POLITECNICO DI TORINO
Repository ISTITUZIONALE

MATto - A NEW MATERIAL LIBRARYAT POLITECNICO DI TORINO, DESIGN COURSE

Original
MATto - A NEW MATERIAL LIBRARYAT POLITECNICO DI TORINO, DESIGN COURSE / DE GIORGI, Claudia - In: innovation in Design Education. Theory, research and processes to and from a latin perspective. Proceedings of the Third International Forum of Design as a Process.STAMPA. - Torino : Umberto Allemandi & C., 2012. - ISBN 978-88-422-2174-6. - pp. 75-88

Availability:
This version is available at: 11583/2498738 since:

Publisher:
Umberto Allemandi & C.

Published
DOI:

Terms of use:

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

Publisher copyright

(Article begins on next page)

25 April 2024

INNOVATION IN DESIGN EDUCATION

Proceedings of the Third International Forum of Design as a Process

FORMIA, E. M. (ed.)

Allemandi & C.

INNOVATION IN DESIGN EDUCATION

Theory, research and processes to and from a Latin perspective

Edited by
ELENA MARIA FORMIA

UMBERTO ALLEMANDI & C.
TORINO ~ LONDRA ~ VENEZIA ~ NEW YORK

Published by Umberto Allemandi & C.
via Mancini 8
10131 Torino, Italy
www.allemandi.com

First published 2012

© 2012 Umberto Allemandi & C., Torino
All rights reserved

CONTENTS

MATto - A NEW MATERIAL LIBRARY AT POLITECNICO DI TORINO, DESIGN COURSE

Claudia De Giorgi[1]

MATto is a material library which includes more than 500 samples of new generation materials, particularly used in the field of design and architecture. MATto has been developed in the Politecnico di Torino Design Course, also with the help of the students, in order to keep designers up to date about the latest materials available for their projects.
MATto in 2010 has become a consultancy service supported by Torino Chamber of Commerce for the Small and Medium Enterprises (SMEs) of the Piedmont Region in Italy.
Up to now, for each MATto material sample, an analysis sheet is arranged, which reports the technical (physical-mechanical) properties of the materials, its applications, the available format and a cost estimation. But the innovative aspect of MATto is to provide meta-project solutions by identifying new materials or semi-finished products suitable for every specific need or request of each project, based not only on the technical and economical performances: also the sensory and environmental material properties are considered.
The environmental profile is aimed at acquainting the decision maker with the materials' environmental aspects by adopting a cradle-to-grave point of view. Consequently, an eco-profile of MATto material takes into account how the material environmental properties could change in accordance with the product requirements. As a result, MATto is a tool for the problem setting, by which the designers (and the students, and other figures involved in the product development) are assisted for identifying which material parameters influence the product eco-performances.
The sensory profile could be useful for considering the human perception of material too. Specifically, the touch, sight, smell and hearing senses are taken into account with the help of specific tools (also patented by the MATto group), in order to define a simplified "sensory vocabulary", which could become a universal reference tool. In the vocabulary, the adjectives are specified according to a scale of values, which has been identified according to the results of different analysis sessions carried out by "tasters" (groups of 20/30 people, also students, untrained and trained, to test the materials and describe them using specific instruments). The scale of values immediately quantifies the characteristic described by the adjective. In this way, the designers could be guided when they are dealing with the

[1] Politecnico di Torino, DAD, Italy, Researcher.

expressive-sensory aspects of the materials.
Consequently, by using these four research keys/point of views, technical, economical, environmental and perceptual properties, the most suitable materials selection provided by MATto could be compared with the analysis of the traditional material provided by other well-known databases, and could become the key for future designers to improve the SMEs development, according to the current sustainability and innovation trends.

••• Materials choice; sensory; sustainability; project •••

THE ROLE OF THE DESIGNER TODAY

Selecting materials is a design issue. The designer today is a key figure who, thanks to his expertise and ability to connect different professionalisms, acts as the main player and the link between the business world and the complexities involved in managing environmental and sensorial issues. His role is crucial in environmental issues as "eighty per cent of the environmental impact made by the products, services and infrastructures around us is determined at the design stage. Decisions taken at this time shape the processes which determine the quality of the products we use, the materials and energy required to produce them, the ways they are used on a daily basis and their destination when we no longer require them" (Thackara, 2005, 11).
The role of the designer is, however, also important for shaping and satisfying new requirements for sensory elements, pleasure and depth of experience, that are emerging from consumers.
Sustainability and sensory elements are therefore not aspects that are unique to the specific sector of eco-design, but which involve the design as a whole.
Only by making changes upstream, by addressing the cultural approach and initial strategies that lead to the product, can we change the business logic and rationalize not only the object and its entire life cycle, but also the strategies that underlie the economic and industrial policies, in order to create products that are truly environmentally-friendly but which also express their sensory and expressive features.

