



Tangible Means

EXPERIENTIAL KNOWLEDGE THROUGH MATERIALS

EKSIG 2015 – KOLDING

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MADEC: Exploring new methodologies to transfer material knowledge into design disciplines

Chiara Lecce, Politecnico di Milano, Italy

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. (Bak-Andersen 2013, p.69) 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.

MADEC is a research group based in the Design Department of Politecnico di Milano in 2014 with the initial support provided by FARB founding (Fondi di Ateneo per la Ricerca di Base), which deals with the relation between design and materials in design history and actuality. The center carries out researches on the "Italian Culture of Materials Design", intended as the capacity of the Italian design to "interpret" materials and technologies to generate products and environments innovation.

The main goal of MADEC is to develop vocational students' and apprentices' design-related competencies, integrating design into materials' research and development, to better support commercial and societal applications benefiting from a cultural and multidisciplinary knowledge.

This paper will report in particular two significant experiences carried on during the first year of MADEC: the e-journal issue "Italian Material Design: learning from history" and the open lectures cycle "The Ideas and the Matter".

The general project has been basically divided in four main activities: creating a open source on-line platform and a research and co-design network; enhancing academic papers and publications both concerning design history studies and contemporary topics; organizing transdisciplinary symposiums, workshops and seminars; participating to European projects seeking for collaboration between researches, designers and material suppliers and manufacturers.

To the conclusion the paper will try to figure out the points of force and weakness of the research project and to trace future guidelines to improve its research and educational methodology.

Keywords

material culture; Italian Material Design; transdisciplinarity; co-design; design hybridization

We are entering a new era where products and experiences are going to be shaped by invisible forces, complex science and new manufacturing methods. So, to create advanced, sustainable and sensible design for the future, a proper understanding of materials is needed now, so it will become an ever increasingly critical element for designers.

With the 90s, due to the increased complexity of the materials and the production processes (Manzini, 1986; Manzini & Bertola, 2004), the responsibility to develop a design object is no

more left only in the hands of designers. Moreover, with the affirmation of miniaturization and nano-technologies, goods dematerialization has considerably reduced the interest of the design theory about tangible material products.

Today with the merging of the physical world of atoms with the new world of digital bits (Gershenfeld, 2005; Dunne, 2005; Anderson, 2010, 2012), a new call for design methodologies started.

In this scenario, that recognizes the relevance of design competences to improve the communication between the different parts of the innovation process both technical or not (e.g. to turn ideas and technological inventions into products and services or to make innovative products commercially acceptable, user-friendly and appealing, but also to explore more archetypical and emotional meanings about objects), there are yet several barriers to overtake: for instance, the distance between disciplines and the scientific knowledge gap (becoming relevant with nano-technologies) that limits designers comprehension and application of advanced materials. This barrier becomes also a major obstacle to the creation of sustainable industrially produced products.

Yet, there are opportunities to create alliances between material suppliers and manufacturers with designers to incubate radical technology-led design ideas and startups that need support from product makers creating front end products which can help this sector have more intellectual control over market tendencies, both using new and old materials.

For this reason is necessary to facilitate the access to scientific researches: the knowledge, unless deployed with engaging licensing models is locked up in research labs. Transdisciplinary approaches can accelerate virtuous innovation, endorsing - rather than “flattening” – the complexity of contemporary technology.

Great emphasis was laid on these themes by several international research centers as the Material Ecology (Cambridge University), Material Beliefs (Goldsmiths University of London), SymbioticA (University of Western Australia), DAMADEI Project (EU) and Materiability research network (ETH Zurich).

To this challenge MADEC wants to respond supporting the evolution of the Italian peculiarity also called the “creative use of technology” (Ferrara & Lucibello, 2008), through a strategy/methodology able to open the action edges into the transdisciplinary debate and into the business dynamism. The Center methodology is based on a meta-design approach starting from the collaboration between actors from different disciplines.

“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. Indeed, history is still an extraordinary source of knowledge that allows focalizing on the cyclic creative and innovative dynamics of the connection between materials, design and production. Several theoretical contributions (Bosoni & De Giorgi, 1983; Branzi, 1983, 1984, 1996; Antonelli, 1995; Doveil, 2002) underlined the specificity of the Italian design material culture, documenting how it emerged over the engineering culture during the XX Century.

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* prof. 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.

