MECHANICAL ENGINEERING I PHYSICS I PRESERVATION OF THE ARCHITECTURAL HERITAGE I SPATIAL PLANNING AND URBAN DEVELOPMENT I STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING I TECHNOLOGY AND DESIGN FOR ENVIRONMENT AND BUILDING I TERRITORIAL DESIGN AND GOVERNMENT I URBAN PLANNING, DESIGN AND POLICY I AEROSPACE ENGINEERING I ARCHITECTURAL AND URBAN DESIGN I ARCHITECTURAL COMPOSITION I ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING I ARCHITECTURE, URBAN DESIGN, CONSERVATION OF HOUSING AND LANDSCAPE I BIOENGINEERING I DESIGN I ELECTRICAL ENGINEERING I ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY I ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING I INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING I INFORMATION TECHNOLOGY I INTERIOR ARCHITECTURE AND DESIGN I MANAGEMENT ENGINEERING I MATERIALS ENGINEERING I MATHEMATICAL MODELS AND METHODS IN ENGINEERING

DOCTORAL PROGRAM
IN DESIGN

Chair:
Prof. Luca Guerrini

The Politecnico di Milano was among the first universities in Italy to start a PhD program in the field of design in 1990. Based on this tradition, the PhD program in Design was established in 2008, as the result of a process of substantial re-thinking the way design was taught at PhD level. The program is run by the Department of Design together with the Department of Mechanics and the Department of Chemistry, Materials, and Chemical Engineering. In its current configuration the program aims at developing professional competence to carry out high quality research in terms of design as a complete scientific field. In this respect, its main topics are: to reflect on the nature of design, with its aesthetic, formal, performance and meaning values, as well as its capability of being an agent of social change towards more sustainable systems; to strengthen the disciplinary core of design; to develop and share a common body of knowledge and methodologies, as well as a complete set of tools able to distinguish the designer from other researcher/professional figures involved in design activity.

Main goal of the program is therefore to train designer-researchers who, while addressing the problems and opportunities of contemporary society, know how to produce original knowledge in design. More specifically, visions, proposals and projects (research through design) must be produced, tools and methodologies developed with which to put them into practice (research for design) and reflections on both design itself and on its fields of application (research into design) must be explored. The program is structured in different fields of research (corresponding to the teaching and operational subdivision of the discipline in the Department of Design, as well as in the School of Design) and in lines of research (corresponding to the specific issues on which research is carried out in the PhD program). As a consequence, there is a strong relationship between the PhD program, the Department and the School, which provides the best opportunities to combine both teaching and research experience during the three-year training program. In this respect, the program offers the best foundations both for starting an academic career and for employment opportunities in research centers, design enterprises and public bodies.

Mission and goals

The PhD Program in Design trains designer-researchers who, while addressing the problems and opportunities of contemporary society, know

how to produce original knowledge in design. The curriculum lasts three years, during which period both educational and research activities are provided. Some of these activities enable candidates to acquire ECTS credits up to a total of 75; 40 of these relate to structured teaching activities.

The Program develops design skills and analytical abilities, proposes various research methodologies and promotes a collaborative disposition.

The program is structured into various research fields, which correspond to specific research teams within the Department of Design. In order to coordinate research activity over a wide range of topics, teams cluster around three Sections, which are: Design and Cultures; Products Strategies and Services; and Design for Environments, Landscape and Mobility. The research teams - Methods and Tools for Product Design and Materials and Design are active respectively in the two other Departments involved in the program (Department of Mechanics and "Giulio Natta" Department of Chemistry Materials and Chemical Engineering). Research teams also contribute to the teaching activities undertaken by the School of Design. The PhD program carries out research on specific topics emerging from the research initiatives of all Departments. Each year the Academic Board makes a list of suggested topics to be developed during the three-year training.

At the beginning of the program candidates become effective members of a research team, within which they develop an original research topic (PhD thesis), selected from those on the list mentioned before; this activity is the fundamental core of the learning process. Parallel to this main activity, candidates are involved in several other educational processes, divided into common and specialist activities.

Common activities are those such as courses and seminars related to the discipline of design and research methodologies and practices, considered in their entirety. Specifically: common activities are proposed to consolidate the cultural and operational background, which is common to all areas of design research. *Specialist activities* are those educational activities specifically regarding the areas of research developed by both the PhD program and the Departments.

The Program therefore offers PhD candidates the following opportunities:

• To develop a PhD thesis, working on a specific line

of research as members of a research team;
• To participate in courses and seminars on design, on design research and on research in general, developing competences concerning the discipline of design and the profession of the researcher;
• To participate in courses and workshops in which to hone their competences in the design process;
• To participate in workshops, developing high-level specialist competences and acquiring knowledge and tools for the development of their research topic;
• To engage in an internship in an international research center to verify the hypotheses, the methodologies and the results of their work and to consolidate the network of international relationships within which it is found.

Moreover, the activities of the PhD in Design include participation in projects taking place within the research team; participation in conferences (as listeners or speakers); writing of scientific papers; participation, as tutors, in teaching activities, in the perspective of an on-going synergy between teaching and research activities.

Professional qualifications

The Designer-Researcher, which the PhD program in Design intends to educate is a flexible professional figure: a designer who knows how to carry out research and a researcher who uses design tools. At the same time he is also an expert in knowledge management, in constructive interaction among different actors and in the communication of ideas and proposals.

The combination of these skills is useful in a variety of work environments. Specifically: in institutions expressly dedicated to the development of design research, such as universities and research centers; in design agencies and in the most innovative and design-oriented companies; also in public corporate bodies, in service companies and in organizations for territorial development which, increasingly, are faced with complex design problems, which the Designer-Researcher can effectively address, analyze and contribute to resolve.

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INTERM&DIA. INTERACTION AS A DIALOGUE BASED ON MATERIALITY

Bergamaschi Sara – Supervisor: Prof. Lucia Rampino

This thesis explores the field of interaction design by the industrial design perspective. The interaction is seen as a dialogue between two entities. Both, interaction and dialogue require the involvement of two actors who are in contact for sharing something. Typically, they share information but it is also possible to enrich this relationship with emotional factors (like feelings) and personal point of view (like thoughts and ideas).

Each dialogue – and, consequently, each interaction - is based on specific language. In the interaction design field, four languages were cataloged according to their "dimensions":

• The 1-D language: based on words and poetry.
• The 2-D languages: painting, typography, diagrams, and icons.
• The 3-D languages: physical and sculptural forms.
• The 4-D languages: sound, cinema, and animation.

The limit of this categorization is that languages are considered as separated, without any touching point. However, they can be used together to enrich the interaction between the system (products or digital interface) and the user. This thesis is based on the idea that these languages may be enriched transferring some features of one language to another. Particularly, this research is based on a number of philosophical studies on the use of words (1-D language) which suggest two ways of using them: as a codified language and as an empirical language.

Starting from phenomenological studies, these languages were defined in this thesis as:

- Codified language: a form of expression based on conventions/symbols/codes shared by a group of people. This language is useful to be applied in dialogues where the contents of the information have to be clear and not misunderstood. For example, the traffic light informs users about their possibility to cross the street applying three colors which meanings have become conventional: green, red and yellow.

- Empirical language: a form of expression in which the contents of the dialogue are not completely established a priori, but meanings are individually created by the user during the interaction with the product itself. Empirical language can be used to create meaningful product experiences, like in the artistic and poetic fields.

Since I am an industrial designer, this research focused on the 3-D languages. Historically, industrial designers are indeed familiar with the physical and sculptural forms of artifacts. Nevertheless, in this research, 3-D languages are not only intended as pure physical shape, but also as all that we can perceive through the human sensory apparatus (e.g. touch feelings, smell properties …). In order to be more inclusive and to refer to all the five human senses (view, smell, touch, taste and hearing), this research intends "sensory language" as a language based on any kind of sensory stimuli. Nature is filled with beautiful examples of sensory language: tomatoes change their color according their ripening or people blush in embarrassing situation. Nowadays, microchips have become so small that they can be embedded in traditional materials such as wood, glass, polymers, fabrics and even more, making such materials "smart". Thanks to these materials, products can now change their sensory features (i.e. shape, texture etc.) proactively and in a reversible manner, according to a specific situation. Such changes can be designed with an informative intent, i.e. a mug that is able to change color to communicate that the temperature of the drink inside is getting higher or lower. Therefore, nowadays product designers have new material opportunities to work on; and the industrial design field can be enriched with new forms of material interaction, novel ways to convey meanings, and new shape possibilities: indeed, products are able to establish over time dialogues with users through their sensory features.

This research aims to explore if interactive products can establish meaningful dialogues based on sensory stimuli and how they can be designed according to codified and empirical languages. In this perspective, I have chosen to focus my research on a specific field to test the limits and the potentialities of these languages based on dynamic sensory features of industrial products. The field of resources conservation have disclosed some opportunities for such languages. Studies have demonstrated the importance to establish dialogues between the product and the user (mainly through smart meter based on screens) with the aim of informing and motivating users to change their behavior in order to be make sustainable choices in their daily life.

This research aims to contribute to achieve a "cross-fertilization" between features that traditionally apply to the alphanumeric language (1D language) and the sensory language (3D language). Indeed, the sensory language can nowadays exploits new opportunities coming from the development of smart materials and new technologies.

In order to test the real possibilities of such cross-fertilization, the Research-through-Design approach was applied and two prototypes have been created. "Glass of Water" explores the use of sensory language as a codified code through a the light, which decreases its brightness according to the amount of water consumed, so recalling a glass of water that is consumed."F.E.E.L."(Feelings and Experiences for an Embodied Learning) investigates a sensory language that is responsive to the situation: this means that the sensory changes do not convey information through conventional symbols but they create a dialogue as a sort of "repartee" between the user and the product. Then, two prototypes were tested with users during three focus groups, which were organized with the aim of explore the interests, feelings and the engagement of the users as well as their understanding about the information conveyed through materiality instead of using alphanumerical language.

The two design concepts demonstrate that like words, also senses can be designed in order to either convey simple information (codified language) or to emphasize emotions (empirical language). The resulting concepts shown that designing for a codified language or for an empirical one have different implications into the design process and thanks to the results of three focus groups it is demonstrated that they can also influence the users' understanding.