DESIGN, SENSORY ELEMENTS AND SUSTAINABILITY

According to the most advanced trends in design culture, the choice of suitable materials for creating the product should be dealt with as early as the meta-project phase, which is then expanded upon and loaded with meaning: materials, in fact, have a significant influence on the design; they support its technical functionality and at the same time create its personality.
Choosing the materials for the product, until very recently, was put off until the final stages of the project; recently, however, designers have realized that if this choice is made from the initial stages of the design path, the product will have more chance of meeting the initial requirements.

Those requirements have greatly evolved: products are no longer required only to have the traditional aspects (relating to physical-technical-mechanical requirements, reliability, safety, etc.) but, in accordance with our changing times, they must also have "soft" properties, such as increased sensory expressiveness and, at the same time, complex elements such as a plan for the life cycle of the product which respects our planet.
In this increasingly articulated framework, in order for the designer to be able to choose the most appropriate materials for his project from the earliest design stages, he must not only be aware of the updated panorama of what is actually possible but, in particular, he must be in a position to analyse that in relation to his project. It is therefore crucial to provide the designer with criteria for interpreting, and methods for evaluating, the sensorial and environmental performance of materials, so that he can be guided in his choice.
This must be a tool which can be adapted according to different cultural contexts and based upon the assumption that there is no significance in talking of environmentally-friendly or "sensorial" materials in absolute terms but, rather, it is necessary to select the materials or combinations of materials that seem more suitable in relation to the different contexts for use, useful life and end of life of the products.

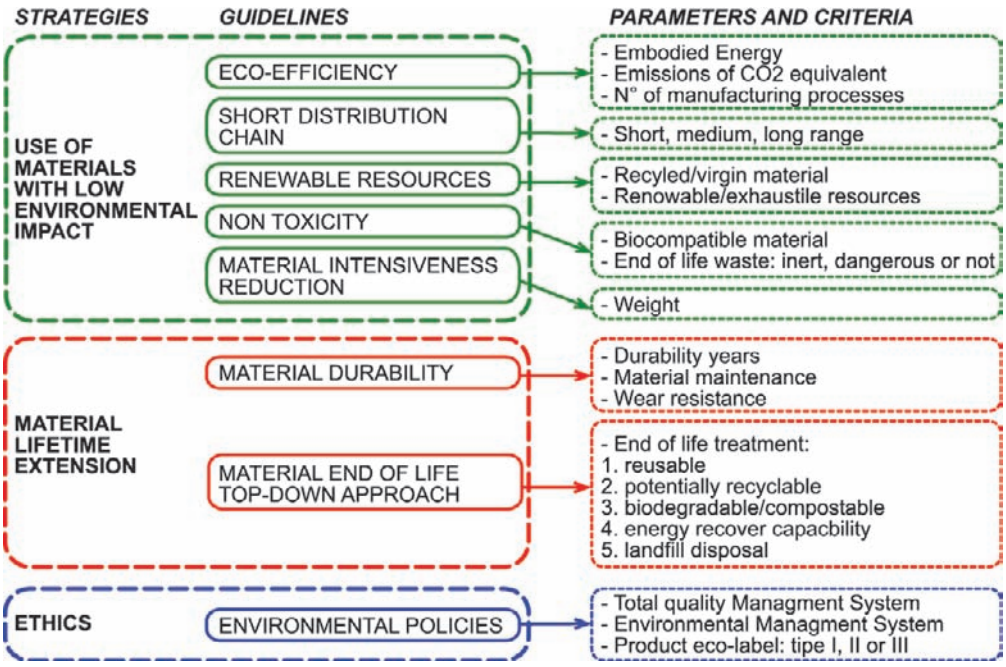

FIG. 1. MATto APPROACH TO THE MULTI-CRITERIA RESEARCH OF MATERIALS.

