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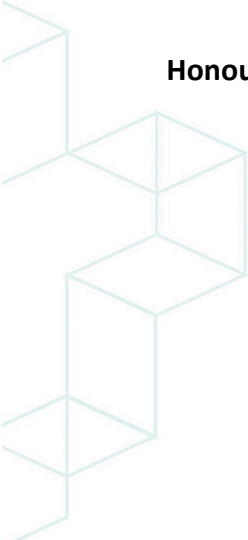
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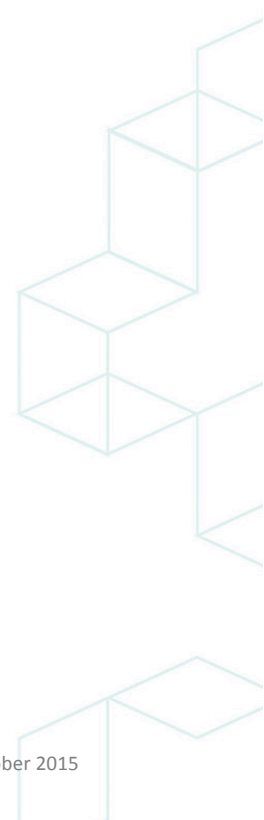
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Salomão Gomez, UFSC, Brazil

Parallel Session 10, Design and Visual Culture
Carlos Rosa, Universidade Europeia, Portugal

Parallel Session 11 - Design Processes
Cristina Pinheiro, IADE-U, Portugal

Keynote Speakers

Pieter Desmet

Faculty of Industrial Design of Delft University, The Netherlands

Is Full Professor of Design for Experience at the Faculty of Industrial Design of Delft University in The Netherlands. He chairs a research group that focuses on emotion- and well-being-driven design. Desmet is board member of the International Design for Emotion Society and program director of the Design for Interaction Master's programme. In 2012, he co-founded the Delft Institute of Positive Design, a scientific institute that stimulates and initiates the development of knowledge that help designers in their attempts to design for human flourishing. Besides his research, he contributes to local community projects, such as a recently developed sensory wellness neighbourhood park, and a cultural Rotterdam-based "House of Happiness."

Gabriel Patrocínio

Universidade do Estado do Rio de Janeiro, Brazil

Designer and design activist, graduated from ESDI (Rio de Janeiro) in 1982, and got his PhD from Cranfield University, UK (2013). His thesis on public design policies received in 2014 a first prize at the 28th Award of Museu da Casa Brasileira. Associate professor and founder of the Design Policies Lab at IFHT/UERJ (dplab.rio). He is member of the board of the Association of Graphic Designers (ADG-Brasil) and from the Design Curatorial Board at MAM-RJ. Has also been a member of the consulting board from the Brazilian Association of Design Businesses (Abedesign), and from the advisory design board at the Secretary of Development from the State of Rio de Janeiro, as well as professor (from 1983), vice-director and director of ESDI (2000-2008). Has an extensive experience as an international conferencist in the field of design and innovation and as a consultant on intellectual / industrial property.

Joan Costa

Elisava, Barcelona

Costa es diseñador, sociólogo, investigador y metodólogo. Es uno de los fundadores europeos de la Ciencia de la Comunicación Visual. Consultor corporativo, asesor de empresas en diferentes países. Costa es conocido como el comunicólogo número uno del mundo. En 1987 crea y dirige en Barcelona la Enciclopedia del Diseño, primera del mundo en su género, donde el autor reivindica las escuelas europeas de diseño en contraste con la escuela norteamericana y la japonesa. Es doctor honoris causa por la Universidad Jaume I, de Castellón, España; la Universidad Empresa Siglo 21, de Córdoba, Argentina, y la Universidad Peruana de Ciencias Aplicadas, de Lima. Autor de más de 40 libros, ha creado y dirige el Máster Internacional DirCom; Máster Internacional en Diseño de Comunicación Visual; Máster Internacional en Design Management; MasterBrand Internacional, entre otros.

Loredana Di Lucchio

Sapienza University of Rome, Italy

Ph.D., Researcher Professor in Design at Sapienza Università di Roma. Her research and teaching activities, as well as, her essays and conference papers, are focused on the relationship between production and consumption in contemporary societies within a convergence between the approaches of the Strategic Design, Product Design and Design for User Experience. Currently, she is: Scientific Coordinator of the Research Laboratory 'Sapienza Design Factory' which is focused of Design for Rapid Manufacturing and Research Supervisor of the Laboratory of 'Usability and Accessibility' which is focused on Design for User-Experiences. She is also Editor in Chief of Scientific Journal 'Planning, Design, Technology' published by RDesignPress and Co-Editor of the scientific journal 'Design Principles and Practices' published by Common Ground Publishing

MADEC. Material Design Culture

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ABSTRACT

Due to the increased complexity of materials and production processes, the responsibility of the development of a design is often left in the hands of technicians and production personnel. This lack of knowledge about materials thus effectively creates a barrier between the designer and the product. Bridging this gap represents a challenge to designers and especially to the design schools. Designers cannot know everything but they can open their minds and develop a more conscious understanding of this new field of design practice starting from a cultural point of view. This paper wants to present a research promoted by the Design Department of Politecnico di Milano and funded by FARB (University Funds for Basic Research), for the creation of a Research Centre named MADEC, with the ambition of recognizing peculiarities of Italian Material Design Culture, and tracking their evolution in the contemporary era of “tailor made materials” as technological paradigm. The paper is divided into three parts: the first part concerns reasons, motivations and research state of the art; the second part describes in detail the research activities developed during the first year of the project; and the third part is dedicated to conclusions with some critical considerations and future actions.

