

DOCTORAL PROGRAM IN DESIGN

Chair:

Prof. Francesco Trabucco

Field of study

Held at Politecnico di Milano university, the Doctorate in Design Research is created and managed by the Industrial Design, Arts, Communication and Fashion Department, INDACO, in cooperation with the Department of Mechanics and the Department of Chemistry, Materials and Chemical Engineering. Politecnico di Milano research doctorate courses aim to build the skills needed to perform highly qualified research jobs in manufacturing and service enterprises, the public sector, and the university. The scientific field to which this course belongs is industrial design. Its interdisciplinary relationships include the philosophy and theory of language, art history, design, science of materials and technology, industrial engineering, decision making, and computer science.

Industrial design, following the meaning adopted within this doctorate, is intended as a discipline acting within the industrial culture and accompanying its transformations. Among its main tasks is to deal with processes and products configuration. In this sense, this school specific meaning goes to use, function, social and individual consumption of the products (the functional, symbolical and cultural factors) as to manufacturing (techno-economical, techno-systemically, techno-productive and techno-distributive factors). All these themes are expected to be faced with the support of the conceptual tools of research in its theoretical, critical, historical and methodological articulations.

The complex of the issues investing the theme of innovation will represent the conceptual trajectory of the whole program. The attention to innovation-related phenomena are due to various factors, partly internal to the dynamics of the discipline of industrial design, partly motivated by the perception of the growing complexity of the innovative process, thus fostering in-depth analysis and new approaches which can legitimately be faced within the doctoral programme. Whatever the motivations for the analysis of technological change and innovation, this trajectory of enquiry highlights the factors and fundamental ingredients of the process of development, transition and transformation of industrial products, services and systems. As a starting point a broad view of innovation is assumed, being a dynamic process involving the development or improvement of new products, services, technologies, processes, institutions, systems, strategies. Such an extended view of innovation includes the range of economic and social activities

- in areas such as communications, corporate strategies, market dynamics, education, public institutions - so relevant for design action as product design in its strict sense.

Professional qualifications

The Doctorate in Design aims to train a designer/researcher with malleable qualifications. For the professionals produced by this programme are both designers who know how to do research and researchers skilled in using design tools. At the same time they are experts in managing awareness, in constructive interaction among various players, and in the communication of ideas and concrete proposals.

This skill set finds application in a variety of work environments. It is particularly in demand in organizations explicitly devoted to developing design research, such as universities and research centres, design agencies, and companies that are attuned to social and technological innovation. It is also sought out by public-sector organizations, by service enterprises, and by local development organizations, which are increasingly faced with complex planning problems that the designer/researcher can effectively deal with, analyze, and find solutions for.

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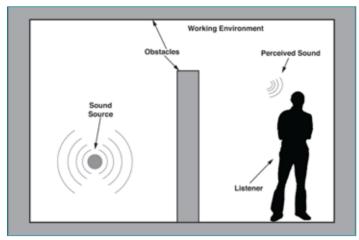
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VIRTUAL ACOUSTICS FOR PRODUCT DESIGN AND PROTOTYPING PROCESS

Marco Ambrogio - Supervisor: Monica Bordegoni

Product Design is taking more and more advantage of new technologies for the optimization of the different steps of the processes from the concept to the final product.

The concepts developed in the design phase need to be analyzed before their approval, in order to quarantee the quality of the final product. Traditionally, the evaluation phase consists in building and analyzing a large number of physical prototypes in order to evaluate different characteristics of the product, such as functionality, usability, aesthetics, comfort and so on. Most of times physical prototypes are expensive and not flexible enough to perform different kinds of tests. As a consequence, the practice of Virtual Prototyping is spreading. A Virtual Prototype consists in a digital model of the product, usually the CAD model, conveniently expanded with additional information, such as functional parameters and physical properties, which can be easily represented and modified. Virtual Prototypes can be used to evaluate the product concept during the design process, thus reducing the needs of producing physical prototypes and the costs related to their production and validation. The kind of analyses that can be performed on a Virtual Prototype depends on the information the prototype



1. Concept of the virtual environment

is enhanced with. Material properties as surface finishing offer information that can be used for the aesthetic evaluation of the bodywork of a car. The physical parameters of linking elements, such as springs and dampers, are useful to perform interaction tests focusing on different industrial products, as for instance household appliances.

So far, the research works addressing Virtual Prototyping have mainly focused on visual, haptic and tactile aspects. However, some industrial products need to be evaluated also from an acoustic point of

There are some categories of industrial products, e.g. vehicles, household appliances, power tools and so on, that generate

different kinds of sounds when users work or just interact with

The sound quality can play an important role in customers' choices, and can discriminate between similar products. Sound can be an important aspect of an industrial product. However, without its validation during the early design phase, it could be likely to obtain inaccurate results, which may lead to negative evaluations from the customers' point of view.

The current research work is aimed at defining a method for integrating the use of Virtual Acoustic Prototypes in the Product Design Process. The method mainly consists of three different phases: the analysis of the acoustic requirements

of a given industrial product (i.e. the expectations of customers about the desired sound generated by the product), the implementation of a Virtual Acoustic Prototype and evaluation of the sound generated with the help of the Virtual Prototype.

The three phases have been deeply analyzed and for each phase a specific tool has been identified. The research has been conducted with the aim of identifying, defining and validating each used tools individually.

