# DOCTORAL PROGRAM IN INDUSTRIAL DESIGN AND MULTIMEDIA COMMUNICATION

Chair:
**Prof. Francesco Trabucco**

The doctorate programme final objective is the training of a high profile researcher, whose aim is to develop research either in academic or industrial contexts. Relevant steps connected with such a training are the refinement of analysis techniques, the development of critical abilities, the organisation of an original contribution to knowledge in technological and industrial culture, the proposal of innovative approaches and visions for the theory and practice of industrial design and multimedia communication, the building of increasing skills in research planning, research strategy building and research management.
Aim of the activities carried out in the course is the production of specific researches by the single students. This work is accompanied and supported by the research activity carried out form the students in the Research Units and by crossing activities like classes, labs and thematic seminar.
The doctorate programme is articulated into two directories:

## Industrial design

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 industrial products configuration as well as with all those factors investing the process of shaping products themselves. 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, technoproductive and techno-distributive factors). Through the lenses of such a perspective, adequate relevance is recognised to product planning, service design or further remarkable border areas intersecting different disciplines, such as multimedial communication, technological innovation, firm organisation, management and environmental planning. All themes are expected to be faced with the support of the conceptual tools of research in its theoretical, critical, historical and methodological articulations.

## Multimedia communication

On its side, the section of communication design is meant to provide a suitable training to the resolution of complex problems in the field of multimedia communication. The training programme - based on historical, critical, theoretical and planning approaches - will involve the design of communication in any applied aspect: from the design of interfaces to the design of communication systems (teleeducation, e-commerce, data banks), from corporate image manuals to communicative strategies, from typographic design to the design of icons and signals. The programme contents are expected to face the resolution of visual communication and communication design either with conventional technologies or with multimedia-multisensorial ones.

## Trajectories

In the continuity with the activity assumed in the last decade, 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.

The programme, for both industrial design and multimedia communication directories, is articulated into four training trajectories, toward them the research themes should converge, they are as following:

- *Research skills*: learning how to carry on research activity;
- *Research practice*: highly intensive thematic areas where research skills may be practised;
- *Research thinking*: learning how to compare research activity and research culture, how to acquire abilities of competence transfer, how to design opportunities of application;
- *Research outcomes*: producing an original contribution to design knowledge.

Two professional profiles are expected:

**Profile A:**
· A scholar-researcher devoted to planning research, building a research culture, divulging research and whose main task is to sustain the operability of research in industrial design and communication design, fostering their cultural foundations (inter and extra-disciplinary). Allocated either in academic or professional contexts, this figure of researcher is expected to produce: research knowledge, methodologies and tools, research education, training and updating.

**Profile B:**
· A high profile researcher capable to identify problems, to select objectives and to detect solving strategies within the industrial context: an analyst for tacit or implicit problems, a generalist for desirable interactions in design solutions, a designer in a wider sense, with specific skills in positioning a design problem in the correct dimension and perspective and whose task is to favour and direct the transition from design hypothesis to design solutions in industrial contexts, exploiting limits, constraints and opportunities.

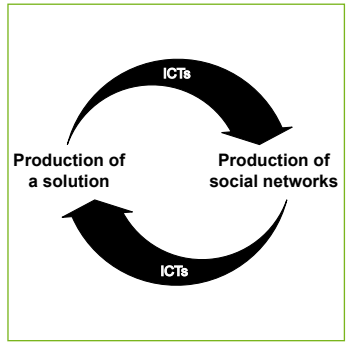
# A SOCIO-TECHNICAL FRAMEWORK FOR COLLABORATIVE SERVICES: DESIGNING A DIGITAL PLATFORM FOR COLLABORATIVE COMMUNITIES

Joon Sang Baek

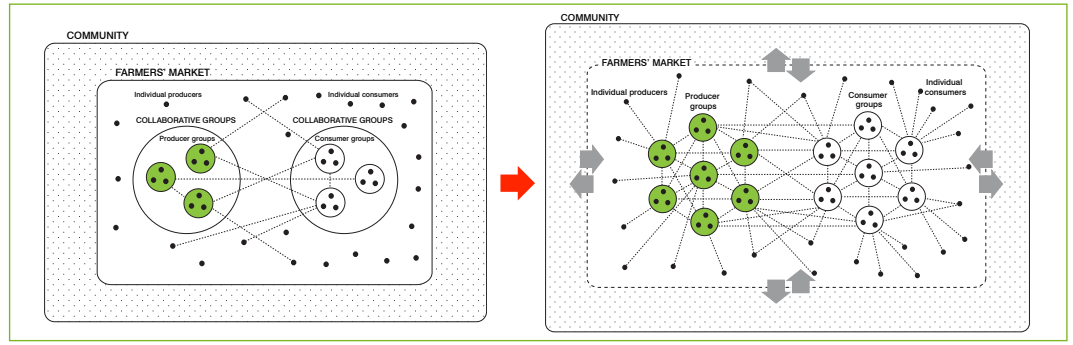
The main contribution of this thesis is the development of a socio-technical framework for collaborative services, a systematic approach to design a digital platform for collaborative communities.
The following demands motivated this research: (1) social innovations are emerging from the margins to the mainstream as alternative solutions to contemporary economic, environmental and social problems; (2) there is a growing interest in design for social innovation towards sustainability and consequently an increasing demand for new tools, methods and theoretical knowledge concerning this topic; (3) in a conventional process to design a digital platform for collaborative service, investigation of user needs concerning their social relations tend to be neglected compared to the technical needs; and (4) in order to design a collaborative service that effectively produces a solution and social networks, a systematic approach to design a digital platform through socio-technical intervention is needed;

The development of a socio-technical framework starts with redefining the theoretical model of collaborative service. The original model proposed by Cipolla is based on Buber's dialogic principle and has limitations in dealing with collaborative service on digital platform for two reasons: (1) its limited scope fails to address collaborations that proliferate in communities that are not necessarily composed of I-Thou relation; (2) and it is difficult to validate the model. The new model has two dimensions of service: the degree of collaboration and the interpersonal tie strength. A collaborative service is defined as a service implemented through collaboration of the final users who act as co-designers and co-producers of a service based on latent, weak or strong ties. As a result of a collaborative service, two basic elements are produced: a technical solution to user needs and social networks among collaborative individuals. The production of a solution facilitates the production of social networks and vice versa, thus forming a virtuous cycle. ICTs amplify this virtuous cycle by providing tools for collaboration and contributing to creation of social networks, mainly weak ties, which underpin collaborative service.