MATto

Materials analysed in terms of physical-technical-mechanical aspects and investigated from the perceptual and environmental sustainability aspects constitute an innovative tool to assist the design and the designer.

This approach is now applied in MATto, the Material Library of the Design Course at the Politecnico di Torino. A material library, or rather, an interdisciplinary centre for discussing design, sensorial elements and sustainability in a scientific context, with experts able to work alongside in-house designers and freelancers in the quest to solve problems connected to creating new products and to improving existing ones.

What the university is offering is not just an interpretation of the parameters of the existing situation and not just theoretical references to a hypothetical sensorial state which often makes way for mere suggestion or for the empirical; instead it is opening itself up to companies and designers with the aim of providing a useful and effective service.

MATto is a material library which includes more than 500 samples of new generation materials, particularly used in the field of design and architecture. MATto has been developed in the Politecnico di Torino Design Course, also with the help of the students, in order to keep designers up to date about the latest materials available for their projects.

Up to now, for each MATto material sample, an analysis sheet is arranged, which reports the technical (physical-mechanical) properties of the materials, its applications, the available format and a cost estimation. But the innovative aspect of MATto is to provide meta-project solutions by identifying new materials or semi-finished products suitable for every specific need or request of each project, based not only on the technical and economical performances: also the sensory and environmental material properties are considered.

The environmental profile is aimed at acquainting the decision maker with the materials' environmental aspects by adopting a cradle-to-grave point of view. Consequently, an eco-profile of MATto material takes into account how the material environmental properties could change in accordance with the product requirements. As a result, MATto is becoming a tool for the problem setting, by which the designers (and the students, and other figures involved in the product development) are assisted for identifying which material parameters influence the product eco-performances.

It is hoped that the MATto-materiali per il Design (MATto Design Materials) service (under an agreement with the Turin Chamber of Commerce which makes the centre available to manufacturing companies based in Piedmont) will also take root at other universities so as to support the design process which is today more "sensitive" and complex (innovation in terms of sustainability and sensory elements), and where the designer often finds himself alone, faced with crucial choices which are not only expressive but which, above all, are becoming more stringent.

THE WORLD'S MATERIAL LIBRARIES

Today there are millions of different materials and new ones are constantly springing up: "The proliferation of new materials and the enormous technical and expressive possibilities offered mean designers must keep continuously updated on their properties and possible applications" (Langella, 2003, 75); in fact the designer and manufacturer are faced with a huge and growing scope of possibilities, in which the choice of materials and the transformation processes can be combined, giving rise to what is known as "hyper-choice" (Manzini, 1986).

There is, in fact, no specific material which stands out as an almost mandatory choice for a type of product, but many different materials in competition with each other: only a careful, in-depth analysis, with a perspective that includes the entire life cycle of the product, can result in identification of the most satisfactory solutions.

In order to search for, classify and sort technical information relating to materials and products for the world of architecture, design and industrial production, "material libraries" have been created; real and virtual archives of indexed material samples that are offered to designers as research tools in an attempt to increase awareness of all the materials available today.

The term "material library" is a neologism, coined to identify physical or virtual places in which technical information is collected and made available in relation to a wide range of materials, particularly in the world of architecture, design, fashion and industrial production in general (Lerma, De Giorgi & Allione, 2011).

The first material library to be opened was Material Connexion, founded by George M. Beylerian in 1997 in New York, with another base opening in Milan in 2002.

Material libraries are not just born from the need to assist the designer in gathering information on new materials, but also to help companies make themselves known on the market, to form part of a community and thereby gain contact more quickly with other organizations, to build solid collateral and publicity and to meet potential new customers or partners. The material library was created to respond to the need shown by companies and institutes for a structure capable of interacting with the user, for a physical and virtual place, which constitutes an evolution from portals (considered more as containers of technical data) and which is also a creative workshop. In general, material libraries operate in the service sector, researching and systematizing innovative materials: they use various means of communication, organize fairs and exhibitions, create newsletters, disseminate information that is accessible to all and publish books showcasing materials.