It has been decided to use the same sound quality descriptors both to define the acoustic requirements and to perform the simulations, is related to the evaluation tests on sounds with the Virtual Acoustic Prototype, in order to easily compare the expectations of the users with the perceived sound quality. More in detail the literature related to procedures for sound quality evaluation has been studied and, on the basis of the information achieved, the Semantic Differentials procedure, data that require to be analyzed that consists on the evaluation of the characteristics of a sound through the use of pairs of bipolar adjectives, has been chosen.

For what concerns the development of the Virtual Acoustic Prototype, a Virtual Acoustic Environment has been entirely developed and implemented. The state of the art on the tools used in the field of Virtual Acoustics has been largely studied, in order to identify the most effective techniques and algorithms used for the simulation of sound fields.

The Virtual Acoustic Environment of accuracy of the numerical consists of an interactive environment where users can hear sounds produced by virtual models of products. Users can change some characteristics of the virtual environment, as adding objects, changing material properties. A concept of the Virtual Acoustic Environment is shown in Figure 1. The core of the system is based on the simulation of the

propagation of sound waves using a ray-tracing algorithm.

The major innovative aspect of the Virtual Acoustic Environment, if compared to canonical commercial software used to perform acoustic kind of output obtained from the implementation of the Virtual Acoustic Prototypes, and consequently to the potential users that can exploit the functionality of the system. While the outputs of the simulations performed with commercial software are generally complex numerical by engineers, the Virtual Acoustic Environment provide an audible feedback, which can be immediately perceived and evaluated by common users in a natural way.

Once the implementation of the Virtual Acoustic Environment has been completed, two testing sessions have been carried out to validate the Environment. A numerical validation, where sounds recorded in real configurations have been numerically compared with sounds simulated within the Virtual Environment, has been performed to analyze the level

simulation.

A validation of the perceptual equivalence between real and simulated sounds conducted by asking subjects to evaluate a characteristic of the sounds, has been performed to assess if the Virtual Acoustic Environment is able to reproduce the acoustic feedback perceived by people when they use an industrial product.

The analysis of the results obtained with the numerical test evidenced that the sound propagation algorithm produced accurate simulations for middle and high frequencies, but a loss of accuracy occurred in low frequencies. This problem can be avoided by integrating the current algorithm with a new method, more suitable to simulate the propagation of low frequencies.

The results obtained with the perceptual test showed that the acoustic feedback quantified by evaluating the level of annoyance perceived by users in the real configurations and in the simulated ones, is comparable.

On the basis of the results obtained with the two testing sessions, it is possible to assert that the Virtual Acoustic Environment is able to reproduce sounds that are comparable with the real sounds, which can be audible in real situations. Therefore, it is possible to hypothesize the use of the Virtual Acoustic Environment in the industrial context: it could be used for performing the acoustic validation during the development phase, thus reducing even more the need of physical prototypes.

THE DESIGN OF HEURISTIC PRACTICES RETHINKING COMMUNICATION DESIGN IN THE DIGITAL HUMANITIES

Giorgio Caviglia - Supervisor: Paolo Ciuccarelli

Digital technologies affect academic research in many, different, ways. For the last few years, computers and Internet have been changing the way research is conceived, conducted and communicated by transforming scholarly publication and collaboration, or supporting the storage, the analysis and the dissemination of data and information. While natural, medical and social sciences have a long and established tradition with these technologies and with a laboratory model to perform their studies, humanities have been more reluctant to the adoption of digital methods and tools. More recently, however, new research areas and activities have emerged from the intersection between humanities and computing. Today, the digital humanities represents a heterogeneous set of studies and practices that aims at understanding the implications and the opportunities that digital technologies can provide as media, tools, or objects of study in the humanities. Digitization, the process of encoding information in a machine-readable format, has provided new modes of accessing to and working with traditional materials. Moreover, the cultural and social dimensions of software and hardware constitute new

and challenging fields of study for traditional and emerging humanities disciplines. These new relationships between the 'digital' and the 'humanities' are rapidly demanding for adequate instruments and methods of observation and interpretation. Information visualizations and interfaces are proving to be essential tools to explore and make sense out of big and heterogeneous amounts of data. However, most of the methods and the technologies are still adapted from other disciplines and the biggest challenge seems to imagine new genuine research tools capable to embrace and emphasize humanities endeavor. This scenario provides a great opportunity for design - especially communication design - to participate in the current definition of new forms of scholarships, contributing at both theoretical and methodological levels. The research wants to investigate the possible role that design, especially communication design, can have between practice and theory in the definition of new research methods within the digital humanities. Like, and perhaps more than, other disciplinary contexts, the digital humanities are looking at design as an indispensable set of practices and knowledge to be integrated in their activities. The question

about the design of digital tools to support humanities inquiries is still central in current research initiatives and agendas. The nature of humanities inquiry and the work scholars engage with data and their representations, provide an almost-perfect context for design and design thinking to apply their situated, interpretative and user-centered approaches. Drawing upon a critical review of the current relationships between the two fields - design and digital humanities - and several direct experiences within digital humanities contexts and projects, the research argues that not only design represents a valuable partner in the development of digital humanities tools, but also that humanities inquiries themselves can be conceived as design processes. In fact, even though many are

the effects and the challenges that digital technologies bring into the activities of scholars and researchers, a reconsideration of the relation appears as the most significant and distinctive one. Making becomes the sine qua non condition for theory production, research is carried out through projects where practice and experimentation has a primary role and scholars become professional practitioners.