The next step was to investigate existing cases of collaborative service on digital platform and to identify their characteristics. 40 cases were collected on various topics such as health, welfare, food, transportation and entertainment. The case studies led to the following findings: (1) the cases exhibit a common structural system which consists of 4 elements: a platform, an enabling solution, a collaborative service and an event; (2) a typology of collaborative service based on the meta-objective of service was drawn: producer/consumer network, mapping diffused information; aggregate social action; creating social network for conviviality; mutual support circle; competences, time and products exchange; and products, places and knowledge sharing; (3) a typology of collaborative service based on users' social network structures was drawn: a tightly knit group, networked individuals, a tightly knit group and networked individuals, a network of tightly knit groups and a network of loosely knit groups, a network of tightly knit and loosely knit groups.




1. Virtuous cycle

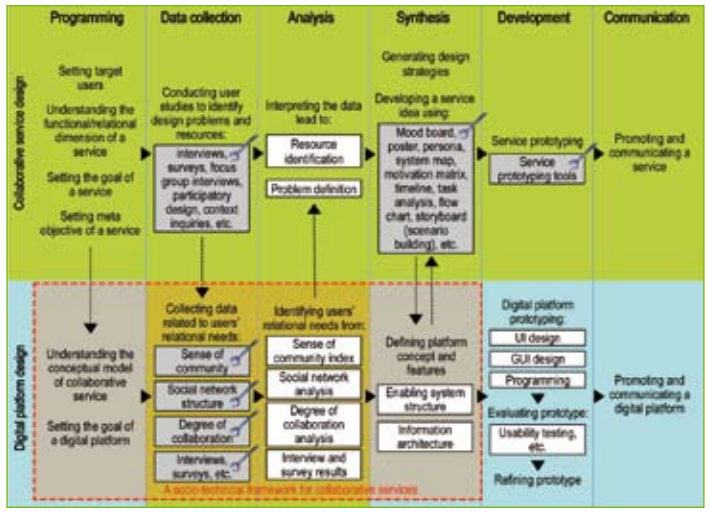



2. Transformation of the farmers' market through socio-technical intervention

A collaborative service aims to serve user needs with an innovative solution that typically accompanies certain types of relational quality such as friendship, trust or conviviality. In order to understand how designers and engineers develop collaborative services on digital platform and how they address technical and social needs of target users in the design process, case studies were conducted. The studies revealed that, in terms of the process and the methodology, there was no systematic effort in current approaches to identify and fulfill users' needs relating to their social relations in the communities. Social relations and relational qualities were treated as a byproduct of collaboration that could be only anticipated but not designed. This raises a need for a systematic approach to design a collaborative service and its enabling solution that facilitates the production of social networks through social and technical intervention.

A new methodology to investigate social needs of users was thus proposed in the context of a project to create a sustainable food network in Milan. The methodology involved the use of three methods – sense of community index, degree of collaboration analysis and social network analysis – to analyze problems concerning the social needs of producers in a peri-urban area and consumers in Milan. In the SCI, the producers scored higher (9.41) than the consumers (8.03), indicating that the former had a stronger sense of community than the latter. SNA revealed that the social network structure of the producers was fragmented into collaborative groups whose members were connected via strong and weak ties. Based on the result, strategies for designing services and a digital platform were proposed.

In the end, findings from the project were applied to a wider framework and a socio-technical framework for collaborative service was introduced. The framework has the following characteristics: (1) it integrates the development process of a digital platform into service design process; (2) it provides designers with a systematic approach to design a platform that supports a collaborative service with socio-technical intervention; (3) it focuses on facilitating the production of social networks of collaborative communities by analyzing their implicit social needs.




3. A process of designing a collaborative service on digital platform

# SUSTAINABLE LOGISTICS. REVERSIBLE TECHNOLOGIES FOR URBAN DESIGN IN AGRICULTURAL AREAS AND TEMPORARY URBAN SOLUTIONS

Francesca Balena Arista

## Introduction

This reseach focuses on environmental issues and explores the possibilities of using temporary connective infrastructures, such as bridges and roads, which have low impact on the landscape and are removable. We propose the extension of reversible and temporary approaches, which have already been used in other design fields, to the design of roads and bridges. Our proposal does not consider the substitution of existing infrastructural networks. It rather suggests the possibility of using temporary roads and bridges complimenting existing infrastructure. Particular attention is given to agricultural territories, since structural problems tend to be more challenging in that field.

## General and specific objectives

This work represents a first collection of available reversible logistics for roads and bridges. It is an exploratory research that intends to verify the possibility of using the existing logistics as a useful basis for ecocompatible land interventions. This work proposes presenting technologies that are currently used in the military and emergency fields. Going towards the more general, we intend to bring an original contribution to the ongoing discussion about the re-thinking of the relationship between urban and agricultural peri-urban areas, providing new theoretical material for the discussion.