Starting from the contributes collected in this issue it emerged the idea of an “Italian way” toward the technological innovation in design practicing that is founded on the thin and historical dialogue between technique and esthetic and on the particular attention of Italian designers for materials communicative and symbolic values. That design modality brought to a descendent of products that wonder, still today, for their sophisticated and surprising techniques and for the elaboration of ideas that broke up the consolidate knowledge introducing discontinuity in current thoughts, anticipating social aspirations and helping to germinate new life styles.

Selected articles

The issue collects eleven original articles with heterogeneous topics. 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 (2014), goes through the reconstruction of the most important steps in the history of the company Mazzucchelli 1849. It is an illustrative history of the Italian know-how, beginning with the processing of the horn, replaced by Celluloid (Fig.1) and finally substituted by the polymer Rhodoid (Fig.2) and other more efficient plastics.



Fig.1-2. Left: Cover from a publication about *Celluloide* material. Right: Advertising about chromatic variations of the *Rhodoid*. (Cecchini, 2014)

“Franco Albini and the ‘Gommapiuma’ Pirelli. For a history of natural rubber foam in Italy (1933-1951)” written by Giampiero Bosoni (2014), regards the unknown and unpublished industrial program adopted by Pirelli, between 1933 and 1940, for the application of the so called “Gommapiuma Pirelli” in the field of home upholstery. The focal point of this investigation is a little book written and edited by Franco Albini titled *La Gommapiuma Pirelli alla VI Triennale* (Fig.3) dedicated to the different applications of foam rubber adopted by the Italian rationalist architects in different exhibitions of the VI Triennale of Milan in 1936.

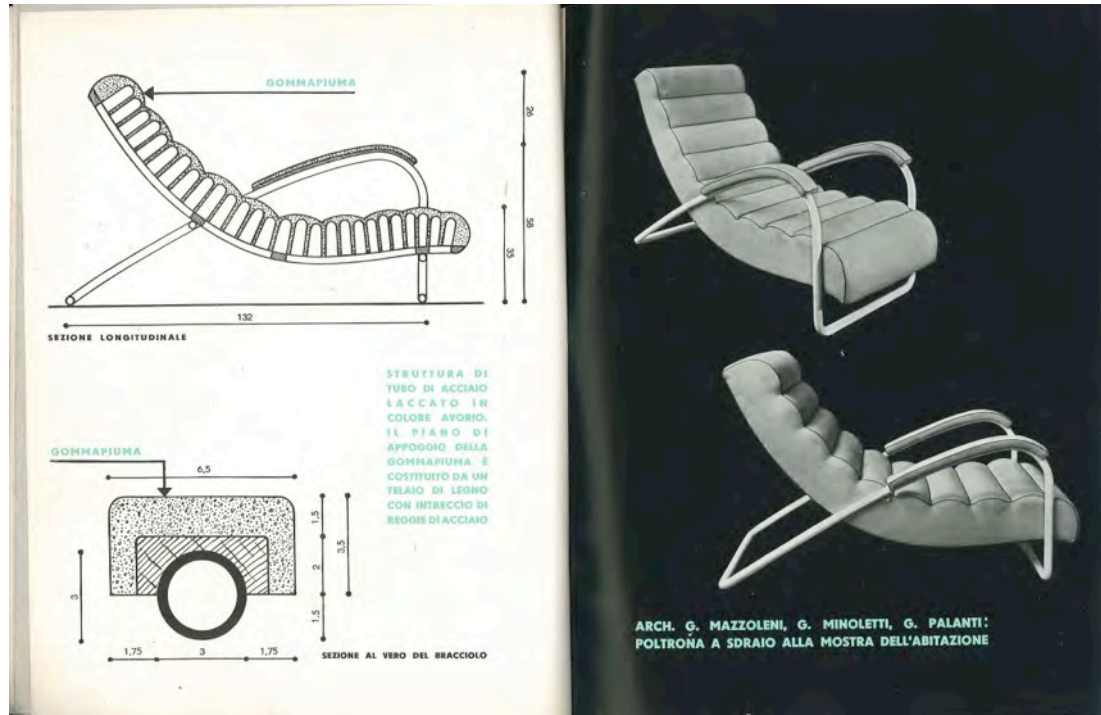


Fig.3: Pirelli Gommapiuma' applications on furniture, project by Mazzoleni, Minoletti and Palanti, published in: *Franco Albini, La Gommapiuma Pirelli alla VI Triennale Milano 1936 XIV*, editoriale Domus, Milano 1936. Photo Credits: @Fondazione Franco Albini.