Recognizing strong synergies between recent epistemological assumptions in the digital humanities and consolidated theoretical approaches within design practice and theory, the research places design at the center of digital humanities activities. By bringing the idea of design as a form of knowing*in-action* and designers as reflective practitioners, within digital humanities contexts, the research proposes also a new collaborative model, where designers and developers' ability of representing and modeling knowledge joins the interpretative work of scholars. towards the definition of new hybridized ways of thinking. More than focusing on the development of interfaces, according to a traditional designing-prototypingdeveloping process, the research wants to emphasize the interplay the emerging fields of Software between interpretative activities by designers, developers and scholars, where each 'move' can work as trigger for the next one. As a result, a new theoretical and practical framework has been developed, in which visualizations and interfaces are not conceived as things, but rather, as expressions of new ways of looking, reasoning and building with, and through, digital technologies. Based on this framework, and in order to better explore the collaboration between designers and digital humanities scholars, a joint research lab between the Politecnico di Milano and Stanford University has been also established. The research has been conducted by combining

analytical and critical inquiries

with design activities. Situated

in the emerging intersections between communication design and digital humanities, the research has proceeded within a strongly interdisciplinary context. Data and Information Visualization constitute the primary research areas where the work stems from. Visual design, computational design and Human-Computer Interaction appear also as primary fields involved in the research, especially due to both the representational and interactive aspects of digital artifacts. Since digital humanities are also concerned with the study of digital technologies and their cultural and social dimensions, the research has integrated and adopted perspectives that come from and involve new approaches about the production and the use of digital technologies. In particular, Studies and Cultural Software constitute the theoretical context in which parts of the analysis can be situated (especially regarding the review of interfaces in the digital humanities). The research has been carried out through three macro phases. The first phase has focused on a critical review of the state of the art. conducted at three different levels. Starting point has been a deeper understanding of the current digital humanities scenario: from the theoretical and epistemological perspectives to the most practical and methodological implications digital technologies have brought into scholarships and research. A further analysis has been conducted on the relationships between design and digital humanities, in terms of disciplinary interests,

divergences and synergies. Lastly, a review of digital humanities projects involving information visualizations and interfaces has highlighted the most prominent approaches and tendencies. A second phase has required a direct immersion in a digital humanities context and the development of several projects. This period has provided the opportunity to establish a concrete and deeper acknowledge of the environment, the procedures and the approaches involved in research contexts. Moreover, it has been possible to directly apply and evaluate theoretical and methodological assumptions about the design of digital tools. A third, conclusive, phase has been dedicated to the analysis and the discussion of the experiences gained during the research. A critical review of the results and the process involved in the development of the projects, has then led to reconsider not only the approach to the specific case studied, but has exposed problematic aspects about the role and the conception of communication design within digital humanities. These considerations, together with a further confrontation with the field literature, have provided the elements to formulate and propose a new collaborative model.

PRODUCT SEMANTICS FOR FCO-FFFICIENCY. REDESIGNING PRODUCT CHARACTERS TO COMMUNICATE ECO-EFFICIENCY IN HOME APPLIANCES

Shujoy Chakraborty - Supervisor: Lucia Rampino

Introduction

Currently the communication of Eco-efficiency in home appliances is very weak as this industry has only concentrated on the technical attributes (technology content) of appliances, overlooking the appearance attributes of their products. This thesis investigates the encoding of Eco-efficiency as a meaning in home appliances using the Product Semantic theory, and proposes that the linguistic shortcoming i.e.: ambiguity in exact usage context of Eco-efficiency, is also reflected in the design approach towards Eco-efficient home appliances as according to Krippendorff (2006) parallels have existed between transmission of meanings through design and the link with language.

What cannot be clearly defined in language is difficult to translate into design. When the meaning of what a product has to communicate is not clear to the consumer, then, he or she will have difficulty in assessing the product and will therefore appreciate the product less (Blijlevens, Creusen, & Schoormans, 2009). From a point of view of language the term 'sustainable development' (and by its derivation 'sustainable design') is a semantically empty term (Vezzoli & Manzini, 1989) due to large scale improper usage. This thesis will explain the application of Human Centred design approach of product semantics to extract product characters which successfully

communicate Eco-efficiency as a meaning to consumers. The final output is to derive a ready to reckon set of design guidelines in the form of a set of 6 product characters-Futuristic, Feminine, Unconventional, Practical, Simple, Smart - which appliance designers can attribute to design the intrinsic features of home appliances.

The aim of this research is to attribute the above characters to communicate Eco-efficiency through the appliance intrinsic features using a non-instrumental interaction paradigm. Intrinsic product features are physical attributes – form, geometry, colour, proportion, & composition as opposed to extrinsic features which are strictly related to a manufacturer's marketing identitypackaging, branding (Lee & Lou,

Extracting these characters is an attempt to throw some light into the issue of communicating Eco-efficiency in EuP's (Energy using Products) by demonstrating the application of product semantics in home appliances and endeavoring to lay a foundation for future research into other allied product categories. This thesis will conclude by analyzing the degree of success of the 6 product characters, and reason upon the advantages of applying an objective product semantics process to solve an inherently subjective domain of Eco-efficient design, and attempt to tame what has been

of a wicked problem (Erlhoff & Marshall, 2008, p-108; Syarief & Hibino, 2003).

Why home appliances?