Keywords: MADEC; Material culture; Italian Material Design; Transdisciplinarity; Material Design-led Methodology.

INTRODUCTION

When we talk about Material Design Culture we mean “the whole which includes knowledge, belief, ethics, habits and any other capabilities acquired in the relationship between design and materials”. The history of design is rich of stories about material design.

In 2010 Mike Ashby¹'s book *Materials and Design* (2009) was translated in Italian language by a group of researches of the Politecnico di Milano. Ashby's was considered the most relevant scholar of *material studies*, he developed software able to select materials during the design process but after the concept development, through parameters of mechanical proprieties, to give products their own mechanical performance, which is just as essential for the use of a product as consideration of the functional aspects. This is considered the classic engineering derived approach.

However the history of design, particularly the history of Italian design, is rich of stories of designers inspired by new materials for their lust, lightness or softness. Designers can feel shapes, uses and meanings of materials and through their project they are able to increase the perception and the value of products. Actually designers have never seen technological innovation and materials solely as elements of a problem of constructive correctness. Instead, materials are used as creative input and parts of the linguistic poetic palette of a project, which can be used with their inherent potential for expression and communication during the use.

In contemporary time, due to the increased complexity of materials and production processes, the design questions are more complex. Not only common people, but also designer today don't know how things are made and how materials are composed. The more the industrial production processes and materials are sophisticated, the more is the lack of knowledge about materials, thus effectively creates a borderline between designers and production. Bridging this gap represents a challenge to designers and especially to the design schools. (Bak-Andersen, 2013) Designers cannot know everything but they can open their minds and develop a

¹ Mike Ashby is a professor of the Engineering Department at Cambridge University.

more conscious understanding of this new field of design practice starting from a cultural point of view.

So, at the end of 2013 prof. Marinella Ferrara founded the MADEC project. The proposal suggested a specific strategy to deal with the core of the topic - the "Material Design Culture"- to underline the historical identity of Italian Design and to understand how this identity could evolve inside the contemporary research and the technological innovation scenario, in order to establish new methodologies, tools and network activities. The work team coordinated by Marinella Ferrara is composed by: Giampiero Bosoni, full professor of Interior Design and design historian²; Giulio Ceppi, senior researcher of Industrial Design and architect, who cooperate in Domus Accademy with Ezio Manzini and Antonio Petrillo on the issue of materials identity; Andrea Ratti, associate professor of Industrial Design, designer in the nautical sector and expert on composites materials based on fibers; Chiara Lecce, PhD in Interior Architecture and Exhibition Design; Sebastiano Ercoli, PhD student and Naïke Cogliati a young designer.

MOTIVATIONS AND STATE OF THE ART

The Italian design approach to materials

The research required a fundamental assumption: recognising the peculiarity of Italian design approach to materials. In the past, several theoretical contributions (Bosoni & De Giorgi, 1983; Branzi, 1983, 1984, 1996; Antonelli, 1995; Fiorani, 2000; Doveil, 2002) pointed out a particular capacity of Italian design to apply materials and technological processes. In Italy a specific design method led to a generation of designers and companies that still today wonder for their surprising and sophisticated use of materials, as well as for the elaboration of ideas that broke up a consolidate knowledge introducing elements of discontinuity – compared to the common thought – anticipating social aspirations and supporting the growth of new styles. This "Italian way" acquired a singular might in certain periods. This Italian approach was also communicated through exhibitions, visual artefacts and theoretical materials diffused by media. It is now the place of a mythology that still supports the image of the Italian design.

Some important historical issues provide evidence of the particular attention of the Italian Design with its stories. In the 50s, Italian designers in cooperation with the developing industrial field of plastic materials soon conducted some original linguistic experimentation. In this time and in the 60s designers opened new market opportunities for materials applications. Designing products with amazing shapes, they interpreted desires of the Italian society to new life styles while allowing the industrialization of furniture and house-ware sectors of production.

The 70s were one of the most crucial times for the Italian Materials Design Culture thanks to the "Design Primario". This shifted the design focus from hard materials qualities (i.e. mechanical properties of materials) towards the soft qualities of products (i.e. the expressive identity of materials: color, transparency, smell, sound, temperature, surface texture, etc). These soft qualities stay at the heart of human experience because they affect users perception and thus the conscious or unconscious meanings transmitted by design.

In the late 80s the "silent revolution" of compounds led design towards a new challenge for technology. Designers transferred technology from the production sectors supported by big investments in research (like in automotive sector) to others with small investments (like furniture sector). They worked exploring the new performance of innovative materials and went beyond technological boundaries. Materials were pushed to their technical and expressive limits, giving surprising visions of the nature of materials, creating a sensory displacement effect. To this regard we can remember the MoMA exhibition called "Mutant Materials in Contemporary Design", curated by Paola Antonelli in 1995, as well as the "iMade" exhibition curated by Frida Doveil in 2003, which presented some interesting researches by the Italian furniture industry.

