to me in a way that makes me believe that Mc Donald is a brand that cares about art*. Respondent aged 25-30, Brazilian origin, higher education in design

▪ For the 32.2% who stated that the Branding Art manifestation did not change their perception of the brand, they specifically cite tradition and the fact that they have an already established imagery about the brand. Thus, Branding Art strategy would not be enough to change the brand's positioning.

- *I've had a lot of exposure to the brand in my life, changing the image I have of the brand may take a while*. Respondent aged 31-35, Brazilian origin, higher education in business
- *It does not change as it is already a known, consolidated and standardized brand*. Respondent aged 31-35, Brazilian origin, postgraduate degree in law
- *It doesn't change my perception of the brand because the products it sells remain the same*. Respondent aged 18-24, Portuguese origin, higher education in design

▪ 53.9% considered that there was a positive change regarding the use of artistic references for the Mc Donald's brand. This new perception is qualified in a very similar way to the characteristics that have already emerged in the previous questions, such as "unexpected", "innovative", "creative" and "interesting". It is also worth noting that some respondents even claim to become interested in the brand when they see it carrying out such an initiative.

- *It's something I haven't seen any brand do so far, and because it's a topic I like, I would see it as a fun and interesting advertisement*. Respondent aged 18-24, Brazilian origin, higher education in design
- *It makes it more interesting. I often don't want to just see food, food, food. I like them to bring something else to the conversation*. Respondent aged 25-30, Brazilian origin, graduate in fashion

- *For bringing humor, surprise. It conveys [the image of] a creative brand, which will always want to surprise its audience, which is tuned in to what happens in the world, as it is a modern language*. Respondent aged 36-40, Brazilian origin, postgraduate in advertising
- *I would start following the brand on Instagram and liking the posts (nowadays I don't)*. Respondent aged 18-24, Brazilian origin, higher education in Advertising and Propaganda.

The solidity of the brand's image and positioning in the market is one of the factors that appears as a justification for a negative or indifferent perception in relation to Branding Art strategy. Those with a negative perception indicate that the brand seems to hurt its own values by producing associations with the visual arts. Still, a significant percentage perceive the action positively, highlighting its innovative, creative and independent character.

The questionnaire is followed by a question common to the qualitative stage of the research; in it, the aim is to quantify the references known by the respondents. Only 3.3% of respondents said they did not know any reference, while the majority, 28.3%, said they knew from 1 to 3; 27.6% know from 4 to 6 works; 25.7% demonstrated science from 7 to 9; and, finally, 15.1% responded that they had knowledge of 10 to 12 of the figures presented, which is the maximum number.

This data is interesting, above all, because it shows a very high parity of the intermediate alternatives, from 1 to 9, with a small percentage variation between them. This information differs significantly from the percentages presented in the qualitative stage; In it, 41.7% said they knew 4 to 6 references, the same percentage that recognized 7 to 9. The remaining 16.7% said they knew 10 to 12 images. In the qualitative stage, there were no responses for the interval 1 to 3 references, an option with the highest percentage in the quantitative stage. This just demonstrates the inconclusive character of such a small sample in the first phase of the investigation. Respondents were also asked to answer which artworks they recognized most deeply. This time there was a great convergence with the qualitative questionnaire, with emphasis on Mona Lisa with 57 mentions, in addition to Leonardo Da Vinci or just Da Vinci, which add up to 48 citations. It is interesting to note that sometimes the name of the Italian painter appeared in place of the Mona Lisa or appeared in the same answer, possibly also referring to the Vitruvian Man, cited 27 times. Next, Mondrian was identified with 25 mentions, Venus de Milo with 19 and Renoir with 11. Grant Wood was cited 6 times and Fragonard only 1. Pop art stands out as the style cited by 39 respondents.

Also noteworthy is the number of mentions of artists who do

not have works represented in the 12 selected images but are cited: Van Gogh (19 times), Monet (10 times), Picasso (9 times), Tarsila do Amaral (4 times) and Manet (2 times).
From this analysis, it is possible to conclude that there is a basic popular knowledge about the artistic references used in the McDonald's brand Instagram. Thus, although a portion of respondents did not choose the range from 1 to 3, but rather intervals with more references, when asked to name them, a part only managed to cite 1 to 3. That is, there is a mismatch between the number known references and their naming/identification. The most recognized include Mona Lisa, Leonardo Da Vinci and Vitruvian Man or Piet Mondrian.
Finally, it was questioned whether, given the lack of knowledge of any of the exposed references, the respondent would be interested in seeking their origin. Almost three quarters of the total of 152 respondents said they would be interested in doing so (Graph 13). This answer confirms the possibility that Branding Art strategy has an educational role in stimulating the search for knowledge.

In-death interview with Marketing Direction Miriam Squeo
As previously indicated, the main objective of this research was on the side of consumers; thus, it was intended, through a quali-quanti research, to identify how they understood and received branding strategies imbued with artistic references. To go deeper in the investigation, in order to clarify some opaque points revealed by this research and, furthermore, to understand how brands think and develop marketing strategies with artistic references, an interview was conducted with Miriam Squeo, Marketing Director of L'Oréal Paris in Brazil, with the product development scope for all categories: skin care, hair care and sun care. The interview was of the semi-structured type. Thus, a previous script was elaborated, but as the interview progressed, new questions and issues were developed. The initial script sought to understand, essentially, how a marketing strategy is conceived and in what ways art can appear as an ally in this process. As highlights of the interview, this notion of fostering education is also reported by the Marketing Director as one of the justifications and purposes for the use of Branding Art. In addition to this educational role, she pointed out other reasons for using this strategy: the possibility of speaking to a new audience and the association of new values to the brand.
Besides, an interesting aspect raised is the limits of Branding Art and the importance of its consistency with the identity of a brand, product, or campaign. As seen in the quantitative stage, the preference for the imagery set with artistic inferences is

not enough to change the image that consumers have of the McDonald's brand; there is a tension between the traditional code of the product and its language and the adoption of a way of communicating that makes use of art. In this sense, one of the main conclusions of this work is that Branding Art has a relevant role for brands, but that it is not absolute and, above all, it needs to be used with intelligence and consistency.

Conclusions

This survey was guided by three major questions: what is the perception of consumers about a traditional brand that makes use of Branding Art; which values does this strategy add to the brand and product; and, finally, whether Branding Art can produce, as an effect, the incentive to knowledge.
On the first big question, there was a split in the answers. Although the set of artistically inspired images has been associated with adjectives such as "interesting", "creative" and "fun", there is still a greater association of the McDonald's brand with its traditional imagery representation, which demonstrates the strong associations that the McDonald's brand fast food has nowadays. In this sense, we can understand that there is a significant positive perception, but not unanimous; many respondents understand that the Branding Art strategy applied specifically to the company's communication pieces sounded as not true or not coherent with the tradition and positioning of the brand.
Regarding the values added to this strategy, most respondents understand that the insertion of artistic references has a positive connotation. There is an emphasis on adjectives that evoke creativity, innovation and even a more luxurious appearance, with the term premium.
Finally, on the educational aspect of the strategy, it was found that it is possible that actions imbued with artistic references incite the search for new knowledge. Nearly three-quarters of respondents said they would be interested in researching the origin of unfamiliar artistic references on fictitious Instagram. Although definitive conclusions cannot be drawn from just one question, it indicates a possible role education of brands that make use of Branding Art strategy for the language of their brands. To have this confirmation, it would be necessary to carry out a more in-depth study on the subject.
This study presents relevant conclusions that contribute to a field that is still scarcely explored: the relationship between brands (excluding those in the fashion segment) and the world of visual arts; and aims to contribute to further debates and research on such an interesting topic that brings together art, design, visual culture and brand strategy.

Track 5
Design for Digital Interactions And Communication

Long Abstracts

INTRODUCTION TO INTERACTION METHODS THROUGH THE USE OF RTR PROCESSES

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This communication proposes the use of RTR (Real Time Render) systems in design processes through a system of interaction between design methodologies and transdisciplinary actions that allow a more sustainable design and communication of the design, communication and interactive process. The research stems from direct experience through participation as a researcher in the industrial research project STREAMER commissioned by the company ASSO and developed through the Research Body InResLab scarl in 2019.
The system is aimed at the design world and in particular at architects, industrial designers, interior designers, manufacturing companies, communication companies and presents techniques and methods developed to meet the representation requirements and to guarantee the predictive analysis required by the design and communication of the creative and manufacturing industries.
The process is designed to manage, with a single media, digital 3D models displayed in real time at high quality, combining in its workflow the process of design (concept, to prototyping and realization) and interaction (representation and choice).
Its objectives are to visually organize, present and navigate virtual environments, make the representation process easier for the designer, enable better design quality, and avoid interpretation errors throughout the process. They also make it easier for the client to understand the new space or product, and lead to considerable savings in (physical) communication costs and time-to- market for the manufacturer.
In this context, RTR techniques make it possible to use digital virtualization systems of models, which are able to simulate reality, allowing the operator to relate to it in an interactive junction, thus activating direct design techniques based on perception (as opposed to metaphorical design), which consist in designing the artefact as it will be and not just representing an interpretative scheme (the usual design method).

Keywords
Interface, Interdisciplinary, Transcript, Interconnection, Interactions

The objective of this research path is to evaluate the usefulness of the introduction of RTR in the digital transition of the production, commercial and communicative spatial, manufacturing and interactive multimedia representation fields related to them. Innovations compared to the current state of the art do not relate to the purely physical or computerized aspects of research, but to the applied aspects of the use of methodologies within a sustainable pathway.
The research developed is certainly an excellent starting point for possible future implementations. In spite of the various complications encountered during its implementation, and although the realisation of a hypothesized virtual space is today only possible with recent and expensive innovations in the field of software and hardware, there is a good chance of making these interactions of processes and disciplines more accessible to a different and greater number of users.

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DESIGN & TECHNOLOGY: MEDIATION BY DIGITAL ADVENTS IN AVATAR THERAPY

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This research presents an analysis of Avatar Therapy, a method of treating auditory hallucinations for patients with schizophrenia through images that supposedly represent the voices that people with schizophrenia hear.
The objective proposed here is to understand how the aesthetics of these images can successfully produce their therapeutic effect through design and technology tools. The study conceives the therapeutic process as an intersemiotic mediation and translation. In addition, it aims to analyze the processes of figuration and representation and the characteristics of the graphic software.
It is an internal validity study with external validation capacity in its applicability and generalizability character. The research modality performed here fits (1) in the theoretical scope for aiming at fundamentals and structuring systems that can help in improvements for the development of Avatar Therapy; and (2) in the bibliographical scope for recovering the scientific knowledge of C. S. Peirce's semiotics and applying it to the design of this therapy images.
The framework of the research objective is given in an analytical explanatory character, as it tries to identify determining factors for the occurrence of Avatar Therapy effectiveness in a speculative, observational and experimental way. Thus, the approach used here is qualitative, as it seeks particular aspects of the relationship between design and technology in applying this type of therapy.
The research results indicate that Avatar Therapy is not just the materialization of a hallucinated voice but the facilitator of immersion in reality. It demonstrates the need for a deeper understanding of the digital sensory environment, the simulated environment's aesthetics, and experiential design in the digital environment. This reality made possible by the virtual process of the therapy is given by a numerical and logarithmic language created to correspond with the patient's hallucinatory pro-

Keywords
Schizophrenia, Avatar Therapy, Intersemiotic translation, Figurativity, Representation

cess. This simulated environment can also be evaluated under aesthetic aspects since technological environments can mobilize perceptions with sensitive qualities.
In this context, Avatar Therapy avatars must be understood from reproducing something that is not visibly identified, not even by the patient. Thus, computational language and the pertinent intersemiotic translation process itself demonstrate that the search for figurativity must be allied to the context of representation, as these images must allude to a previously hallucinated reality arising from computational logarithmic data.
It reveals a type of imagery representation that promotes the study of languages in the evolution of treatments for schizophrenia that are not based on the use of antipsychotic drugs.