Within the Europe home appliances account for the largest share of domestic energy consumption. With refrigerators and freezers accounting for 15% of residential consumption followed by washing machines accounting for 4%, and dishwashers, ovens, and clothes dryers accounting for around 2% of total residential end use (Mills & Schleich, 2009). This makes them an important contributor to the agenda of energy efficiency. On its part the EU has set an efficiency guideline to increase appliance efficiency by 20% at the end of 2020. Most appliances under development at the moment are meeting the 20% consumption reduction target in the A+ energy labeling category. Appliances companies are large corporations with shareholders, who demand constant 'value generation'. Eco-efficiency for these corporations is a risk. A 'risk' is defined as a future event which has not yet realized itself and could have a positive or a negative impact. Appliance manufacturers are unsure of the benefits of investing in an Eco-efficient platform, whose returns on investment are very 'risky'. A typical platform takes couple of years to develop and can entail several million euros of investment, thus improving the compared to Horst Rittel's concept commercial success of an Ecoefficient appliance will encourage higher investment in this industry segment where consumer awareness is already low mainly due to the poor and overly complex product communication strategies for Eco-efficiency (Mills & Schleich. 2009).

Product semantics can help to make this communication easier and more intuitive to the end user thus helping to increase the competitive advantage of Eco-efficient appliances in the marketplace and thereby reducing the perception of risk taking by manufacturers.

Methodology adopted

The methodology followed in this research is that of action research using the "research through design" approach described by Rampino & Colombo (2011) utilizing various methods of literature review, appliance design activity with Whirlpool Europe, applied research, and design workshops in different phases of progression. Finally the research ends by applying the product semantic approach to a design process as a set of 7 sequential steps adapted from Butter's (1989) 'character attribution process' which he introduced to design product forms with predetermined meanings.

- 1. Perform a design workshop which is aimed at developing a series of Eco-efficient washing machine design concepts using product design students.
- 2. Collect suitable adjectives by conducting feedback questionnaire analysis on the design concepts from nonexpert users.
- 3. Extract the most suitable adjectives amongst all the adjectives collected. These adjectives will be ranked and grouped using a group voting methodology (KJ method) and organized as product characters.

- 4. Product characters will be visually attributed using mood boards and used as input for a second designed workshop. In all 6 characters were finalized.
- **5**. Second workshop performed using product design students aimed at designing a washing machine expressing the given characters

little or no qualitative tools when dealing with conveying a meaning through form giving (Lawson & Storer.2008: Boess.2008). Thus this thesis attempts to throw some light into this issue by extracting 6 product characters using the product semantic theory and try to introduce an element of objectivity to communicate



1. Product characters: futuristic, feminine, smart - futuristic, conventional,

- 6. The effectiveness of the characters will be tested in communicating Eco-efficiency by using a second feedback questionnaire from non-expert users.
- 7. Product characters will be verified as successful design guidelines for appliance designers.

Implications for theory and practice

Examples of professional designers having applied the product semantic theory into successful product development are few and far between, such as a Philips 'Roller Radio' (Blaich, 1989). Early proponents of product semantics such as Krippendorff blamed an 'untheoretical design profession' (Capitello, 1991) for this eventual rejection. The fact is that professional design practitioners and theoretical academicians regard semantics in fundamentally different ways. Designers tend to depend more on intuition & experience with

Eco-efficiency through home appliance appearances. Although the product characters derived here are based on a Human Centred design approach based on feedback captured from users, they need to be tested across a wider variety of consumer product categories in order to prove their robustness. The research outcome therefore should be taken as a possible roadmap for future development and has attempted to enable better communication of Eco-efficiency in home appliances.

Application of product semantics in the home appliances industry can help to bridge the gap between what marketing communicates through mass media and the designers intend through product aesthetics, while working on the development of the same appliance platform thereby improving the market identity of a manufacturer.

COMMUNICATION DESIGN FOR URBAN ENVIRONMENT. THE DESIGN OBSERVATORY

Elisa Chiodo - Supervisor: Daniela Anna Calabi

The research Design della Comunicazione per il territorio. Un Osservatorio per il progetto (Communication Design for urban environment. The Design Observatory) has two main aims: to identify the field of "communication for urban environment" by the gathering, analysis and mapping of research and project contributions; to define, through the previous analysis, a research and design tool specific for this research area: the Observatory. In particular the research focus is the design of artifacts to communicate urban spaces. In this case Communication Design for urban environment is defined as the design of devices and communication systems to interface with places. Since several years, this field of interest is under course of study in the DCXT group (D.Com research unit, Design Department, Politecnico di Milano) through researches, national and international projects and didactic activities. Since there isn't both a unanimous definition of this research area and of the criteria for cataloguing projects, the first aim was the analysis of the state of the art.

The analysis of the state of the art and the gathering of several project has shown that the contributions are not only numerous, but also very

different.

This first analysis has led to setting parameters to catalogue the projects collected, to a mapping of them and to a selection of case studies with interesting communicative features and allowing a high mediation between the user and places.

This methodological strategy has highlighted the need to design a tool, an *Observatory* specific to this research field, able to support research activities selected case studies, researches and the design of devices and communication systems. The Observatory organization is part of a broader context focused on the creation of Design research and project tools.

The Observatory, as a tool systematic and upgradable, has as main goal to support the design of communication devices projects that have strong and to share the knowledge regarding this specific research

References for its organization are those archives and virtual collections used as platforms to access to gathered data and projects (e.g. Aiga Design Archive, Visual Complexity, etc.), which were collected from their editors with particular attention to technological developments and visual representations. The Observatory is a tool for the consultation, gathering and sharing of different

contributions. It offers a collection of selected projects regarding the "communication for urban environment", which are interesting for their innovative features. Therefore the Observatory is not only an archive but also supports the design methodology. allowing the sharing of project results and methods.

The Observatory has an international approach: the and projects are from all over the world, offering a qualitative view of the state of the art. It consists of three main sections. The section Innovation Prototypes Collection (IPC) presents a collection of projects case studies as "prototypes". The selected prototypes are historical and cultural reference innovation features in relation of the context in which they are designed and used: they have defined new parameters and methods in communication design.