## Theoretical and critical premises

Since a long time disciplines in the context of projects, from Urbanism to Territorial planning, from Design to Architecture, look for sustainable answers to human needs and their environment. The Harvard University Graduate school of design had recently published a book called "Ecological Urbanism", which gives a good example of how this subject has been intensely approached lately. In the introduction of this book M. Mmostafavi, director of the Harvard University Graduate school of design, writes that "the ecological urbanism entails the project's potential of the Design disciplines to predict future scenarios". In contemporary society, characterized by continuous and fast changes of direction and function, urbanism must have the ability of adapting continuously to the new. A key aspect of this kind of urbanism – as much as it is important to the agriculture – is its ability to be a reversible, evolving, temporary project. This vision is one of the possible paths to have a sustainable urbanization. Another important reference for this research was the ENSP of Versailles, specially the work of Gilles Clement, who proposes to get inspiration from nature's flexibility and adaptability to respond to society's contemporary and complex needs. Another teoretician of ENSP, Pierre Donadieu, proposes a complete change in the traditional ways of landscaping and urbanization, considering the mechanisms that govern the balance between the city and agricultural areas.

## Research focus

The traditionally built roads are the most permanent signs which may be left in a territory. The design disciplines have not given enough attention to the design of new infrastructural techniques.
So, my research questions are as follows: Why not use reversible infrastructures? Why not using temporary bridges and roads that are easier to dismantle?
In this sense, reversibility equals sustainability: it doesn't leave permanent footprints in the landscape, because they can be dismantled, and since it can be re-used, it therefore minimizes the consumption of precious resources. Normally the use of this kind of infrastructure has remained limited to big construction sites and in temporary interventions in cases of emergency or developing countries. We proposed of broadening the use to include agricultural territories and practical temporary urbanization. The agricultural context has precise functional demands that pose specific seasonal needs when it comes to the mobility of personnel and machinery. As examples consider the harvesting of grain or of vendemmia. The rest of the year these infrastructures might be hardly used and therefore superfluous and/or oversized.

## Methodology and research phases

Due to the lack of existing structured research and the lack of bibliography in the field, this study is based mainly on information gathered from companies specialized in designing this kind of project. This has made this research more difficult, but surely makes it more valuable and specific.
In the first phase of this research we have distinguished the following conceptual topics: the environmental impact caused by connective infrastructure such as bridges and roads over the natural landscape; the reversible technologies as a eco-compatible instrument; the proposal of mixed systems of infrastructures both permanent and temporary; the problems related to the peri-urban territory. The second phase of this research is the longer and more complex one. This is the cataloguing of existing reversible logistic technology and analyzing it. The third phase is a hypothetical study on the usage of a mixed permanent and reversible infrastructure system using the city of L'Aquila and its new post-earthquake temporary settlements in periurban territories, especially in the valley of Aterno river, in the south of the city. The Aterno valley was, historically, an important foodfarming territory for the city. In this territory survive the "Tratturo": a wide track, which may be grassy, gravelly or of hard-packed earth, it was the ancient path used by shepherds for transferring flocks seasonally from one grassland to another. We propose the use of light infrastructure which may solve the temporary mobility and transportation problems without compromising the landscape. In this way, the areas which now will host provisional roads and bridges will later be at least partly recoverable for agriculture and other uses. Hence, we propose the integration between existing infrastructure and new transitory micro-interventions, thereby allowing the recovery of the tratturi system and the protection of the local agrobiodiversity.

## Conclusions

From the analysis in this research we could conclude that the 'light-logistics' is in fact able to offer interesting solutions for a reversible and temporary approach to this kind of project. In general, the main problem is that materials used for constructing roads and bridges is relatively heavy and thus to be able to utilize it to agricultural needs, it is necessary to adapt these materials to the specific needs of 'light-logistics'. Thus the intelligent way to go would be to focus on new, light materials such as high resistant polymer plastics substituting the metal alloys used in most production processes. There exist new innovative projects resulting in new patents which have as a major advantage a better ratio between weight and resistance. The attention that these environmental problems receive has renewed the interest in researching new technologies, opening the road to what we may define as neo-functionalism. If the historical functionalism looked for solutions for permanent and perfect systems, the new functionalism will focus on searching for solutions that can function temporarily and can be suitable as short-term solution. All these technologies are being developed and researched with the intention of being practical in easy assembly, easy transportation and in being applicable to its specific function (emergencies and construction sites).
The main focus in the development of these technologies is not on eco-compatibility. This is the new perspective that should now start to influence this project.

# FILM AUDIO DESCRIPTION: A COMMUNICATION DESIGN PERSPECTIVE

**Cibele Bustamante**

Have you ever imagined a life in which your vision was absent or severely impaired? For many people this is the case. One of the disadvantages of this situation is that many cultural, educational and entertainment products are less accessible. To optimally enjoy these sorts of materials, vision often has to be present or substituted as best as possible. For many of these situations, a verbal description of its visual content can be a solution. Rendering visual content into words is the simplest definition of Audio Description.

The main scope of this research was to explore the possibilities of treating Audio Description (AD) in the perspective of a project of Communication Design. There were many reasons for doing this, which may be presented in the form of questions such as "Where do AD and Communication Design meet?" and "Is it possible to face an AD project as a project of Communication Design?". Long before this research started, the answers to these questions seemed quite obvious to the author of this thesis. For a long time she had worked as a volunteer helping visually impaired teenagers in Rio de Janeiro to study for their school exams in disciplines such as Biology and History. On many of these occasions, one of the biggest difficulties was to describe images: how to explain the main differences between Medieval and Renaissance paintings to someone who cannot see? How to explain what different parts of a cell look like? On all of these occasions, a great effort was done to render visual concepts accessible, relying basically on trial and error, metaphors, raised dot diagrams and a lot of creative thinking. The task of having to "translate" visual image into words proved to be a great exercise to a Communication Design professional.