At the beginning of the new millennium, some authors theorized the dematerialization of products as an effect of the connection of miniaturization and a new eco-friendly design agenda. This reduced the interest of design theory for advanced material and the confidence with technology. While, on the contrary, scientists, chemical engineers and physicists in many part of the world, have been busy developing new advanced and smart materials, built one atom at a time, with computerized analysis and characterization methods. Ezio Manzini (1986) was the first to explore the implications of designing with advanced materials. He highlighted that the design process had become more complex and that it was necessary to keep control of technical complexity, no more manageable only by designers. He marked the opening of a new chapter in the history of design and the need to define a new framework, a vision, even a method, by which the designers could work with

2 G. Bosoni discussed this issue since his cooperation with Vittorio Gregotti (1986) and during his work for Rassegna (1983) magazine in the seventies.

other actors of innovation to imagine a new interactive nature of products.

A new emerging scenario

A new chapter is opening now, but there are still a number of problems to be solved: technical gaps that limit the intervention of designers in understanding and applying smart materials; guilt-feelings that pushed focusing design interest towards immaterial production, like communication and service design; the raise of environment awareness. Today's a new idea of technology, based on increased environmental awareness and on greater control on productive processes, enables design push forward its horizons. The *European Competitiveness Report 2010* has highlighted the systemic importance of KET (Key Enabling Technologies). Among KETs, Advanced Materials have a very large economic size and they are essential for further development of many other KETs. Advanced materials adds functionalities to materials in order to increase the added value of the products. This will enhance the competitiveness and also make it more difficult to copy a product. In this field of scientific research, design skills are achieving a significant role, because they "close the cycle of innovation". Since design is capable of improving communication between different actors, it promotes mechanisms of innovation, lowering the risk that, after substantial funding, and scientific research being not adequately exploited. When new materials, products and production processes are conceived together, the industrial take-up time as well as time to market is minimized. And, most importantly, design promotes human-centered innovation. Now it is necessary to stimulate research on new tools and techniques, like smart materials and systems that are expected to play a key role in quality of life, productivity, economic progress, and sustainability. But it is also important to discuss how smart materials could implement and redefine our objects and spaces in an efficient manner. So we suggested in the MADEC proposal that today the relationship between design and innovation is increasingly correlated and dependent on trans-disciplinary processes in which specialized knowledge is integrated by implementing practices of co-design and open design.

RESEARCH AND ACTIVITIES

The MADEC' research combines different approaches starting from an historical, theoretical and cultural point of view reaching a more technical and advanced scenario related to the materials design discipline.

"Italian Material Design: learning from history"

The possibility to restart from the past, studying the consolidate practices of the Italian design, could be a useful strategy to give to *material design* approach a specific Italian connotation, even though its evolution in the international contest. For this reason one of the first work of MADEC research team concerned design history. From the collaboration with the Italian Association of Design historians (AIS/Design), Giampiero Bosoni and Marinella Ferrara (MADEC' strikethrough investigators) curated a monographic number of the Association' e-journal *AIS/Design Storia e ricerche* (www.aisdesign.org/aisd/storiaericerche). This special issue, titled "Italian Material Design: learning from history" (2014 December) is dedicated to materials design seen through the historical evolution of industrial design culture, and beyond, in Italy. It is a number rich in contributes, discoveries and insights about design and materials culture, largely based on original archive documents that report history of small and big companies, as well as episodes of handcrafted excellences from different Italian regions during the XX century. The collection of essays proves the definition of an Italian way to the design system that contributed to express a special talent in interpreting technical knowledge generating innovation in both linguistic and deployment terms and, even in architecture, a myth of this capacity of interpreting materials and productive technologies. This analysis has been possible by examining objects and designers as well as corporate histories, with all their technical abilities and productive interests, and the set of relational and communicative practices, debates, writings and lectures.

The richest number of contributions deals with the relation between companies, designers and technological innovations lead by material experimentations: "From celluloid to bioplastic: 150 years of experimentation with materials seen through the activity of the company Mazzucchelli 1849" by Cecilia Cecchini; "Franco Albini and the 'Gommapiuma' Pirelli. For a history of natural rubber foam in Italy (1933-1951)" written by Giampiero Bosoni; "Rising matter. Pirelli, rubber, design and the polytechnic dimension after World War II" by Marinella Ferrara; "Fratelli Guzzini's approach to materials", by Valentina Rognoli and Carlo Santulli; "Abet Laminates: design of surfaces" by Chiara Lecce.

A second common point of view, deriving from the articles review, concerns episodes of handcrafted excellences from different Italian regions that evolved with material experimentation: "The materials that innovate the culture of industrial product in South Italy. Intentions and experiments in the figures of Roberto Mango and Nino Caruso" written by Vincenzo Cristallo and Ermanno Guida; "Paolo De Poli (1905-1996) master of fired

enamel” by Valeria Cafà; “Autarkic Materials and Types. The culture of the product between industry and handicrafts in Italy in the early forties” by Federica Dal Falco.