Material libraries are actually being continuously updated: those responsible for these services must always be vigilant and seek innovative and interesting materials and processes, in order to enrich and enhance the knowledge within the structures themselves and to be able to compete with other material libraries that appear on the market. In the majority of cases, material libraries offer services and advice whose nature "is predominantly commer-

cial and is characterized by networks between various interested parties: manufacturers, designers, researchers, etc." (Lucibello, 2005, 29). Material libraries are a growing trend, whose function varies from advice on innovative materials to support designers during the design phase, devising the concept, and prototyping.
"For some designers, material libraries are primarily centres in which to find inspiration for new projects; there are people who consider them as places to visit, like a contemporary sculpture exhibition or a 'documentary' of current affairs, in which 'curious' simple materials with an extra-terrestrial aspect become major protagonists or collector's items [...]. For others, they are considered places in which to work, to conduct in-depth research on a specific component with the possibility of drawing upon the expertise of consultants [...]" (Campogrande, 2009, 67).
The latter is the best way of looking at material libraries: places of research and documentation, where you can touch materials, get to know all their features up close: places providing information and advice to those who need to locate innovative materials and technologies to enhance their projects and industrial processes.
Each structure is characterized by its own method of cataloguing: all usually catalogue materials according to the family to which they belong, physical-technical-mechanical aspects and current applications. Some material libraries, however, aim at offering an extensive panorama of all material families; others specialize in particular sectors of application or in a specific material category: this is the case, for example, for Matrec®, the first Italian database for free public dissemination on the main themes of eco-design of materials and recycled products, or for Materioteca®, also Italian, dedicated only to plastic materials, already equipped with educational and research structures and for Materiautech, a French structure, dedicated also to research in the world of plastics.
Finally, the latest evolution in these material libraries was to include among the cataloguing criteria the perceptual characteristics of the materials or their environmental friendliness.
Having recognized the importance of the tactile, visual characteristics... of the materials, the multi-sensory element has become a factor for cataloguing materials in material libraries, at times according to the technical approach (reflective power, heat conduction, acoustic features...), and at other times according to the perceptual approach of an empirical nature, based upon the perception of the materials by human organs, but focused upon the practical and not always upon scientific criteria.
In some, materials are analysed according to sensory words, but the evaluation of materials is often conducted through manipulations undertaken by the team that catalogues the materials, and is therefore based only upon the experience and expertise of those team members, and not upon a substantial, trained scientific sample of "material tasters".
Each institute draws up its own individual system of cataloguing and evaluation.
Unfortunately there is no common language, vocabulary or method of sensory evaluation for materials that is based upon scientific, but also simple and comprehensible, criteria,

which would make the results of the actual analyses available to all: industrialists, manufacturers, designers, students.
It is therefore necessary to develop a method of sensory evaluation which, through words, images or other forms of communication, is able to collate, translate and simplify the existing methods of sensory evaluation in a comprehensive way.
Within the world of material libraries, in addition, a key issue is the evaluation, which is not always homogeneous, of the environmental friendliness of innovative materials.
The need to respect the environment has already positively raised awareness in material libraries, for example, with the gathering and collecting of new materials designed to be environmental friendly during their production or use (see, for example, the materials inspired by biomimicry criteria), but it has also highlighted the need to provide environmental information on the materials already stored within the libraries.
Therefore, just like the sensory element, the environmental element also highlights the requirement to provide, in new and direct ways, data and information in relation to the environmental performance of the materials, linking them more clearly with design opportunities.
It is therefore necessary to provide data which is not just quantitative, but which is also qualitative, that is, able to provide information on the behaviour of the materials during the different phases of their life cycle. Information based upon scientific methodologies and tools, but which is easily interpreted by designers when they come to select a material for a project.

THE SENSORY VOCABULARY

The sensory vocabulary, developed by researchers working in MATto, defines and describes, through "descriptive adjectives" and scales of value, the sensory characteristics previously identified by the group of "tasters" (groups of 20/30 people trained in testing materials and describing them, using scientific instruments), and is supported by relevant images, videos and sounds. The scales of value which accompany the descriptive adjectives are aimed at immediately quantifying the value attributed to each adjective. The images of the materials and the videos of the samples being manipulated, which accompany the vocabulary, are a quick way to make clear and explicit the meaning and value assigned to the descriptive adjectives.
The descriptive adjectives which make up the sensory vocabulary represent the first level of searching for materials according to expressive-sensory elements.
It will, therefore, be possible in MATto, and in the database being developed, to search for a material by selecting the pre-chosen adjectives; the search can include adjectives relating to just one sense or to the four analysed senses, for example: the "soft, smooth" feel, the "opaque" look, the "odourless" smell and the "light" sound.
This first search level will highlight various materials, characterized by different and multiple physical, technical and mechanical characteristics and environmental friendliness,