Despite this, when stating the intent of working with AD from a Communication Design perspective, many people wondered what the link between the two was. To answer those who pose the question, it is generally enough to say that in order to describe *what* you see, you have to know *how* to see. And learning how to perceive the meaning conveyed in a visual image is the fundament of Communication Design. Moreover, this profession is probably the most apt to work in different media and to explore different senses other than vision. So, as already stated, the main objective of this research was to explore AD from the perspective of a Communication Design project. For this reason, this thesis is divided into two main topics, the first one answering two main questions:

**What is audio description?**
More than simply presenting the subject of the research, a collection and organization of many scattered sources were presented in one single source thereby making this the first comprehensive work on the subject.

**Which are the different approaches to audio description?**
A definition of AD should include different techniques, approaches, and places, together with different kinds of materials which can be audio described (e.g. a theater play, a film, a sculpture, a sport match).

In order to answer the questions presented above, the first part of this thesis is organized as follows:

The starting point of this dissertation is the AD's main public — individuals who are blind or have low vision.

This information, even though it may at first seem unnecessary, will prove important once issues such as the meaning conveyed in a visual image and the question of what should or not be audio described in a specific case, are discussed.

The second chapter explains what AD is, gives a historic overview of it and presents the current state of AD in countries all over the world. It was then possible to realize how great the difference is in the development of AD and also to sense how quickly this area has been developing in recent years.

This chapter also presents other kinds of public for AD (which are not only the visually impaired) showing that the market for AD may grow in size. It also shows some other ways for visually impaired people (VIP) to apprehend visual information.

In the third chapter, the most common places for AD are presented, namely: theaters; museums, galleries and heritage sites; television; cinema venues; and a quick overview on other situations where AD may be applied, such as dance presentations, events and festivals. Here, as much as possible, the differences in approaches and methods used were compared and discussed.

A deeper analysis of AD features is given through a discussion of some of its available guidelines, in Chapter 4. At this point, it is possible to start rendering the intricacies hidden under the simplest stated definition of AD and how it may present different points of view.

Once this material was organized and put together, it was necessary to give a more in depth sight of how Communication Design would approach an AD project. Since each kind of material to be audio described (a painting, a film, a photograph) have different kinds of project and rules, it was necessary to choose one type of "audio describable" material to be our main focus.

It was then considered that the audio description of films showed the most practical and desired applicability and that they also proved most challenging due to their dynamic nature. Hence, Chapter 4 signs the end of the first part of this thesis.

On all the subsequent chapters, our research on AD is focused on the audio description of films. Thus, our main questions at this point were:

**How is a project on film audio description carried out?**
In this sense, we look at the film audio description process using the concept of Design project: the production workflow, the project's constraints, constraint generators and its solutions. Furthermore, we present AD as a communication phenomenon and how this process is done.

**Is it possible to create a set of tools common to all film audio description, looking at it as a Communication Design project?**
In order to explore this possibility, a case study was carried out.

This second part is thus organized as follows:

In Chapter 5 we present an introduction on what the AD of films is and discuss the process of its production as it is done today.

The sixth chapter approaches AD as a Design process detailing the way in which Design can be used to optimize AD. This is done by utilizing concepts, theories and methods from the Design field on the main commonalities of the two subjects, namely the visual meaning conveyed in motion pictures and the concept of project.

The next logical step is a discussion on the communicative aspects of AD, which subsequently will characterize it as a Communication Design product. This discussion starts by designing a prototype of a communication process for AD and then argues on each of its steps, such as how do people acknowledge what they see and the relationship between visual image and verbal text.

At last, we have approached Narrative theory and Piety's AD's language system, in order to suggest forms of better assessing and controlling information given by the original film. To accomplish this task, both Narratology and the AD's language system notions were merged, giving birth to a new set of categories for the analysis of films that have already been audio described. We have then used this new set of categories to analyze four audio described pieces, namely: the English and Italian versions of *Indiana Jones and the last crusade* and the Brazilian and English versions of the film *Blindness*. By doing this, it was possible to give further considerations which may assist on the design of new audio description for films, such as the identification of three main keys for an audio description of better quality (constancy, frequency and control); and the suggestion of disposing information into tables during the material analysis stage, in order for it to be more easily accessible during the scripting phase.

# DRAWING FOR INDUSTRIAL DESIGN: DIDACTIC TOOLS FOR BUSINESS WORLD

Flora Gaetani

## Introduction and objectives

The research aims to define some strategies for the teaching of representation within the courses that deal with product design. First of all, it has been investigated the relationship between design and representation.
The most important analogy between drawing and design is the multidisciplinary nature that leads them to have a relationship with several disciplines belonging to art, science, technique and technology. Specially, the relationship between design and other disciplines is supported by several uses of drawing techniques. Indeed, drawing has a central role in the process "shape - shape perception - transmission of shape perception". For this reason, drawing is highly involved in the design process "idea - idea formulation - idea realization".
The relationship between drawing and design has a central role also in the didactic of the design discipline. Indeed, drawing and design are the two most important disciplines in the didactic offer of design courses.
Drawing for design has its specific techniques, different from others applications.
But drawing has its specific technique different in the different area of design.
In particular, this research aims to investigate the role of representing inside the didactic in product and industrial design.
Through a bibliographic research focused on the design didactic, it has been highlighted that constructivist approach in design teaching is fundamental because it allows students to do experience and to learn from this experience. Therefore the aim of this research is to define some didactic strategies for drawing teaching inside product design courses, using the metacognitive approach typical of design teaching.
These strategies are drew up trough the analysis of the role of representation:

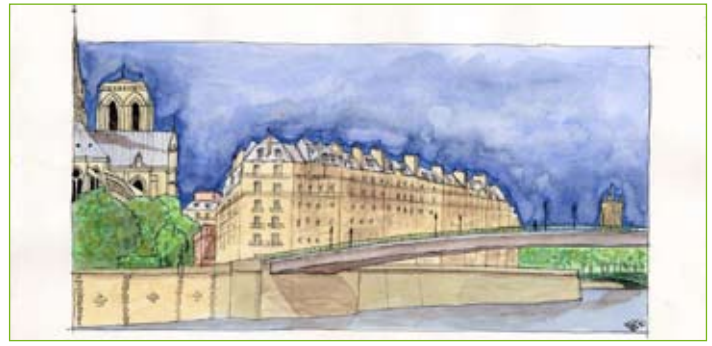
- inside historical school of design;
- inside today design trainings in Italian university degree courses;
- throughout all the design process.