INTERACTIONS TO BE: THE CASE OF SPECULATIVE INTERACTIVE PRINT MEDIA

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Keywords
Interactive print media, Interaction design, Speculative design

Research Scope and Goals

An interactive presence in print media is a claim with some time, motivated in part by a presumed threat over the production and distribution of communication media that are gradually disappearing. Replacement of print-based media by digital versions and the fact information passes from physical to interactive environments, with generalized and uninterrupted access, made those who value close relationships with materials stand out (Ballatore & Natal 2015), realizing print media experience and influence on our thinking and on our perception of the world was endangered.
Print media occupy a great importance in our information needs, although they span through different activities. They contribute to knowledge acquisition, daily tasks, content distribution or mobility. Their tradition and functionality is based on the notion of 'mass media', – the sharing of the same communication media for most people –, which contrasts with interactive digital media and their functioning designed for individual choices.
With the emergence of the Internet and computerized devices, we have been witnessing a progressive decrease in the use, purchase and circulation of print media. Digital alternative (Carreiro 2010) brings convenience, speed and simplification of access, facilitating tasks and operations, while presenting us with opportunities for participation and generation of personalized content. But also, a marked influence on cognition, literacy and development of younger generations (Larson, 2015).
Digital technologies approach to print media has led to the appearance of objects with electrical circuits, sensors or QR codes that provide transition from print to digital or examples of augmented reality on smartphones. However, these creations do not retain haptic properties of paper and analogue reading and do not consider user interaction. Therefore, several proposals have appeared to combine concerns about the disappearance of print media with digital media interactive capabilities (Rekimoto

2002; Holman et al. 2005; Watanabe, Mochizuki & Horry 2008; Lahey et al. 2011; Girouard, Tarun & Vertegaal, 2012; Khalilbeigi et al. 2012; Tarun et al. 2013; Peiris & Nanayakkara 2014; Heibeck et al. 2014; Wegrzyn 2014; Kelaidis 2015), which challenge established conventions of our relationship with them.
Endowing print media with an interactive capacity has faced material, procedural and technological difficulties, inherent to an apparent print/digital dichotomy, which has faded (Wiberg 2018; Höök & Löwgren 2021). But also, difficulties in accepting transformations, in which remaining print media are filled with new possibilities of contact with people and new combination of elements where lasting materials are positioned to maintain haptic and sensory features. This physical existence offers interesting advantages for designers to know and work with, as they allow storage of large amounts of information for a long time; they can enhance experience, through touch and smell; they resort to tangibility, making use of texture; and do not depend on electricity to function.
In this paper, we identify and characterize works that resort to printable related technologies where interactive features are paramount. Interaction and design processes have the potential to associate a multisensorial perspective and behaviours with print media, helping them to preserve importance and contribute in an innovative way to the hybrid physical/digital landscape.
Our research deepens an understanding of interaction design approaches and their application to print media, by stating conditions and interactive ways to create and develop products and systems involving print. It leads to an appreciation of print produced objects as non-digital or hybrid interface, recognizing the main means for these proposals to be effective or relevant.

Study

We have conducted an exploratory study of print related media as interactive systems. We present different types of print media, their characteristics and relevance for interactive purposes.
We analysed factors that interfere in the relation of print media with interaction features, observing cases where the attempt has already been made, noting technological possibilities and constraints, as well as materials that support them.
We reviewed main literature regarding print media typologies and its challenges facing electronic publishing and availability.
We also collected several projects as examples of print media being understood or connected with interactive systems. For each project, in addition to a synthesis description, we noted the type of media, materials and technologies used and types of interaction.

Methods and procedures

Literature review

Print is an essential part of our culture and society, as a production technology and way of communication. Recent resort to distance learning has enhanced inequalities and digital exclusion, as it remains out of reach for at least 500 million students worldwide (United Nations, n.d.), increasing the need to maintain print materials. Imposition of online classes has emphasized difficulties for some students to keep up with school and over digitalization of services tends to exclude individuals with no or difficult access to the internet (Gomes 2020). On the other hand, reading on paper is still more effective than on screen (Mangen, Walgermo, & Brønnick 2013; Delgado et al. 2018), while learning online competes with entertainment sources leading to dispersion. Textbooks are then essential instruments to support writing, reading, and learning mathematics; the materiality of books is still fundamental to successful learning (Silva 2019). Despite this it is understandable to adhere to digital situations, where people have been a central point when planning actions and functions, and where some characteristics of mediated interaction can be well observed, as most are aimed at a multitude of recipients (Thompson 2018). These media have a direct and indirect influence on our experience of print media (Tapscott 2009), since we can observe other ways in which objects are proposed to people. But the relationship between print and digital media has not had the desired effect. Techniques such as QR codes or augmented reality had a sense of novelty quickly overcome. Simultaneously, there are positive results in the combined reading between printed books with e- books and audio-books (Larson 2015), readers have more memory of a story read in printed books than in e-books (Mangen, Walgermo, & Brønnick, 2013), or that compared reading comprehension reveals print media advantages (Delgado et al., 2018).
A common point that stands out is interaction, understood as a physical sequence of actions and reactions between a human being and that which surrounds him (Heeter 2000). Although interaction design emerged in a context of digital technologies and human factors, there is still designer's intervention as creative mediator, in evoking situations and languages for the future (Mazé 2019). Interaction design acquired a multidisciplinary character (Blevis & Stolterman 2008), gathering knowledge of psychology, sociology or education and simultaneously, involving tasks and elements of graphic design, product design and architecture (Höök & Löwgren 2021) while implying user participation with alternate messages over time. Norman (2013) defends interaction as something that must be oriented towards the use

given by people, even in an analogue way. Dubberly, Haque and Pangaro (2009) also note it when observing interaction with static and dynamic objects, moving interaction away from technological dependence, but closer to the medium in which it manifests itself. Some devices and systems are designed so that the physical part is decisive in interaction. Recognition of physical elements as necessary for interaction is related to technological contributions, such as portable objects and wireless networks. However, interaction in physical environments leads us to three-dimensional objects. Margetis, Antona and Stephanidis (2015) state situations to allow natural interaction with physical 'smart objects', although, such an effort has not been made with paper, which is a material that can become interactive through 'technological augmentation', with the advantage of providing interaction in a more immediate way. Paper is present in various objects with which we already relate and its interactive inclusion is beneficial because it does not become intrusive.

Print media characterization

We started a characterization of print media by understanding it as communication and knowledge materials, subject to creative intervention and meant to instruct, communicate, educate or be a combination of all this (Caldwell & Zappaterra 2014). Different categories can be identified such as books – including school textbooks, catalogues and brochures –; periodicals, as magazines and newspapers; promotional media, as posters and billboards; packaging; and others such as signage and merchandising materials (Kipphan 2001). There is a wide range of printed artefacts for different types of users and contexts (Kipphan, 2001) which influences their characterization. They vary in intention, sector of activity, relation to information and material production.

Interactive print media examples synthesis

We gathered, described and analysed eleven projects with different types of interaction levels and depths, made using technologies and materials where printing and the possibility of interaction are highlighted:

- SmartSkin (Rekimoto 2002), a table and a tablet to introduce a new sensor architecture for the design of interactive surfaces sensitive to touch and gestures;
- PaperWindows (Holman et al. 2005), a window-like environment that simulates the use of flexible 'paper' displays in digital shape;
- Bookisheet (Watanabe, Mochizuki & Horry 2008), a prototype of bendable interfaces for browsing content based on the metaphor of leafing through the pages of a book;
- PaperPhone (Lahey et al. 2011), a smartphone-sized flexible E ink display to evaluate bend gestures in performing tasks with a flexible display;
- Display Stacks (Girouard, Tarun & Vertegaal 2012), a system that enables physical stacking of digital documents using flexible E ink displays;
- FoldMe (Khalilbeigi et al. 2012), a device concept for double-sided displays that can be folded;
- PaperTab (Tarun et al. 2013), a paper computer with multiple functional flexible E ink displays;
- PaperPixels (Peiris & Nanayakkara 2014), a toolkit for creating subtle animations and environments on paper;
- Sensory Fiction (Heibeck et al. 2014), a set consisting of an augmented book and a wearable that uses connected sensors;
- Electrolibrary (Wegrzyn 2014) and Blink (Kelaidis 2015), both hybrid books that seem traditional physical books but integrate digital content using printed electronics.

Findings and results

Most identified and analysed projects correspond to experimental prototypes and not products or implemented services of commercial endeavour. There is prevalence for the use of flexible displays, or what can also be called 'smart papers' or 'e-papers' that use E ink, bend sensors and arduino boards usually connected to a host PC. Such technologies are usual in conventional electronics prototypes, although nowadays, it is also common to use materials of printed electronics, such as conductive inks, to function as sensors in hybrid media. While these materials require an external device to display digital content, printed electronics has much potential as they are more affordable, renewable and biodegradable than conventional electronic components. From our systematization and comparison of different examples, it results that these proposals have a speculative value. They are positioned not as a final object, as a product or solution to a problem, but rather as proposals that activate discussion around the concepts they reflect. Regardless of the purpose for which they were carried out, we can recognize matters of literacy, different ways to access knowledge, improvement of educational conditions, and mainly distinct approaches to media falling in some disuse and worthy contributions to rethink an industry that has been in decline.
Although one should not assume the disappearance of print media, our analysis indicates a need to rethink or adapt them, in their relationship with people, who face changes and as such, challenge the objects around them.

Connection to systems that promote interaction, renew people's experience and expectations. This directly affects designers in their process, especially in idea generation, but also in developing interactive prototypes. Our synthesis represents possible solutions that designers should consider when designing artefacts produced by printing technologies, so that they foster interactive experiences with people.

Conclusions reached by researchers

Print media are not interactive by themselves like digital media. However, print media can benefit from interaction features, possible by material augmentation and connection to computer systems and even from interaction as a broad concept, that encourages different and ambitious relationships with people. Print media is still a material embodiment that constantly relates to various audiences and yet seem unchanged when confronted with nowadays contexts, filled with interaction-based user experience.

Our study brings us closer to material and technological conditions that allow interaction in print media, introducing an understanding of the nature and purpose of projects developed so far as proposals for the future, where printing maintains its usefulness and value. These proposals approach a design territory named as speculative and critical, where design raises questions about the time to be, revealing social and cultural maturity.

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A DESIGN APPROACH TO PROTECT CHILDREN'S RIGHTS TO PRIVACY AND FREEDOM

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The lack of privacy in digital services is one of the main features of contemporary surveillance capitalism. Privacy can be understood as the right not to have intrusions into one's private life and information, which we call negative privacy. Conversely, we regard positive privacy as the right to have personal data processed by service providers in a way that respects and enhances users' preferences and tastes.

This paper—which is part of a PhD project in design, ethics, and privacy—explores the relationship between UX design and positive privacy for a specific group of vulnerable users and citizens: children. In particular, this paper analyses to what extent design patterns found in YouTube Kids protect and enhance their positive privacy by recommending content consistent with the videos they (and their parents) have previously watched and searched for. The methodology followed involves field research and an assessment of the legal provisions governing the processing of children's data under European and American legislation, along with YouTube Kids' privacy policies.

Our research reveals that the app's UX has major loopholes that do not guarantee users' positive privacy adequately.

Keywords

Design Ethics, Human-centered Design, UX Design

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TO BEE(CONNECTED) OR NOT TO BEE? THE ROLE OF DESIGN IN THE INDUSTRY 4.0 ERA TOWARD THE NEXT GENERATION OF URBAN BEEKEEPING

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Research concerning the sustainability impacts of the fourth industrial revolution is in its early stages (Ghobakhloo, 2020). Therefore, sustainability implications of Industry 4.0 regarding economic, environmental, and social impacts of the digitization of manufacturing require further investigation (Ghobakhloo, 2020). This study addresses this issue by framing the process through which Industry 4.0, characterized by its digital technologies, can positively contribute to sustainable economic, environmental, and social development. From this perspective, the Industry 4.0 paradigm can solve a long-established problem: the death of bees. For several years, events of mortality or depopulation of bee families have been reported in many countries. This phenomenon, which has multiple and still unknown causes, has assumed serious dimensions.
In the United States, the problem, called Colony Collapse Disorder (CCD), is attributed to an overlap between environmental causes and different types of parasites (Mutinelli & Granato, 2007). Current hypotheses on CCD causes consider Varroa infestation, new or emerging diseases, such as Nosema Ceranae (Higes et al., 2006) or Israeli Acute Bee Paralysis Virus (Hutchison et al., 2009). In addition to these causes, there are poisonings by pesticides, both used for agricultural protection and hive parasites control, environmental stress factors, and climate change. In Italy, the first reports of beekeepers regarding bee collapse and hive depopulation date back to 1999 (Porrini et al., 2003), but this phenomenon is still little addressed.
Therefore, our project aims to promote the bees well-being through a "smart hive" equipped with sensors to monitor the hive conditions in a non-invasive way continuously. The goal is to develop smart hives scaled to the urban and condominium context through Urban Beekeeping (i.e., the practice of raising bee families in urbanized areas)(Lorenz & Stark, 2015; Moore & Kosut, 2013; Sponsler & Bratman, 2021). Indeed, the Internet of Things (IoT) is moving rapidly to the agricultural sector, focusing