The collection is also composed by projects made in different time periods: from the first editorial example of travel guide, to devices that exemplify a new communication model based on an high level of technological innovation, interaction and user involvement.

The other two sections (In Progress Collection and Mv Collection), integrative to the IPC, are been created to allow the Observatory members to present and to share several useful contributions (e.g. projects, researches, articles, etc.).

The methodological strategy used for define the IPC was made by systematization and cataloguing, for "prevalence of semiotic function", of urban communication projects. The selection of case studies, the prototypes collected in the IPC, was made through an analysis of user involvement (participation projects by specific parameters related to Design innovation features (e.g.: notoriety and impact in the context of application; originality of the topics and / or originality of the sources; user interaction and involvement; design features: expressive modality, cross media system, innovative technology, etc.).

are a total of ninety and were classified into different groups. The projects of each group have different design features and communication aims. The different projects collected

inside the *Observatory* can be consulted through different filters that help to orient the user search. In order to give different level of consultation we have decided to offer both the traditional filters of digital collections and archives (such as: Author: Country: Years: etc.) and others more related to the design features of the collected projects.

The search inside the IPC can be done for: geographical area (specific location and scale considered into the project application); design features: media and cross-media systems; expressive modality and multimedia contents: level of interaction and content fruition (e.g.: before, during and after the exploration of the place); of the user in the creation and sharing of information). The Observatory also allows additional levels of consultation through specific sections and web pages for each project of the collection: in them the user can consult in depth their communication features. From this it can be deduced that the *Observatory* by nature and The projects, selected for the *IPC*, goals is inextricably connected to research area of Communication Design for urban environment.

> The gathering, mapping and cataloguing of the projects collected in the *Observatory* show a strong transformation both in the communication forms and media. This current transformation in the expressive modalities,

technologies and media,

resulting from the incremental use of the digital technology. shows an evident change both in modalities of contents production and transmission This has consequently led not only to the idea that the same content could be from the beginning designed for different media, but also that is possible to design some innovative modalities to access to contents by the creation of new possibilities of communicative interaction and mediation. The projects of the IPC present how, from one side, the communicative systems allow the user to have crossmedia experiences and how, from the other side, the multimedia devices are leading to a convergence of contents and formats.

Furthermore new mobile devices allow not only the chance to have information both in real time and in situ, becoming mediators tool between the user and the territory, but also allow an high level of user involvement in a bottom up content creation. New media and languages led to experimentation both in the most technological and artistic fields, involving different disciplines including Communication Design.

DESIGN COMPETITIONS - NEW VALUE PROPOSITIONS

Onur Müştak Çobanlı - Supervisor: Alessandro Deserti

This Doctoral Dissertation provides insights on Design Competitions, Awards & Contests; what they were before, and what they have become, and how enterprises or institutions could utilize them to create added value. Classified under: ICAR/13 DISEGNO INDUSTRIALE scientific sector.

In parallel to growth of design field itself, design competitions have evolved significantly, growing both in size and scope. First competitions were searching for the "aesthetically beautiful" designs, schematics or drawings. However, today we see that design competitions have evolved way beyond their initial aims: They are no longer "just beauty pageants"; as digital platforms advanced, design competitions have become powerful tools that serve multiple purposes. The rules of design competitions have changed and the transformation is so great that once secondary aims, or externalities, "out of the box thinking", "innovative collaboration", "outsourcing design", "subsidizing design through governmental support", "creating awareness" or "brand communication" have become primary aims of the new era of design competitions. Today, it is possible to find competitions that accept a wide-range of entries ranging from "sketches"

to "prototypes" to "just ideas" to "complex product/service systems" or "configurations". Design competitions also shifted in a direction to be more "multi-disciplinary" than ever. New aims such as "community building", "customer base formation". "database building", "co-branding with designers", "recruiting of employees", "creating standards", "social working", "brainpower collection", "trend identification and research". "fostering innovation", "trendidentification" and others have come to be. Many companies and platforms have appeared which exploit this new phenomenon or benefit from it as the design competitions change from a "non-profit" attitude towards building new business models where profit was at the center of the activity. The aim of this doctoral dissertation in design is to explain the new phenomenon and transformation about design competitions, and how new design competitions could be used as a multipurpose tool to foster innovation by enabling enterprises to integrate designers' and end-users' inputs in an efficient manner through newly discovered operational models (such as helping enterprises to crowdsource design and out-source innovation, by facilitating talent

acquisition, via improvement of creative efficiency and productivity through introduction of competitions and by cultivation of a corporate design culture, by helping to procure design services in a costeffective manner, by serving as a platform to run user-centric participatory product design development events and tests, as a tool to determine trends and collect statistics, as a way to collect user insights to improve existing products, service designs and systems etc.. and others.) In addition because design competitions are just too important for a "laissez-faire" kind of approach. The doctoral research was also aimed at building several guidelines and tools to manage, evaluate and organize design competitions. The research goes in detail to design competitions, contests and awards through the scientifically gathered data about the phenomenon through surveys, participatory action research and casestudies. Concurrent trends in design competitions: business and operational models, involved actors, and benefits to partakers are identified through scientific controlled experiments and statistical data gathering in order to provide solid & reliable knowledge regarding the subject to act as a basis for future reference. Key

findings also include ways to utilize design competitions, and tools to manage or organize them. The dissertation refers to the following fields: design education, advanced design, design and management, co-innovation, co-creation, crowdsourcing and outsourcing innovation.