from which the designer will be able to choose the one that is most suitable for his project. In the vocabulary, adjectives are specified according to scales of value (from 0 to 100 as regards touch) which have been identified based upon the results of various evaluation sessions, conducted by groups of tasters and according to sounds and images which illustrate and document the tests and manipulations conducted on them.
The scales of value, currently accessible for characteristics of touch, immediately quantify the characteristic described by the adjective. The manipulations of the materials have been conducted in accordance with the methodologies devised to highlight their touch, visual and sound characteristics.
The images, videos and sounds of the manipulations represent an immediate way of understanding the significance of an adjective and a value used to describe a material: for example, with regard to shape memory materials, it is extremely helpful to have a video which shows how long the deformation, and therefore the shape memory, lasts.
The value scales, images, videos and sounds of the manipulations are a second and more in-depth search level, which is useful for those who are already clear of the values that a material must possess (softness 60 out of 100) or for anyone wanting to elaborate on the meaning of the descriptive adjectives.

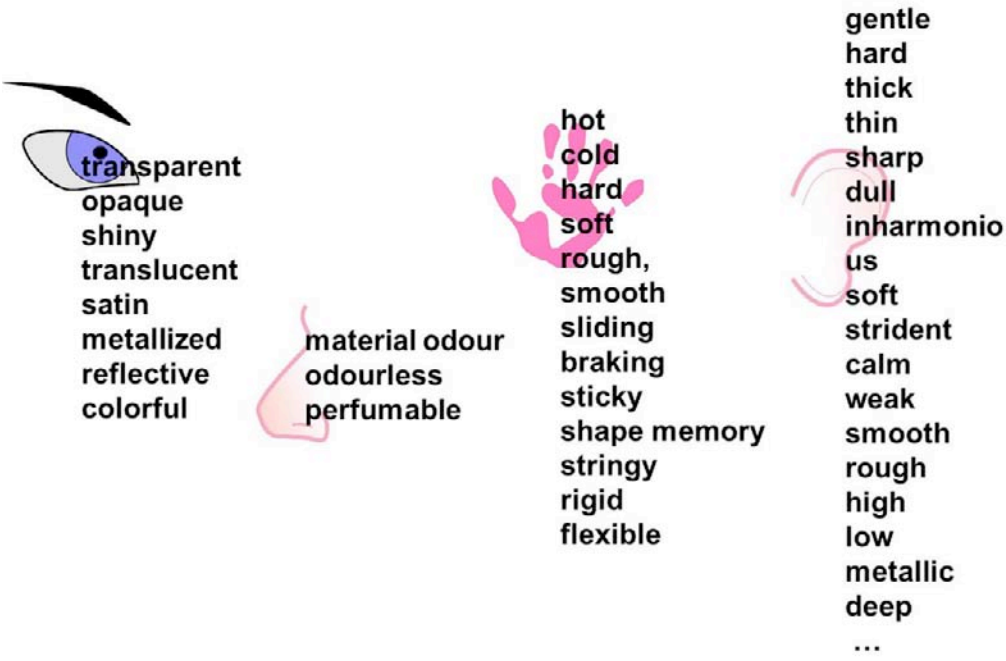

FIG. 2. THE SENSORY VOCABULARY CREATED AND USED IN MATto.

THE CHARACTERISTICS OF ENVIRONMENTAL FRIENDLINESS AS A RESEARCH TOOL

The methodology also investigates the aspect of environmental sustainability of the materials, providing basic information about energy consumption, toxicity and the possible end of life scenarios. This is quantitative information accompanied by qualitative indications, characterized by a strong planning vision: materials that are completely sustainable do not exist, but methods of sustainable use.

Data referring to the environmental friendliness of materials is grouped according to their main categories: the use of materials with low environmental impact, extending the life of the material and the ethics of the manufacturer-supplier. Within these main categories, some parameters have been identified (embodied energy, toxicity, etc.), on the basis of which guidelines have been drawn up for the design which are useful in evaluating the materials suited for a sustainable product. Based upon these guidelines, parameters and criteria have been identified for measuring/evaluating the materials; the parameters indicate how each investigated material meets the environmental friendly design guidelines.