Another essay is dedicated to the Pirelli Company: “Rising matter. Pirelli, rubber, design and the polytechnic dimension after World War II” by Marinella Ferrara (2014). The research analyzes the production activity of Pirelli in the period of the second post-war until the end of the 60s (Fig.4).



Fig.4: Pictures from the article “Il mondo della gomma e il colore” (*Pirelli. Rivista d'informazione e di tecnica*, 3, 1955, p.46-47). Photo credits: @Fondazione Pirelli.

The article “Fratelli Guzzini’s approach to materials”, by Valentina Rognoli and Carlo Santulli (2014), focuses on the experience of the Italian company Guzzini that linked its history and image particularly to the use of a material, PMMA. This work unveils an unprecedented history of material research about the substitution of a natural material, as horn, with a synthetic material, using it as a “surrogate” in terms both of technical qualities and expressive-functional ones (Fig.5).



Fig.5: Salads cutlery made with Galalite material, early 30s. Photo credits: @Fratelli Guzzini.

“Abet Laminates: design of surfaces” by Chiara Lecce (2014) is the last article concerning the relationship designer-company-material innovation. The main goal of this paper is to retrace a deep and more complete discourse about how, when and through which characters, a manufacturing industry of semi-finished materials as plastic laminates, has evolved to become such an important and particular phenomenon in the history of Italian design (Fig.6).

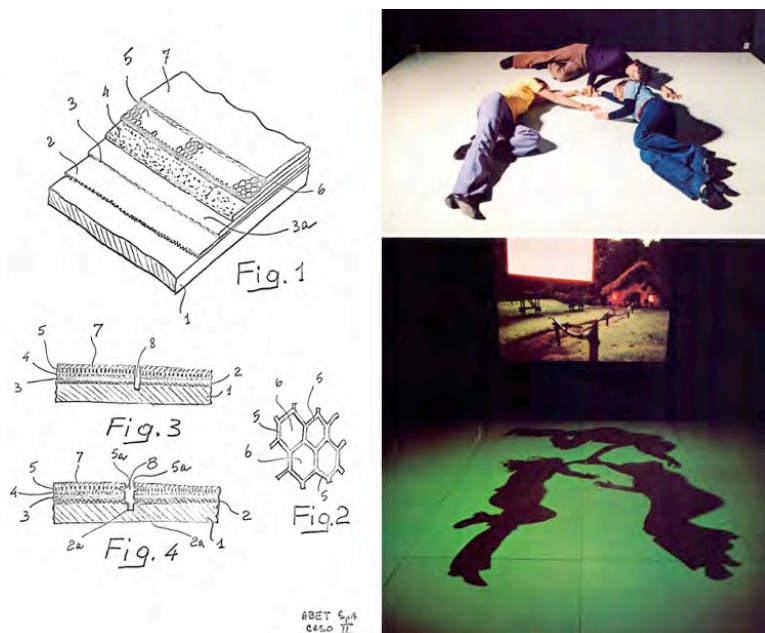


Fig.6: *Lumiphos* plastic laminate by Clino Trini Castelli produced by Abet Laminati, 1972. Photo credits: @ Archivio Castelli Design Milano.

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.

An example is the essay “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 (2014) about the contribution from Campania region to the culture of Italian design as a result of the endemic cultural complexity of the area with its transitory outcomes, its materials, productive traditions, companies, intellectual milieus, and exclusive personalities (Fig.7).



Fig.7: Roberto Mango, wicker chair inspired by the old technique of “nassa” (fish trap). Photo credits: @Archivio Mango.

Valeria Cafà (2014) describes another case with the article “Paolo De Poli (1905-1996) master of fired enamel”. The article reconstructs the research by De Poli about the use of enamel: from the use of different metals (copper, pinchbeck, silver up to iron and steel) to the variety of the color range (Fig.8).



Fig.8: De Poli enamel colors palette (46 x 132 cm).

“Autarkic Materials and Types. The culture of the product between industry and handicrafts in Italy in the early forties” by Federica Dal Falco (2014), is focuses on the Italian autarkic products of the years 1940 – 1943. The essay selects groups of materials, glasses, reconstituted woods and textile providing an overview of furnishings and artifacts conducted by looking at the main magazines of those years.

The latest referee is the contribute of Giulio Ceppi (2014) 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 (Fig.9).