This research on design competitions focuses on the relationship between design, innovation and business. The research provides us insights on collaborative innovation through design competitions, branding through design contests and marketing through design awards, and using design competitions for out-of-the box thinking and innovation. Furthermore design competitions are studied as a policy application tool on the governmental level such as a tool by means of ranking, unbiased to incubate design competency and awareness in a country, as a tool to subsidize design in the form of indirect economic supports through awards. From a different perspective, design competitions are also studied for their social competences as facilitators; which provide added interaction between designers by bridging companies and designers, and the role of design competitions as a social communication network to bring like-minded people. Furthermore, in this thesis it is discussed if it would be possible to make design relatively more «measurable» for involved parties. The measurement is discussed within the context of competition rankings and scores. Finally, the uses of design competitions in education is discussed through many

perspectives; such as the role of design competitions for improving the competitiveness of students to come-up with better works, or their role for design portfolio development, or by being as a tool to evaluate (or self-assess) the ability of a person to use and understand designlanguage. This research also mentions design competitions as platforms to promote designers, and mentions usage of design competitions for promotion of design oriented enterprises etc.

Before starting this dissertation, the following questions were unanswered: Could design competitions be a possible step in measuring design value? Could studying the design competitions help to come up with a way to measure design value in a way that nondesigners can evaluate: such as scoring and others. Could design competitions provide a way to ease connection of companies and designers? Could design competitions be used as an effective tool to create new connections between companies and young designers and design graduates? Could design competitions be used as a possible way to integrate crowd sourced innovation to institutions, a possible way to enhance design culture within a company? Could new tools to improve and make it easy to organize design competitions, contests and awards be created? Could new tools to help judge quality of design competitions be imposed? How, design competitions, awards, and contests could be improved to make them more favorable to participating designers? Etc.

the following question in mind: Do design competitions have positive value propositions? I.e. could it be possible to use design competitions to generate further value added in/for: businesses, organizations, governments, institutions, designers, educators and other partakers such as the organizers, sponsors and participants? If the answer to this question is yes, we would want to highlight how & which ways design competitions create value added, and how we could improve or amplify the value added generated by design competitions further? If the answer is no, or if there are negative issues or difficulties with the design competitions, how could we deal with them? The hypothesis is that the design competitions do have positive value propositions however there are certain conditions such as the organizational aspects; submission mechanisms and evaluation methodologies to be met for design competitions to provide positive value propositions.

The research initially starts with

FROM A DESIGN MUSEUM TOWARDS A EUROPEAN CULTURAL PLACE: THE DESIGN MILIEU Strategies for European Design Culture in the globalization era

Susana Paula Gomes Louis Gonzaga - Supervisor: Luciano Crespi

The aim of this thesis is to establish the strategic lines for the creation of a place dedicated to European Design. Based on the survey and study of European Design museums, and by analyzing their typologies. missions, relationships with locale and audience, we verified that the European museology trend focuses mainly on the conservation and communication of industrial production artifacts mostly of nationalistic nature, with little differentiation from its peers, be it in the available services, be its museum strategies.

Based on the theoretical-critical background of the design culture and of the Museum Studies, we have associated the evolution of the subject to: the globalization of the creation and production processes; new cultural ways and expressions; and the European Union's strategies for the creation of transcultural environments. By crossing these macro-areas with the results obtained in the mapping of the design museums we were able to formulate the following hypothesis: are the places dedicated to design communicating its diversity, plurality and multiplicity of expressions in the contemporary European society?

From this hypothesis comes the research question that guided this investigation. How can we

build a systemic and holistic vision of the European design culture, through its exhibition places and relationship with its audience?

To compose this plan, Design Museums, as well as Design Week/Festival events and Design Districts were specified as the main agents in the conservation, dissemination, exhibition and divulgation of design in Europe. By resorting to a qualitative methodology to analyze each of these agents, and to the Ground Theory instruments, we were able to, on one hand; determine the diachronic portrait of this cultural system, and on the other, to obtain the results of its social and cultural impact.

The contrast of these results has given us empirical evidence that provides a project opportunity. Thus appears the Design Milieu concept. It is a place that spotlights the plurality of the European project practice and compares it to itself and the world.

It is a place that gathers a museum's curatorial and tutorial features; with the cultural, interventional, performing and contemporary character of an event; and with close relationships with the community (public and professional) embedded in the urban territory, as a district.

DESIGN FOR SATISFACTORY AND SUSTAINABLE PATTERNS OF CONSUMPTION AND PRODUCTION

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The research addresses the design(er) role for the spreading of sustainable patterns of production and consumption (SPC). Considering the limited advantages and Rebound Effects of previous technologically-led strategies (e.g. Green- or Eco-Design), and acknowledging the necessity to operate for people active involvement in the transition, the envisaged strategy in this research is the prompting of satisfactory feedback by practicing potentially sustainable practices.

To this purpose, the involvement of people in creative processes for artefacts production – i.e. Do-It-Yourself (DIY) – appears as a promising way to maximize awareness of contemporary issues related to producing and consuming by a « more "direct encounter" with the world ». This transition will be catalysed by the spreading of contemporary phenomena where bricoleurs. amateurs, lead-users, prosumers have been affirming the 'New DIY Age'.

The research hence analysed the different steps of the creative process where people could be involved (Concept, Definition, Assembly, Creation, and Transformation). The last step, Transformation, refers to reusing, repairing, repurposing, reappropriating, and in general activities aiming at prolonging products life-span once they

reach their end-of-life. This envisaged contribution appeared to endow remarkable potential in terms of positive impact for the environment and resources consumption, by reducing the amount of wasted materials and 3. How can designer contribute artefacts.