The latest referee is the contribute of Giulio Ceppi with the article “Material Design in Italy. Domus Academy Research Centre and its contribution: 1990-1998”. Ceppi tells from the inside as one of the founders of the *Domus Academy Research Centre* that had primary importance in the formation of an Italian culture for the design of materials.

The collection of essays proves the definition of an “Italian way” to the design system that contributed to express a special talent in interpreting technical knowledge generating innovation in both linguistic and deployment terms and, even in architecture.

“The Ideas and the Matter”

Sciences and technologies are extending design fields, modifying materials and everything that surround us, even our body, redefining on a perceptive level the boundary between things and us. To identify the actual evolution of the relationship between science knowledge and design, MADEC started in 2014 a wide debate with a series of open lectures entitled “The ideas and the matter: What will we made of and what will the world made of?”. The project has been organized in parallel with Giulio Ceppi, Fortunato D’Amico, Massimo Facchinetti and Francesco Samorè from the Politecnico di Milano School of Design, involving their students during the Final Synthesis Design Studio - Interior Design Degree. 2014/2015. This collaboration has been very interesting in order to see the results of student’s projects as a proof of the influence of the different notions brought from the lectures at the end of the semester. Therefore, “The Ideas and the matter” involved keynote speakers from several disciplines (art, biotechnology, engineering, anthropology, architecture and design), becoming one of the most significant experience conceived during the first year of MADEC (from October to December 2014). Contributions were organized in three different sessions: *Extension*, *Osmosis* and *Inclusion*. Concepts that act as metaphors of the complex polarities like body/space, artifice/nature or interior/exterior, that are increasingly characterizing the contemporary design world. Today these conflicts tend to dissolve thanks to the capacity of contemporary research to hybridize, integrate and coagulate experiences.

Extension. The first section developed as an itinerary, it starts from the inner of human body with a lecture of the prestigious molecular biologist Giuseppe Testa, director of the Laboratory of Stem Cell Epigenetics of the European Institute of Oncology and European School of Molecular Medicine (Milan). Testa assumes that the molecular life sciences are making visible what was once invisible. Yet the more we learn about our own biology, the less we are able to fit this knowledge into an integrated whole. Life is divided into new sub-units and reassembled into new forms: from genes to clones, from embryonic stages to the building blocks of synthetic biology that, he affirmed, is programmatically the nearest to the world of design.

The journey continues arriving to the human body “boundaries”, reflecting on how technology, needs and wishes are combined together to design human prosthesis thanks to the contribution of the biomedical engineer Pietro Cecini, one of the founders of Roadrunner Foot Company.

The section ends transiting over the human body surface and with a reflection on the implications of wearable devices for medical uses thanks to the lecture of Matteo Lai CEO of Empatica Company. Lectures collected into *Extension* underlined how designers today are seen the less as “instruments suppliers”, the more as “co-decision makers”. (Bassetti, 2004)

Osmosis. Osmosis as generically defined by the dictionary is a gradual, often unconscious process of assimilation or absorption. This definition well fits the aim of this second section of lectures that try to give a correlation between different disciplines similar to an osmotic movement. The session starts with the artist Michelangelo Pistoletto’s lecture on the *Third Paradise*, “The basic idea of the *Third Paradise* is the overcoming of the current worldwide existing conflict between the two polarities of *nature* and *artifice*. The *Third Paradise* is symbolically represented by a reconfiguration of the mathematical infinity sign. In the “New Infinity Sign” three circles are drawn: the two opposite circles signify nature and artifice; the middle one is the conjunction of the two and represents the generative womb of the *Third Paradise*.” (Personal communication, November 10, 2014)

The second appointment titled *Mater Materia* with the designer Clino Trini Castelli the founder of Castelli Design Milano, a firm whose work explicitly addresses user experience and perception. In 1972 he coined the term *design primario* which addressed the role of other “subjective” aspects of the space, including light, sound, microclimate, texture, and scent.

Artifactual Elegance by Roberto Cingolani and Chris Bangle is the third combined speech of the *Osmosis* section. They presented separately their work experiences under a common vision that brought to a real collaboration between science-technology and design. Cingolani is a physicist and the Scientific Director of the Italian

Technology Institute (IIT) in Genoa from 2005. His work includes different field of scientific research as: *Advanced Robotics*, which concentrates on an innovative, multidisciplinary approach to humanoid design and control, and the development of novel robotic components and technologies (iCub project); or *Nanophysics* dedicated to research and support activities related to design, characterization and application of nanocomposite materials. Chris Bangle is an American automobile designer, he known best for his work as Chief of Design for BMW Group, where he was responsible for the BMW, MINI and Rolls-Royce motorcars. In 2008 he introduced *GINA Light Visionary Model*, a fabric-skinned shape-shifting sports car concept for BMW. In 2009 he founded the studio Chris Bangle Associate (GBA) in Italy that works on innovative concepts and production design extended beyond cars to all manner of products and service constructs. Bangle and Cingolani reported during the lecture their collaboration experience. In fact, they teamed together to explore the future of consumer applications for robotics under the theme of *Artifactual Elegance* – and approach to human-machine interaction that attempts to renegotiate the idea of "robot" away from that of industry and into an arrangement of emotional and functional interpretations similar to those practiced in car design.