1. Abacus of objects

2. Example of "reality observation" exercise, part 1 (drawing of Flora Gaetani).

## Methodology

The research is divided in four parts: the first three parts correspond to the analysis of history, didactic and work; in the fourth part the results are described.
The historical analysis has been carried out exploring teaching methods of the first European design schools: Bauhaus and HfG in Ulm.
The education is analysed with an extended look on the Italian university didactics in product design focusing on representation courses.
First of all, it has been done a quantitative analysis on Italian students of design, enrolled at the Italian Universities.
Afterwards, it has been done an analysis of representation classes at Product Design courses. Finally, it has been done a fast description of international school of design.
The world of enterprise is analysed in three steps.
First of all, it has been given a definition of the design process and it has been investigates what type of representation techniques are used and when.
Afterward, it has been done an iconographical research on designer's drawings and a bibliographic research on designer's evidences with regard to drawing & design relationship.
Finally, it has been submitted a questionnaire to some design company to understand the relationship between designers and companies.



3. Example of "reality observation" exercise, part 2 (drawing of Flora Gaetani).

## Results obtained

The results are connected in order to highlight coherences and inconsistencies between competences of students and the needs of the world of enterprise.

Some guidelines are described:

- it is important that students have a basics knowledge on descriptive geometry;
- a lot of representation tools are used during future occupation; for this reason it is important to teach them during the graduation courses;
- it is important to submit to students exercises that introduce decontextualised situation: in this way students get used to understand scenarios different from his own life;
- it is important to complement representation courses with design worshop to understand the use of representation tools;
- at least, it is important to involve professional people to do some lectures.

In conclusion, the planning of some learning exercises aims to offer ideas for the didactic of representation in the product design degree courses.
First of all, I set up an abacus of objects to use for the exercises that require it.

The exercises are nine:

- exercise zero: to teach how to apply the theory of descriptive geometry in free hand sketches;
- morphological genesis: to understand the shape genesis of objects, from the easy one to the complex one;
- oneself expression: to improve students abilities to express abstract concepts trough pictures and lettering;
- reality observation: to teach to watch reality around student;
- survey: to teach how to survey objects;
- shape & icon: to teach how to summarize a shape through an icon drawing;
- material: to teach to use different representation tools and techniques to represent different type of materials;
- three dimensional model of study: to teach how understand object shapes using a CAID software;
- three dimensional morphological genesis: to understand the shape genesis of objects, from the easy one to the complex one in a CAID environment.

## Potential developments

The future actions of this research will be:

To set up a corpus of exercises:

- using the one described;
- enlarging the number of exercises with similar one;
- enlarging categories of exercises;
- using the exercises done by others professor.

To apply the same methodology to the others areas of design:

- interior design;
- communication design;
- fashion design.

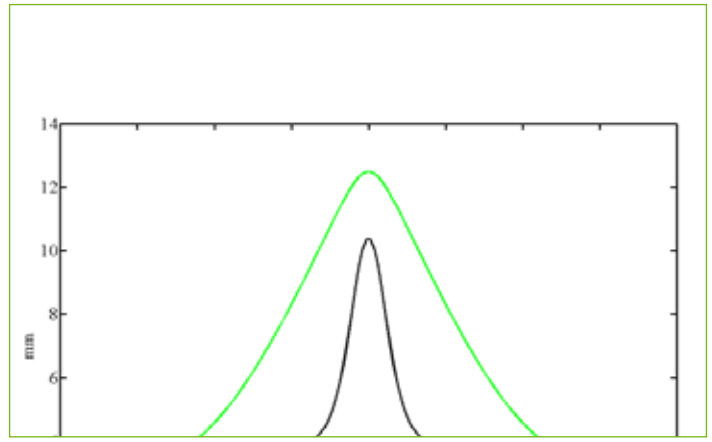
# DESIGNING SMES COLLABORATIVE NETWORKS
## Guidelines and competencies in strategic design

**Marzia Mortati**

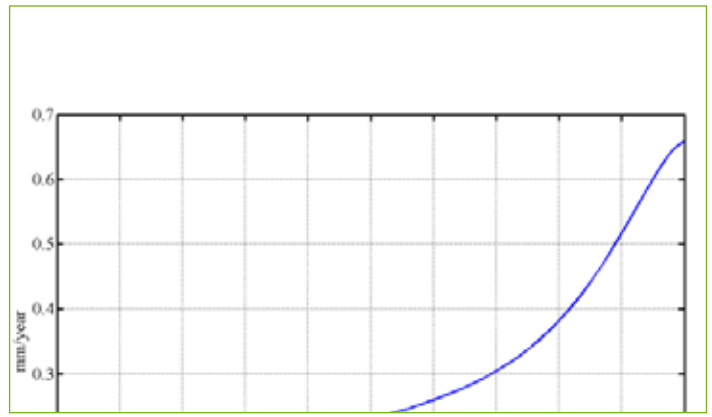
The complexity and the turbulence of the actual socio-economical system have driven the need to widen the interests of professionals dealing with business strategy. Addressing business challenges means considering the intensified global competition and the pressure of the environmental/sustainable challenge, the rapid pace of technological advance and the changing ways to operate with distributed teams and co-created solutions. The traditional boundaries of professions are blurring, and so are the strategies a company can actuate for innovation. This requires complex interventions negotiated between different socio-economic actors (companies, institutions, citizens) working in teams of multi-experts. This evolution affects professionals, researchers and disciplines. In Innovation Studies the Open Innovation paradigm argues for the need to establish new and open innovation models, where much of the knowledge comes from outside the boundaries of the company, and in Entrepreneurship Studies papers are increasingly published on entrepreneurs' social networks. The concepts of openness, collaboration and connectivity acquire importance in many fields and the need for a *relational worldview* is been put forward by business strategists, sociologists, economists, firms, managers and designers.