Keywords
Design Ethics, Human-centered Design, UX Design

on the broad applicability of new technologies (Kontogiannis, 2019). For example, existing applications in agriculture include livestock monitoring (Kontogiannis, 2019). Thus, the research investigates livestock monitoring by proposing the implementation of an IoT management and alerting system for beekeeping. One of the most relevant research tool concerned a comprehensive state-of-the-art related to hive monitoring systems (Edwards-Murphy et al., 2015; Gil-Lebrero et al., 2017; Lyu et al., 2019; Zacepins et al., 2016). A formal questionnaire was administered to a sample of 305 participants (100 male, 205 female) in order to collect information on social knowledge about the problem of bee death, urban beekeeping, and the hypothesis of having a condominium hive. A number of 244 subjects showed an interest and willingness to have a condominium hive and be part of the monitoring network.
The research method used is Co-Design (Sanders, 2008), a well-established approach to creative practice that explores the equal collaboration between interested citizens or those who seek to solve a particular challenge. A key principle of Co-Design is that users, as "experts" in their own experience, become central to the design process. Today, more than in the past, sustainability is about social action (Ghobakhloo, 2020; Niedderer et al., 2016): the collective participation of people in local initiatives to manifest well-being and change is vital.
In this project, the role of design is to inspire innovation and the creation of sustainable value (Ceschin & Gaziulusoy, 2016; Niedderer et al., 2016; Sherwin, 2004), through a case study. Thus, the project represents the design outcome of the Poduct for Strategies Laboratory within the master's degree course in Industrial Design at the Polytechnic University of Bari, supported by the beekeepers of the project DontBEEScared – stai sen'APEnsieri. BeeConnected is a beehive monitoring system that involves creating condominium communities that first have to verify access requirements such as negative allergy tests, crack-free building safety, and minimum distance from the hive. Then, condos can obtain a hive in their building and monitor it with the help of an experienced beekeeper and an app. Thanks to Arduino, the IoT technology allows them to check the values related to the hive's health, chat with their beekeeper, and interact remotely without additional costs.
Value creation is about generating new functionality and meanings within the project. The new functionalities are related to the sensor system designed to monitor temperature, humidity, frequency, weight, and geolocalization parameters to make the end-user (expert or not) aware of the swarm's health status. Thus, there is no more necessary to use measurement tools

whenever bee health needs to be monitored. In fact, in the past, beekeepers monitored the parameters of the beehive. Instead, the sensor system allows to do it without any physical presence, but only reading measurement outputs directly on their mobile app. The new meanings, on the other hand, are related to the new social perspective of beekeepers. The urban beekeeping scenario concerns creating a condominium community that purchases a swarm or a whole honeybee family and decides to raise it. The condos will always contact an experienced beekeeper to avoid the danger of death or swarming and with whom they will be in constant contact through the app's chat.
The design strategy aims to create real virtual communities, which will be able to:

- safeguard the Apis Mellifera, with all the benefits derived for society, environment, and agriculture (Patel et al., 2020; Sponsler & Bratman, 2021);
- make the population aware and educate them, taking advantage of the enabling technologies of Industry 4.0 through innovation (Ghobakhloo, 2020);
- biomonitor the atmospheric pollution (Balestra et al., 1992; Bogdanov, 2006; Devillers & Pham-Delegue, 2002);
- ensure jobs for beekeepers. The experienced beekeeper monitors the health status of the bees, is always in contact with condos, and helps them collect production materials (e. g. honey, wax, royal jelly, and propolis)(Krell, 1996).

In conclusion, the future of traditional beekeeping is to implement smart beehive management and start using automated and remote tools to monitor bee colonies combined with hive control mechanisms to improve the productivity of bee colonies. Thus, this research shows how Industrial Design infused in a pilot project could set social and environmental transformation through the Industry 4.0 paradigm.

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GERONTECHNOLOGY: DESIGN DISCUSSIONS ABOUT THE USABILITY OF SMARTPHONES FOR THE ELDERLY

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Aging causes a decrease in cognitive, haptic, vision, and hearing abilities, which can directly affect the usability of smartphones by the elderly. At a time that companies are in an accelerated process of digitization, many services require consumers and users to be able to use digital tools to perform their tasks and have their needs answered. The COVID-19 pandemic increased this digitalization, and the elderly are the part of the population that suffers the most from the effects of coronavirus, which means that they need to be isolated. Activities like communication, shopping, and physical became digital all over the world and they need to use their smartphones and computers to have access to all these facilities.

Another effect of aging is that elder people suffer from isolation and depression, and they need to communicate with their parents easily. The smartphones were not developed for this public, and designers need to look at them closely to project better solutions to and with them.

Gerontechnology emerge as a multidisciplinary field that proposes that the technology needs to be adapted to attend to the needs of the well-being of the elderly and to facilitate the interactions between generations too. This concept is not so new but now with the pandemic, it became more important for society. In addition, it is important to emphasize the diversity of audiences that access this information that needs more care, not only to ensure more access to data but also, following the precepts of universal design - ensuring that everyone, including people with special needs, has access to the same categories of information as any other user, whether in the physical or virtual world.

The objective of this paper is to answer "What are the publications on smartphone usability applied to the elderly public in the last five years?" and "is there, in Design, any methodology that focuses on the development of digital artifacts for the elderly public?"

Keywords

Gerontechnology, Design, Elderly, Usability, Smartphone

Methods

The reseach started with the search in Scopus, Springer, ACM, EBSCO, IEEE and Science Direct repositories using the following strings: Design <AND> Interface <AND> Methods <AND> Self <AND> Smartphone <AND> Usability <AND> Elder. After this, analysing articles related to the theme and with significant relevance, were selected, using the following criteria to develop a theoretical foundation that will can be used as a basis for future studies related to gerontechnology.

In this first collection, 930 publications were listed in the six search engines, closing the search in the periods between 2016 and 2021. The large number is due to the use of keywords that are applicable in various areas such as Design, Gerontology, and Psychology. To cut the search and select the most targeted publications, extraction stage, inclusion criteria were defined (I):

(I) Explains usability analysis method for the elderly and digital interfaces;
(I) Publications with a maximum of 5 years;
(I) Publications that address accessibility issues that can be used by the study audience;
(I) Non-specific methods that can be adapted to answer the specific questions of the elderly audience;
(I) The research audience is the elderly.

Just as the exclusion criteria (E) were defined, which would define whether the study could be refused:

(E) Do not use usability analysis techniques;
(E) They present evaluations without presenting the method used;
(E) It is not related to the study area;
(E) Do not consider accessibility issues;

After that, the first extraction of publications was made, which resulted in filtering that allowed a greater adherence of publications to the research topic in question.

After the initial selection of publications, 806 publications were rejected because they did not address the target of this study or they did not contain some criteria that would justify their inclusion and because they were outside the period defined for publication of five years, in the maximum. From this phase, 122 publications remained, which were analyzed in the extraction stage. For the extraction stage, the publications were analyzed more deeply from the reading of abstracts and methods to identify which publications fit the profile sought. At this stage resulted in 73 papers that fit the profile sought for the research. The in-depth analysis of publications with more citations was prioritized according to the repositories, even so, the least cited were still analyzed, but in a less in-depth way to collect important

information, since the dates of their publications were more recent, therefore, less disclosed. The selection and extraction steps resulted in 66 articles related to the keywords in this research. As it is a combination of different areas, the research brought many publications in areas such as medicine, gerontology, and design. A new classification step was performed to identify the articles with the highest number of citations in the bibliographic databases that resulted in 12 papers, which resulted in the choice of the ten most cited, which were analyzed in depth.

The Results

The article by Burdick and Kwon (2017) makes a very important contribution, introducing the theme, based on its already established concept, in addition to explaining the emergence of this area of study and projects aimed at the elderly. Gerontechnology brings concepts from gerontology, medicine, design, and HCI to discuss possibilities for the elderly and bring improvements to their lives. According to, gerontechnology has a very strong connection with HCI and Ergonomics, mainly because it studies the relationships of the elderly with digital appliances and interfaces and studies their physical, cognitive, and motor problems, characteristic of aging.

Wang's (2017) study addresses the importance of anthropomorphism in the development of better user involvement with the smartphone. He says that the smartphone can be considered a social actor. To enforce it he says that anthropomorphism represents more than images, in this case, it speaks in a tone of voice, answers presented, and more positive propositions, which can interfere with the way the user interprets the smartphone and makes decisions. According to the author, interactions can vary according to culture. Kim et al (2016) propose a model for measuring the acceptability of technology by the elderly. Two inquiries were carried out with the elderly to identify how their immersion works and their smartphone usability. They have broken acceptance into an important phase called "Intent to Learn" which has three factors related to it: self-efficacy, readiness for conversion, and peer support. These factors directly influence the acceptance of the smartphone by the elderly. A provisional theoretical model, to be verified and validated by peers, which extends existing theories to explain how participants accepted the technology, is proposed. Jin et al (2019) performed a systematic review that analyzed the informal learning promoted using smartphones by the elderly. The results revealed that the studies used four theoretical frameworks to understand their learning: (a) technology acceptance theory, (b) experiential learning theory, (c) social cognitive theory, and (d) activity theory.

In addition, they identified six themes of informal learning of older adults using mobile devices through important findings from existing studies: (1) self-learning of medical or health knowledge, (2) affective and emotional dimensions, (3) ambivalent attitudes, (4) practical uses, (5) interpersonal and intergenerational communication, and (6) collaborative learning experience.
The article by Durrant et al (2017) brings results from a qualitative study on how the use of the internet supports autonomy after the transition of life between work and retirement. This study recruited six recent retirees and included the deployment of online, a design research artifact that recorded and viewed key online services used by participants at home for four weeks. This article offers a triple contribution to the field of HCI, promoting a life-oriented approach by conceptualizing the self as a dialogical phenomenon that develops temporally, an informed reflection of the Psychology of the Self.
The study by Yang and Lin (2019) investigated the reasons for the elderly to adopt ubiquitous social services to interact with other people. Based on the theories of user integration and gratification and the theory of media wealth, 226 users were interviewed, 196 of whom were over 60 years old, and the survey results identified the following factors as decisive for the choice of smartphones: sociability, personal achievement, and influence of fashion movements.
Nurgalieva et al (2019) developed a systematic review of the literature in search of usability guidelines and recommendations for touchscreens with a focus on the elderly. They identified that there are 434 design guidelines aimed at seniors, but only 15% of them had, in their development, validation by experts or peers. Important research observation: the authors realize that contrary to the standardization created for the public, the elderly has heterogeneous profiles and different problems among them according to age.
The main problems found are related to vision, physical (haptic), and cognitive issues. Guidelines can be confusing, contradictory, and obsolete (due to technological updates) or too general, too long to apply. The authors found that studies homogenize the public without identifying cultural or socioeconomic differences, which can change the perception of the elderly by technology. There are a relevant number of studies, but they are neither conclusive nor unison. The authors created a conceptual categorization analyzing the real difficulties reported in the review:

- Perception skills (vision and hearing)
- cognitive (memory, attention, and processing speed)
- psychomotor (coordination between vision and motor control)
- motor (loss of muscle control).

To define its structure and facilitate its association with design, the authors selected a taxonomy of the fundamentals of design to categorize the guidelines: actions, behaviors, contexts, displays, effects, forms, and goals. The study was validated through a focus group with geriatricians and specialist nurses in geriatrics to identify, in their experiences, which factors can influence the use of smartphones by the elderly.
Based on an online literature review on 3760 websites, Song et al (2018) assessed the state of the art on smart aging. That talks about the facilities brought by technology to the everyday life of elderly people. Smart Aging is divided, according to the authors in Smart Living:

- Environments designed to offer greater connectivity and facilities for the elderly;
- Mental Skills.
- Social Experiences.

To identify the specific needs of the elderly, Melo et al (2016) proposed the redesign of a note app, collaboratively with users, to identify their difficulties in usability issues. The methodology used was User-Centered Design.
Wang (2018) proposes the application of multiple decision criteria methods by non- specialists, thus applying his research to 18 people (12 experts and 6 elderly). The article cites a list of critical design criteria subdivided into 12 sub-criteria:

- Psychological (Visual elements; Voice elements; Scenery elements);
- Cognitive Psychology (Graphic Design, Memory Load, Reaction Time);
- Social (Group Process, Social Cognition, Social Influence)
- Human Interface (Ease of operation, interactivity, Consistency).

Kunaratana-Angkul (2020) created a tool for simulating visual impairments such as low visual acuity, glaucoma, to test interfaces created for the elderly. The results are interesting, but they come up with a dilemma: most users approve of the application but are not comfortable with having an automated diagnosis. They prefer this to happen through a consultation with a real person, in person, which will bring them more security.

Conclusions

People's needs remain as they get older, but difficulties in using technological artifacts tend to increase due to cognitive, haptic, vision, or hearing limitations.
A discussion was recently launched around Gerontechnology, a multidisciplinary area that deals with themes related to the elderly and is supported by several areas of knowledge, such

as medicine, gerontology, usability, design, and technology. The purpose of this discussion is to focus on the development of tools that make life easier for elderly users and remedy commonly encountered problems. As much as design is a user-centric activity and has general guidelines that favor the usability of systems and artifacts, discussing specific issues of certain groups can improve the user's performance in performing tasks, even if simple, such as taking a picture or send a message.