The last session of *Osmosis* was dedicated to the work of Maurizio Montalti, a young designer and founder of Officina Corpuscoli studio in Amsterdam. His lecture, titled the *The Growing Lab: Fungal Futures*, is an interesting example of design driven by materials experimentation. In his opinion one of the main challenges of the current Century is to transform our consumption-oriented economic system into an eco-friendly and self-sustaining society, capable of minimizing energy consumption, carbon emissions and the production of waste, while reducing production costs. In his specific case the material used is *Mycelium*. He explains: "*Mycelium* is the fast-growing, vegetative part of fungi, consisting of a tight network of interconnected filamentous cells, called hyphae. The *Mycelia* of mushroom-forming basidiomycetes are highly attractive because of their tendency of growing on a wide variety of substrates (e.g. agricultural waste), with the potential of converting waste products into novel compounds, characterized by diverse qualities; depending on the species and on the growth parameters, in fact, it is possible to develop materials with peculiar properties, as for instance in relation to strength, elasticity, thickness, homogeneity, water repellency, etc." (Personal communication, November 25, 2014)

Inclusion. Our inner vision amplifies our capacity to perceive and absorb the outer. In the educational field, the encounter of different knowledge, before separated, could become an ideal procedure to implement participatory approaches and sharing processes. Innovative explorations complained everyday terms as "interior" and "exterior", sometimes apparently invert their meaning. The project *Campo Expandido* presented by the Mexican artist Raymundo Sesma in the first session of *Inclusion*, is a good example of an amplified work process, inclusive of a wider logic of the contemporary city problems. His architectural painting, dedicated to the regeneration of buildings facades in degraded urban contexts, demonstrates that is possible to redevelop environments, to reconnect disconnected urban tissues. *Inclusion* continues with the combined lectures of Tiziana Monterisi and Marco Baudino. Tiziana Monterisi is an architect and founders of the project *N.O.V.A.Civitas* (acronym for Nuovi Organismi di Vita Abitativa – New organisms of housing life), born inside the Michelangelo Pistoletto Cittadellarte Foundation. The project promotes a sustainable culture in the architectural and environmental sector principally investigating and experimenting with rice straw construction technology. Marco Baudino is the technical director of Future Power Company. As *N.O.V.A.Civitas* uses rice straw this company carries on a specific experimentation recycling rice husks and manufacturing 100% biodegradable pots, named *Vipot*.

The last day of the cycle sees two lecturers by the renowned designer Stefano Marzano and the famous French anthropologist Marc Augè. The session faces two different disciplinary field tiring to analyse the contemporary world with the tools of their relative professions and cultural approaches. Stefano Marzano during his lecture brings his long lasting experience as Chief Design Officer and CEO of Philips Design in Philips between 1991-2011. "(...) True innovation has to be recognized by people as such, and should advance the interests of the company while contributing to the quality of life by giving people something they really enjoy, or really need, or really appreciate." (Personal communication, December 9, 2014) Professor Marc Augé is one of France's leading intellectuals. His work has revolutionized his primary discipline of anthropology and serves as a key point of reference for work inside and outside of this field. Using one of his most famous concepts, namely the idea of the "non-place" (Augè, 2009) in this lecture Professor Augé examines concepts such as globalization, urbanization, "city-world" and "world-city". He opposes the "City World" (*monde ville*) of global business, tourists and architects to the "World City" (*ville monde*), the megacity where all differences become apparent - social, ethnic, cultural and economic - and a space where "misery and opulence rub each other".

Results and dissemination

Simultaneously to the open lectures cycle "The Ideas and the Matter", 44 students of the Final synthesis Laboratory, arranged into 30 groups developed 30 concepts related to product innovations and new interior

scenarios, the same was done by 35 students from another class of Politecnico di Milano. Meanwhile all the lectures were recorded with the support of the Giannino Bassetti Foundation, and published on-line as an open source material (Dipartimento Design – You Tube Chanel). At the end of the project, MADEC started to transcribe all the lectures in order to collect them into a final international publication together with five adjunctive essays specifically written for the publication by MADEC' research group components. Actually we are going to close the first year with this publication. During this period MADEC team has supported workshops and seminars.³

All these heterogeneous contributions demonstrated that design is a tool for innovation in new or emerging markets where user-friendly, sustainable and appealing design is a must to create or enter the market. But is obvious to add a pragmatic consideration, how can design educators use the technology and techniques available today to embed an ethos of inventiveness driven by curiosity? In fact, beyond the cultural and theoretical stimuli, bringing advanced and smart materials to design schools is as challenging as facilitating the processing equipment and domain expertise needed to create meaningful collaborations. There is a lack of knowledge on how to use a material in a system and see its use as a cyclical process.