Fig.9: *Neolite* material sample, 1990. Photo by Giulio Ceppi.

Therefore, we think that “Italian Material Design: learning from history” with its heterogeneous stages and different entities, characters and dimensions, constitutes a stimulus to develop soon, in other occasions, wider and more articulated research perspectives, based on the historical relation between Italian design culture, and beyond, and materials quality in a technical, esthetical and symbolic correlation.

“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 form 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” (Fig.10) involved keynote speakers form several disciplines (art, biotechnology, engineering, anthropology, architecture and design), becoming one of the most significant experience conceived during the first year of MADEC (form October to December 2014).



Fig.10: “Le Idee e la materia” program manifest.

Contributes 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.

The emerging scenario sees design as the principal interpreter of transdisciplinarity, able to give meanings and aesthetic values to scientific and technologic discoveries. Design enters into laboratories and operates with biologists and doctors; it proposes itself as a strategic stimulus for innovation in different fields, going beyond that disciplinary barriers which continue to separate the fields of knowledge, stopping cultural evolution.

Extension

The first metaphor is referred to the relationship between the *quality of the sight* and the *quality of the project*. The related lectures, in fact, demonstrates how innovation trajectories empowered the ductility of our sight (its deepness and its wideness) disputing in which way designers “read” –and consequently design- the relation between “interior” and “exterior” worlds. Innovation and development in biotechnological sciences is redefining both ourselves as human beings, but also the space and the artificiality that surrounds us, shaping new scenarios and possibilities for the design profession.

So the first section, named *Extension*, is 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).

During his lecture titled *Naked Genes. Reinventing the Human in the Molecular Age*, prof. Testa argues:

Evidently design students that will generate the products of the XXI Century should familiarize with the capital fluxes of this century and in this case in which way the capital fluxes intercept life fluxes. (...) We are entering the age of biologic control, and control is an essential element of design, when someone design and produce something then he would also in some way control them. (personal communication, October 7, 2014)

What Testa assumes is, in synthesis, 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. Referring to the world of design he says “(...) The new frontier probably is the so-called *synthetic biology* that is programmatically the nearest to the world of design”. (personal communication, October 7, 2014)

Then the journey continues arriving to the human body “boundaries”, reflecting on how technology, needs and wishes are combined together to design human prosthesis (Fig.11) thanks to the contribution of the biomedical engineer Pietro Cecini, one of the founders of Roadrunner Foot Company.

Roadrunnerfoot is nowadays one of the leaders in research, development and production of devices for disabled people thanks to specific operational process. In fact, Cecini explain that each product is conceived meeting the user’s needs as a healthy limb. This modus operandi requires vanguard and high cost technologies, like: optoelectronic systems and measurements from a piezoelectric force platform generated by healthy limbs and by amputees applying commonly used prosthetic components, or tridimensional Analysis of kinematic and dynamics of able people walking and running, structural analysis, prototyping and mechanical testing according to ISO 10328.

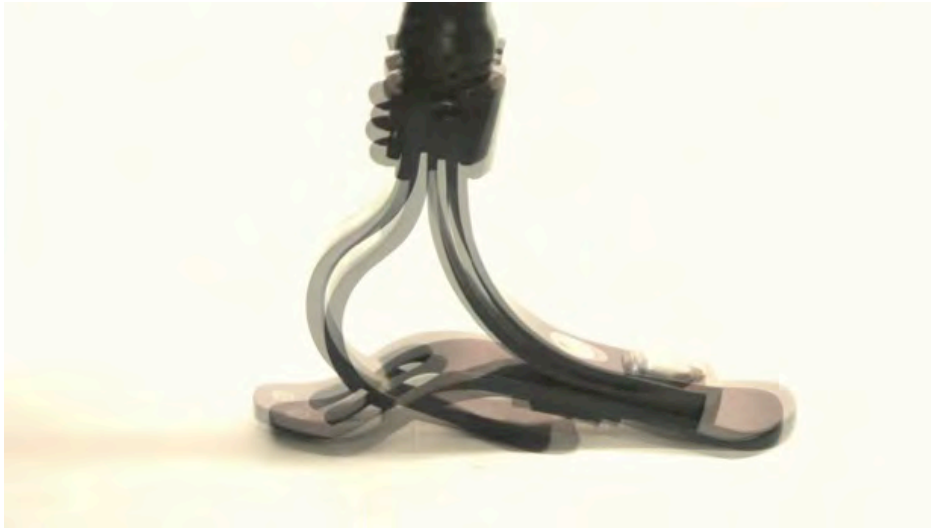


Fig.11: Prosthetic foot in carbon fiber, returning energy, laminated in autoclave with aeronautical process. Photo credits: @ Roadrunnerfoot

Now the world of prosthetics is trying to go beyond simple mechanic replacement for the body, to take in account the important psychological necessities related to the esthetic of an artificial limb.