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Track 6
Design for New Materials and New Manufacturing

Digital clay: from the "exaptation" to the innovation of the traditional ceramic industry

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The article describes some of the results of the research project "Product Innovation for the Traditional Ceramic Industry: DIGITal tAles and tiLES" (DIGIT(A/I)LES) coordinated by the author and funded by Bari Polytechnic University. The research project was carried out in two main phases:

- the first with a critical - analytical approach (desk) will produce the update of the state of the art aimed at the innovation of meaning of the so-called "useful objects," relating aspects pertaining to individual and collective practices of use, with the dynamics of production in traditional manufacturing contexts;
- the second with an experimental approach (field) will demonstrate the adaptive value of design and implementation methodologies in the field of digital craftsmanship, with particular reference to the field of ceramic artifacts, establishing the relationship between parametric design support tools, dedicated to "form" and "color," and formal and technical outcomes.

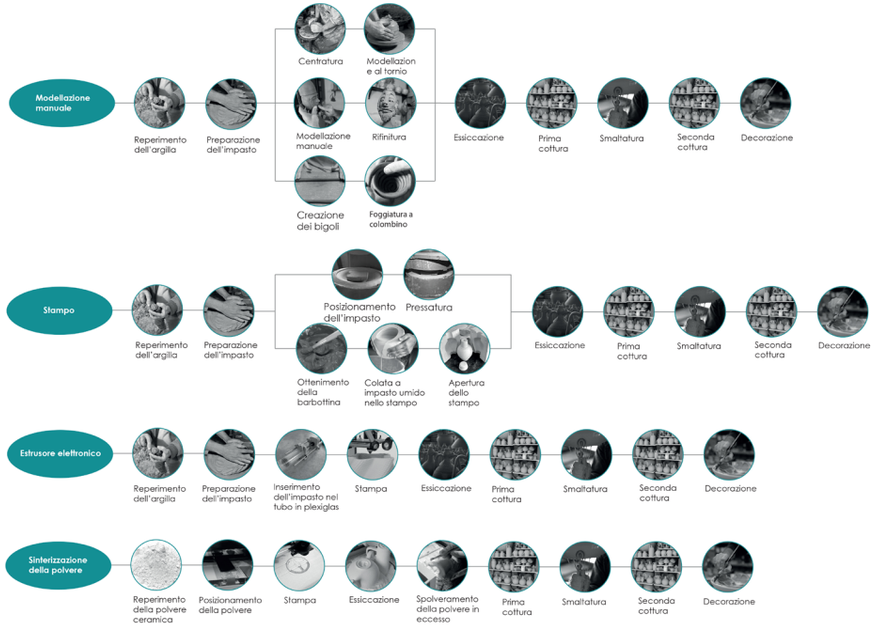
The overall objective of the research is to contribute to the updating of industrial design research methods aimed at the innovation of meaning and significance of artifacts in relation to the dynamics of technological innovation of production methods, with particular reference to the ceramics sector.

Keywords *Sustainable design, updating manufacturing systems, exaptation, technium, generative clay*

Introduction

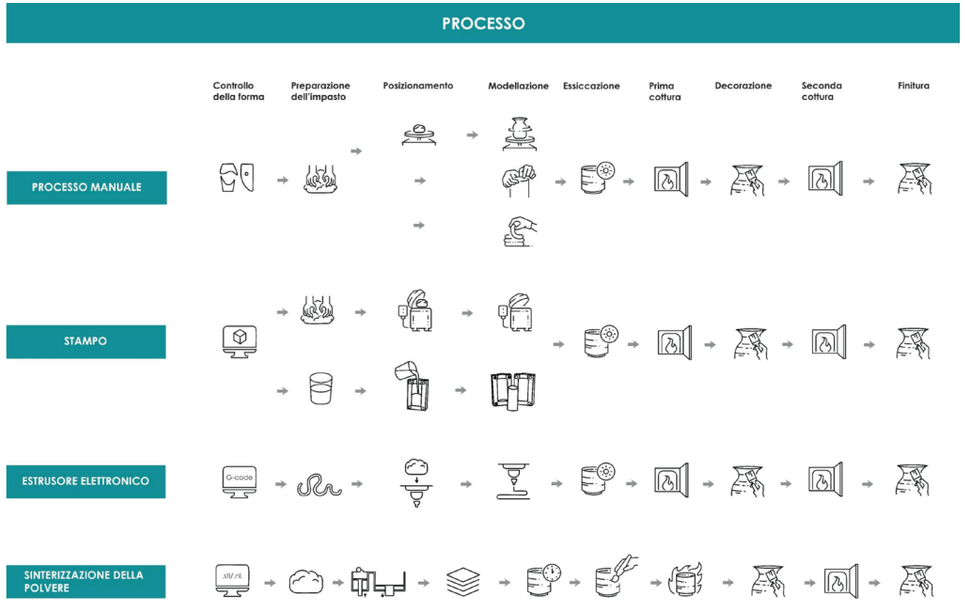
Following the main articolation of the research project the paper is structured through a dual approach: a research led approach based and a design led approach.
The first one, based on a critical-analytical approach, and has been developed trought literature review and case studies analysis. It defines a cultural premise and would like to define the scenario of the digital craft exploring the contributions of taht disciplines which support the theory of complex systems. The aim is to propose an organic vision of the history of things which takes into consideration the life cycle of ceramic materials in the context of the technical-instrumental acquisitions that saw the appearance of the first type-functional archetypes and their subsequent disappearance.
The second one will carry on some experimental case studies on “generative clay” and will demonstrate the adaptive value of the design and methods of realization in the field of digital craftsmanship, with particular reference to the ceramic artefact

Fig. 1 Schematic table of the main stages of production of ceramic artifacts, in relation to the main manual and digital production techniques. Image taken from the dissertation (2021) "Tradizione e innovazione nel rapporto tra la materia e le sue possibili manipolazioni" Miano V., Polytechnic University of Bari (supervised by proff. Di Roma A., Scarcelli A.)



sector, establishing the relationship between design and digital fabrication based on the value of the imperfection generated by a seemingly "random," designed trought a conscious, process.
The scenario investigated focuses on both the cultural dimension involving product innovation processes and the technical dimension relating to the updating of production methods and systems. The theme aims to define a design approach in which the product is contextualised in the ritual dimension, which defines, on the one hand, the socio-cultural scenario and, on the other, the dynamics of use, consumption and production of things: design thus takes on a cultural role aimed at innovating the meaning of products.
The need to investigate the meaning of objects derives from the need to find more appropriate tools for understanding the complexity that characterises contemporary society, moving from the level of the relationship between product form and function to that of the language of artefacts that focuses on meaning and significance. This approach matures within a cultural context that tends towards social inclusiveness, on the basis of recalling roots

Fig. 2 Schematic table of the main stages of production of ceramic artifacts, in relation to the main manual and digital production techniques. Image taken from the dissertation (2021) "Tradizione e innovazione nel rapporto tra la materia e le sue possibili manipolazioni", Miano V., Polytechnic University of Bari (supervised by proff. Di Roma A., Scarcelli A.)



without binding them to an exclusive identity (Bettini 2012). The research project lays its cultural premises on the assumption that all cultures are always multicultural, that is, they are "sum and subtraction of all the elements that have passed through them over time" (Aime 2004), and that it is therefore improper or incorrect to try to forcibly fix the characters of a cultural identity, to make it exclusive and therefore different from others, for the sole purpose of enhancing local own qualities. Contemporary times have imposed diversification as the key to survival, explained that competitiveness in a globalized world is played out on the field of exalting one's own traditions, through the construction of a clear and very well-defined identity (Micelli 2011). The risk is to remain on the surface and build a "false identity," with a fascinating appearance and useful in the immediate, but without characters of persistence, without the ability to meet the real needs of society, to be able to speak the same language. In this sense, the writing is in a historical strand of design research directly related to social disciplines aimed at defining a direct connection between need and requirement, leading to the definition of the symbolic values of things.

General obiective

The general objective of the research is to contribute to the updating of the methods of industrial design research aimed at "innovation of meaning" and "technological innovation" of artifacts of use with particular reference to the field of ceramics and to achieve evidence of innovation in the context of the process and production through digital manufacturing. The pre-design method typical of the craftsman's "making" - based on the informal transfer of models to production - shares the adaptive and replicable approach of the development logic of the computer parametric project. Therefore, through the specification of materials, techniques and tools, the process of conformation is seamlessly achieved. For many years the issue of sustainability applied to the landscape and to the built environment has defined practical methods for the design disciplines addressed to the development of low-impacts materials and low-impact manufacturing processes, in order to reduce carbon emissions. The present paper proposes an approach to sustainability focusing on the cultural identity of the local traditional production traying to focusing on how design could “become part of the solution, to become active agents in the transition towards sustainable ways of living”(Manzini, 2012).
In alternative to a "globalized" approach to the industrial design this paper aims at highlight how the renewal of traditional models and skills from craftsmanship through digital design and manufacturing could allow a sustainable process of technological advancement, fostering social inclusion. This approach concerns both with the human dimension of the work, and also with the competitiveness of manufacturing systems based on the culturalization of the Economy.

State of the art -a cultural premise

The continuity of the presence of the ceramics in the history of material culture is the condition on which the text reflects, systematizing certain processes and artefacts which, placed on an ideal timeline, highlight the relationships between production, art and technique. The recent history of design finds in the ceramic material the possibility to connect its point of observation to an extended dimension of the time of artefacts, which takes into account the dynamics of the relationship between material, technique and technology as factors of a cultural exploration. This aspect presupposes an organic vision of the history of things together with an interdisciplinary approach, considering the life cycle of materials in the context of technical and instrumental acquisitions that see the appearance of the first type-functional archetypes and their subsequent disappearance, "adapted" or "ex-acted" to a more complex technological system and optimized functional performance. At this connection, paleontologists Stephen Jay Gould and Elisabeth S. Vrba took Darwinian evolutionary theory further, bringing some of the scientist's insights to fruition. To do this, they introduced a neologism, exaptation (ex-aptation), in addition to the term aptation (adaptation) (Gould, Vrba, 1982, pp. 4-15).
In this exploration, the cognitive approach of archaeology anticipates design in the observation of artefacts and gives continuity of scientific observation to the production of the object of use. In this regard, George Kugler states that archaeology, together with ethnology, deals with the "material manifestations of civilizations", and that there is no solution of continuity between prehistoric tools and the things of today (1976, p.9).
From a terminological point of view, it is interesting to note how recent is the meaning given to the term "producing" as the intentional act of modifying a good in order to shape an object. In fact, historically "the production of artefacts did not have its own denomination, but was part of "making", which required "know how", or art. Arts were the name given to productive organizations from the Roman era until the industrial revolution. [...] as we go back in time, the production of useful objects and works of art had in common a savoir faire that required the ability to use the means and rules, or techniques, proper to the trade" (Mannoni, Giannichedda, 2003, p. 4).

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Thus, the history of ceramic production finds its cultural roots in the context of empirical logic, which has seen its knowledge structured around the characteristics of workability, extraction techniques and a complex system of processing techniques that has given rise to real specialisations of know-how since ancient times. This is the origin of the expression "material culture", according to which "every culture is classified as "material" when it requires knowledge based largely on the natural characteristics of the raw material used". (Mannoni, Giannichedda, 2003, p. 20). Nevertheless, this expression does not linger in a deterministic hypothesis of the material and its technique as opposed to a social and spiritual dimension of the artefact produced: "The integrated study of artefacts, behaviours and meanings is one of the possible ways of recognising non-material aspects as well, relating for example to collective and individual choices and knowledge" (Giannichedda, 1997, p. 123).
The complexity of ceramic production has thus established its own history in relation to the technique that has allowed the evolution of those principles empirically acquired in the most remote eras and systematized in the industrial era through the scientific approach, initiating today a real revolution in the digital context. Technology is never detached from the history of nature, but rather becomes its natural development: it is the continuation of nature by other means. It is assumed that a new invention needs an antecedent (archetype) from which a new system produced with techniques and materials optimized by more evolved technical processes and systems originates.
In this sense, here we assume one of the potentials expressed by the concept of technium as enucleated by Kevin Kelly (2011), referring to the "generative impulses of our inventions that stimulate further production of tools, further technological inventions, further self-growing connections" (Kelly 2011, p.14), and taking artefacts as a key word in the extension of this metaphor to biology.
Here, reference is made to the introduction of the concept of exaptation in the context of evolutionary science by Stephen J. Gould and Elisabeth S. Vrba (1982). Exaptation refers to the mode of biological evolution that tends to use systems and structures not endowed with an original adaptive function, but employed according to an entirely unexpected use. The term 'ex-aptation' refers to any character that 'evolved for other uses and was subsequently "co-opted" for its current engagement' (Gould, Vrba, 2008, pp. 15).
The technium is a continuous exaptation since innovations can easily be borrowed across different lines of origin or transferred over time and repurposed.