MADEC moved the very first steps in this direction organizing other activities, but much more has to be done to fulfill this goals. The first step was to built an open access web site (www.madec.polimi.it) in order to publish updated news about interesting case studies and researches focused on materials design in the international scenario. Recently it has been added a new section of the website called "Making of", in which there is a selection of practical tutorial to let better understand smart materials manipulation to almost everyone. And, of course, all the activities of MADEC are constantly updated together with innovative students projects contributions from the School of Design of the Politecnico di Milano. MADEC website is also a useful platform to collect the entire contacts network that is gradually grown during this year, although it is necessary to bring it to a more widespread diffusion. In fact, almost all materials produced till now are written in Italian language except for few academic papers.

CONCLUSIONS AND CRITICAL OBSERVATIONS

All the activities conducted by MADEC with a wider vision of the concepts "matter and materials", "design and meta-design" had a double role: to enlarge the fundamentals of our knowledge with several visions that came from different design fields, with a common idea of cross-pollination between disciplines and to demonstrate how much boundaries of human knowledge have been expanded from the macro-world to the micro-world. The researches underlined also what have changed: the depth of our look inside the matter is augmented, the real matter on which we focus our look has changed and the places and actors of knowledge production have changed too; the complex relation between technology and nature, considered hostile, could be skillfully managed by humans through all the "meanings" that creativity could contribute to conceive and express avoiding obsolete models; today nature could become the measure and method for designing the artificial, guaranteeing sustainability and beauty, therefore competitiveness; the gap of knowledge that high specialization contributed to create could be overtaken through a wider multi-disciplinarity; opened and shared knowledge is the only way that will enable us to pin ourselves toward the future.

Actually the main goals of MADEC project are: to open a wider network for European researches collaborations; to develop the creativity-driven material design methodology as evolution of the Italian way of material design; to develop new tools for materials knowledge open access able to spread open knowledge between digital creation and physical making. This tool can be developed for design practice and for teaching activities with a specific focus on a possible development of a more social model of decentralized production. We introduce this approach as a complementary approach to industrial production. Access to knowledge through cross-disciplinary comparison can accelerate virtuous innovation, enhancing (rather than flattening) technical complexity. The new method could apply some special tools like *open source platform* for sharing and developing knowledge. At this regard we are observing some other international centers focused to develop design process based on new scientific concepts. We are looking forward to launch a process of cross-pollination between disciplines and also with manufacturers/suppliers of raw materials, specific research centers for different materials, technology centers, material libraries and scouts technologies.

³ "Regenerated plastics and new packaging design for food" (12-16 May 2014, Politecnico di Milano): workshop with Marinella Ferrara (supervisor) in partnership with the company Ecoambiente. "Material design. Ceramic Contaminations" (11-15 May 2015, Politecnico di Milano): workshop in partnership with the company Micacera. "New material design. Scenario of smart materials" (seminar by Marinella Ferrara - January 2015, PhD School of Design of Florence University). "New materials to built tomorrow" (seminar by Marinella Ferrara - 21 October 2014, Auditorium di Palazzo Lombardia, Milan).

Building the “creativity-driven material design” methodology

The “creativity-driven material design” methodology provides for the integration of tailor-made materials during the design process, in order to create new scenarios of concepts material and product. Actually the method is under construction, so it was essential to have a conscious knowledge of the actual panorama about generic creativity-driven methodologies.

An important referee to develop a correct methodology process was the publication titled *Innovation Methods Mapping: de-mystifying 80+ years of innovation process design* edited by GK VanPatter and Elizabeth Pastor with the *Humantific Lab*⁴. Essentially the publication concerns an in deep analysis of a wide variety of innovation process models created since 1920s. In particular two main innovation process models have been compared: *Applied Creativity* (or *Creative Problem Solving - CPS*) and *Design* (or *Design Thinking*). The research found that there are three basic types of innovation process models: “Script models” that prescribe a series of detailed actions or behaviors, often with the caveat that nonlinearity is intended; “Zone models” that are more like scaffolds or frameworks inside which many action options are possible, often without any behavior prescribed; and “Script/Zone models” which combines the two. An other useful indication is that most CPS process models contain graphically-depicted behaviors signals: diverge <, converge > and deferral of judgment. Also “Open innovation”, defined as multiple, internal and external humans engaging together to address challenges with open tools, has been part applied creativity (CPS) history since the 1940s. (Van Pattern & Pastor, 2013)

The analysis ends with a list of ten “Common Innovation Method Design Missteps”. From that list we depict the most relevant for our intents: “Missing Meta Process” (having a meta method to enable multiple participant orchestration is much more important than any technique, today most forms of cross-disciplinary work, not only require an externalized meta framework, but deep knowledge regarding how to apply it in various innovation contexts); “Missing Separation of Content from Process” (applied creativity methodologies enable deep expertise in both content and process to be present in different roles), “Missing Behaviors” (today’s huge interest in multiple participant co-creation and collaboration, behaviors have become critically important, behavior synchronization is a key ingredient in any robust methodology-based, innovation-culture-building initiative), “Missing Visual SenseMaking” (using only words and numbers to solve problems and explain solutions, rather than words, numbers and pictures, significantly foreshortens the viewing lens and certainly the possible outcomes, today *sensemaking* is being recognized as a key 21st century leadership navigation skill), “Missing Cognitive Surfacing” (understanding that all human adults have cognitive/thinking preferences/styles is important in training of any methodology), “Missing Culture Connections” (innovation method design is not just about making an abstract drawing of steps or assembling techniques. Its about understanding the role of innovation process in designing and deciding what kind of culture you want to create in your organization). (Van Pattern & Pastor, 2013) The results of the entire work lead to the *Integrative Thinking*, which is the disciplined ability of recognizing, orchestrating and integrating the diverse brainpower of cross-disciplinary teams as they grapple with and navigate complex innovation challenges. *Integrative Thinking* is about recognizing and respecting the default thinking preferences of individuals regardless of discipline, and how those preferences map to innovation process. (Van Pattern, 2013)