The section ended transiting over the human body surface and with a reflection on the implications of wearable devices for medical uses tanks to the lecture of Matteo Lai CEO of Empatica Company. Strictly connected with the rise of the Quantified Self is the success of wearable technologies. Products connected to our bodies and to the internet, are now able to transform different aspects of our lives (such as physical activity) into data. The Embrace smartwatch (Fig.12) from the Italian brand Empatica represents one of the best examples in the international panorama of wearable technologies. Created after research on the medical application of wearable computing (in collaboration with MIT), it is able to predict seizures and monitor stress. In the near future electronic devices attached to our skin will play a fundamental role in healthcare.

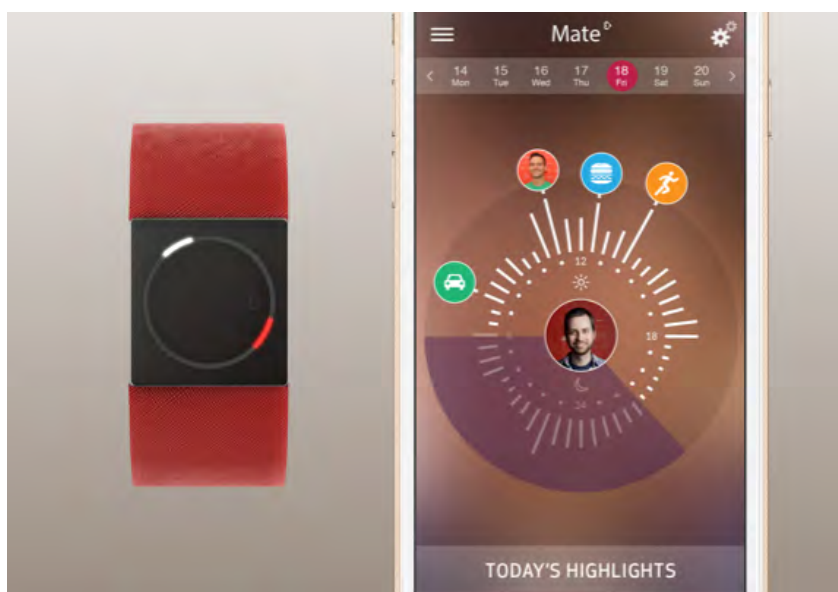


Fig.12: Embrace smartwatch. Photo credits: @Empatica.

Concluding, we can assert that 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.

Osmosis starts with the artist Michelangelo Pistoletto’s lecture on the *Third Paradise*. He explains:

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)

He concludes “We live in a specific scientific and technologic epoch. (...) *Cittàdellarte* - foundation instituted in 1998 proposing to place art in direct interaction with all the areas of human social activities - is a place where we try to put together esthetics and ethics; we don’t care to see all the great inventions, that are beautiful, but it is necessary to understand how they are used” (personal communication, November 10, 2014).