Mannoni, Tiziano, Giannichedda, Enrico, (2003). ibidem

Giannichedda Enrico (1997), "La storia della cultura materiale" pp. 117-132, in Milanese Marco (a cura di) L'archeologia post medioevale, l'esperienza europea e l'Italia (Atti del convegno internazionale di studi, Sassari 17-20 Ottobre 1994) Sassari, Edizioni All'Insegna del Giglio, pp. 386.

Gould Stephen Jay, Elisabeth S. Vrba, (1982), ibidem

Kelly Kevin, What technology want, (tr.it. Quello che vuole la tecnologia, Torino, Codice edizioni, 2011, pp. 401).

Kelly Kevin, (2011), ibidem

"With very few exceptions, technologies do not die. In this respect they differ from biological species, which inevitably become extinct in the long run. Technologies are based on ideas: culture is their memory. They can be rediscovered after they have been forgotten, and they can be recorded (by ever better means) so that they cannot be ignored" (Kelly 2011, p. 54-60). Unlike biological evolution, which defines an advancement and therefore a cessation (at least apparent) of characters, systems and species, technology is only partly superseded because, Kelly argues "in modern society a technology that is supposed to have disappeared can be rediscovered by a minority who go back to its origins, if only for ritual pleasure". It is no coincidence that design has recently started a disciplinary reflection on the so-called neo-craftsmanship strand, in virtue of a possible economic, social and cultural sustainability of ceramics material productions, which supports the so-called glocalization phenomenon on the basis of the reactivation of knowledge connected to the extractive basins.

Generative clay

Generative modelling, thanks to the contribution of coding, has given great development to the subject of new design and to digital craftsmanship itself. This new modelling process has the characteristic of being close to computer programming, but with a facilitated approach thanks to visual components. The system makes it possible to implement the normal operations of generation, transformation and evolution - even substantial ones - of models through reversible operational sequences, preserving the memory of the original geometries. The development of technical-ideative tools and digital prototyping and production systems creates a new relationship between design theory and production and reproduction practices in the computerised logic: the technique no longer resides exclusively in the completed object, but in its prefigurative conception. In fact, the management of form and decoration in the art industry in ancient times did not take on any mediation between the design phase and the realisation phase; the author of the product's conformation often identified himself with the person who technically carried out its production. The division into phases, already within the development of serial processes of realisation in the art industry, made the elaboration of geometric models necessary to support the transmissibility of the idea to the various material executors. Electronic modellers - which in the last twenty years have made possible the so-called digital revolution as a matter of representation and communication of the project, through its virtual restitution - assume today a central role in the process

of prefiguration of the artefact, as they prove to be instruments of technical-formal control able to manage synthetically all the main phases of ideation and prototyping, providing decisional keys for the optimisation of the form and its realisation process. The geometric definition of artefacts and chromatic values, together with the implementation of parametric software and the generative logic of some cad and raster applications, favour the development of new formal expressions; the design process thus becomes "a true information system: cultural information on the product, information on its use, linguistic information and visual information" (Branzi,2008, p. 117).
In the experimental phase, parametric computer systems will be implemented for the development of a set of containers in which the main techniques relevant to generative design research developed at the desk will be put into a system. In particular, the study focuses on understanding and innovating the processes of artistic craftsmanship, mediating the field of unique artefacts (or limited series) with the field of large-scale industrial production. The theme of experimentation will be addressed to the aesthetic characterisation of clay; the methodology adopted will mark the process in design and production phases. The approach will be aimed at defining the expressive and communicative potential of a ceramic surface, through graphic-visual, tactile and chromatic considerations, in relation to the triad consisting of material, tools and production process. Parametric design, together with the production of models by means of print output and/or electronically controlled processing, represents a phase of evolution in the contemporary art industry linked to the results of digital technology. The vector and bitmap software applications, through generative logic, offer new operational tools and possibilities to elaborate innovative formal languages, coherent with the mathematical models that support them through the algorithms.

Case studies and experimental research

The design research focused in the analytical phase on finding those case studies where the artifact is formally defined through the use of novel machinery or tools (sometimes designed ad hoc) in order to obtain results that explore the collaboration between design and randomness and deepen the relationship with the unpredictability of the end result.
In particular, this section shows the outcomes of the design experimentation and case study analysis conducted by Valeria Miano through her bachelor's degree thesis (2021) under the supervision of the author.

Branzi, Andrea. (2008). Introduzione. In Introduzione al Design Italiano, una modernità incompleta, pagg. 10-11). Milano: Baldini e Castoldi.

Study cases 1 - Erosion

Floris Wubben, a Dutch designer, created a collection of ceramic products "Erosion," with a surface characterized by irregular textures, using a flame-throwing device created especially by him following some experimentation that led her to observe the damage to the surfaces of objects inside the kiln. The function of this tool is to shape the surface of the ceramic, which is placed wet on a rotating central support of the device, while the torch emerges from an adjustable semicircular arm. The material used reacts to high temperatures, so it makes it possible to create textured layers that can be adjusted by changing the distance between the surface and the flame and the speed at which the object is rotated. According to Wubben's statement, working with ceramics is a delicate process because "the temperature of the kiln and the drying of the clay are very precise," so he "began to study how to control ceramic explosions: when the pieces are wet and the surface is heated, the layers pop out." The Erosion collection, made with the collaboration of ceramic studio Cor Unum, consists of different elements such as bowls, vases, and cups, each decorated with mixed glazes, different colors, textures, and special patterns using earth tones in a way that makes each piece unique. Before being burned with the flamethrower, the object is glazed. This causes the layers of enamel on the surface to break down during burning.

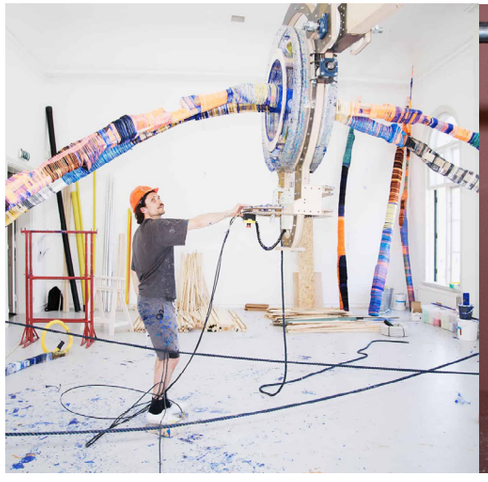
Figg. 3-4. "Erosion" (2020) by Floris Wubben studio. Series of plates and cups whose suoerficial decoration is achieved by using a gas burner to etch textures onto unfired porcelain objects. Combining different glazing techniques with this etching technique results in contrasts of color and texture.

Study cases 2 - Unsighted

The work of Swedish-Chilean designer Anton Alvarez is the Yves Klin collection of 12 vases created for the Unsighted exhibition, whose name is a play on words referring to the ceramic firing process and the vibrant shade of blue that characterizes the vases first mixed by French artist Yves Klein in the 1960s. Each piece is made from clay extruded through a three-ton ceramic press specially made by Alvarez, called The Extruder, which allows the clay to take on an ever-changing shape depending on how it is pressed, as if it were paint squeezed from a tube. The extruder made by the designer is a more sophisticated version of the specimens already on the market and has the special feature of being controlled by a remote control rather than by body force. It is connected to a movable table that can be moved during the process so that the user can get different shapes and patterns of the clay, even varying the speed, to get pots with all different textures and sizes.

The choice of International Klein Blue was not initially planned, but the vibrant shade of blue also proved functional during the firing process. However, the color, which is not a glaze, is not totally mixed with the clay. Rather, it is "a separate clay that is smeared on the pieces, almost like a paint." Alvarez's goal is for the pieces themselves to look like they are made of blue material.

Figg. 5-6 "Unsighted" (2018) by Anton Alvarez. Each piece is made of extruded clay through a three-ton ceramic press specially made by Alvarez, called The Extruder,which allows the clay to take on an ever-changing shape depending on how it is pressed, as if it were paint squeezed from a tube.



Study cases 3 - Woven

However, 3D printing also has many limitations. In fact, this technology is made in such a way as to obtain always the same, repeatable and precise shapes, always reproducing the same action and extruding layer after layer. Thus, these are not factors dictated by randomness but everything is controlled, effectively increasing the level of repeatability and precision. For this van Herpt uses the concept of kil, a Dutch word whose meaning is "cold, cynical, without feeling, an absence of humanity to a certain extent." The 3D printer then becomes the protagonist and puts humans in the background. Therefore, while it allows more people to create, it also excludes them from the process and does not allow them to touch the object before it is finished. "By introducing elements of randomness, I wanted to reintroduce error, human touch, stochasticity. The process wanted some serendipity, some joy through intentional failure. He wants repeatability and precision, but also error." That is why he created the Woven collection, which features textures that harken back to craftsmanship, so as to bring back to life unique objects traditionally made by the skilled hands of artisans. In this case, however, manual labor is replaced by the mechanical movement of the 3D printer, at the same time showing us the potential of ever-expanding technology and reminding us of the craftsmanship of yesteryear.

Figg. 7-8 "Woven" (2014) by Olivier van Herpt. Characterized by textures chericonducing to craftsmanship so as to bring to life objects uniquelytraditionally made by the skilled hands of artisans. In this case, however, manual labor is replaced by the mechanical movement of the3D printer.

Experimentations

The study of the morphology of the nozzles of the Delta WASP40100 3D printer led to a series of observations that gave rise to a series of consequential steps that allowed the final design to be realized. The idea behind the procedure is to create nozzles to be used during the ceramic printing process, which would allow, starting from a model characterized by elementary surfaces, more complex surfaces whose result, however, is unpredictable. The first phase involved the development of a nozzle modeled on the basis of a cap of a 60-mL kitchen syringe, so as to evaluate the success and proper functioning of the prototypes, before proceeding to the fabrication of the final nozzles. The experimentation resulted in three different types of nozzles, differing from each other in shape, size of the outlet holes, whose diameter was chosen on the basis of existing ones, and in their arrangement on the surface, according to specific reasoning on the basis of geometric rules. Therefore, it was possible to obtain three nozzles defined by peculiar characteristics and from the application of which it was possible to obtain three heterogeneous applications.Next, modeling of the real nozzles was carried out by taking as reference a nozzle of Delta WASP 40100 with the diameter of the exit hole of 8 mm. The realized nozzles have the same morphological structure as those of the WASP, with the exception of the end tip replaced by the redesigned one.

Fig. 9 Nozzle #1, #2, #3 (2021) by Valeria Miano. Bachelor's degree thesis "Tradizione e innovazione nel rapporto tra la materia e le sue possibili manipolazioni", Polytechnic University of Bari (supervised by proff. Di Roma A., Scarcelli A.).

The last step is to make the final nozzles to be applied to the Delta WASP 40100 3D printer, in order to proceed with the wax printing of the final results.The three nozzles, as mentioned above, were modeled following the same dimensions as those with which the printer was pre-equipped and manually threaded. The three coils obtained as the final result were modeled according to a hollow cylinder with a base and height of 10 cm, the G-code of which was subsequently created to be sent to the 3D printer. The parameters were set according to the characteristics of a nozzle with an output diameter of 4 mm. At the time of printing, the three nozzles were set with a distance from the base plate of about 1.5 cm, unlike standard nozzles whose height is fixed at a couple of millimeters from the base. This is because, presenting different and more complex ends than the classical ones, the spillage of the material is unpredictable and irregular, so an attempt was made to prevent the tip from boarding into the clay by maintaining a greater distance.However, as we shall see, the problem was not completely eliminated, creating interesting textural effects.

Nozzle #1The first nozzle used has an end cut at a 30° angle with the 2, 3 and 4 mm diameter exit holes, in succession, aligned on the vertical axis.When the printing process began, the first layers coming out of the holes were quite defined, overlapping randomly but maintaining a fair amount of definition. Continuing with the overlapping of the layers, it could be seen that gradually the different layers overlapped without preserving the separation of the filaments any longer, but crushing each other. Furthermore, despite the distance of about 1.5 cm left between the tip and the distamping base, it could be seen that as the layers piled on top of each other, the tip sank into the material, dragging the clay during the completion of each printing cycle. The result was a coarse, messy effect characterized by the accumulation of thicker layers of material in some places on the coil.