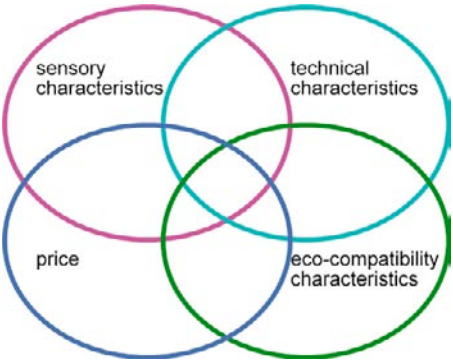

FIG. 3. OUTLINE OF QUALITATIVE AND QUANTITATIVE PARAMETERS IDENTIFIED TO PROVIDE A MULTI-CRITERIA EVALUATION OF THE SUSTAINABILITY OF MATERIALS AND SEMI-FINISHED PRODUCTS.

WHAT DOES MATTO OFFER?

The sensory vocabulary, with its variations, and the environmental friendly characteristics are part of the information/technical sheets which accompany the materials catalogued in MATTO: the information, provided by companies or discovered and validated by the research group which works to develop the material library, is completed by information relating to the perceptual element of the materials and their environmental impact.

In the material library it is possible to research materials based upon their technical characteristics and based upon costs, as has been customary to date, but also based upon the criteria of sensory elements and environmental friendliness. The cross-referencing of these four areas of research greatly reduces the range of materials which meet the demands of the designers: "The choice of materials for a certain design represents an opportunity to be grasped in order to enable technological transference and innovation. A good designer

establishes at an early stage the materials to be used, or the company does on his behalf, and according to the scope of his work, he develops his research to adapt perfectly to the design objectives" (Lucibello, 2005, 80).

Materials can be researched according to the four areas, as previously noted: the first and classic search, based upon technical data and material costs, can provide a list which is still quite long, and is, though, narrowed down by research according to sensory elements and environmental friendliness such as, "soft and smooth" to the touch, "opaque" to the sight, "odourless" and with a "deep" or "low" sound and with embodied energy that must be below certain values. A cross-referencing interpretation of the characteristics of materials can, for example, be done by starting with the need for sustainability, in particular, biodegradability; from the materials which meet the characteristics, you can then exclude those with sensory elements that are less significant from a design perspective.

In the continuous research of innovative materials, two issues will increasingly intersect; sensory elements and eco-compatibility: "[...] An encounter that connects, in a systemic and holistic vision, the criteria of ethical and differential production with those of a rich and conscious consumer, in a conciliation of local and global values. Sustaining sensory elements is aimed at bringing together the concept of the territory with that of the consumer, in the knowledge that the understanding of a product runs from awareness of its production stages, and occurs by being able to trace its evolution from matter to final goods" (Ceppi, 2009, 117).

This new and complex approach to design, and in particular to the meta-project, is expressed through critical exploration of the materials and is completed with the help of virtual reality and prototyping. Real and virtual models of designs containing the map of materials to be evaluated are submitted to be selected by the customer in both traditional and new ways.

The choices made by designers according to technical criteria, costs, sensory and environmental elements can actually be evaluated also in non-conscious ways, through the use of non-verbal methods and tools such as the eye-tracking machine, a hypothetical means of final assessment.

Eye-tracking provides decisive evidence on the ability of the product/interface to attract and retain or divert the attention of the observer: it is based, in fact, upon recording what an individual observes or ignores when they decide to consider a certain product.

The analysis can be applied with equal effectiveness to real and virtual prototypes: an interesting indication for optimizing costs, particularly in cases where the investigation generates design feedback which gives rise to new evolutions of the concept.