A second step to define our methodology was looking outside of the design world. The management researches are now very interested in the successful practices of “design-driven innovation” in various industries. These design practices happens stressing design, instead of technology, in their innovation (Utterback et al., 2006). Design practices, focusing on new applications of materials as well new behaviors in society, are able to generate unexplored design solutions for new product concepts. To produce products which are design-driven innovation, companies need researchers who "envision and investigate new product meanings through a broader, in-depth exploration of the evolution of society, culture, and technology acting as interpreters who are able to envision how people could give meaning to things through intense involvement in the design discourse" (Verganti, 2009). A research⁵ conducted in creative industries on the basis of Verganti’s theory affirms: “To design new product meaning for new costumers, the company should sense the trend forecasting data which are collected with various methods by which various possible new meanings are produced. Then, the designer with his/her design paradigm helps the company do the *sensemaking* process in which the one of the possible new meanings is considered to be the best in anticipating a new trend is selected and defined. To translate the defined new meaning into a new product, the most suitable product language to express the defined new meaning -supported by selected appropriate technologies - is selected. The result will be used as

4 A multi-disciplinary consultancy specializing in the creation of strategies, tools, and organizations that enhance adaptability and innovation based in New York.

5 The contribution of the research by P. Kembaren et al. (2014), was to reveal that to deliver a new meaning successfully to the market, at least for the design-entrepreneur-led creative industry, there are ways other than the ones suggested by Verganti (2009).

specification to develop the new product.” (Kembaren et al., 2014)

Mixing and connecting all these referees, MADEC’s “creativity-driven material design” methodology (Fig.1) is based on a “Script/Zone” innovation process model. It consists in the reversal of the traditional problem solving approach to material design: material doesn’t exist in its peculiarity before to be chosen, but is born out of the interpretation of the technical opportunity and social necessities. The material and its application are designed and realized starting from a “scenario” (*sensemaking*) that derives from a combined “sensing” process. The process converges to the Concept. The product concept itself defines the idea of the material, of its texture, performance and behaviors on the base of scientific advances and technological platforms (*specifying*). Then before to get the final product prototype a “design discourse” phase is necessary to complete the design-driven process. Once the product has been fixed, to deliver the new product with its defined new meaning into the markets, a storyline is carefully designed along with its product language to amplify and to relate the message of the defined new meaning to the mind of the potential costumers (*setting up*). (Kembaren et al., 2014) Finally the product position inside the market diverges from different possible approaches connected to production processes (B2B or B2C).

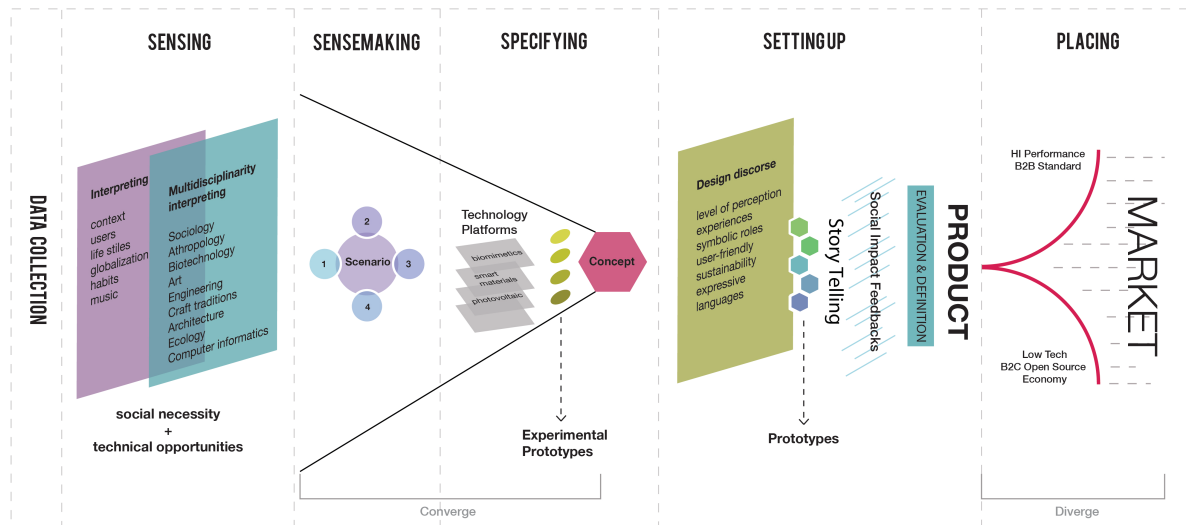


Figure 1. “Creativity-driven material design” methodology by MADEC.