Design is increasingly being recognized as a fundamental ingredient to integrate in companies for innovation, because it can shape ideas and translate them into practical and appealing propositions for users while answering to a green imperative. Nevertheless a product is nowadays just one of the possibilities for design, while relationships and communities are considered far more valuable. In the same way a company's value can no more be identified as a purely economic object that has to be possessed and exchanged to produce profit; instead it seems to move towards intangible assets different from money, that is culture, relationships and reputation. Here lie the principles and beliefs of this research that considers a company as part of a wider community, that is embedded in a potentially infinite number of socio-economic relationships. **The design of these relationships is the main object of this doctoral research.** This argues in fact that such networks of relationships (social networks) can not only be mapped and measured, but also designed. Although it is possible to find many parameters for analysis and measure in the literature, design guidelines and tools are missing. Design can have an important role by using own competencies and tools suited to face the complexity of the situation.

This research develops through two main parts: an exploratory/abductive one, and an on-field one. In the first the theoretical framework is built, focusing on important points of evolution in strategic design as well as on connection points between design and the theme of firms' networks. A reach multidisciplinary exploration has been developed, through which Social Capital has been identified as the main theoretical body. This is in fact an economical benefit obtained through social relationships and is function of the social structure in which an actor is embedded. Social Network Analysis has been explored as one of the disciplines that have focused on measuring and mapping social networks. Entrepreneurs' social networks studied in Entrepreneurship Studies have also been explored, both in terms of benefits/risks and of governance structures. The theoretical exploration concludes by defining few elements that allow a link with design activities: four dimensions of analysis are systematized out of a distinction between quantitative and qualitative dimensions of analysis of a




1. Dimensions to analyse a collaborative network




2. Sensemaking process and design competencies

network, and a design unit (called NETS) is established that tries to make sense of networks as operational tools. This is the legacy of the theoretical exploration that is tested through an on-field action. This was carried out in collaboration with the design research center ImaginationLancaster, Lancaster University, and with a multidisciplinary partnership of three other business schools in the North-West of England.

The test allowed a deep phase of reflection on the action, where five main elements of value for this research have been extracted: (1) the role of design in a multidisciplinary collaboration, (2) the role that facilitators (especially design ones) played in the test with companies, (3) the intrinsic nature of *sensemaking process* of the activities designed, (4) the values/capabilities of design used during the process, (5) the basic characteristics of a design tool aimed at designing collaborative networks.

This doctoral research contributes mainly to enhancing the culture of strategic design and suggests some topics for reflection on the connection between design and social capital. The main result is having begun to develop a sensemaking approach for designing connectivity, especially applied to SMEs'. This is a process that aims at translating chaotic circumstances in a situation that is explicitly understood and serves as springboard for action.

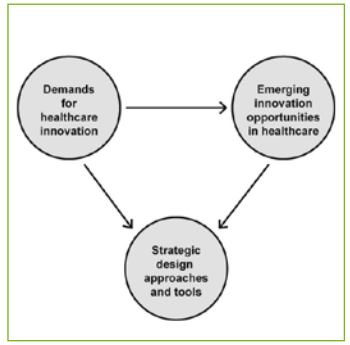
The value of this research is multilayered. The first level concerns the theoretical contributions made: the link between strategic design and sensemaking, the definition of the competencies of design in such complex interventions, the link between design and social capital. Another value is in the direct applicability of results, which produces an immediate value and impact of this research.

# DESIGN TO IMPROVE AND INNOVATE HEALTHCARE EXPERIENCES

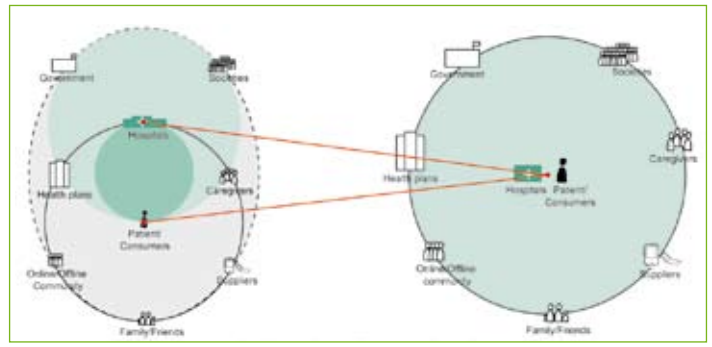
Hyojin Gina Nam

This research is aimed to contribute to the profession of the design discipline in healthcare improvement and innovation encompassing products, services, environments and the system. The research hypothesis is that design can provide a compelling contribution to improvement and innovation of healthcare in the age which transformation and redesign of healthcare is more required than ever before.