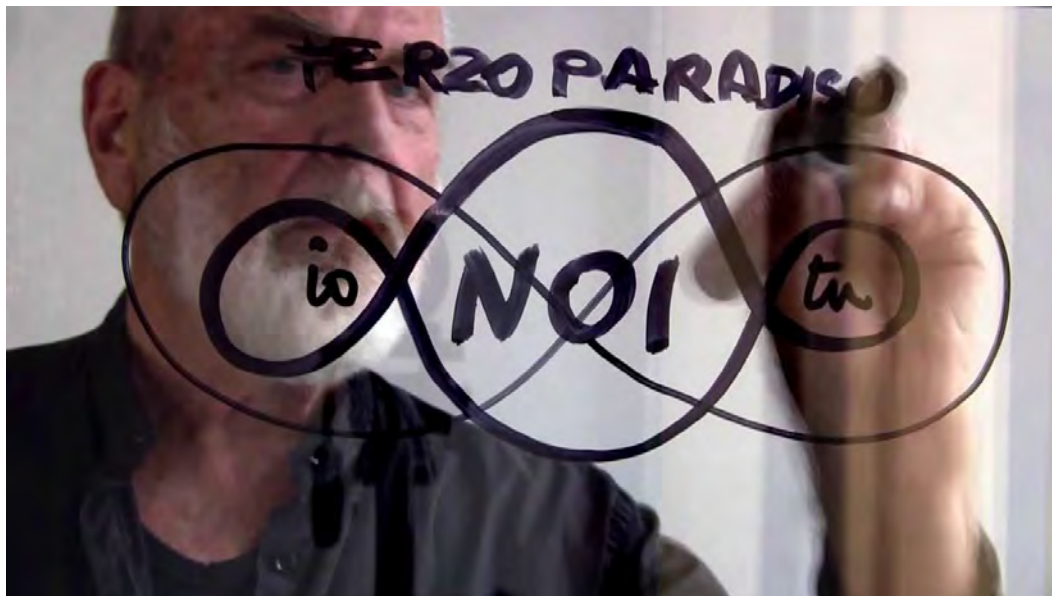


Fig.13: Michelangelo Pistoletto drawing the symbol of the *Third Paradise*. Photo Credits: @Fondazione Pistoletto.

The second appointment titled *Mater Materia* with the designer Clino Trini Castelli. Castelli is the founder and principal of Castelli Design Milano, a firm whose work explicitly addresses user experience and perception. Most of his professional activity has involved researching and advising on color trends. Along with his work on color, Castelli has also addressed the role of a number of other “subjective” aspects of space, including light, sound, microclimate, texture, and scent. In 1972 he coined the term *design primario* for this work:

When we work in the *design primario* way we use very subtle effects - in smell, in light, in color, in many manifestations of reality - and we amplify them to a degree that becomes significant at the figurative level - very significant, very expressive, and very important. So this has guided a sort of poetics, a minimalist poetics, that expresses one phenomenon at a low level of energy, at a low intensity, but that becomes very significant when taken on very large scale. (personal communication, November 11, 2014)

Castelli has in his work focused more on the effects of design than on physical form, he remembers “Instead of designing objects like all my colleagues, I started my career designing laminates with glowing lights and things like that. I cannot say exactly why, but to me there was a kind of natural sensibility to that kind of dimension.” (personal communication, November 11, 2014) In order to better describe his work, Castelli coined the word *qualistic*. It is a dimension where the *perception* of quality can be shared in an objective way by any person.



Fig.14: Clino Trini Castelli, showroom Cassina “Virtual Lantern / Grey Light Pavillion”, realized with reflective 3M panels 1985. Photo credits: @Archivio Castelli Design Milano.

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 (Roberto Cingolani) and design (Chris Bangle).

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 Fig.15); or *Nanophysics* dedicated to research and support activities related to the design, characterization and application of nanocomposite materials, and to the design and construction of new technologically advanced instruments for imaging, microscopy and spectroscopy.

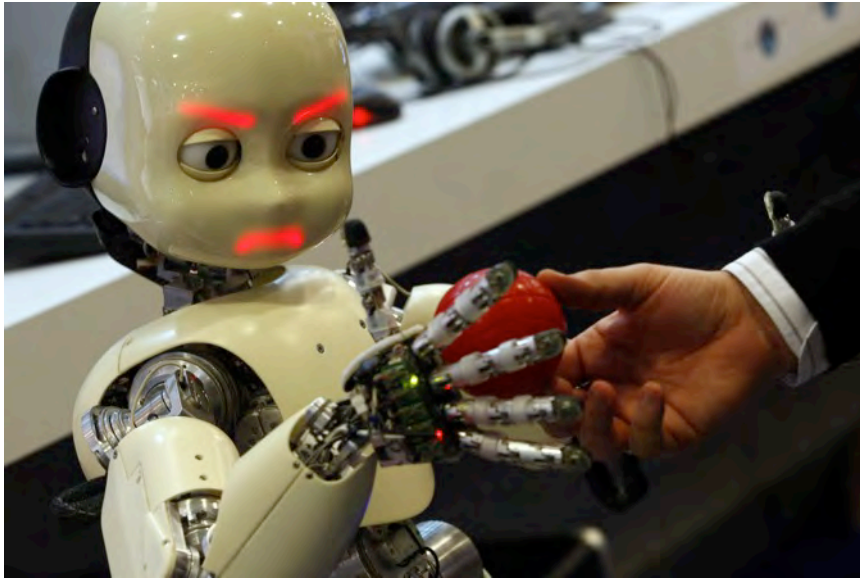


Fig.15: *iCub* humanoid robot developed at IIT as part of the EU project RobotCub and subsequently adopted by more than 20 laboratories worldwide.