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Do it yourself Magazines: Craftwork versus Handicraft Work

Handicraft work as a secondary occupation is not considered craftwork. Craftwork or craft, as called by some, implies a commitment to cultural roots, identity or artistic manifestation. *SEBRAE* (2010) establishes that the handicraft production is characterized by the use of previously defined moulds and patterns from *Do It Yourself* and *Handicrafts* magazines. Such work does not come from an effective, creative process and results in products with limited aesthetic. It is rather a hobby or a secondary occupation during the spare time, between household tasks.

This is considered a significant issue in the present study, due to its economic reach in the market of raw materials, and specialized magazines about manual work for decoration and utilitarian purposes. Despite the entertainment aspect of such publications, the result is a range of products often marketed in tourist fairs supported by local city halls. In the capital of São Paulo, that kind of handicraft work is promoted by the industry in a big fair *Mega Artisanal*, which annually gathers around 180,000 people. Most of the exhibitors come from large companies, which publish the specialized magazines and produce the raw material for paintings, embroidery, and other types of craftwork. According to the Brazil Federal Government (2013), Brazilian Institute of Geography and Statistics *IBGE* data show that approximately 8.5 million Brazilians make use of handicraft as their small business. Those micro-business entrepreneurs handle more than R\$50 billion a year. Today, the craftwork market is considered the fifth best business in Latin America. Indeed, the dissemination of various techniques through magazines, sites and blogs specialized in handicraft work has increased, showing the interest and the pleasure people demonstrate towards manual work as a way to spend time. On the other hand, this trend is bringing about a standardization, which impoverishes the ideas and products, since it is based on a repetitive and industrial matrix. It is a phenomenon: “everything must be handmade”, which presents a shortage of technical expertise, aesthetic knowledge and cultural base.

Craftwork and Contemporary Art: the Challenge of a Collaborative Work

The close relationship between design and craftwork is pointed out by the market demands and generates income to artisanal communities. Whereas in the relationship between art and craftwork, we can more closely observe distinct objectives and proposals, aiming at the artistic development process and resulting work of art. Andrade (1944) defines the true artist as “the one who is aware of his destiny and his mission in the world” and who “will invariably discover the truth which states that the work of art is what really counts in art”. Craftwork is the technical part that can be taught. However, there is a part of the art technique, which is the objectification, the achievement of an artist’s inner truth. That part of the technique is in line with secrets, whims and commands of the person’s total subjectivity, either as an individual or a social being. This cannot be taught and its reproduction would be an act of imitation. Fabris (1991) states that technique is at the same time knowledge and production, a simultaneous process in which the artist acquires knowledge by making, and makes within a cognitive development, resulting in the encounter of intuition and intellect aiming to attain the metaphoric knowledge.

The most recent work by the artist Ana Maria Tavares, *Natural – Natural: Paisagem Artificio*, in Fortaleza/CE is an example of challenging collaborative production between contemporary art and craftwork, as shown in *Figure 5*.

Tavares (2013) carried out a case study about Burle Marx gardens along with a study of female artisans, drawing a relationship among art, architecture and craftwork. She developed a questioning dialogue about landscape, nature, and artifice/representation, deriving from crochet pieces made by the artisans mediated by the designer Celina Hissa. Concepts such as shadow, light, volume, weight, artisanal production methods versus industrial production and the production time were examined. At last, the artist proposed that they interpret the landscape with their threads, needles and crochet stitches, facing the challenge of not picturing it as it was, but using instead their own craftwork language, aiming to “revive the senses” and “provoke the reasoning”.



Figure 5. : A Garden to Burle Marx. Installation with small shower parts and crazy flower made in crochet, created by the artisans. From Natural-Natural Paisagem Artificio Ana Tavares exhibition in Fortaleza, CE, 2013. Photo credit: Sérgio Araújo

CONCLUSIONS

What is this craftwork and what is its relationship with people today? By becoming contemporary, craftwork has gone through a process of re-signification of traditional connections. In the place of the former social order based in past cultural values which were reflected in the artisanal practice, there is now the fragmentation of practices and the discontinuity of the know-how learning processes, resulting from the accelerated rhythm of changes in contemporaneity and the global extent of the market of utilitarian and artisanal product, in an economic system which keeps producers separated from consumers in large distances. On the other side, the spirit of endurance and search shown by the artists, designers, and artisans bring a new proposal to the survival of contemporary craftwork. Designers emphasize narrative and meaning in their objects rather than functionality, incorporating artisanal interventions that become closer to art, and artists propose aesthetic experiences in dialogue with artisans in their artistic doing. This movement stimulates the sense of creativity among artisans, going beyond the technical ability and mimesis, the learning options through printed media and internet, and the migration of knowledge from several cultures. Indeed, this exchanging movement presents new ways of motivating the intrinsic human desire of making.

In order to keep contemporary craftwork development in this path, as the examples cited in the present study show, it is necessary to build value through the quality, the adequate scale of production, the incorporation of new symbols providing meaning to the objects, the recognition of new exhibition networks and the formation of artisans in the field of fine arts. Finally, to guarantee the sustainability of this segment it will be essential to provide structured means for the artisans to achieve their autonomy in the relationship with the new economic circuits.

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