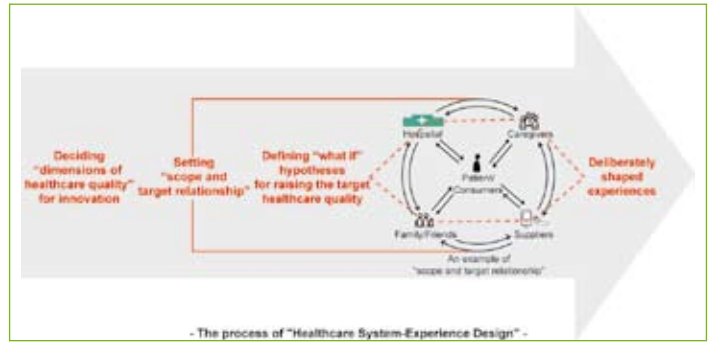
Firstly, the author analyzes the contemporary phenomena and key trends in the global society and the healthcare field, and investigates the demands for healthcare innovation.
Ageing and epidemiological transition have changed the focus of healthcare. Medical errors have drawn international concerns and interests to improve safety and quality. Active patient/consumers, mobile health and social networks have changed the healthcare ecosystem. Various disciplines participate in healthcare discussions for solving the limits of current healthcare systems. The use of ICT is transforming healthcare systems and services. By and large, healthcare is influenced by two paradigms in conflicts, which are "evidence-based" and "patient-centered". Medicine focuses on implementing the best evidence-based care. Management seeks performance and cost containment. However, the common approaches of healthcare innovation are not enough to meet various needs of healthcare stakeholders. Therefore, healthcare needs innovation in a different way. Two types of innovation are suggested, which are "sustaining innovation" and "disruptive innovation" by Christensen et al. (2009). "Design for healthcare experiences" can be regarded as a specialized design practice for the people with uniquely focused needs and interests in healthcare. Engagement of end-users in the innovation process is also essential to achieve practical quality and safety.
Secondly, the author figures out emerging opportunities in healthcare innovation, and verifies the opportunities through "action research". Healthcare innovation can be summarized to the six dimensions of healthcare quality, which are Effectiveness, Safety, Patient-centeredness, Caregiver-supportiveness, Accessibility, Equity and Efficiency based on the worldwide healthcare quality research. The dimensions are complementary but sometimes competitive. Also, diverse directions of healthcare innovation can be summarized to sustaining innovation in "the hospital-centered scope" and disruptive innovation in "the patient/consumer-centered scope. Considering the common approaches of healthcare innovation focused on health outcomes and performance, design's approach in healthcare innovation can be said as "Deliberately shaping experiences for compelling products, services, and environments in the healthcare system" based on Donald Norman's argument (2009).
The "action research" is composed of three projects with different goals by different partnerships. Those are "A Quality Improvement Design Activity for an ophthalmologic outpatient department of a general hospital in Seoul" engaging in products and services, "IMproved Pediatric EXperiences for a pediatric ward of a general hospital in Milan" to improve healthcare experiences




1. Conclusive conceptual nodes



2. "Healthcare System-Experience Design" to help healthcare-centeredness and patient/consumer-centeredness coincide




3. The process of "Healthcare System-Experience Design"

with the environment and new product solutions, and "The future MObile HEalthcare scenario development for a global electronics company" focusing on products and services for everyday's health and well-being. Based on the comparative analysis of the processes and results of projects, the author concludes that different scopes between hospital-centered and patient/customer-centered affect target relationships and hypotheses. Designers' various relations also cause different processes, positioning, and outputs. Finally, the author suggests a design approach to deliberately shape experiences for compelling products, services, and environments in the healthcare system. By concentrating on various relationships and interactions in the system, the approach named "Healthcare System-Experience Design (HSED)" can innovate healthcare experiences to result in better outcomes and increased satisfaction. Whatever a healthcare innovation intends for, different needs from different stakeholders coexist. HSED helps the various needs of the different scopes meet as much as possible. Ultimately, the hospital-centered scope and the patient-centered scope are tuned to satisfy each other deliberately through HSED.

The strategic activities for "Healthcare System-Experience Design" include 1) Deciding "dimensions of healthcare quality" for innovation; 2) Setting "scope and target relationship"; 3) Defining "what if" hypotheses for raising the target healthcare quality; 4) Solution-focused testing to shape experiences deliberately; and 5) Evaluation to prove innovated experiences and improved healthcare quality.

# CREATIVE PROCESSES IN HETEROGENEOUS DESIGN TEAMS

## The study of group dynamics from an activity theory perspective

**Irina Maria Suteu**

The wide spread of the networked connections have a strong impact on the way professional designers work together. This and the ongoing change in the economic and social reality call for a close attention on the design training and education. This research starts from the acknowledgement of the diversity in the professional practice and academic environment, and aims to consider the benefits and challenges of the heterogeneous workgroups. In this respect the main question I attempt to answer is how to communicate in the context of the heterogeneous design workgroups. In order to do this, three examples of pedagogical activities are presented and discussed. The first two cases are linked by the same brief and took place in Italy and China (LSF 07-08 and CHITA 08). The third example presents a project developed by graduate students at the Institute Without Boundaries in Toronto, Canada. Due to the nature of the group dynamics that can only be understood through close observation and involvement, a multi-method approach has been used. The action research methods enabled the data collection, while the analysis of the experiences was done using the cultural-historical activity theory. The findings show three main categories of mediating artifacts used in the group activities: verbal conversations, written lists, and drawn sketches, and the different uses according to the cultural and disciplinary background of the participants. The results bring into consideration three points. First the changing role of the designer from practitioner to educator and researcher is emphasized, and the influence of the classroom setting in the activities, and student – teacher relation stressed out. Second it is shown how the creative capabilities of the heterogeneous group and the benefits of the diversity can be supported by representation tools generated by the designer for this purpose. Third the above finding is supported by a concrete example of an annotation tool generated in the last pedagogical activity studied at the IWB in Toronto, Canada. The representation of the process was aimed to help the researcher understand of the overall process of one months project visualizing the actions taken by the participants, the group configuration and the material and immaterial artifacts used. The structure of the annotation tool was then modified to serve future experiments, marking in this sense the beginning of future developments of the research. Future work will take into consideration the concept of representations for the observation of team dynamics and complete a set of tools to be further tested and improved in several experimental iterations. Moreover the study opens several research directions such as: the influence of the characteristics and configuration of the physical space in which the design activity takes place on the performance of the team members; the importance of the study of the creative flow according to the assigned tasks and the division of labor; the creative potential coming from the interpretation of the artifacts used in the development of the project.