The two design activities lighted up the importance - for the designer - to develop skills both in the products' technical feasibility and in the user investigation. The designer, who wants to embrace the sensorial language, has to develop skills about functional materials as well as on how to hybridate microprocessor to traditional materials; he/she has to be able to perform a user research and to gain knowledge on how to design for our senses, being aware that different senses can have different meanings. For instance, the sense of smell is strictly connected to people's memories while a vibration instinctively alarms the user. From the users' point of view, it was observed that establishing a material dialogue through a codified code gives prominence to the message and to the communicative intent of the products. A codified language can be applied when we want the user to be conscious of the informative content, such as when the aim of the product is to make users aware of the amount of water consumed in a given situation. On the other side, applying an empirical language means to underline the experience of interaction with the product. Such experience is likely to be perceived as more engaging and attractive by the user, resulting in a possible fruitful strategy to motivate him/her to reduce his/her consumptions.
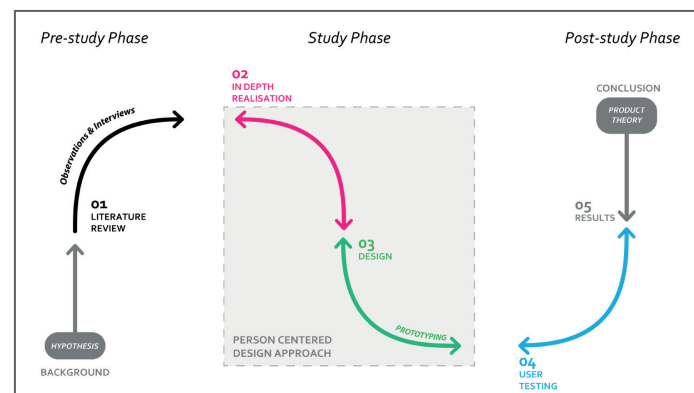
DESIGNING FOR THERAPIES IN DEMENTIA. ICT-ENABLED DESIGN PRACTICE FOR SUPPORTING NON-PHARMACOLOGICAL THERAPIES IN ALZHEIMER'S DISEASE

Beril Imamogullari – Supervisor: Prof. Alessandro Biamonti

Alzheimer's disease (AD) is incurable but it is treatable, both drug and non-drug treatments of its symptoms are now widely available. Best treatment efforts are known to be a synthesis of pharmacological and non-pharmacological therapies. Non-pharmacological therapies are consisting of physical and social components, which could be supported by designerly way of approach. While memory problems are the most characteristic symptom of this disease, many AD patients also mostly experience communication deficits. The loss of the ability to communicate thoughts and needs creates great difficulties for the patients to interact socially and sustain relationships with their surroundings and even with their therapists. Therefore, patients become frustrated at their loss of self-expression, and studies have demonstrated that impaired communication is strongly linked with the development of significant behavioural concerns. In other words, verbal communication loss noticeably intensifies the behavioural and psychological symptoms.

Non-verbal behaviours on the other hand, such as looks, head nods, hand gestures, body posture or facial expression provide a lot of information about interpersonal attitudes, behavioural intentions, and emotional experiences. Therefore they play an important role in the regulation of interaction between individuals. Patients produce non-verbal signals and are responsive to others. Non-verbal communication is effective in Alzheimer's disease specifically in the late stages whereas the neuropsychological symptoms, also known as behavioural and psychological symptoms of dementia, could be determined and treated accordingly.

This PhD research examines a new way of therapeutic support for Alzheimer's patients and their caregivers. In this end, this study has three goals: (1) to assist Alzheimer's patients gaining more benefits from the non-pharmacological therapies or, even slowing down the progress of the disease symptoms, (2) to create a smart tool to enhance the communication between the therapist, carer and the patients and (3) to bridge the gap between design, ICT sensors and dementia therapies by proposing a theoretical background and finally to create a baseline for the further studies.

Figure 1 indicates the path pursued during the PhD research. Accordingly, there exists three phases in this research process: pre-study, study and post study respectively. In the Pre-study phase the theoretical framework was generated. In the study phase, Person centred design approach is adapted as the person is in the centre and his special needs and wellbeing is the matter. Accordingly, this research mind-set is set participatory, whereby family members, caregivers and medical doctors are considered the experts and equal partners throughout the research process. Empathic observations and in-depth interviews are conducted with the caregivers and medical doctors. Their real life experiences are highlighted and the design recommendations and suggestions are listed. These design suggestions are expected to illuminate the upcoming researches in this area.

On the other hand, in order to create a therapeutic support through design and technology, a design practice is developed. The concept idea is determined as "communicating emotions through technology" which focuses on enhancing the patient's emotional state and keeping these positive emotions as long as possible. This concept suggests that ICT sensors can be used to detect the negative emotions and on the selves technologies can be used to elevate patient's emotional state. Therefore it aims to assist carers and therapists coping with neuropsychological symptoms (emotional and behavioural disturbances) of AD as well as suggests a new way of communication by using nonverbal signals as a tool. To verify this hypothesis, the prototype is developed. Finally in the post study research both the concept and the prototype is tested with the Alzheimer participants. The finding of the user testing showed that the prototype has a promising effect on reducing the severity of psychotic and emotional symptoms of the disease, having said that the product increases the concentration of the patients, aids to focus their attention as well as provides soothing.

As a conclusion, this PhD dissertation has contributed to design field by adding a novel design concept and related product, which also be patented, as well as suggested design guideline and real-time experiences and their unique insights of the Alzheimer's treatment doctors and Carers. One of the patient's relative whom he was asked discussed with about the design concept, has made a comment which summarize the situation very clearly:

"When you are in a rough situation, people tend to buy anything if they think it will help them even if it is hard to afford. Even the slightest support is needed. I would have bought your product without a second thought."

Pre-study Phase   Study Phase   Post-study Phase

02
IN DEPTH
REALISATION

CONCLUSION

PRODUCT
THEORY

Observations & Interviews

01
LITERATURE
REVIEW

03
DESIGN

05
RESULTS

PROTOTYPING

HYPOTHESIS

BACKGROUND

PERSON CENTERED
DESIGN APPROACH

04
USER
TESTING

1. Research process of the PhD dissertation

THE FLEETING BEAUTY.
IMPROVING THE AESTHETIC EXPERIENCE
OF URBAN SPACES BY ENHANCING
THE LITTLE-KNOWN HERITAGE.

Caramel Claudia – Supervisor: Prof. Anna Anzani

In the urban environment many interesting elements like buildings, gardens, and architectural details are inexplicably neglected. Noteworthy for their features and significant for the identity of places and people, these silent spectators of our daily routine may be lost due to the lack of official recognition of their value. Especially in the period of economic and social crisis that contemporary society is going through, rethinking to these presences as an opportunity to improve our aesthetic experience of the city, and consequently the quality of our life, is mostly necessary. Therefore, the aim of this research is to raise awareness about the importance of beauty as a fundamental right of citizens by enhancing the little-known architectural heritage. Considering these elements as part of the built environment that we experience every day allows us to regard them both from an Environmental Aesthetic and from the Aesthetics of the Everyday Life point of view. More specifically, the little-known heritage as here intended may be analyzed within a theoretical context which stands in the overlap between these two areas. However, the idea of beauty seems to be today a difficult concept, invoked and

neglected at the same time. Referring to the Italian context, for example, we can notice how the term *bellezza* is largely used in titles of books, projects, advertisement and slogans, making it difficult to understand its real meaning. Nevertheless, the call of beauty is not only a passing craze: it rather emerges as a desperate and collective need. This finds a valid explanation in the present condition of anxiety, fear, and inquietude nourished by terrorism, political and social changes that are redefining our collective identity. In this scenario, the aesthetics value of built environment cannot be reduced to its beautiful features but it involves our sense of place and belonging. This feeling grows by interacting every day with surrounding elements that give us the comforting pleasure to be at home. Moreover, the beauty that we can experience in the city is not only a condition in itself but by acting for its achievement, people can improve the quality of their life.
However, the ongoing social processes are changing the way we dwell in private and public spaces and a general indifference towards the existing beauty is emerging as a consequence of several factors. Our lifestyle requires us to be always busy,

in a hurry and consequently we pay less attention toward our surroundings. Also, the large spread of mobile devices is changing the ways in which we interact with people and places. The lack of sensitiveness not only prevents us from recognizing beauty but sometimes makes us get used to ugliness. Habits and resignation are important obstacles in this sense. Moreover, in our society the aesthetic education does not seem to be considered as a fundamental aspect of the human life fostering on the contrary other qualities like personal success and economic interests. Besides these reasons, several times our inability to notice beauty stems from physical obstacles and the private ownership is one of the most important.
However, from the observation of circumstances and behaviors that make it difficult to see beauty, interesting contributions are paradoxically emerging. Indeed, in a more and more individualistic society, concepts like participation, sharing and engagement, have become very common, especially in the virtual context of social media. In addition, the permeation of digital world within the domestic sphere is changing the idea of privacy by opening new forms

of accessibility. More and more the virtual spaces offer places where people can meet and establish relationships that can result in real actions towards the environment. At the same time, politics carried out by several institutions are aimed to involve citizens in an ever-increasing number of activities changing their position from spectators to actors. All these processes have a real impact on the way of dwell in private and public spaces, and the challenge has been to evaluate if these approaches may offer practical solutions for a holistic appreciation of the beauty hidden in the city.
In order to analyze these potentialities, several case studies have been chosen. Virtual and real solutions have been evaluated to provide a framework as broad as possible of the ways of approaching beauty in contemporary living. Referring to the current strategies of Interior Design, inexpensive, flexible and reversible interventions aimed to use urban spaces have been considered. Moreover, in keeping with the interdisciplinary approach of the research in the Design field, the collection of cases study has been conducted by analyzing projects developed in different contexts such as art, social media, marketing, etc. The study of each project has been carried out by highlighting its fundamental characteristics, starting from the design challenge, the engagement strategy and tools adopted to reach the goal, as well as the outcomes achieved. Moreover, all cases have been reinterpreted

trying to apply their general principles and solutions to open new perspectives in the enhancement of the little-known heritage.
As a result, some points have emerged. These can be summarized primarily in the need to recognize the surrounding beauty as an open and participatory process. Citizens and institutions must be awakened from the condition of anesthesia in which sometimes they experience the city. In this attempt, flexible and reversible solutions can be adopted to modify people's perception of the urban environment by changing the speed of their movement or by stimulating their attention towards significant elements. Moreover, the potentialities of social networks may be directed to improve citizens' participation in this sense. At the same time, new forms of accessibility should be favored by working in those spaces between private and public dimension opened up by the culture of sharing. Virtual and real solutions could be adopted to soften the existing boundaries and create the necessary trust condition to develop these processes. Moreover, these tools may be used to collect and share the intangible beauty made by personal memories and stories. Indeed, unlike buildings and artifacts recognized as official Cultural Heritage that are experienced as something extraordinary, the elements here considered are strictly related to everyday human life and often they are inhabited by common citizens. As a consequence,

the enhancement solutions have to be settled differently and a greater range of factors including the intangible heritage made by personal memories and stories should be taken into consideration to appreciate this fleeting beauty. All proposals should be oriented to foster the potentialities of the current ways of living to improve people's awareness towards significant elements existing in the city. This approach can also be intended as a real and sustainable response to the crisis of contemporary society. Design as an activity aimed to enrich everyday experiences of aesthetic and ethical values here is addressed towards beauty appreciation, resolving the main difficulties in making it a fundamental right and contributing to improving the quality of life. Rather than suggesting rules to be applied indifferently, some guidelines have been outlined, open to different interpretations according to specific heritage features. Finally, a possible application has been proposed with the aim to support local administrations in the enhancement of the less known buildings in Liberty style existing in the province of Varese, Italy.