Nozzle #2 Next was used the nozzle characterized by a spherical end with two rows of exit holes of 2 mm diameter and a hole, of the same diameter, at the tip.Again, a distance of 1.5 cm was maintained between the tip and the base, and it could be seen that the various filaments obtained overlapped, again, quite distinctly during the primistrata, compressing more as the layers overlapped. In fact, although the effect was even milder than during primistrata, again the end screwed into the clay, dragging small amounts of material away. The previously noted effect was thus repeated, albeit more evenly than in the first coil.

Figg. 10-11-12 Clay spool #1, #2, #3 (2021) by Valeria Miano. Bachelor's degree thesis "Tradizione e innovazione nel rapporto tra la materia e le sue possibili manipolazioni", Polytechnic University of Bari (supervised by proff. Di Roma A., Scarcelli A.).

Clay spool #1 At the time of the beginning of the printing process, the first layers that emerged from the foririsult quite defined, overlapping with randomness but maintaining a fair definition. Continuing with the overlapping of the layers, it could be seen that gradually the different layers overlapped without preserving the separation of the filaments anymore, but squashing one on top of the other. In addition,despite the distance of about 1.5 cm left between the tip and the distamprint base, it could be seen how, as the layers piled up on each other, the tip sank into the material dragging the clay during the completion of each round of printing. This resulted in a coarse and disordered effect characterized by the accumulation of thicker layers of material in some places on the spool.

Clay spool #2 the nozzle is characterized by a spherical end with two rows of exit holes with a diameter of 2 mm and a hole, of the same diameter on the tip. Again, the distance between the tip and the base of 1.5 cm was maintained, and it could be seen that the various filaments obtained did, again, overlap in a fairly definite manner during the first layers, compressing more as the layers overlapped. In fact, although the effect was still milder than in the first nozzle, again the end screwed into the clay, gradually dragging small amounts of material along. The effect previously noted was, therefore, repeated, albeit more evenly than with the first nozzle.

Clay spool #3 Is characterized by spherical endsin this case with two rows of exit holes with diameters of 2 and 3 mm. The same precautions were used as in the two previous cases, maintaining a distance from the bearing surface of 1.5 cm. In this case, the result was more satisfactory than in the previous spools, presenting a more uniform surface, although it continued to have small clusters of material dragged by the nozzle tip. Nevertheless, the result appearsmore uniform.

Nozzle #3 The last nozzle used again has a spherical end, in this case with two rows of exit holes with diameters of 2 and 3 mm. The same precautions were used as in the previous two cases, maintaining a distance of 1.5 cm from the support plane. In this case, the result was more satisfactory than in the previous coils, presenting a more uniform surface while still having small clusters of material dragged by the nozzle tip. However, the result appeared more uniform. In this case, a further test was later carried out by changing the printing parameters to an 8 mm nozzle diameter setting to see if this would result in substantial changes. The result was coarser than the first attempt, as the overlapping layers appeared less defined and thicker.

Results

The geometry adopted for the modeling of the nozzles led to the concretization of a new printing process, characterized not by the composition of the shape and the desire to obtain a regular and definite appearance, but rather by the effects that the morphology of the nozzles had on the production process. From the results obtained, it is evident that there was no control of the shape, but a study of the geometry, the purpose of which was to derive a controlled and already predicted unpredictability. The accumulation of matter obtained during the printing process, in fact, does not represent a defect, but is characteristic of the final result. Thus, the desire to try to control randomness is pursued, the concept of which is based on the role of new technologies, which are considered not only an extension and enhancement of human capabilities.

Echinoid-inspired Design.
The development of a dental surgical forceps inspired by pedicellariae

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Biomimetics introduces a methodology based on the transfer of nature's strategies, selected during millions of years of evolution, into new functional applications. Technological problems are therefore solved by observing, analyzing, adapting, and transposing biological principles.
Based on this methodology, the present study analysed the pedicellariae, which are reactive, forceps-like grasping systems found in sea urchins, to develop an innovative dental surgical instrument. By morphologically reformulating the traditional forceps, the bioinspired biomedical instrument is able to effectively perform extractions, promoting less damage to the alveoli, with minimal tissue tearing as well as providing greater comfort to the patient, less healing time, and optimizing the work of dental practitioners.
Methods and tools developed by the Biomimicry Institute 3.8 were used. The results achieved led to the development of two-design concepts bioinspired, and provided a starting point for future studies and product design, prototyping and usability testing.

Keywords *Biomimicry, Bioinspiration, Echinoids, Dentistry, Forceps*

Introduction

Biomimetics is a learning from nature approach aimed to solve technological problems through observation, analysis, adaptation, and transposition of biological principles. In this way, nature provides models with a multitude of natural structures and systems that perform various functions, from the simplest to the most complex (Benyus, 1997). These strategies are employed by organisms to enhance their survival and reproduction as well as by entire ecosystems to sustain local balanced biotic and abiotic interactions, representing a multitude of possible solutions to human problems (Rowland R., 2017).

The interdisciplinary approach that combines the understanding of natural structures, systems and processes with their abstraction and translation into technological applications is commonly known as “Biomimetics”, “Biomimicry”, or “Bionics”. Over the past decades, other terms emerged in conjunction with this process, such as nature-based solution, bioinspired design, biotechniques etc. All these terms are mainly used as an equivalent and the terminological choice often depends on historical and cultural contexts in which projects are developed (Langella, 2019). The term biomimetics was coined by the engineer and physicist, O.H. Schmitt, in 1957 and the related approach was officially introduced and certified in 2015 by the International Organization for Standardization (ISO 18458). The term biomimicry was coined by Benyus (1997) and includes specific methods and tools developed by the Biomimicry institute, which is currently highly adopted. The definition of “bionik” or bionics was stated in 1993 at a meeting of the The Association of German Engineers and successively extended by Werner Nachtigall in 1998, defining a technical transfer from nature to technology. This term has been highly used during the 50’s and Carmelo di Bartolo’s bionic works represent outstanding examples; however, this term currently changes its definition mainly referring to robotics as well as biotechnology in the replacement or enhancement of tissue, body parts and organs with mechanical versions. In the present article, the term Biomimetics and Biomimicry are used as synonyms.

In biomimetics,biological systems can inspire studies and projects in many fields, such as engineering, design, and architecture. Among the various forms of collaboration between design and bioscience, Biomimetics is a discipline that proposes the transfer of biological quality and functionality to design artifacts. The study of these biological systems is an appropriate response to the respective challenges that present themselves as Design problems (Arruda et al., 2019; Langella, 2019).

Echinoids, commonly known as sea urchins (Echinodermata: Echinoidea), are characterized by functional skeletal structures

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Coppard, S. E., Kroh, A., & Smith, A. B. (2012). The evolution of pedicellariae in echinoids: an arms race against pests and parasites. Acta Zoologica, 93(2), 125-148.

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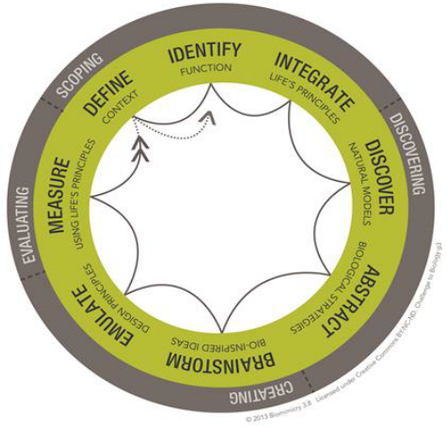
and strategies that inspired the development of numerous bio-inspired solutions in various industrial sectors such as building constructions, robotics, biomedical and material engineering I (Perricone et al., 2020). Among the skeletal components, the test and spines, articulated on its surface, provide effective support and protection against predators. Additionally, a wide range of small pincer-like appendages called pedicellariae present on the test surface are able to deter pests and parasites (Coppard et al., 2012). Pedicellariae can be broadly classified into four types: : globiferous (gemmiform), ophicephalous, triphyllous (trifoliate) and tridentate (tridactylous)(Cavey & Markel 1994). Each shape absolves specific functions and are employed in different activities such as gripping, defence, covering and cleaning (Coppard et al., 2012). In this context, inspired by these pedicellariae morphologies, the present study aimed to develop an innovative dental surgical forcep.

Dentistry has advanced in favor of the function and esthetics of the oral cavity, through the preservation of the dental elements. However, some elements need to be removed for various reasons, such as teeth without periodontal support, extensive carious lesions that make restorations impossible, root fractures, unsolved endodontic problems and orthodontic indications (Irinakis, 2006). For this reason the exodontia is still one of the most routine procedures in the clinical practice of dentists. However, still, one of the most challenging (Donati, 2015). The most common accidents and complications are: hemorrhages; alveolitis; pain; edema and trismus; injury to the inferior alveolar nerve; infections covering fascial spaces; injuries to adjacent teeth; bone fractures of the maxillary tuberosity and/or mandible; bucosinusal communications; periodontal problems in adjoining teeth, and displacement of teeth to noble anatomical regions (Oliveira, 2006). To elaborate the prototype the following criteria were taken into consideration: Third molars are usually the last teeth to erupt in the oral cavity, and are therefore the most commonly found teeth in the inclusion position. Surgical removal of the third molar, although a relatively common procedure, is an invasive operation and is commonly performed on young and healthy people, who, in most cases, have no experience with this type of surgery. Moreover, third molars are potentially capable of causing disorders and damage to the oral health of the individual, a risk that justifies the indication for exodontia. Adequate morphology in order not to be an obstacle in accessing the tooth structure; appropriate contact support surface for better support in the dental surfaces; surface or gripping system in relation to the support points of the patient's anatomy in order not to cause discomfort during use.

Methods and Approaches

According to Rowland (2017), the Biomimicry thinking was described in four design process phases. From Biology to Design, there is a specific path to start with an inspiration from the world of Biology and allows tracing the diagram in a sequential way problem-based or bottom-up. This process is defined according to a studied biological entity, its strategies are mapped. Through the understanding of its biological principles, its abrasion, an implementation technique is used to propose a design solution. The four phases of this research are identified in a diluted way in the steps of the diagrams that constitute the Biomimicry DesignLens. This is a methodological approach developed by the Biomimicry Institute 3.8, which includes Biomimicry Design Thinking, and has its details framed in the constituent stages and phases in the modality of the diagram Biology for Design, being a flexible methodology for creative processes with application of nature models in the creation of innovative Bioinspired solutions. The dialog in all stages occurs contiguously during the development of this study. The Biology for Design modality was selected for presenting a didactic method that has an approximation to the bottom-up project approach, facilitating the fulfillment of the objectives in face of the problematic presented. Biomimicry Thinking consists of four areas in which the process is developed: scoping, discovery, creation, and evaluation. Following the steps of the Biology for Design method and its specific steps, this research presents the necessary requirements and successfully integrates the strategies and principles of life in the area of Bioinspired design.

Fig. 1 Diagram Biomimicry Thinking – Challenge to Biology – Biomimicry DesignLens Source: Biomimicry Institute 3.8 (2015).



Rowland, R. (2017), ibidem

The diagram is composed of four main fields:

1. Scoping:
Divided into five stages; In the course of scoping phase, the design challenge is contextualized and eventually communicated as well as:
(a) The description of the chosen design challenge;
(b) The description of the context;
(c) A design statement listing the specific function that a potential solution must fulfil;
(d) A vision statement for the desired outcome and impact in the described context;
(e) Life's principles most relevant to the specific type of design challenge.

2. Discovering:
Divided into two stages; discovering a natural model and abstraction of biological strategies; it is the process of exploratory research in search of design inspiration.

3. Creating:
Subdivided into two stages; brainstorming for Bioinspired ideas and emulating design principles; an exercise in finding creative design solutions to a specific challenge.

4. Evaluating:
Where the design is evaluated using as a measure, the principles of life. The process achieves best results when it occurs in iterative processes. This is the way to measure or estimate the nature, quality, capacity, extent or importance of a specific solution.

Design method

The realization of the steps to be followed are not rigid. The Biomimicry Institute lists two possibilities that can occur according to the figure 2 and makes it possible to go through the diagram in a sequential way. Problem- based (Top-down) - steps can follow sequentially that starts with a design problem (a problematic) until the resolution of the problem based on the biological solution transferred from nature. Solution-based (Bottom- up) - process defined according to the need, in which a biological entity is studied, mapping its strategies, through the understanding of its biological principles to propose a design solution. Thus, the focus of the research was on the Bottom-up method in which a search for structures in nature was conducted for the development of a forceps for dental extraction.

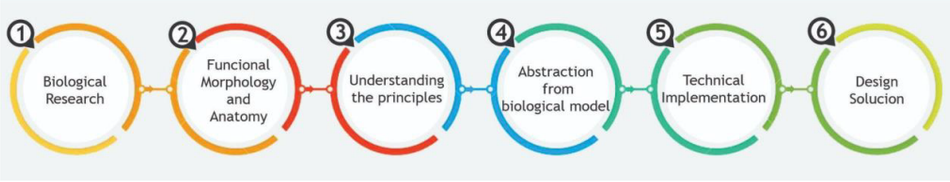


Fig. 2. Design process. Source: Authors.