In conclusion, I suggest that there are no predefined answers to the initial question, how to communicate in the context of the heterogeneous design teams. Instead each situation has to be seen with all its particularities and details in the context where it evolves. In this sense each project has to be regarded as a hybrid, temporary culture that generates a "trading zone" in which expertise, skills and perspectives are exchanged. The experiments in the academic environment are relevant in this respect, especially because of the emphasis placed on the learning, acquired through active involvement by all the members of the team, as an outcome of the design activity. Given the attention to artifact-mediated relations, the cultural-historical activity theory can be seen as a navigating instrument that enables the designer to understand and express the dynamics of the heterogeneous project team involved in the process of a design project.


1. Designer's role and the division of labor in the situations studied


2. Designer's role as a researcher of the hybrid culture created for the time being of the project

# ADVANCED FASHION MANUFACTURING

## Technology unleashes creativity to new forms of business and design practices

Viola Chiara Vecchi

Technology is one of the most significant aspect to improve the quality of the output and introduce innovation in the Industry system. From this prospective the Fashion System and technology are closely related with each other for leading a deep innovation in the products and in business strategies by using creativity. This thesis focuses on this aspect and it aims to identify the actions of renewal and revitalization of Fashion System, achieved through advanced technology. This renewal, it's present in many products, services and in all production chain and it ruled by a deep integration between design practices, digital technologies and creativity.

Starting from Computer Aided Design software, entering in hardware, to then arrive in the use of IC technology for business facilities, the thesis analyzes and collect the most interesting cases in which fashion will benefits from new advanced technologies and in which through design we can find new ways to innovate product and business. Indeed, from the project, to production and distribution, the rapid spread of technologies, represents a successful prospective for the industry system to ensure flexibility and establish new ways of producing, designing and selling.

In the design phases, for example, Cad Software helps designers to describe new concepts product and to show to their clients how the look of the new dresses will be. Otherwise, Virtual-try-on tools can be employed to analyze all the fabric characteristics, such as for example thickness or elasticity, to simulate the integration with a digital human model. These solutions in fashion industry, are also becoming interesting for to rapidly validate fashion collections directly on computer, without the need of a real prototypes. The big advantages of these virtual garment solutions is the easy way to generate the project in a very quick time and the advantages of combining the virtual geometry data with production line operations.

After the project phases, a large group of Direct technologies like rapid prototyping or laser cut we allow to obtain a complete correspondence of the virtual and real shape without losing the control of mass production rules. Sintering technology, for example, keeps intact digital geometry and gives the possibility of realize very complex shapes that they were impossible to produce by traditional techniques. In the other hand, textile printer and laser cut technology can be used with many types of material to reproduce any computer image with no limitation to number of colors and shape. But one of the areas in which we can find the most common and innovative applications is in marketing and retail services. Today, by using Internet buyers can see the collection remotely, and costumers can search information and see video and film about their favorite brand and the "luxury lovers" community can meet with each other in blog and social network. In complex, what we have it's a very complex and advanced manufacturing system that it helps to manage the entire cycle of production in a more flexible way: all process are faster and free from the barriers of space and time and you can connect technology and people in network, jumping over the steps. This syncopated rhythm of the system identifies three major trends: the first category, is the machine flexibility that allows to change the system's ability to produce new types of products; the second one is called routing flexibility, which consists of the ability to use multiple machines to perform the same operation into a single technology; third, technology lets people to connect one to each other in a free and not conventional way. For example by using external devices like body scanners, you can create high performance or personalized products, to include customers data or preferences of clients in the project. In the second case, direct manufacturing technology allow to move from concept to production, in one step and in the third case, there are many examples about new free web-based interface, like open source archive, spontaneous social network or co-producer platforms, in which people exchange opinion, information and personal experiences.

1. Technology helps to generate the project in a very quick time

2. Virtual garment solutions allows to go over standards construction

3. Direct manufacturing free forms

This phenomenology of innovation inspires a new open production organization and the training of a new creativity network and each of these paradigmatic scenarios offers an interesting reflection and is part of the design rules taken into consideration in my research. Starting from the idea that innovation grows by creating "open source knowledge" and "network cooperation" free, the research project worked on the new concept of "Crowd Accelerated Innovation". The Crowd is a group of people who share interests. These communities can be small or large, but what is important is that among the members of the group there is someone who can drive innovation. The second aspect in this Crowd System is that members must be visible and more the system is open more, it will help to determine the speed of innovation.
This concept is an excellent starting point for a new reflection on the role of "networks of communication ", that even when used to develop relations between companies or business partners, they have the role of cognitive and cultural network. A "fluid" form of relationship that, despite its broad perspectives, is still difficult to achieve. We are still in the process of setup, where a free knowledge society is one of the crucial points of the "social issue".
Through this analysis, the thesis highlights some of the opportunities achieved by applying technology at a free collaborative system.
A new generation of products, a sustainable business and a global commercial network, are the strategies on which companies are playing their competition and their value.
From these meanings, we can deduce that innovation is the result of several factors, that together, they define a new way of doing things. Ultimately, technology is a matrix of a new way of working and useful element to achieve un innovative organizational forms, social and cultural rights.