ASSISTIVE [WAYFINDING] DESIGN AND TECHNOLOGY
DEVELOPMENT OF A WEARABLE HAPTIC-FEEDBACK NAVIGATIONAL ASSISTANCE FOR ELDERLY WITH DEMENTIA

Che Me Rosalam – Supervisor: Prof. Alessandro Biamonti

In today's new media age, there are constant discoveries in the field of design and technology. While this is indeed an expedient progress, rarely the attentions are given on the debilitated multitude. Each of us is possible to undergo functional limitations at some time in our lives, due to biological and non-biological causes. Neglecting the mortality factor, the most usual substance of these restraints is ageing. Aside from physical and sensory changes, age is typically affiliated with the decline of cognitive function. This increases the inclination for elderly to suffer from Alzheimer disease or dementia.

Demographic trends on the constant grow of population ageing and dementia cases are a worrying scenario, as the disease induces destructive implications to both patients' life and everybody around them. One of the most obvious deficits that we highlight in this study is on their wayfinding/navigation problems. The decline in spatial navigation skill is interrelated with the mobility, autonomy, caregiving burden and eventually institutionalization. In providing better or optional acquisitions, designers should contemplate the inadequacies of a specific design, so that the decisions for preponderance do not disregard individual's abilities and disabilities, as the non-inclusive

designs worsen their limitations. Hence, from the viewpoint of design and technology, the study aims to understand the decline of wayfinding ability in elderly with dementia in order to find the possible ways to assist or improve it. The theoretical construct was fortified with series of literature reviews on: (1) the stressed issues – mobility-related disabilities (2) related works – wayfinding strategies, assistive and wearable technologies.

Discoveries from those theoretical requirements initiated the design project as an intervention to alleviate the difficulties of elderly with dementia during the outdoor wayfinding, mostly grounded on User-Centered Design (UDC) and Inclusive Design (ID) philosophies. The most notable innovative elements of the proposed concept are: (1) the integration of haptic signals, instead of visual and audio interactions and (2) the wearability

aspect, unlike todays' conventional navigation systems. Figure 1 demonstrates the conceptual framework of the research, founded from the theoretical construct.

The study takes into consideration the principle of ID in parallel with Universal Design (UD) and Design for All (DFA) that upholds the philosophies of UCD at its substance, in order to promote more design and technological solutions for the mentioned issues. The achievement is clarified through the creation of pertinent technology that specifically caters the targeted problem, as referred to Assistive Technology (AT). Figure 2 below portrays this intersected relationship.

The design project as a case study went through three main phases of developments with each phase features its individual strategy of assessments (illustrated in Figure 3 below): (1) a survey aimed to
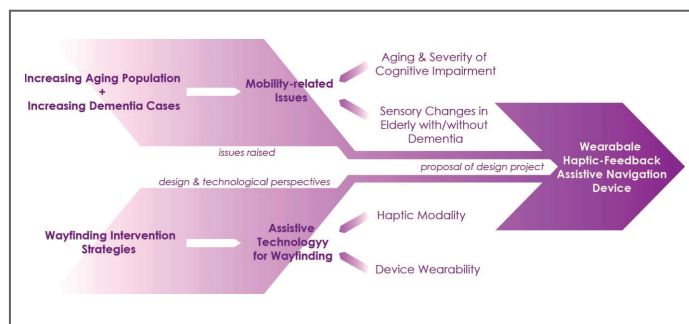
investigate the perception and acceptation of dementia experts and caregivers towards the proposed design concept, (2) a usability test with target users (subjects in diverse dementia severity), aimed to evaluate the utility of the first developed device prototype, and (3) second usability test with the target users from different group, focused on the wearability aspect of the prototype's refined version. These assessments were founded on the aspects of functionality, comfort or wearability

Improving the wayfinding ability maintains the mobility, preserves the performance of daily activities, and ultimately leads to a good quality of life – an important survival factor for the patients. In a broader view, the study caters the critical issues by means of developing the design project that was utilized as a platform to validate the hypotheses and research questions emerged from the intensive analyses of previous works. Despite the disclosures of promising findings from the theoretical

profitable for future research. Numbers of insufficient evidences and information in the previous studies have been partly featured in this thesis, but some other related matters remain lacking. For that, the study encourages more future works on the field of design and technology, mainly under the themes of design for disability or design for disabled people, as well as the assistive and wearable technologies.

The present study demonstrates that these research themes provide the alternative-yet-compatible approaches to the commonly performed studies in the topics associated to elderly, disabilities, therapeutics, health and promoting wellbeing in general. However, the goals of this study could not be achieved by solely taking into account the perspective of design and technology alone. In addition, although we have conducted sequence of validations to authenticate this alternative
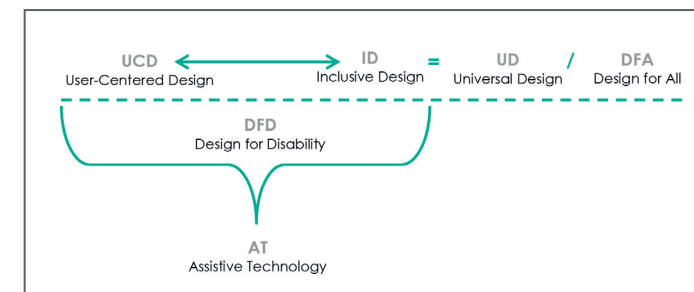
2. The correlation between the design principles that motivates the design project

and usefulness. Collective results demonstrate that the straightforward–yet-intuitive plus wearable features of the device are appreciated, and in some way augment the sensing of haptic signals. This suggests that haptic stimulus can be a useful form of navigational signal for our target population – elderly with dementia. However, user familiarization is highly essential and influences the success of the intervention. This is proven when there were some indications of improvement towards the navigational performance of the participants after a few sessions of navigational tests.

3. The main phases of assessment for the design project
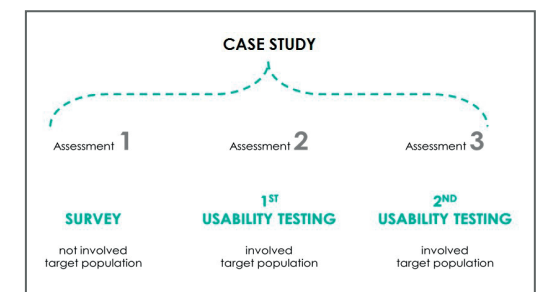
constructs until the series of evaluations, comprehensive analysis of market research and planning are essential before this intervention could be commercially implemented.

The undertaken study puts emphases on several issues and subject matters that may be

approach, but more evidence-based research works that could possibly blend both fields should be further promoted. Therefore, to establish these multi-disciplinary studies, the researches should embrace the knowledge and exercise the investigations from both of the respected disciplines.

1. Research Conceptual Framework

INTANGIBLE CULTURAL HERITAGE IN MUSEUMS OF CULTURES: DESIGNING COMMUNITIES' PARTICIPATION IN MUSEUM CO-CURATION PROCESS
DESIGN AS STRATEGIC APPROACH TO ENHANCE THE INTANGIBLE HERITAGE

Chiesa Sara – Supervisor: Prof. Eleonora Lupo

External Examiner: Prof. Susana Dias Nèlia

The subject of the Intangible Cultural Heritage (ICH), its definition, protection and enhancement is central in the national and international debate since 2003, year of the Conference for the Safeguarding of ICH. What is noteworthy is not the novelty of the idea to enhance the ICH and the participation in the museum studies domain, but the fact that these two topics are not integrated yet into design approaches within museums, in particular considering the participation of migrants and individuals with migrants' background. For the purpose of this study, I will use the expression 'migrants' or 'people with a migrant background' to refer both foreign people immigrated in European countries and their descendants born in the countries of settlement, instead of referring to the new comers such as immigrants or political refugees.

Three theoretical themes represent the cornerstones of this research. As initial aspect, the today rereading of the ICH concept, in the perspective of design exhibition and co-curation aspect and, furthermore, its legislative and literature definition in relationship with the museum mission. Secondly, the reviewing

of the decolonization process of ethnographic museums, by highlighting the attention on the ICH role; and thirdly the participatory design in museography as a form of co-curation of contents during all the phases and models of the dialogic exhibition process. Once identified the heritage object of the present work, the extra-European ICH, we must also identify the actors involved in its enhancement. Namely, those that should be considered as holders or 'bearers' of this heritage; the institution in charge of preservation of such heritage, and the role of the designer as mediator in the reactivation of ICH during the dialogic exhibition design process. In order to combine the different models of participation, phases of exhibition design process, and active actors described, I elaborated an analytical interpretative matrix (figure 1), used to classify and to analyse the cases studies presented in this thesis. Describing the cases, the matrix has been reviewed and redefined to become an instrument able to help in the analysing process as well as in the designing phase. As in a circular process the matrix is interpretative, analytical and meta-design tool, used to suggest

and propose forms of co-curation in relationship with the phases of the dialogic exhibition process and the participative models. The first part of the research is dedicated to a theoretical analysis of ICH, its different definitions and conception, and both national and international legislation related to it. With respect to the previous research in this topic a glossary is realized in order to try to collect the numerous worldwide definitions of this concept. I will then present ethnographic museums in their 'process of decolonization' with a specific interest on the role of intangible cultural heritage. The sphere of design for cultural heritage is important in order to redefine the role of museography for the enhancement of ICH and to understand the exhibition process within the involvement of the communities. Starting from the well debated concept of 'indigenous curation', the aim is to draft the different levels and degrees of involvement in the co-curation process, supported by the design. How the concept of 'indigenous curation', developed in extra-European context, where the communities of indigenous are constantly present and involved since long time in the museum's redefinition and

rereading of their heritage, still today, is applicable in European museum?