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 motor cars. 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 lectures their collaboration experience. In fact, CBA has partnered with IIT to study and propose consumer applications for robotics. While the IIT context is focused on scientific and engineering research the CBA is an immersion into a designer-visionary studio. Together they teamed to explore the future of consumer applications for robotics under the theme of *Artifactual Elegance* – and approach to human-machine interaction (in all ways: functional and aesthetic) 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* (Fig.16).

Mycelium is the fast-growing, vegetative part of fungi, consisting of a tight network of interconnected filamentous cells, called hyphae. Thanks to such structure, the mycelium is capable of harvesting, transforming and re-distributing nutrients, both for his own benefit (mushroom growth) and for the larger ecosystem. 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)



Fig.16: The Growing Lab project by Officina Corpuscoli. Photo credits: @ Officina Corpuscoli.

Montalti concludes his lectures describing the *Mycelium Design*, an on-going, long-term research-project, initiated by Officina Corpuscoli, together with partners such as Utrecht Universiteit and Mediamatic (Fig.17).

The project seeks to study and analyse the mechanisms underlying structural and decorative properties of the mycelium as well as their improvement, while exploring and assessing natural variations, environmental growth conditions and genetic qualities of the selected mycelia, aiming to identify tailor-made mycelia for use as building blocks or as both structural and decorative material. (personal communication, November 25, 2014)



Fig.17: Maurizio Montalti, grown materials, Utrecht University lab, 2015. Photo credits @Fondazione Giannino Bassetti.

Closing the section of *Osmosis* we can assert that the interaction between different actors enables to see beyond what has been already seen, opening our sight as designers toward a less-known but equally stimulating and inspiring world in which it is necessary to involve different professions to fulfill our goals.

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. Therefore, today it is possible to move our activities and our knowledge into the network system that is globally managing our work contacts and social relations.

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, demonstrate that is possible to redevelop environments, to reconnect disconnected urban tissues, raising the esthetical value on the city exterior to improve the inner quality of the local neighborhood life. Interdisciplinary trespassing has always been pertinence of art.

This section introduces also another topic connected to importance of the designer role inside the complex production system whom will be committed to requalify our planet. Designer responsibilities to society and environment have to be constantly in evidence, especially today that we are facing to a continuous growing of dumps also because of uncontrolled design objects productions.

Tiziana Monterisi and Marco Baudino combined lectures are collocated in this direction.

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. Architect Monterisi explained the system of sustainable building technics use by *N.O.V.A.Civitas* that principally investigate and experiment with the construction technology of rice straw. In this way, the project promotes a return to rice cultivation and the use of straw as a building material, starting a virtuous process in terms of social, economic, environmental, agricultural and architectural. The experimental architectures are made with frames laminated wood infill with straw bales. All finishes are natural: clay and lime plaster, pine wood cooked, cocchiopesto and natural oils.

Marco Baudino is the managing and technical director of Future Power Company. As *N.O.V.A.Civitas* use rice straw this company carried on a specific experimentation on recycling rice husks. For the first project presented rice husks are used to manufacture biodegradable pots, named *Vipot*. Mixed with natural amalgam, rice-husk results in a material that makes the pot solid and consistent, one that is not derived from chemical processes or processing and that is finally 100% biodegradable.



Fig.18: *Vipot* recycled rice husks pots by Power Future.

Another interesting project by Future Power is the Greenhouse Gases. Baudino explains:

Rice husks are burnt in an incinerator, heat, water vapor and large quantities of CO₂ are produced. When rice husks are composted, some methane gas is also released to the atmosphere. Furthermore they compost slowly because of their high lignin content. When rice husks are digested anaerobically in a biogas installation the methane generated is converted to electricity, heat and compost. (personal communication, December 2, 2014)

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 analyze the contemporary world with the tools of their relative professions and cultural approaches.