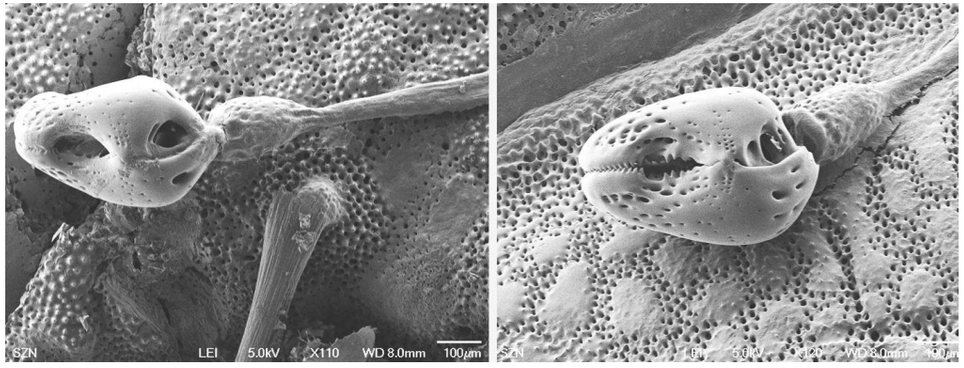
1. Biological research

The echinoid endoskeleton has attracted the attention of numerous researchers due to its unique morphology, structure, and material properties (Perricone et al., 2020). The endoskeleton displays numerous functional details and consists of four main structural components: test, dental apparatus, spines and pedicellariae. All these parts of the echinoid skeleton consist of the same basic high-magnesium calcite material; however, their microstructure displays a great potential in meeting several mechanical needs according to a direct and clear structure-function relationship. This versatility has allowed the echinoid skeleton to adapt to different activities such as structural support, defense, feeding, burrowing, and cleaning. Although constrained by energy and available resources, many of the structures found in the echinoid skeleton are optimized in terms of functional performances and, consequently, can be used as role models for bio-inspired solutions in various industrial sectors. In this context, an in depth study of the pedicellariae was carried out using Scanning Electron Microscopy (SEM) and images retrieved from the literature (primarily Coppard, Kroh and Smith, 2012). The different pedicellariae shapes were studied based on their functions.

Perricone, V., Grun, T., Marmo, F., Langella, C., & Carnevali, M. D. C. (2020), ibidem.

Coppard, S. E., Kroh, A., & Smith, A. B. (2012), ibidem.

Fig. 3. Pedicellariae of Arbacia lixula apical system. Source: Authors..



Coppard, S. E., Kroh, A., & Smith, A. B. (2012), ibidem.

Campbell AC. 1976. Observations on the activity of echinoid pedicellariae: III. Jaw responses of globiferouspedicellariaeand their significance. Marine & Freshwater Behaviour& Phy, 4, 25-39.

2. Biomechanics, functional morphology and anatomy

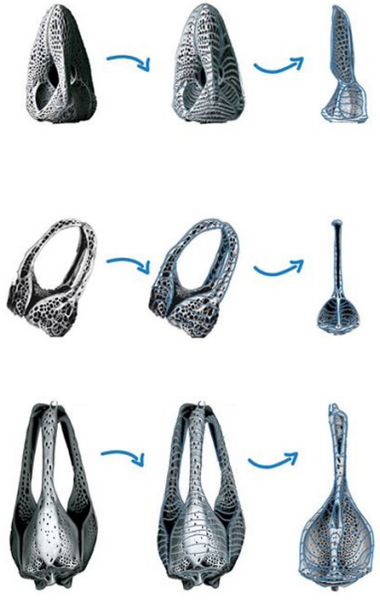
Pedicellariae can be categorized into globiferous, ophicephalous, triphyllous and tridentate (Caveyand Markel, 1994). Each one is specialized to fulfill different functions, varying from species to species in number, combination, and distribution on the echinoid surface. Often all four can be found on the same individual, with clear spatial distribution differences, suggesting that their form and functions are closely related. Each morphology specializes to efficiently keep the organism surface clear from algae, encrusting organisms, debris and to deter pests and parasites (Coppard, Krohand Smith, 2012).

3. Understanding the principles

Pedicellariae reactive and gripping systems providing the echinoid with an epithelium sensitive and reactive to biotic and abiotic environmental stimuli. They appear as gripping elements with variable selectivity in scale (from small debris and algae to large debris particles, parasites, and predators). The pedicellariae open and close after a direct stimulation through an inbuilt reflex arc or by stimulation of the test surface through the underskin nerves (Campbell, 1976).

4. Abstraction detachment from biological model

Fig. 4. Study of the shape construction through volume lines. Source: The authors.



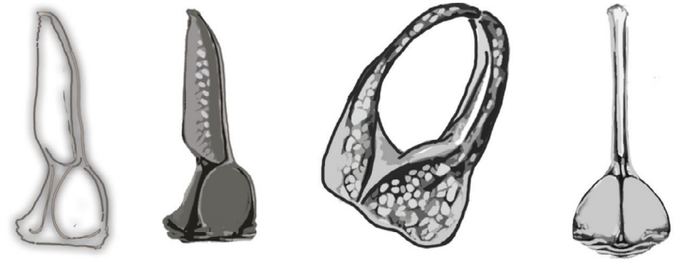
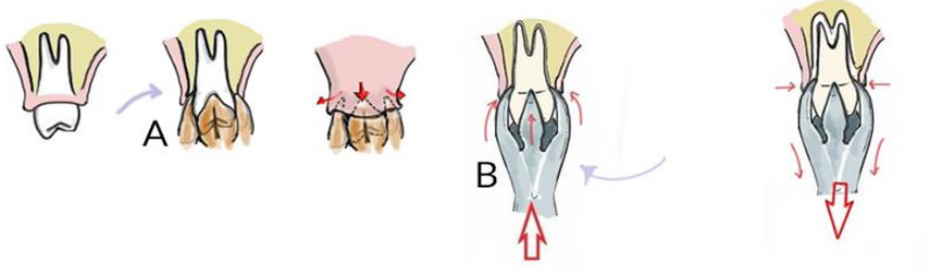


Fig. 5. Sketches generated after studying the shape. Source: The authors.

5. Technical implementation

Fig. 6. (Left) Conventional forceps engaged over tooth. (Right) Physics forceps engaged over tooth. Source: Adapted from Patel, H. S. (2016).

Fig. 7. Sketches Simulation of the use of forceps. Source: The authors



Patel, H. S. (2016). Comparative Evaluation of Efficacy of Physics Forceps versus Conventional Forceps in Orthodontic Extractions: A Prospective Randomized Split Mouth Study. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH. doi:10.7860/jcdr/2016/17724.8160

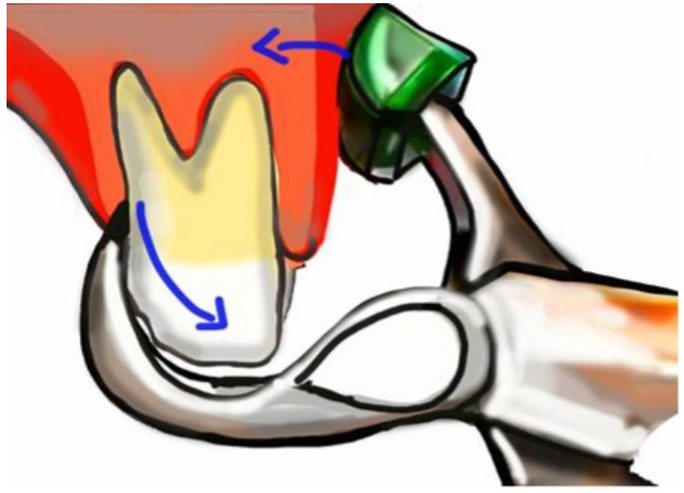


Fig. 8. Sketch based on study of the physical forceps. Source: The authors.

Fig. 9. Sketches of adaptation of the morphology to the product. Source: The authors.

6. Design solution

Two models were developed, one based on conventional forceps (sketch) and the other on physical forceps (3d model). Increasingly in the field of dentistry, specialists are seeking techniques for tooth removal that reduce or eliminate trauma to the tissues while preserving the remaining bone around the tooth. Thus, reducing discomfort after tooth removal and preserving the gums.

Fig. 10. Design solution based on conventional forceps. Source: The authors.

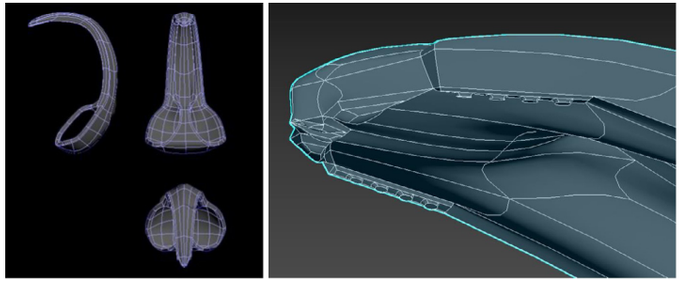


Fig. 11. Abstraction morphological of the Pedicellariae. Source: The authors.

Fig. 12. Rendering of the Design solution. Source: The authors.

Conclusion

The emergence of new technologies in biological research, such as SEM imaging and Micro-CT scans, as well as the advances in productive processes including 3D modelling and digital fabrication led biomimetic design to unique and ingenious forms of industrial production in which natural principles and all the biological discoveries achieved can be converted into a physical product. Along with this advance in productive modes, design should explore nature in a conscious way in which life becomes a mentor for the development of cutting-edge innovations. Beyond trends, consumption, and stereotypes, it is important to create a conscious and sustainable production.

Biomimetics becomes a fomenter of new solutions and strategies opening new frontiers and opportunities of hybridization between design and sciences. It also represents an important integrative and competitive process for the new industrial era, i.e., the fourth industrial revolution. In this study, the strategies found in nature were abstracted and applied for the development of a new biomedical solution optimizing the relationship between resources, performance, knowledge transfer, principles and logics. In this regard, the present study arises as a junction of a rational convergence between the problem, biological inspiration, and development of a new bioinspired product. In this study, gripper models for tooth extraction based on pedicellariae structures and functions were developed.

The achieved results are encouraging and provide a starting point for future research in which several aspects of this design strategy and resultant bioinspired forceps could be further investigated including:

a) Simulation testing using finite elements (FEM);
b) The prototyping of a physical model through additive manufacturing;
c) Delphi methodology in which experts are consulted;
d) Ergonomic testing and;
e) Preliminary Usability Tests on Patients.

Track 6
Design for New Materials and New Manufacturing

Long Abstracts

INTRODUCTION TO INTERACTION METHODS THROUGH THE USE OF RTR PROCESSES

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This communication proposes the use of RTR (Real Time Render) systems in design processes through a system of interaction between design methodologies and transdisciplinary actions that allow a more sustainable design and communication of the design, communication and interactive process. The research stems from direct experience through participation as a researcher in the industrial research project STREAMER commissioned by the company ASSO and developed through the Research Body InResLab scarl in 2019.
The system is aimed at the design world and in particular at architects, industrial designers, interior designers, manufacturing companies, communication companies and presents techniques and methods developed to meet the representation requirements and to guarantee the predictive analysis required by the design and communication of the creative and manufacturing industries.
The process is designed to manage, with a single media, digital 3D models displayed in real time at high quality, combining in its workflow the process of design (concept, to prototyping and realization) and interaction (representation and choice).
Its objectives are to visually organize, present and navigate virtual environments, make the representation process easier for the designer, enable better design quality, and avoid interpretation errors throughout the process. They also make it easier for the client to understand the new space or product, and lead to considerable savings in (physical) communication costs and time-to- market for the manufacturer.
In this context, RTR techniques make it possible to use digital virtualization systems of models, which are able to simulate reality, allowing the operator to relate to it in an interactive junction, thus activating direct design techniques based on perception (as opposed to metaphorical design), which consist in designing the artefact as it will be and not just representing an interpretative scheme (the usual design method).

Keywords
Interface, Interdisciplinary, Transcript, Interconnection, Interactions

The objective of this research path is to evaluate the usefulness of the introduction of RTR in the digital transition of the production, commercial and communicative spatial, manufacturing and interactive multimedia representation fields related to them. Innovations compared to the current state of the art do not relate to the purely physical or computerized aspects of research, but to the applied aspects of the use of methodologies within a sustainable pathway.
The research developed is certainly an excellent starting point for possible future implementations. In spite of the various complications encountered during its implementation, and although the realisation of a hypothesized virtual space is today only possible with recent and expensive innovations in the field of software and hardware, there is a good chance of making these interactions of processes and disciplines more accessible to a different and greater number of users.