Through a qualitative research, by an investigation of different case studies considered interesting for the present work, the goal is to examine in depth the knowledge of intangible cultural heritage and specifically the modality to show it in museum through a co-curation process. I provide case studies, where the collaboration between actors with a migrant background, museum staff and the designer in the reinterpretation of cultural heritage, through the mediation of the design discipline as activator of 'knowledges' and catalyst for relationships, is evident, in order to allow a better comprehension of the research topic and the relevance that design discipline can have on it.

The aim of this research is to analyse all passages of the dialogic design process and to identify the phases and the models people's involvement, to build a referential theoretical model. Moreover, my intention is to underline the centrality of the immaterial heritage's 'bearers, the Living Human Treasures, in all the participatory processes that will end with a possible display of the ICH, proving how the co-curation is a value added for a museum exhibition and for the visitors' comprehension. The research has the objective to compare participative processes that lead to the enhancement of intangible heritage within the museums of cultures, founding the best examples of museums carrying out a policy of co-participation and identifying the moment,
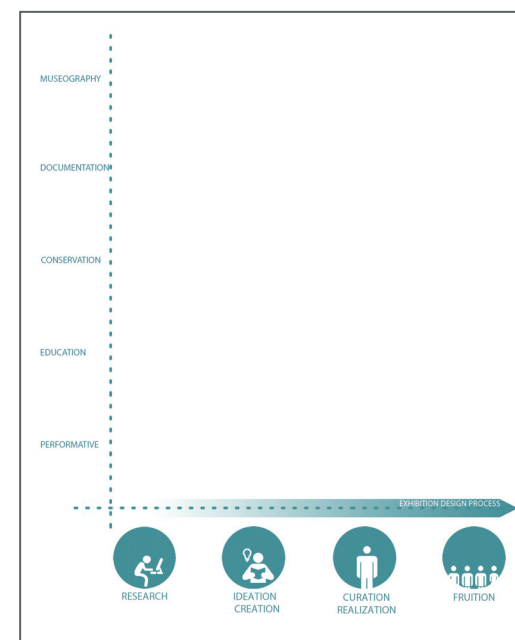
1. Dialogic exhibition design process, interpretative matrix

within the dialogic design process, in which this happens, by proposing also a series of best practices, to be considered as suggestions that should be applied in future to similar contexts and with comparable ICH, interpreted by the proposed framework.

In the third part, the theoretical evaluation of the case studies will be integrated by an experimental action within the MUDEC (Museo delle Culture) of Milan, designed by the English architect David Chipperfield. At the museum entrance, there is a space dedicated to the organization Forum Città Mondo (World City Forum), called in 2012 by the Municipality and composed of more than 400 migrants associations operating in cultural and social environment. The MUDEC is the legal head office of the Forum and the associations have the

opportunity to use the space to organize events, exhibitions, conferences. This relationship between museum organization and migrant communities is as big as great challenge for the MUDEC and for the municipality. It represents an innovative experience: furthermore the collaboration between museum and communities in European museums is carried out sporadically and this is the first time that the communities have a dedicated space for themselves. Museum staff is aware of the possible difficulties, incomprehension, different points of view, but the opportunity to collaborate with a group that desire to be involved in the museum activities and that is asking to have a space where expressing their culture is an unmissable occasion to experiment a communities based museology.

DESIGNING HOTEL FOR ALL FROM INTEGRATION TO SOCIAL INCLUSION

Fossati Maria Rosanna – **Supervisor: Arch. Prof. Francesco Scullica**

External examiner: Arch. Prof. Sean Vance

Interior Design is the scientific context where I started my research, a multi-dimensional discipline able to answer to and deal with the phenomena of contemporary society, through contamination with Humanities and Arts, by comparing and profitable application of experimental methods. What seems to me essential to highlight since the introduction of the thesis is the view of **Interior Design** as the act of conceptual and practical design of a box **of relations**. A creative act not only able to answer to functional needs, but also to deal with social and relational needs in which also the cultural and sensory qualities of the environments become an immersive experience. The project as "arte-fatto" - **arti-fact** - responds to people's sociological, intellectual and even political dimensions. In fact, designers **invite people to behave in a certain way**. I think design is the voluntary act of crafting an experience and offering relationships to live *in the de-signed* spaces, created by men for men.

What prompted me to do research was such power of a built environment defined as: **the skill to ideally stand for the target it is intended**. I

believe this can be a **double-edged sword**: have users to live experiences able to create a full recognition, to **satisfy** new curiosity, to surprise or amuse, to arouse the emotion or the feeling researched; or else create a more or less conscious sense of **frustration**, especially in relation to physiological or pathological characteristics of people.

The beliefs just expressed, motivated me to take care of the pragmatic issues related to **social inclusion**, and more specifically to **universal and accessibility design**.

However, the theoretical assumptions of this argument are inspired by the Italian legislative and regulatory ground, as well as by disciplines such as Ergonomics, Semiotics and even Sociology, through the school of thought that formed since '50s in the field of accessible design.

Adopting the *top-down* way, beyond the top-down legislative interventions, the reflection that led the research is inspired by the aspects characterizing the Italian regulatory framework on accessibility, its performance and prescriptive qualities.

On the other hand, in *bottom-up* way, the research drags inspiration by the point of view of designers that get to know

disability mainly through the **DM 236/89**, an instrument perceived as a rigid. In fact, very few are the innovative design experiences in the context of Accessible Tourism, since most of them have an "hospitalized" fame due their specific target (characterized by severe disability or special conditions).

Is necessary to put the focus of the design on the respect for **human diversity**, consisting of differences and physiological characteristics, linked to age, stages of life (e.g. maternity or psychological conditions), culture and also presence of (temporary or permanent) diseases or functional impairments.

The design for disability represents the liminal case, granting a set of attentions that ensures both the comfort for persons with sensory or physical impairment and the plus of "cozy" and "easy" qualities for everyone. Avoiding discriminatory and "hospitalized" solutions means designing organically for all, building tangible foundation for social inclusion.

The scope of the doctoral thesis focuses on the **interpretation of the concept of social inclusion through the tools of design**. Innovative design tools are defined in the attempt to outline

a cultural shift from social integration to social inclusion. The long cultural history of disability within society is in fact going through this important transition, after seeing the more critical moments in history.

Culturally we are passing from the concept of integration, meaning the act of *adding what is necessary or compensating the defect with appropriate means*, to the social inclusion, suggesting the act of *embodying in a whole*.

The main purpose of the research is to ignite a stimulus to the creation of a culture of diversity and disability within the community of designers, whether of they are for spaces, products or services.

As part of my research, this means animating the scientific debate on the design of accessible tourism accommodations, as well as finding design tools to overcome the legislative and strictly technical imprint that shadows accessible design. Ultimate goal of the research is the development of guidelines and tools for designing accessible accommodations, and specifically: stimulate innovative and creative responses to ensure accessibility and social inclusion in the Hospitality sector; analyse case studies, virtuous and not, and in particular experimental design solutions (good practices); enable managers to assess the level of accessibility of their buildings; collect the needs of travellers, with a "for all" view; evaluate customer satisfaction.

An important note for this thesis is that the research is multidisciplinary. The spread of

interests across the research permitted an innovative outcome that might not have been achieved otherwise.

The research has started with the selection of the most appropriate and valid research methodology in order to successfully collect the data required. For this study therefore, it was decided to use a qualitative research approach that would facilitate the collection of in-depth data.

Going deeper in the organisation of this thesis, the research will apply the following methodological approach: framing of the concept of *disability* on one hand and *tourism* on the other, with the related case studies and investigations on the accessible design theme and on the accessibility of facilities.

Following, are analysed the problematic area: if you **summarize the accessibility in terms of access to information, buildings and experiences, is shown that nobody works to design accessible experiences**, often marginalizing the inclusive

issue in the presence of unevenness not impassable by wheels.

The generation of meta-design tools will be finally cultivated as illustrated in this diagram:

The qualitative research, starting from the needs and requirements of each type of user (e.g. children, elderly, presence of temporary or permanent disabilities), **is addressed to all the activities, products and services offered by the hotel** and generates tools for applied research, such as *focus groups* and participatory design (co-design). On the other side, starting from all the activities, products and services and caring about the needs of users, is generated the check of the actual state of the accessibility of facilities. **It is a circular vision in which the needs feed the process and generate the offer and versa** (as explained above).

This innovative vision of the **design process** will be able to create the brief of an inclusive design that **values different skills, instead of demeaning them**.
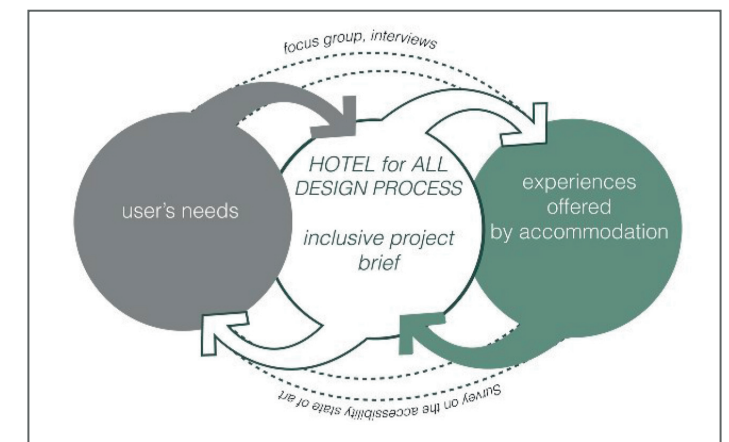
1. The inclusive design process

DESIGN IS POWER. THE DARK SIDE OF DESIGN. AN INTERPRETATION THROUGH NEGOTIATION, POLITICS AND LEADERSHIP. "CHANGE ALONE IS UNCHANGING"

Galli Francesco – **Supervisor: Prof. Marco Maiocchi**

External examiner: Prof. Dijon De Moraes

Design has witnessed a transformation in its validity, scope and methods, passing from being an essentially craft related discipline towards representing a process and system of thinking (Cross, 2001) (Findeli, 2001)(Lawson, 2006). As a consequence, more recently the attention shifted from the process involved in the design practice, to the design as a mindset and attitude and more recently to the disruptive potential of the design approach. Nevertheless many issues that stay at the very foundation of the design as a discipline have been neglected or simply have not been taken into consideration. Perhaps one of the most powerful, and not fully understood, definitions of design comes from Victor Papanek and states that "design [is] a conscious effort to impose meaningful order"(1985). Interesting enough the definition refers to an authoritarian act of imposing rather than finding a meaningful order. The context in which design activities evolve will therefore be shown as a stimulus and not a determinant in the thinking process, emphasizing the autonomy of the constructed thought in continuous change according to the circumstances (Maturana, Varela, 1992).