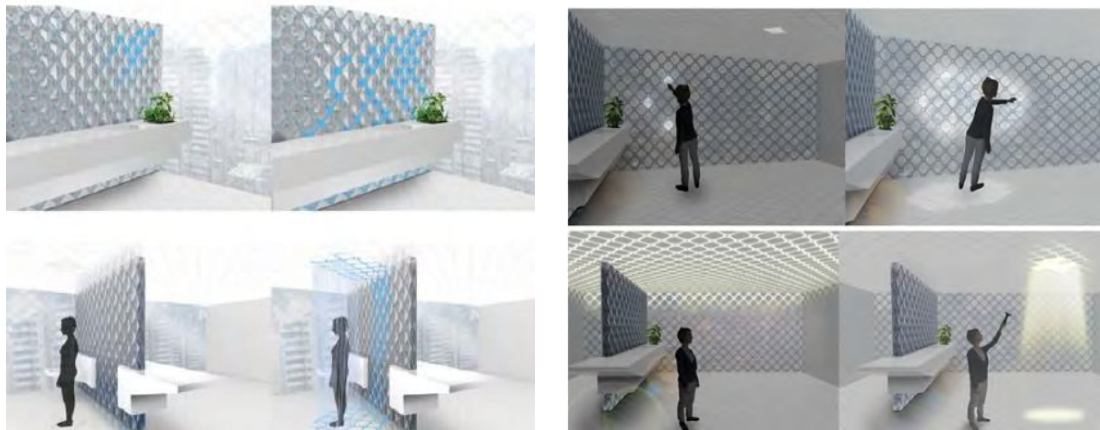


Fig.19: *Off the grid: Sustainable Habitat 2020*, Philips Design Probe, 2010 (project presented by Marzano during his lesson). Photo credits: @Philips Design.

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. (..) Being innovative is also about being a protagonist of the future. Therefore we have to be active participants, innovating in a way that helps us direct the future, contribute to it and make it that little bit better. (personal communication, December 9, 2014)

Professor Marc Augè 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 Augè 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)¹. At the end of the project, MADEC started to transcript 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 seminars².

Conclusions and critical observations about MADEC research project

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. Small and medium sized material suppliers are looking for new markets and new applications but it is limited to new business partners or new processes. The process is long, and they may not move on to expand the application base. They need the support of technology centers and technology transfer companies to facilitate this largely. Material experts from the design world can also play an important role in facilitating the required network.

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 form 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.

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 form 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

¹ https://www.youtube.com/playlist?list=PL_sN_A0uSn03jeVB-Z_bwVgaKJzAKeYuk

² <http://www.madec.polimi.it/>

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” (Fig. 20) 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.

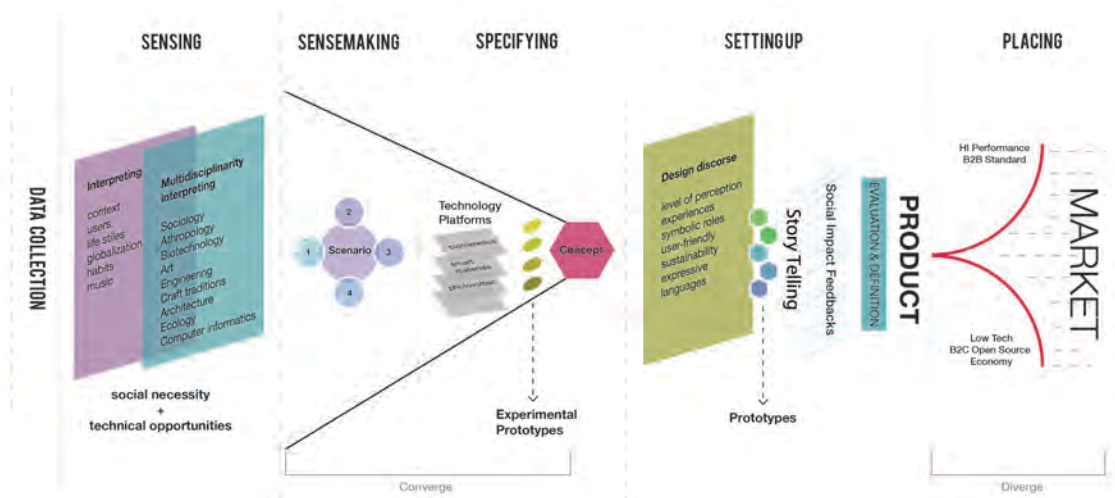


Fig. 20: “Creativity-driven material design” methodology by MADEC.

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