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PERCEIVING GROWN BACTERIAL CELLULOSE. AN AESTHETIC AND SENSORIAL EVALUATION OF BIOFABRICATED MATERIAL

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Keywords
Circular Economy, Growing Materials, Sensorial Material Characterisation, Bacterial cellulose, Material designer

Linear production characterised the last 50 years production system and thispractice profoundly modified Planet Earth on several levels (Crutzen & Stoermer, 2000; Steffen et al., 2015). As a response, research in diverse fields moved towards finding new paths to overcome the linearity and embrace more holistic production practices or simply finding new production paradigms. From an economic perspective, new models have been widespread over the last years, such as the Blue Economy (Pauli, 2018), the Green Economy (Ivlev & Ivleva, 2018) concept until the most recent, Circular Economy model (MacArthur, 2017). Consequentially, Design discipline evolved in the same direction, looking for new practices to respond to the transitional urgency toward new modes of designing and producing goods. Hence, many different possible approaches to shift productive paradigms arose: design activism (Fuad-Luke, 2013), eco-design (Lewandowska, A. & Kurczewski, 2010), design for sustainability (Ceschin & Gaziulusoy, 2016) are just a few examples of the different focuses design discipline is envisioning as possible solutions to promote shift.
Another significant trend emerging in design research seeks to join design and other research fields, such as natural sciences, engineering, arts, with the specific objective of emulating and designing with Nature (Oxman, 2016). In 2012 Myers(Myers, 2012) described for the first time Biodesign as an "approach to design that draws on biological tenets and even incorporates the use of living materials intostructures, objects, and tools".This is just one demonstration of the growing interest in this subject of related disciplines as well. Indeed, in recent years, designers and the academic community shown an increasing interest in bio-manufacturing, understood as a process of materials production - e.g. growing materials and complex objects through the growth of living organisms - through the dialogic exchange between the world of design and that of applied sciences. Biodesign's origin and community are characterized by a DIY and

open source approach (Elsacker et al., 2020), contributing significantly in the in the democratization of life sciences, including the development of biofabricated materials. While designers have always been involved in the material selection process, the focus in this new perspective is on creating experimental materials through innovative, productive processes.
In recent years, in the context of material education and practice in the field of design, direct experimentation has been privileged over the selection and the theoretical approach. The importance of the materials' sensoriality and the direct involvement between the designer and the physical samples of the materials were therefore recognized (Pedgley, 2014), as a way to engage a conversation with materials (Schön & Bennett, 1996) to encourage the creative practice and experimentation. In this process, the materials play an active role by suggesting ways of interaction and manipulation. On these lines, the emerging practice of Material Tinkering (Santulli & Rognoli, 2020) arises as a hands-on, creative andimaginative approach to material exploration, understanding, and development. We can easily apply this direct and creative way to experiment and engage with materials to self-produced, underdeveloped, and low-tech materials, I.e., Do-It-Yourself Materials (DIY-Materials) (Ayala Garcia & Rognoli, 2019; Rognoli et al., 2015). As a new way of crafting, the self-production of materials allows designers to control the whole process independently. It allows them to use the resources they want or find inspiring and invent their tools. In addition, it permits designers to make a technical and sensorial material characterisation according to their visions and creativity. In the context of biodesign the fundamental activity of material exploration through direct hands-on experimentation can be defined as "Biotinkering", namely the act of tinkering with biology, considered by the DIY-Bio community a fundamental activity leading to innovation. Nevertheless, an important question still remains poorly answered: how those new practices on materials may leave the experimental and craftsmanship dimension to be implemented in different production scales? In addition, related to that, how it is possible to control and replicate the process ensuring that the desired soft qualities are maintained when producing these materials? Although growing materials (GMs) are inherently sustainable as they are renewable and biodegradable, current experiments current experiments in terms of circularity are just at the beginning. Valid examples to mention are the grown fungal biotechnologies (Meyer et al., 2020) or kombucha-based leather alternatives (Nguyen et al., 2021).
In the frame of the project (name of the project), funded by (author's referring institution) with basic research grants, authors

are trying to highlight thepotentiality of the development of new materials, through hands-on experimentation, to be further investigated through users expressive-sensorial evaluations, for a more effective outcomes, suggesting feasible applications of biofabricated materials.

Objectives

In this perspective, the authors in this work are focusing on the programmability and assessment of the aesthetic features of the bio-manufactured living materials, functionalised to the application in the initial design stages. The aesthetics dimension is closely dependent both on functional aspects and sensory perception.Those are fundamental characteristics taken into consideration by designers while selecting prime matter for their projects.Working on the intrinsic characteristics of a "living" and "growing" material is a significant and attractive challenge for designers, who can operate on colonies of bacteria/yeasts to encode the aesthetic aspects of the final bio-fabricated material. The aesthetic aspects on which it is intended to intervene because relevantly perceived by users in contact with the finished product are:• surface qualities, e.g. consistency, flexibility, texture;• optical qualities, e.g. transparency, colours, photoluminescence;• volumetric qualities, e.g. thickness and weight.In the presented work, the authors are going to assess the aesthetic and sensorial evaluation of different crops of grown bacterial cellulose (that will be performedtaking into account users' tactile, visual, olfactory experiences and assessing their perception).

Methodology

Relatively unknown materials, like bacterial cellulose, imply complex and novel experiences and aesthetic-sensorial patterns that designers need to comprehend and master to design or integrate them into applications that foster people's appreciation and acceptance. The aesthetic-sensorial evaluation of materials has a long tradition in the design discipline (Ashby & Johnson, 2002; Karana et al., 2008; Rognoli, 2004): at least four different levels of analysis have been already studied and framed within the notion of Materials Experience. Since materiality contributes to the definition of product experience (Desmet & Hekkert, 2007), the concept of materials experience – introduced by Elvin Karana (Karana et al., 2008) and then further investigated, developed and extended (Giaccardi & Karana, 2015; Karana et al., 2014)– is defined as the experiences that people have with, and through, the materials embedded in a product. It describes a holistic view of materials for design, emphasising the role of

materials as simultaneously technical and experiential. Taking materials experience as an entry point, it is possible to understand and describe how people experience materials and how physical, biological, social, andcultural conditions constitute these experiences. These four levels are not separated, but they actually interrelate each other and collectively constitute our ultimate experiences. As studied by Karana (Karana et al., 2015) and subsequently integrated in Giaccardi & Karana (2015):
•The sensorial level concerns the experience that originates from perceiving and noticing material sensorial information by senses. The sensorial experience of a material is related to sensorial information, e.g., material softness or roughness;
•The material interpretive deals with meaning attribution to the materials (e.g., it is modern or nostalgic);
•The affective level relies on emotions provoked by the user-material interaction (e.g., it is surprising, disgusting);
•The performative one suggests the interaction modalities (e.g., invites me to touch).
Meanwhile, sensorial material characteristics could be led back to numerical, quantitative values, meaning attribution, affective and performative levels of analysis strictly depend on personal's users' culture and, in a broader perspective, in the referring application context (e.g. a specific market or a particular application).
In the presented work, the following methodological path is going to be detailed and discussed. A panel of design practitioners and students will be allowed to interact with the material samples at a given time. Choosing a double typology of participants is going to give a chance to compare different perceptions and how they may vary according to the diverse expertise. The samples have been developed to show different aesthetic and sensorial characteristics, implicitly communicating the potential customisation of the grown materials in terms of sensorial (e.g. tactile, olfactory and visual) and aesthetic properties (e.g. colour, material and finishing). In the framework of descriptive test typology (Veelaert et al., 2020), the scaling method will assess the samples' specific material aesthetic and sensorial properties(Rognoli, 2010). According to traditionally coherent sensorial vocabulary, the scales will be elaborated to evaluate specific perceived qualities, as for the Semantic differential methods (Osgood et al.,1957). The descriptive test typology has been preferred for the possibility to assess qualitative sensory profile in a measurableoutput (Piselli et al., 2018). Moreover, this methodology is going to allow researchers to evaluate properties linked to different sensorial registers (as sight, smell and touch). Bacterial cellulose, as a semi-unknown material - or in any case widely debated but little used in design applications-,

can be qualitatively evaluated also through the structuring of "sensory path" for the survey participants. This approach incorporates the study already carried out on the evaluations of innovative materials (Parisi et al., 2016) that underlined how important it is to pay attention also to the relationship between optical qualities and tactile expectations related to them. To facilitate the processing of data collection, the authors plan to pair the in-person testing session with an online data collection form to give participants the opportunity to respond consistently and not interrupt the perceptual assessment by altering it through contact with other materials to be manipulated (e.g., paper).
These results can be collected both through the construction of comparative data landscapes and by retracing the recursiveness of adjectives and terminologies that define the perceptive aspects of the material under analysis. This in order to increase the knowledge of the subject, but also to structure conscious choices on the type of cultures to be further reproduced, as more promising or, alternatively, disruptive.

Expected results

The expected results of the presented work can be categorised in two main groups: outcomes directly emerging by the aesthetic and sensorial evaluation of the material samples and further results that will emerge in medium-long term.The experimental outcomes will highlight the grown bacterial cellulose sensorial profile that a specific panel of design practitioners and students perceived. By analysing and interpreting the results of the form, sensorial and experiential patterns will be identified, as well as crucial issues related to people perception of these relatively new materials in its expressive variations. From this starting point, aesthetic, sensorial and intangible characteristics of the biofabricated materials will be evaluated and assessed.
n future developments, to provide a complete characterisation of the grown bacterial cellulose, the research group will further analyse the material's functional properties. In this way, it will be possible to evaluate the proposed material by its characteristics and properties so that design practitioners and students will have complete information to embody the material into their projects. Ultimately, these aesthetic and sensorial information can be interpreted by designers to enhance meanings and positive experience in the material development, fostering materials appreciation and acceptance by people.It is important to emphasize how a study on the quality of materials can open the door to other possible project impacts in which the aspects of environmental, economic, social and cultural circularity are central. In particular, starting from studies on the quality of materials to be

optimized in terms of reproducibility and scalability, the creation of new production processes, also to be designed, prototyped, tested and evaluated, is also advisable. In this, a fundamental role is played not only by virtual prototyping technologies, but rather by the designer as the planner of a visionary future aimed at plausible sustainability.

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A MATTER OF CLAY: NEW SCENARIOS OF CERAMIC MATERIAL COMPOSED WITH ALGAE

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The research shows new possibilities to conceive ceramic material. It starts from a historiographic investigation of ceramics world, understanding what its birth was due to, the developments and contributions given to civilizations. Sequently, a territorial investigation was conducted on Nove, a town near Venice, famous since the 1400s for its ceramic processing. At the beginning of the 90s a deep crisis began for the ceramic sector which led to the closure of 90% of the factories and to a deep change in the culture of the territory. Hence the heart of my project: how can I renew the ceramic material respecting its poetry and sensitivity, keeping it as natural as possible so that it renews the culture and economy of the territory?
So the ceramic material was renewed through hybridization with other natural elements of the territory.
Given the presence of a river in Nove, the elements identified as suitable for hybridization are algae. They are good thanks to their remarkable presence in numerous bends of the river, and their speed of reproduction. Their use took place on the material before firing (on dough) and after firing (as a finish).
The first step was the identification and collection of local clays called "wild", through these clays it was possible to re-discover the identity of our territory and its history.
The second step was the collection and identification of algae on the Brenta river in Nove, they belong to a specific category called oedogonium capillare typical of southern Europe. They have been inserted into the dough in a viscous state. The insertion of algae has shown considerable potential, the dough is more viscous and consequently more elastic.
The elasticity allows to reach very thin thicknesses without dough cracking or deforming. In addition, during cooking there is a considerable shrinkage, with the same volume the mixture with algae withdraws more while maintaining the strength of the piece unchanged, which allows to have thin but resistant pieces. Then a series of products have been created to understand the workability with different volumes. The aesthetic of these objects due to the algae addition create imperfect surfaces but rough and "natural" to the touch.
Algae are then also used in the finishing of the material, in particular as glazing. The tests were carried out with frit, the result from these first tests proved extraordinarily promising, the algae in contact with some components of the frit reacted and released significant quantities of pigmentation which create surfaces with unexpected colors.
In 2008 researchers Gupta and Rastogi, discovered that this type of alga has, compared to the others, a maximum absorption capacity of metals. This suggests that the absorption of the metals by the alga (which by nature is a phyto-purifier) during life allows the release of the same in the form of pigments during cooking.
These assumptions allow you to start a very interesting search, not only through the collection of algae samples from different places can I have numerous color variations but above all I can monitor the quality of the water where the algae were collected. In practical terms, the sample becomes a data viewer on the presence of heavy metals inside the water.

Keywords
Clay, Algae, Biomaterials, Material experience