So that Transformation and RFactivities have been considered as focus of the research, that together with DIY practice have been synthetically named as RE-DIY. The efforts of this research have been further focused on a specific typology of artefacts in order to limit possible variables and favouring the definition of a more reliable and effective study. To this purpose, the typology of artefact with the highest rate of disposition has been selected. i.e. furniture and raw materials (excluding electric and electronic devices) representing the 60% in volumes of waste artefacts in landfills in both United Kingdom and Italy, where the research has been carried on.

The study of the RE-DIY has been based on the affirmed sociological theory of practice, intended as sets of norms, conventions, ways of doing, know-how and requisite material arrays, also named as Meaning, Skills, and Materials components. Practice is therefore the unit of enquiry, analysis and intervention, aiming at highlighting existing and possible connections to foster patterns of SCP.

Three major questions have been posed and investigated:

- 1. How is this practice carried out by practitioners?
- 2. How are designers currently participating to this practice?
- for a satisfactory and advantageous impact?

The investigation of this research questions has been developed by setting an articulated methodology.

The first question has been analysed by carrying semistructured qualitative interviews to 15 practitioners in both Milan (IT) and Lancaster (UK) areas, where the research has been developed, varying according to gender, age, and background. Instantly comparable levels of satisfaction from practicing RE-DIY emerged at different levels of commitment and interest among interviewees, classified in four groups of creativity (Doers, Adapters, Makers, and Creators). The reported personal experiences about RE-DIY practices have been deeply analysed according to the Practice Theory model from sociology studies. Three major components have been inferred about the practice:

- · Meanings, i.e. motivational aspects as saving or lifechoices;
- · Skills, i.e. abilities involved as planning or doing; and
- · Materials, i.e. tangible

components as tools or raw materials.

The analysis of these components highlighted several promising elements in terms of sustainable advantages. Services for artefacts rescuing have been acknowledged as worth being further exploited. To this purpose to the practice. The different Participant Observation and Practice has been carried in two different services for bulky waste draft and envisage the future collection in the two local areas, where further information about artefacts and opportunities for social and environmental impact have been detected.

The second question has been investigated first by collecting and analysing hystoric and contemporary cases of RE-DIY artefacts produced by professionals in the design field. As a result the innovation value in product and service design emerged, enhancing the potential impact of the analysed practice. Professional aspects related to have been further exploited by interviewing design studios engaged with the RE-DIY practice as occasion for people involvement in the creative process to foster emotional attachment, social cohesion, and 2. supporting services for REurban improvement among the others. As a result, the chance for RE-DIY practice to represent a professional – beyond environmental –opportunity has 3. fostering practitioners' been confirmed. The third question has been

mainly addressed by setting Action Research occasions for direct involvement of people in the creative process by RE-DIY. To this purpose four different 'Repairing Workshop' has been led to observe, support, and stimulate people's approach workshops progressively offered information and elements to roles of design for the RE-DIY practice.

At the same time, further professional occasion for designer to bring environmental and social advantage have been inferred and mapped according to two major axes of:

- typology of contribution, i.e. as collaborator or facilitator
- · level of action, i.e. at local or global scale.

The resulting four inferred scenarios of design opportunities and roles are:

- 1. networking with global action for local impact, i.e. collaborating and networking with other professionals for shared projects and intentions aiming at fostering RE-DIY;
- activities and supplying, i.e. collaborating with institutions and professionals to valorise RE-artefacts;
- involvement in transforming processes, i.e. sharing design-



1. Scheme of opportunities for designer in RE-DIY practice

knowledge and -thinking with practitioners;

4. Designing artefacts to facilitate RE-DIY practice, i.e. Designing materials, parts. products, and services to foster the distribution of competences: Wabi-Sabi and Connections.

THIS HOUSE IS NOT A HOTEL - INTERIOR DESIGN AS A TOOL FOR ANALYZING AND DEVELOPING SOLUTIONS FOR (CON)TEMPORARY LIVING

Angela Ponzini - Supervisor: Alessandro Biamonti

Introduction

The research "This House Is Not A Hotel - Interior Design as a tool for analyzing and developing solutions for (con) temporary living" focuses on the ongoing multidisciplinary debate on social, cultural and economical transformations of our time with particular attention to contemporary and nomadic human habits and behaviours

Subject

In particular, the research aims to analyze two subjects: living the city and living it temporarily, whereas the verb to live is used in its most post-modern meaning.

The human being, nowadays, is more and more used to travelling and living temporarily far from its familiar and cultural roots. We refer to this attitude as contemporary nomadism. This temporary way of living is important to understand what to live in a stranger place and to inhabit it for a limited period of time means.

Context

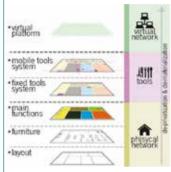
The new tools and skills typical of Interior Design are suitable to interpret (and solve) the new link A Possible Answer between the human being and the space he temporarily lives. By using an anthropocentric method (focused on users), it's possible to reconsider traditional

design approaches and create more suitable and dynamic living spaces.

What's The Matter

The traditional services for temporary hospitality (accommodation services) aren't the only solutions for contemporary nomadism any more. New concepts for temporary living and for hospitality are growing fast, both on a free basis and with a fee: they raise and drive forwards trends that are peculiar of our times, like the importance of having access to the web or living real local experiences. In this scenario, the research questions are strictly connected to concepts like "feel like home" and "homing". How is it possible to feel like home in places that don't belong to our domestic and familiar environments? How is it possible to feel like home in places that are so far from our hometown and our culture? How is it possible to design shared spaces in which everyone can feel free to activate specific services and choose personal and customized elements?