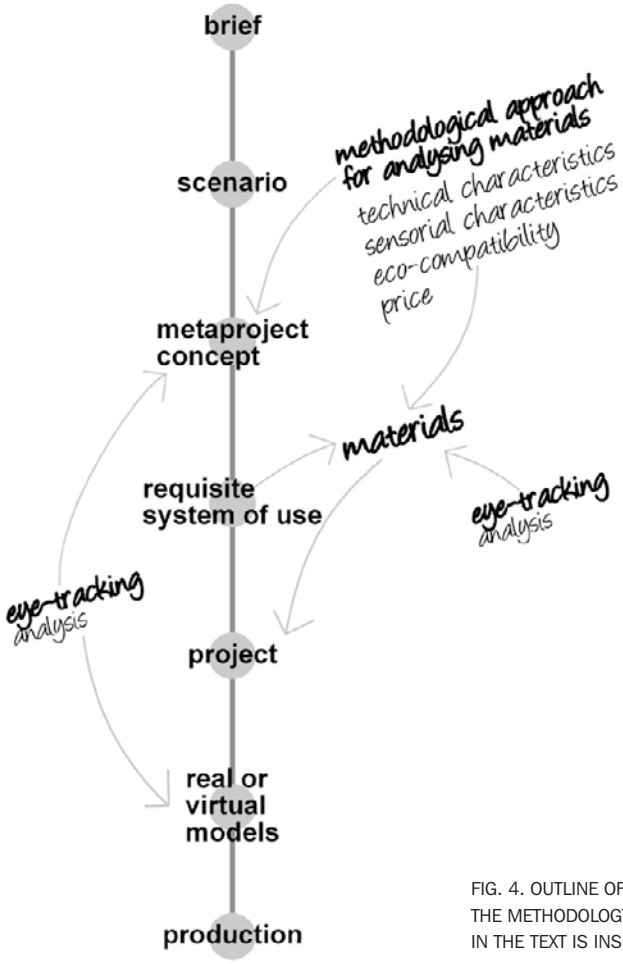

FIG. 4. OUTLINE OF STAGES OF THE DESIGN PATH IN WHICH THE METHODOLOGY FOR ANALYSING THE MATERIALS PROPOSED IN THE TEXT IS INSERTED.

REFERENCES

Campogrande, S. (2009). Diffondere i materiali. In Ferrara, M. & Lucibello, S. *Design Follows Materials*. (pp. 66-73). Firenze: Alinea Editrice.

Ceppi, G. (2009). Sensorialità sostenibile. In Ferrara, M. & Lucibello, S. *Design Follows Materials*. (pp. 114-119). Firenze: Alinea Editrice.

Lucibello, S. (2005). *Materiali@design*. Roma: Editrice Librerie Dedalo.

Langella, C. (2003). *Nuovi paesaggi materici*. Firenze: Alinea Editrice.

Lerma, B., De Giorgi, C. & Allione, C. (2011). *Design e materiali. Sensorialità Sostenibilità Progetto*. Milano: FrancoAngeli.

Manzini, E. (1986). *La materia dell'invenzione*. Milano: Arcadia Editori.
Thackara, J. (2005). *In the Bubble: Designing in a Complex World*. Boston: MIT Press.

COMPLEMENTARY BIBLIOGRAPHY

Allione, C. & Lanzavecchia, C. (2008). *Dall'ecodesign all'architettura*. Torino: Time & Mind Press.

Ashby, M. & Johnson, K. (2005). *Materiali e design*. Milano: Casa Editrice Ambrosiana.

Ashby, M. & Johnson, K. (2007). *La scelta dei materiali nella progettazione industriale*. Milano: Cea Editore.

Ashby, M. (2009). *Materials and the Environment: Eco-Informed Material Choice*. Elsevier: Butterworth-Heinemann Ltd.

Bonapace, L., Bandini Buti, L., & Tarzia, A. (1997). Sensorial Quality Assessment: a method to incorporate perceived user sensation in product design. Application in the field of automobiles. In *Proceedings of the 13th Triennal Congress IEA '97*. Helsinki: International Ergonomics Association.

Bistagnino, L. (2008). Innovare: in che modo?. In Germak, C. (ed.). *Uomo al centro del progetto*. (pp. 32-39). Torino: Umberto Allemandi & C.

Bistagnino, L. (2009). *Design sistemico. Progettare la sostenibilità produttiva e ambientale*. Bra (CN): Slow Food Editore.

Cecchini, C. (2005). *Plastiche: i materiali del possibile*. Firenze: Alinea.

Doveil, F. (ed.) (2000). *iMade*. Cantù (CO): Clac.

Doveil, F. (ed.) (2001). *iMade*. Cantù (CO): Clac.

Fiorani, E. (2000). *Leggere i materiali*. Milano: Lupetti.

Germak, C. (ed.) (2008). *Uomo al centro del progetto*. Torino: Umberto Allemandi & C.

Kemp, S. E. (2009). *Sensory Evaluation: a Practical Handbook*. Oxford: Wiley-Blackwell.