The research starts from the hypothesis that design has a still explored dimension that refers to the power dimension that can be exercised through design. This assumption helps us focus on the contrast between the "visible" side of design that involves all its conceptual or practical manifestations, and a hidden or "dark" side that deals with the politics and power play, but that however has a major influence in the actual design process.
The thesis is structured along the following research questions:

How to acknowledge, anticipate and negotiate the power flow in the design discipline?

How to understand the cycle of power activation, manifestation and preservation?

How to coach and empower an adaptive, leading and learning vision in design education?

The argument is based on the assumption that the act of "change" doesn't have a positive or negative meaning, but it is simply necessary and present in each social and organizational system. In this respect the thesis supports the concept of antifragility, defined by N. Taleb

as the capability to embrace randomness and uncertainty generated by the creation, preservation and destruction of power and being capable to navigate rather then oppose them (Taleb, 2012).
The thesis will unfold in three parts and the concept of power is introduced and studied in three instances: its potential, manifestation and preservation in a cycle immersed within a self-generated, autopoietic system (Varela, 1984). One of the main concerns is to argument the importance of the study of power in design from a multitude of perspectives, integrating theoretical insights from biology, psychology, sociology, social and political science with organizational and war theories. The research methods are specific to grounded theory in which the hypothesis is supported by a main, "grand" theory that is integrated with, secondary ones, and has been tested in educational training settings.

First part concentrates on the visibility of the power dynamics within a autopoietic system and the discovery through observation of the characteristics and quality of the interactions within the system. The power is

explained in its latent dimension of concealed or underlying patterns of potentials (Rummel, 1979), which await the creation of proper tensions. It is underlined how an important role is played by the figure of active observer, determining the perception of the potentiality and influencing the level of entropy by introducing a factor of disorder. This helps anticipating the emergence of design leadership role.

Second part introduces the activation of power and the conflict process that plays a role in the passage from the latent mode to its manifestation. In this chapter the role of the leader will be shown as determinant for the activation of power. The different types of leadership will be explained not only in terms of engagement but also in terms of influence, manipulation, and creating perturbation and controversy (Latour, 1988) for the scope of inducing a power flow and provoke its manifestation. This brings forward one of the principles of martial arts that makes use of the force displaced by the opponent to create a momentum in one's own advantage.

Third part tackles the tensions put in movement by the power or more precise the manifestation of such forces in provoking actions. In this part the following questions will be addressed: first how to influence and control the manifestation of power with criticism, second how the critical perception and cynicism (Sloterdijk, 1988) can change the meaning of the power

manifestation, and third how to propose new meanings in the state of ambiguity and entropy created as a consequence of the manifestation. Criticism is shown as an important element to induce conflict, which acts as a balancing element between disruption and destruction. In this circumstance design leadership can be seen as providing navigation insights rather than tracing clear directions. The main difference between the two concepts stays in the versatility and adaptability of the navigation metaphor that introduces the importance of imagine anomalies and chance seeking (Bardone, 2012) in the leading-learning process.

The conclusion proposes a different meaning of the design that as a provocative activity that most of the time induces conflict and creates problems. To support this perspective it will be explained how change

provoking processes have to be supported by **EMPOWERMENT** activities in design research and **EDUCATION**. In this concern it is explained how seeing design as power is particularly relevant at advanced **COACHING** levels (Dreyfus & Dreyfus, 1980). This allows to draft an unfinished model for **ADAPTIVE LEADERSHIP** (Heifetz & Linsky, 2003) and experiential leading & learning training (Cooksey, 2003). By comparing the different methods in design research it is suggested that the theoretical results of the thesis contribute to an upcoming generation of design research methods that focus on learning and leadership. Finally it is suggested that future work exploring the nature of power flow in design, can take into consideration the paradoxical facet of design like **ANTITHESIS** between its **POTENTIALITY** and the **PRESERVATION OF CHANGE** (Agamben, 1995).
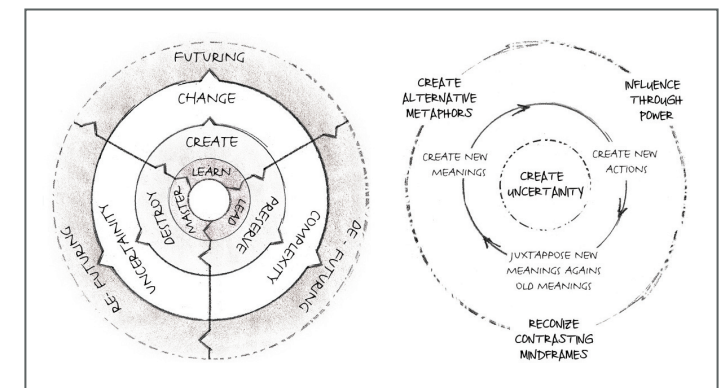
1. The faculty of adaptive leaders, and the implications of meaning – changing process in contextual circumstances

THERAPEUTIC HABITAT
INTERIOR DESIGN AS A TOOL TO DEVELOP SOLUTIONS TO ENHANCE THE EFFECTIVENESS OF NON-PHARMACOLOGICAL THERAPIES FOR ALZHEIMER'S DISEASE

Gramegna Silvia Maria – Supervisor: Prof. Alessandro Biamonti

This research investigates the role of interior design in the enhancement of the effectiveness of Non-Pharmacological therapies for Alzheimer's Disease. Alzheimer's Disease is a neurodegenerative disease and, specifically, and represents the most common form of dementia that causes memory and cognitive impairments, and behavioural symptoms, severe enough to interfere with daily life, and lessen the ability to live independently. It's a long process with a potential duration of 20 years or even longer, after being diagnosed.

Non-Pharmacological Therapies, combined with drug medications, can significantly improve people with dementia's condition, enhancing their well-being and quality of life.

Inside this perspective, the environment can be considered as one important Non-Pharmacological treatment modality, as it can reduce behavioural disturbances, and act as a sort of "prosthesis" in the compensation of losses and cognitive deficits.

The environment is composed not only by physical features, but, moreover, by social and cultural ones. The physical environment it is strictly connected to features, such as ambiance, safety and security of the patients, but also accessibility and comfort. Social environment is intended as the deep meaningful social relationships that surround people with dementia, including family members, caregivers, other residents, relatives, friends, etc. Hence, the cultural aspect of the environment refers to the system of beliefs, ideals, customs and values recognized as own by each patient.

The last stages of dementia due to Alzheimer's disease require the hospitalization of people with dementia, due to the severe symptoms that occur to them. The transfer from ones home to a care facility, or day care regime, is mostly caused by severe behavioural disturbances that lead caregivers to a sort of "inability" to take care of their relatives, and depends on the public care services provided and the availability of family care.

When the environment surrounding them is new and difficult to understand, people with dementia get lost more easily than most people, looking for something they even can't figure out, agitated and stressed, and even behaving aggressively in some situations. This is related to the "sense of identity", and moreover, the "sense of belonging" towards the context an individual is living in. The sense of belonging, intrinsic of every individual, is mined in people with dementia, when they experience a transition from their home, to a care facility, or generally, to a new living environment. It represents, not only a personal sense of being part of a certain context, but also, the feeling of being accepted as an individual with own unique needs for personal space and companionship. The lack of the sense of belonging towards the living environment, causes in people with dementia anxiety and stress, that are expressed through purposeless wandering, aggressive and suspicious behaviour, agitation, vocalisms, repeated movements, and other "unusual" behaviours. The result is a decreased well-being, and a poor quality of life.

The main research hypothesis is focused on defining a specific environmental interventions that can help people with dementia to decode and recognize the environment, in a context different from the familiar one; identify environmental interventions that can help decreasing wayfinding problems, increasing independence, and self-confidence in the patients.

In essence, aim of this research is to define the conceptual model of "Therapeutic Habitat", meant as a fluid system, based on tangible and intangible aspects; products and furniture, technical equipment, instruments, objects, services. A system of environmental devices/tools, that can enhance the comfort perceived by the patients, solve temporary problematic situations, support activities related to Non-Pharmacological therapies. Therefore, people with dementia, due to their loss of capabilities caused by the disease, need certain environmental conditions, or features, to continue living their life, even when the disease worsen, with a high degree of comfort, well-being and dignity. Moreover, the research provides, in its conclusions, a set of guidelines for designers approaching the design of environments for people with dementia, defining specific environmental intervention and strategies in the field of interior design, aimed at the enhancement of the effectiveness of Non-Pharmacological therapies. As a last conclusion, the research proposes a concept for a day-night care centre for dementia, under the name of Alzheimer Point, in which Non-Pharmacological interventions are activated in the form of a daily-living and residential support, for people with dementia due to Alzheimer's disease. Each intervention is meant to be modulated according to individual's abilities and needs. Alzheimer Point is meant to represent a point of reference for dementia care, in a specific geographical area, as it provides medical assessment and assistance, information and support to caregivers, and a comfortable living environment, in the form of a care centre.

ACCULTURATION OF BRAND STRATEGIC DESIGN FOR EUROPEAN LUXURY FASHION BRANDS IN CHINA CONSUMER MARKET

## Han Han – Supervisor: Prof. Francesco Zurlo

Co-supervisor: Dr. Fatina Saikaly

As an extension of the candidate's previous phenomenological consumer research in Hong Kong focusing on the "Luxury Fashion Consumption Culture among China's New Rich", this PhD research targets to explore the possible strategic designs for the European luxury fashion brands in China consumer market. The latter one has become the leading market driving the global luxury economy since the recent ten years, while the former ones enjoy strong brand heritage and prestige meanwhile facing unstable performance that is a sharp cool-off after its intense increase in the China consumer market, due to its particular sociocultural environment. Therefore, the original motive of this research is to find the possible branding designs for a more durable development of the brands in the intercultural context, at the same time expecting to output a framework that may suit not only the specific situation but also any other industries where a foreign brand holds distinct cultural differences with its destination consumer market. It is hence a design research nurtured by multidisciplinary knowledge from sociology and anthropology. With holding the research question "how to design possible strategies for durable development of

European luxury fashion brands in China consumer market?", more theoretical explorations are conducted as a search for the scientific tools interpreting the research question into general and specific objectives, and ways to conduct the empirical studies. *Acculturation theory* from the intercultural studies which used to be applied in immigrant studies is the first main theory that is found as supportive to be adapted in both demonstrating the research scenario and interpreting the branding strategies in intercultural perspectives: with the influence of both the brand culture and identity, and the consumer culture and identity, the continuous brand-consumer contacts are driven by four directions of acculturation strategies—assimilation, integration, separation, and marginalization, which causes the cultural exchange, identity construction, and value co-creation between the brand and the consumers. Therefore, the general objective of this research is interpreted as to explore the possible designs for "acculturation of brand", and the design focus is the continuous *brand-consumer contact*.