If we consider the variety of inhabitants, cultures, social and geographical differences on Earth, it seems hard to identify a common vision of the feels- like-



1. THINAH concept can be seen as an overlapping of six layers in a process of gradual de-materialization

home concept. Everyone has his own personal idea of home (and of feeling like at home), always related to different objects, actions, needs, memories, habits, furniture, environmental features. Keeping this in mind, it's risky to give a unique and definitive design solution. This is the reason why the research, through the formulation of a new concept, aims to suggest some tools (and not fixed design criteria) for (con)temporary travellers' needs.

A Design Solution

This design concept for temporary hospitality is called THINAH, acronym of This House Is Not A Hotel.

The concept provides for: - some phisycal spaces for hospitality, which evolve with the users; these spaces, set with typical domestic interiors, might be exhisting already (the THINAH three layers represent the plug-in) or made ad hoc (the THINAH apt.). These places can be lived and shared between various users at the same time: - some tools, that could be stable (permanent) and/or mobile shared by different places. The quest can use these tools to customize and accessorize (on a temporary basis) the place (THINAH) where he is living, adopting obvious rules of respect for the other temporary inhambitant (THINAH

- a virtual platform, inspired by the social network and web community models: this is because, an online element is fundamental for the management and the development of what we have just proposed. On the platform, each member of the community has a personal account. Throught the platform everyone can have access to a map that shows both places for hospitality (THINAH) and tools (products and services) available on the specific territory. The specific spatial features and characteristics of each thinah spaces are reported in detail on its personal page.

In a process of gradual dematerialization, the THINAH concept can be seen as an overlapping of six layers. From the bottom, the first

network of physical THINAH (composed by plans, furniture and main functions of domestic environments). The fourth and the fifth layers represent the network of tools that enable homing activities. The upper level is the all-inclusive virtual network.

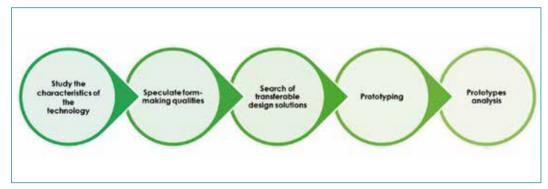
Conclusions

The THINAH concept is based on the idea that the recent domestic forms of hospitality (like private houses on Airbnb) help people feel more like at home while traveling from city to city. It's evident that these spaces, geographically diffused, have already their personal identities and styles; but they can be completed (upgraded) everytime differently, according with different needs and habits: THINAH collects and spreads specific products and services on a local level, connecting people and products on a global level. The research aims to suggest a scenario where, while living in a foreign city and in a new domestic environment (where interiors are the results of histories and memories of strangers), people can count on complementary tools to re-create their own ideal temporary habitat.

WHAT CAN WE DESIGN WITH TUBULAR LASER **CUTTING?**

An exploration of the design potentialities of a CNC manufacturing technology: the case of tubular laser cutting

Patrick Pradel - Supervisor: Barbara Previtali



1. Four research process stages

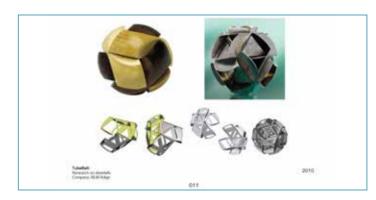
New manufacturing technologies have a key role in the achievement of new design solutions. When a designer is confronted with a new production technology the questions that arise are: what are the designs potential of this technology? How the features of this technology can be used to develop innovative products? From the point of view of design research there are, however, few systematic efforts to develop design tools and methodologies suited to investigate new manufacturing technologies. This thesis proposes a practicebased approach to investigate tubular laser cutting form a design perspective. Tubular Laser Cutting (TLC) is an emerging Computer Numerical Control (CNC) manufacturing technology that allows cutting, dissecting and drilling, any geometric shape on the surface of a metal tube. In order to

uncover the characteristics of tubular laser cutting a research approach was developed. The approach was grounded on the concept of design exploration research proposed by Fallman. The concept of form-making qualities proposed by Nordby was also utilized to define the tubular laser cutting design

The approach adopted was constructed in five stages: study of the characteristics of the manufacturing technology, speculation of form-making qualities, search of transferable design solutions, prototyping, and prototypes analysis. The technical aspects of tubular laser cutting were analysed in the stage study of the characteristics assessed by a panel of young of the manufacturing technology. The aim was to understand the potential of the technology. Then the technical potential of TLC was translated in form-making qualities. These

form-making qualities were used to identify through visual analogy some transferable design solution or in other words solutions from other fields that could be transposed to TLC. In the next stage the identified transferable design solutions were transformed in prototypes made with tubular laser cutting. Then the prototypes were evaluated in a two stages process. In the first stage, the author analysed the prototypes in order to uncover the tacit knowledge gained through the practice-based approach and assess the form-making qualities. In the second stage. a guestionnaire was conducted and the prototypes were product designer. The objective of the questionnaire was to measure the capacity of the prototypes to teach tubular laser cutting form-making qualities and inspire new design

solutions. Prototypes analysis highlighted potentialities of tubular laser cutting but also uncovered limits, which affect its applicability. The findings of the questionnaire suggest that the prototypes conveyed to the interviewed designers the characteristics of tubular laser cutting. The clinical results achieved during the thesis are a fruitful starting point for the development of more systematic studies. Future research is needed for testing and generalizing the approach: then for understanding the role of prototypes as material for teaching design potentialities of manufacturing technologies



2. Burr puzzle



3. Reciprocal frame structure