Koivunen, K. & Kukkonen, S. (2004). Towards Deeper Understanding of How People Perceive Design. In *CADE2004 Web Proceedings of Computers in Art and Design Education Conference*. Copenhagen: Copenhagen Business School.

Kukkonen, S. (2005). Exploring eye tracking in design evaluation. In *Proceedings of JoiningForces, International Conference on Design Research*. Helsinki: UIAH.

Langella, C. (2007). *Hybrid Design*. Milano: FrancoAngeli.

Lanzavecchia, C. (2000). *Il fare ecologico: il prodotto industriale e i suoi requisiti ambientali*. Torino: Paravia Bruno Mondadori Editori.

Lerma, B. (2009). Innovative materials and multisensoriality. In *R'09 Twin World Congress Resource Management and Technology for Material and Energy Efficiency*. Nagoya (Japan); Davos (Switzerland).

Lerma, B. (2010). *Materiali e multisensorialità. Una metodologia di valutazione sensoriale dei materiali per il rafforzamento del metaprogetto, con particolare attenzione all'ecocompatibilità.* Ph.D. thesis. Torino: Politecnico di Torino.

Marino, G. P. (2008). *Innovazione materica e design*. Torino: Time & Mind Press.

Materia (2002). *Future Materials for Architecture and Design*. Rotterdam: Materia.

Material Connexion (2001). *Materials and Ideas for the Future*. Cantù (CO): Clac.

Material Connexion (2007). *Materials Matter*. New York: Material Connexion Inc.

Matério (2005). *Material World*. Basel: Frame-Birkhäuser.

Mazzocut-Mis, M. (2002). *Voyerismo tattile: un'estetica dei valori tattili e visivi*. Genova: Il Melangolo.

Niewiadomska, J. D. (2007). *Il codice percettivo del suono*. Soveria Mannelli (CZ): Rubbettino.

Norman, D. (2004). E*motional design: perché amiamo (o odiamo) gli oggetti della vita quotidiana*. Milano: Apogeo.

Pagliarini, E. (2002). *Valutazione sensoriale*. Milano: Hoepli.

Peyron, B. (2008). Innovative Instruments to Measure Perceived Quality of Vehicle Interiors and Benchmark. In *IQPC. Smart Interior Surfaces & Materials. Innovations in plastics and polymers for attractive new design features*. Wiesbaden (Germany).

Porretta, S. (2000). *Analisi sensoriali e consumer science*. Torino: Chiriotti.

Riccò, D. (1999). *Sinestesie per il design. Le interazioni sensoriali nell'epoca dei multimedia*. Milano: Etas.

Riccò, D. (2008). *Sentire il design. Sinestesie nel progetto di comunicazione*. Roma: Carocci Editore.

Rognoli, V. & Levi, M. (2004). *Materiali per il design: espressività e sensorialità*. Milano: Polipress.

Rognoli, V. & Levi, M. (2011). *Il senso dei materiali per il design*. Milano: Franco Angeli.

Tamborrini, P. (2009). *Design sostenibile. Oggetti, sistemi e comportamenti*. Milano: Electa.

Vezzoli, C., Ceschin, F. & Cortesi, S. (2009). *Metodi e Strumenti per il Life Cycle Design*. Santarcangelo di Romagna (RN): Maggioli Editore.

“Innovation in Design Education” is the title of the Third International Forum of Design as a Process, the annual meeting of the Latin Network for the Development of Design Processes, held in November 2011 at the Politecnico di Torino, Italy. The book presents the results of the conference, which focused on three specific topics of the debate concerning design education: the relationship between schools and companies, innovative instruments for design teaching, and research for education. Particular attention was finally addressed to the host school, which was invited to present its experiences and research relating to the chosen theme.

Elena Maria Formia is an architect and has a Ph.D. in History of Architecture and Urban Design. Since 2008 she has coordinated the activities of the Latin Network for the Development of Design Processes, an international organization of professors and researchers from nineteen universities, which meets every year during a thematic Forum. Her research deals with the history of design and its impact on contemporary professional culture. Over the years, she has attended several international conferences and has written many articles in magazines and journals, such as Strategic Design Research Journal, Redige, I+Diseño, The Art Newspaper, Il Giornale dell’Arte, Il Giornale dell’Architettura, and Le Culture della Tecnica.

ISBN 978-88-422-2175-3