The second main theory supporting this research is *pedagogy of multiliteracies* that used

to be applied for second/foreign language acquisition in current era when learners are treated as active participants with multiple channels for communication. It is inspired from the concept of *brand literacy* which is a key issue for the co-making of meaning and value co-creation between the brand and the consumers especially in the research setting of *acculturation*. The adaptation of the theory from the linguistic education provides an alternative perspective organizing and analysing data of the brand-consumer contacts with focus on the multimodal discourses of the meaning-making process between the brand and its consumers as active learners and value co-creators, instead of the traditional *touchpoint* perspective that gives more effort in time sequence of consumption practice (i.e. pre-, consumption, and post-). With the integration and adaptation of the two key theories—*acculturation* and *pedagogy of multiliteracies*, empirical studies are undertaken by case study strategy. *Salvatore Ferragamo* is taken as the instrumental case for the framework development, while three more cases are used to verify the framework from different dimensions. The candidate applies qualitative methods to collect all the accessible data relating to

brand-consumer contacts across both the place of the brand's origin and four main cities in China (Beijing, Shanghai, Hangzhou, and Hong Kong), including interviews with the brand managers and executives as well as the consumers, *document analysis* of reports and archival records, *direct observations* of both tangible (products, retail site activities and physical commercials, etc.) and intangible (websites, bloggers, other commercials, etc.) offerings, *participant observations* (mystery shopping activities). All the huge amount of field data is summarized as notes and extracted as brand-consumer contacts that consist of two levels—tactical level and execution level, and are organized into the multimodal framework (visual, audio, linguistic, spatial, gestural), and then are further interpreted by the four directions of acculturation strategies. After the process of the data, visualization tools are developed that produce the infographics integrating both the theoretical adaptations and empirical elaborations, which disclose more insights of the framework developed to better achieve the research objective. (below is an example for the infographic for a part of the gestural mode of SF) With the packages of infographics produced for each case, functions of the framework are more explicit as a strategic blueprint to enhance the brand-consumer relationship from multiple meaning-making modes integrating full-scale sectors (from product development to retail, marketing, and service, etc.) in consideration of both the tactical and execution levels for

the general infographic of the contacts in gestural mode (Salvatore Ferragamo)
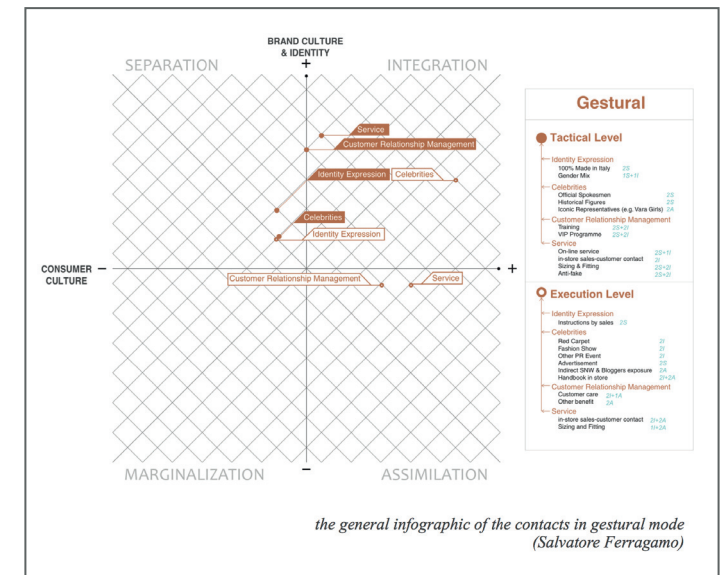
intercultural branding. By reviewing the infographics and checking-up the respective data behind, strategic adjustment can possibly be taken into action to better acculturate the foreign brand in its destination market overcoming the sociocultural.

The theoretical originalities of the research are the adaptations of *acculturation theory* and *pedagogy of multiliteracies* for the development of a holistic framework to the area of strategic branding design in the intercultural context. With the empirical support, a cross-boundary approach for strategic design of the contextualized brand-consumer contacts are emerged. The visualization tools for the contacts in different scales help to extract more possibilities of the framework, including the correlation between each mode of meaning-making with the acculturation strategies, the meaningful "gaps" between tactical and execution levels, the analysis tools for the individual projects

launched by the brand, etc. Though the current research focuses on luxury fashion brands in China consumer market due to the evident sociocultural differences held in between, the output framework is capable for generalization and application in other industries and other countries. It discloses for both the brand practitioners and the academia a possibility to consider the durable intercultural branding strategies from the acculturation perspective enhancing the brand multiliteracies by the strategic design of brand-consumer contacts. It is an alternative view other than globalization, localization, and glocalization, which regards both the brand and consumers in active roles for the co-creation of value and co-making of meaning, especially when nowadays both branding and consumption practices become more democratic based on the increasing modalities for communication.

REIMAGINING ARCHIVES
AN INVESTIGATION ON NOVEL EXPERIENCES OF ARCHIVES TOWARDS HERITAGE KNOWLEDGE PRODUCTION AND DISSEMINATION

Ece Özdil – Supervisor: Prof. Eleonora Lupo,

Design Department, Faculty Member

During these three years of my PhD, I have been researching about a possible shift in the field of archives towards creating engaging experiences for public, with an emphasis on creating open-ended and continuous structures for dissemination and production of knowledge enabled by an exchange among public, institutions and information inside the archive. The issues **of access and activation of cultural heritage** are large-scale phenomena, which from the field of archives relate rigorously but strictly to matters such as policies of re-use, sharing and digitisation. However, within the contemporary socio-cultural domain, it is crucial for **institutions to make a shift in their approach towards being audience-centric for enabling engagement**. For creating the connection between public and institutions, **the use and adoption of digital technologies is also of great significance as they become aids or enablers of innovative practices for audience engagement**.

My research is motivated by all these developments and needs and investigates what kind of experiences archives offer to audiences, how to work upon public visibility, what kind of technologies can enable connection between archives and audiences, thus **what kind of new forms the archive can take to create engaging experiences for the public**. It aims to provide an interdisciplinary perspective, underpinning a more comprehensive notion of **design-oriented heritage activation in which the designer adopts a holistic approach** to guide the future developments in the field of archives.

I've started my research by focusing on the change in the overall field of cultural heritage with a focus on the (r)evolutionary period of museums. Such reflection helped me to identify three shifts that have created the scenario of Heritage Continuum as a theoretical basis: the shift from **ownership towards permeability**, underlining museums' interest in investing more on the visibility of their collections and archives (in particular through digitisation and exhibition activities) to enable a discursive environment as first steps for public engagement, the shift from **stability to growth** as the the amplified roles of these institutions (such as from preservation to integration and visibility, from cataloguing to activating and disseminating) enriched the holdings and also generated also new information and knowledge for these institutions and the shift towards the continual and **continuous circulation of heritage** born thanks to ongoing exchange between the institutions and public.

The research also required a deeper analysis on the notion of archives together with the impact of technologies to understand what archive means today and in particular, what I refer as an archive in this research.
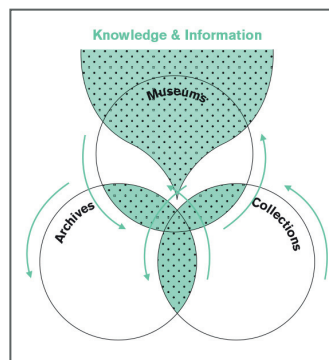
1. Heritage Continuum Diagram. Figure source: designed by the author

I have undertaken a review of archives narrowing my interests into, first of all, to **the *post* steps of archive lifecycle** as it's the public-facing area and secondly, to three different perspectives: Philosophical and Humanistic Perspective, Archivistic Perspective, and Artistic and Curatorial Perspective. Besides, I've worked in **the digital mode of existence of the archives, and it's relationship with exhibitions**. With the support of case studies, I traced several languages and strategies concerning different ways of creating archival experiences. All these activities indicated that to talk about an 'archive experience offer', **the notion of the archives should have been defined from a functional point of view rather than a materialistic point of view**. As a result, I have identified 4 archive models, summarised in the following diagram as the theoretical reference to the definition of archives.

These two main theoretical requirements and assumptions helped me to identify three challenges for archives: **Archive's Space** (and here I am referring to both digital and physical spaces), it's **Experience Offer** (by experience offer I underline the interaction between the space, archival material and users) and **Continuity** in order to propose an answer to my research question. By continuing, on one hand, the case study analysis, and on the other hand, the analysis of institutional insights which were based on Desk (institutions' activities in creating archive experiences) and Field (deeper analysis of case of MACBA Museum's archive in creating an archive experience) research activities, I have realised that **these challenges should be translated and further defined as areas of change in order to help archives to move from an 'open' level (open to public use) to a living level (in continuous growth and circulation)**. Based on this, I have initiated a Design framework as a response to my research questions. **The Design Framework is an exploratory meta-design tool aimed at supporting the design critique and design strategy/envisioning activities of**

2. Models of archives. Table demonstrating how these models are defined. Figure source: Analysed and designed by the author

heritage institutions' projects about archives. It summarises and links the theory (archive models) together with the defined need in practice (shift from an open to a living level) by highlighting three areas of change as Structural Mechanisms, Institutional relationships and Exhibitory forms. **Structural Mechanisms** as the first area of change help institutions reflect upon the operative structure within the archive, in particular concerning its materials. **Institutional Relationships**, instead, is focused on the relationship of the archive entity to its own or other institutions connected. The last area, **Exhibitionary Forms** helps institutions examine the relationship between archive materials and audiences through 'exhibitions' as it represents the first area of direct connection between these actors. The following diagram summarises these dynamics with their sub-categories in relation to archive models in a systematical way also showing the gradual shift from an open to living level.

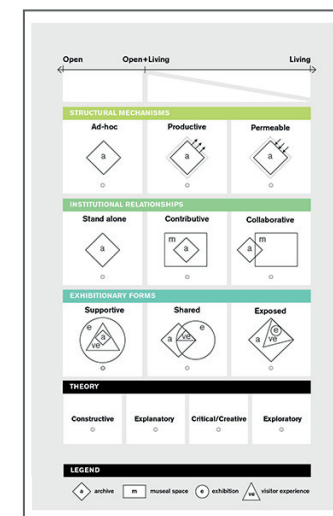The tool is available online on **reimaginingarchives.org**, as

Image 3. Reimagining archives, meta-design tool. Image source: designed by the author

a space for institutions both to get further information such as practical information as 'take away' notes provided by case studies, and contribute to their applications.

I believe that the meta-design approach helped to create a common reference point in which professionals with different backgrounds can fruitfully debate and discuss.

WEB-BASED IMMERSIVITY: SETTING THE FIELD. A FRAMEWORK FOR UNDERSTANDING THE EXPERIENCE OF IMMERSION IN THE WEB ENVIRONMENT

Scuri Sabrina – Supervisor: Prof. Daniela Calabi

The experience of immersion has been widely investigated within several research areas but mostly through a technology-driven viewpoint, which basically considers it as the result of using the so-called immersive technologies. People usually relate immersion to Virtual Reality which, in its turn, uses the term to indicate what technology delivers from an objective point of view. Nevertheless, despite the 1990s debate on Virtual Reality has reduced the semantic dimension of immersivity to a technological factor, we found evidence that technology is not necessarily a synonym for immersivity. There is indeed a second school of thought which considers immersion in terms of cognitive and perceptual absorption. According with this point of view, which approaches the issue through a phenomenological perspective, immersion is much more than a feature of the technology. Rather, it is a feeling we naturally experience also while interacting with those media that are commonly considered as non-immersive, like a paper book. Looking at the current web scenario from this perspective, we observe the rise of several hybrid formats able to create this kind of extremely engaging experiences. They do so by exploiting multimedia convergence and interactivity, which are regarded by literature as the

main dimensions underlying the feeling of immersion. Basically, immersion in the web environment is due to the possibility of interacting with the website and the content it provides, on the one hand, and depends on the extent to which it captivates the user's senses, on the other.
Starting from these assumptions, the present research investigates the experience of immersion in the web environment focusing in what we call immersive languages, that is to say, the way audio-visual contents are displayed and the modes of interaction with them.

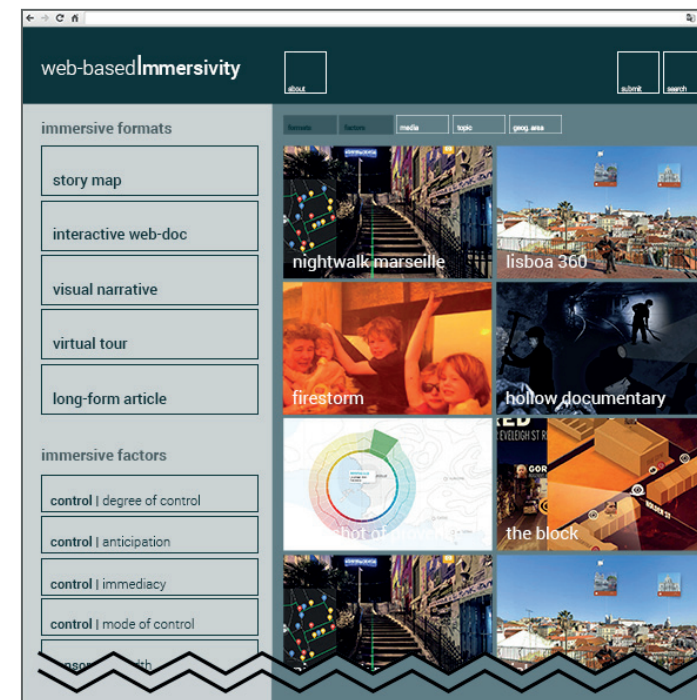**Research questions and outputs**
Nowadays, while browsing a website, users want to be completely absorbed by the contents displayed, they expect to interact smoothly with the different media (texts, photos, etc.), and both their cognitions and perceptions should be entirely engrossed by the experience. When a website meets all these expectation, it is defined by the users themselves as an immersive website. These "immersive websites" have demonstrated to be an extremely effective form of communication, able to generate a deep sense of cognitive and perceptual absorption in a story or in the interaction with the digital environment.
The real issue is that it is very hard to find something more than this

mere adjective. This is true from the users' perspective but also from the academic one. Describing this experience in words is not always easy for the users and by reviewing the literature we didn't find answer to the questions "what are the features of an immersive website?" and "how can we design it?". Indeed, despite today always more websites are defined as immersive, we observe a lack of literature about the phenomenon of immersion on the web, especially within the field of Communication Design studies. Here, we argue that to nurture future developments in the field, a theoretical framing of the experience of immersion in the Web environment is needed. Therefore, the aim of this research is to provide a first investigation on the feeling of immersion in the web environment, attempting to foster the understanding of the phenomenon and provide a framework for it. Specifically, the present work aims to answer the following research questions:

In what does immersion in the Web consist?
To answer this question, we attempted to provide a proper definition of the phenomenon we call here "web-based immersivity".
What are the dimensions of an immersive experience in the Web and what features should a website have to be immersive?

through secondary research. Given the confusion that characterizes the topic, we opted for an approach as much as possible multidisciplinary. For this reason, it was conducted an extensive literature review covering all the main research areas that deal with the phenomenon of immersion, ranging from Virtual Reality to Literary Theory. The results of literature review have been used as a theoretical basis to develop a first framework that has been then tested and refined through primary research. To this aim, an ad-hoc user test was designed and carried out with the support of the researchers of the Madeira Interactive Technologies Institute. The exploratory data analysis was performed using IBM SPSS Statistics. All the data and the

1. Layout of the platform landing page

To answer this question, it has been developed a framework for immersion in the web environment. To this aim, the dimensionality of the construct as well as the aspects influencing each dimension have been studied.
What are the tools to realize an immersive website?
The answer to this question consists in a set of web formats which, by analyzing the state of the art, have been identified as the most suitable to realize immersive web experiences.
Moreover, since the aim of this work is to provide a set of both theoretical and practical tools to design immersive websites, the last chapter of the thesis presents the design of an online platform thought to be the venue where the

2. The first version of the framework

results of this research could be disseminated and made available to a wider audience, not only of scholars but also of professionals.
Moreover, since the aim of this work is to provide a set of both theoretical and practical tools to design immersive websites, the
Methodology
Definition of "web-based immersivity", the main dimensions underlying the experience of immersion in the web environment as well as the aspects influencing each dimension have been identified

outputs of the statistical analyses are reported in the thesis. Contemporarily, a set of case studies was analyzed in order to identify those web formats that can be considered particularly suitable to design an immersive website. The detailed description of the five formats identified as well as the case studies analysis are presented in the thesis.

FUTURES FOR FASHION FUNCTIONAL ACCESSORIES BETWEEN INNOVATION AND FASHION IN THE AGE OF TECHNOLOGY

Tenuta Livia – Supervisor: Prof. Alba Cappellieri

The aim of "Futures for fashion" thesis is to explore the points of intersection and synergies between fashion accessories and technology. It is a research that began in 2013, when attempts at bringing together the worlds of fashion – accessories in particular – and digital technology were few and far apart. Google Glass had just been launched on the market and the first, shy smartband prototypes were appearing. Since then, though many answers have already been found, the evolution of wearable technologies has opened up a number of new questions. The main problems with wearables today have to do with their perception on the part of the consumer and their total alienation from the world of fashion. These are functional objects that are miles away from the aesthetic canons of fashion accessories. Although electronics companies design

and produce wearables drawing on the wearability rules and object types of fashion design, rarely do we see the two worlds working side by side. The general aim of this research is to give an interpretation of the changes happening in the world of fashion and to more specifically suggest ways to overcome the limitations that currently hinder the spread of wearable technologies.
An overview of innovation in the world of fashion – encompassing design, production and distribution – confirms fashion's growing tendency to draw on diverse fields and skills to simplify and speed up processes, create new languages and meanings and shape innovative consumer experiences and buying contexts.
Fig. 1 Fashion and technology in production chain
Technology today is used to design; it is woven into materials or encased in objects. It is the tool that brings to life extraordinary,

almost sci-fi shows, to make the user's buying experience easier or simply interactive, to improve our everyday life, by enhancing the human body. More specifically, we analyse the technologies employed today in the fashion landscape, along with their potential and possible applications in future scenarios. The research focuses on technological accessories or "wearables", that in recent years have experienced exponential growth. It analyses the social effects and diffidence generated by the technical and social limitations of technology – which fashion and design seek to address and overcome - the impact of technology on contemporary society, on people's everyday lives, and how these are changing or have changed the way we live. We evaluate the technical and social constraints of technology, first among these the physical and intangible perception
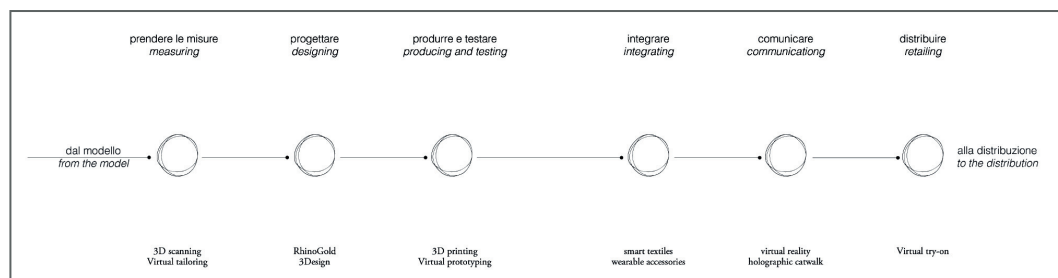
of the technological component, that is usually accompanied by shoddy aesthetics that are subordinated to functionality. We thus look at three scenarios that can help design make the technology invisible: hidden technology, ubiquitous computing and customised technology. The first concerns the opportunity offered by fashion of making the technological component – as yet not sufficiently miniaturised – imperceptible, by hiding it and enclosing it through various expedients inside objects with a captivating design, that do not betray its presence inside of them. The second case is that of technology that is invisible because it is pervasive: everyday life objects are increasingly smart and connected with one another. In this context of widespread technology, wearables – as extensions of the human body – act as interfacing tools that allow the wearer to manage all kinds of devices with ease. Lastly, custom made technologies can be invisible because they are intelligent and autonomous. Wearable devices adapt to the user's movements and can understand his/her needs on the basis of the context and use. The role of fashion and design is thus to bring value to the technology contained in the products. It can increasing its value by bringing about synergy and a degree of interaction whereby the perception of the technological component is reduced to a minimum. Starting with a review of the field, we trace a classification of wearables based on their

connection with the wearer's body, with other people, with objects and with the real or virtual environment. In parallel, we identify the formal and functional developments for each type of accessory. For each product type, we identify its points of contact with technology, that is to say its formal and functional development. Head accessories today are the means to access augmented and virtual realities; watches – the first real wearable technological accessories – have been transformed into smartphones for the wrist; smart jewels renounce their precious nature in favour of the functionality guaranteed by the integration of technology; headphones are called 'hearables', wireless accessories that could become a new frontier for fashion; shoes and bags thanks to their size can easily integrate technology; finally we have 'implantables', technological accessories that move from the surface to the depths, going underneath the skin to transform man into a super-human. The research then zooms in on the jewel, with the aim of making immaterial values tangible through the use of digital technologies, of combining the timeless quality of the jewel with short-term technology and of tracing possible future scenarios for smart jewels. For its strong ties with the past and tradition, the jewellery world is amongst the most diffident toward technology. We thus propose three contexts seeking to bring to life a hybrid in which the immaterial values of the jewel and the power of digital

are combined: Extension of the past, in which technology is the tool giving the jewel an emotional value; Futures re-elaborated to update the technology without purchasing a new model; Artificial environments, seeking to leave unchanged the technology contained inside the jewel and modify the surrounding environment.
The main contribution to research in the field was the identification of future directions in the fashion-technology cooperation, that began with an analysis of the state of the art, including an assessment of the increasingly tight collaboration between aesthetics and technology that is set to cause the emergence of new businesses and new kinds of designer and consumer.
The theoretical conclusions of the research are the output of the analysis of the results obtained from the field testing through thematic workshops and collaborations with companies. It has brought to light the limits and the possibilities of collaboration between fashion and digital technologies.

prendere le misure measuring	progettare designing	produrre e testare producing and testing	integrare integrating	comunicare communicationg	distribuire retailing
3D scanning Virtual tailoring	RhinoGold 3Design	3D printing Virtual prototyping	smart textiles wearable accessories	virtual reality holographic catwalk	Virtual try-on

dal modello *from the model* — alla distribuzione *to the distribution*

1. Fashion and technology in production chain

SOCIAL MEDIA FICTION
A FRAMEWORK FOR DESIGNING NARRATIVITY
ON SOCIAL MEDIA

Venditti Simona – Supervisor: Prof. Francesca Piredda

A growing interest related to the role of storytelling and narrative fiction in design can be witnessed at both the academic and professional levels. In recent years, digital technologies have reconfigured not only the modes of production and dissemination of narrative content, but also the cultural forms and conventions related to the roles of users, producers, authors, designers, and audiences. Social media appeared in the media ecology quite a few decades ago, and today it includes a variety of practices, technologies, and aesthetics, in which users, professional producers, and industries have interconnected roles and functions. Social media platforms have their own characteristics, and one of them is that they are constantly evolving as both the technologies and the companies who owns them, are dynamically changing. For designers who work with media and design media content, it becomes necessary not only to know what are the characteristics of social media as an emergent territory for storytelling, but also to understand the dynamics through which social media are evolving, in order to consciously design content for this particular media context.
The term *social media fiction* has

recently appeared in the literature about the topic of digital fiction; it can be considered as born digital narratives that harness the affordances and architectural characteristics of the digital medium to produce artefacts that could not be experienced in any other way or through any other medium without loosing some of its functions. The point of the argument presented in this thesis, is not to discuss whether these types of narratives can be considered as works of literature, but rather to identify the characteristics of social media fiction which could support designers in communicating through the use of narratives on social media.
The research has two principal goals: 1) investigating and analyzing current practices of storytelling on social media providing a map of the state of the art and highlighting the most significant projects; and 2) defining a methodological framework which could support designers in creating fictional narratives on social media. The study is moved by the following research questions:

RQ1: What are the specific parameters social media are bringing to the design of digital narratives?

RQ2: How designers can be supported in the design activity of creating narrative fiction on social media?

The hypothesis I would like to bring into a discussion is that social media, having its own properties and characteristics, requires new parameters for analyzing and designing digital narratives. These new parameters are not replacing more traditional and classical features of narrative artefacts; on the contrary, new parameters are added to the classical narrative elements. The study is based on a pragmatic paradigm, using the methodological approach of research through design. Experimental research is conducted in two parallel stages of activities, carried out mainly in the educational context. Stage one is represented by a series of workshops, which are different in terms of duration, number of participants, background and skills of participants, and setting. Stage two is dedicated to the support activity to an entire course in Communication Design at Politecnico di Milano. Both phases of experimental research can be considered as design experiments and they were conducted in order to gain qualitative data. Goal of the

experimental phase is to conceive and prototype tools and methods, able to support the design activity of narratives on social media (specifically Facebook, Twitter, Instagram, Tumblr, YouTube, WhatsApp).
Answering the research questions, this work aims at bringing a contribution to the domain of communication design, introducing a framework, which allows designers to consider narratives as the result of a creative design process. Designers can be supported in crafting narrativity taking inspiration and elaborating inspirational collected material, and distributing the narrative discourse according to the specific parameters of social media platforms. Narratives can be considered as the result of a design activity, in which formal aspects, such as the syntactic level of the narrative discourse; content aspects, such as the semantic level of the contents conveyed through social media; and aspects connected to user interactivity, that is the pragmatic level of narrativity should be taken into consideration. Social media are means for conveying messages and information, but the balance between the form and the substance of narrative meaning, is the result of a careful ideation, planning, and construction. To address this challenge, as a result of the experimental phase of research, a design framework was developed in order to support designers in the activity of creating narrative meaning within the constraints of social media. The framework consists in combining the three
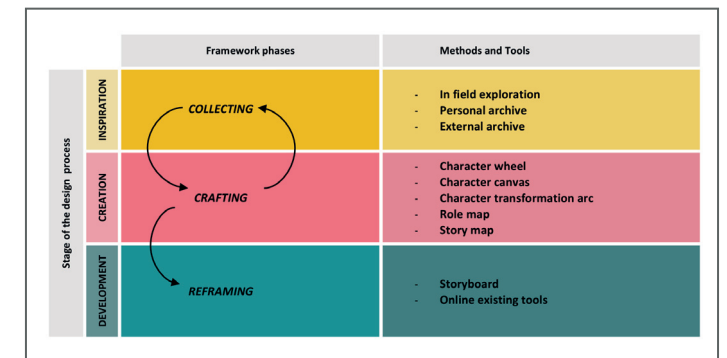
Table 1 – Synthesis of the framework resulted from the experimental phase of research

phases of the design process – inspiration, creation, and development – with the three main phases of collecting, crafting, and reframing, which refer respectively to the activity of collecting visual and non-visual material, developing the narrative elements, and distributing these elements on digital media. Each phase of the framework, then, can be supported by appropriate design methods and tools, which were designed and tested during the experimental stage of the research.
The type of fiction produced by designers on social media can be defined as micronarrative, such as representations which possess some degrees of narrativity, and are composed of autonomous multimodal fragments, spread across the digital narrative space, and that require the user's cognitive action of interpretation. Micronarratives represent an important strategy for designers to engage with people as users of social media, focusing their attention and maintaining their motivation towards a specific goal. If the first

stage of experimental research developed through workshops, partly put aside the issue of considering micronarratives as parts of a bigger storyworld and communication strategy, the second part of experimentation, which developed throughout an entire course, confirmed the importance of structuring micronarratives in a whole narrative world. Moreover, having specific objectives in terms of target audience, message, and goal of the narrative experience, is fundamental in order to reach the users' attention in a highly dispersive context as the one of social media. Micronarratives gain meaning as narratives based on the degrees of narrativity they possess, but they gain meaning as designed objects, if they respond to the strategic goals set in advance by the designers.

MEET ME IN PLAY
CREATIVE PROCESSES AND EXPRESSIVE
TECHNIQUES IN PLAYFUL MULTIMEDIA

Vitali Annamaria Andrea – **Supervisor: Prof. Margherita Pillan**

The goal of this dissertation is to investigate the design processes governing the creation of interactive multimedia artifacts where interactivity, together with other design elements contributes significantly in engaging the audience through the interactive experience.

Interactive multimedia solutions allow people to have access to content and information. Despite the use of interactivity for creating meaningful experience has been widely explored in interaction design, we still lack a design knowledge that models the design mechanisms governing the creation of meaningful and engaging interactions, exploring form and expressive dimensions of interactive multimedia, beyond simply satisfying usability requirements.

This dissertation aims at finding answers focusing the research on other fields of interaction design: experimental and authorial video games. Experimental video games are playful multimedia artworks that enable the expansion of players' sensibility and perceptions, instead of being just entertainment-oriented media. Indeed, designers and creators of experimental video games are exploring expressive dimensions of interactive multimedia to engage audience on authorial

and cultural content. Therefore, experimental videogames are the design field where form and expression, authorship and experimental uses of interactivity, multisensory features, storytelling, collide to create highly experimental artworks, representative of engaging play experiences at emotional, sensorial, ethical or cognitive level.

The research process deals with the topic through a theoretical overview, a collection of case studies, and video game prototyping, reaching different results.

Firstly a theoretical re-definition of meaningful play experiences as sense making processes (out from the full control of the designer) where the engagement could be both tied to multisensory and/or cognitive processes. Players experience a significant engagement through the creation and/or consumption of narratives through play, interacting with storytelling elements and so identifying themselves along the experience. The sense of agency is not anymore in reaching a final goal, but in engaging at ethical, sensorial or emotional level with an authorial content, and potentially with the authors. Which are the design mechanism governing this phenomena?

The dissertation provides a collection of case study and personal prototypes to define and model the design elements of video games that contribute to the creation of the play experience. The final model of analysis identifies three expressive dimensions – storytelling, gameplay, and visual representation – through which designers give form to experimental play mechanisms and multimedia effects. These mechanisms result from author's expression in modeling the different expressive dimensions of the medium, in order to reach a target experience. In the same time, they allow players to find their role in the interactive experience. For example, by interacting with the game world elements or storytelling choices, players give a different shape to the final experience, expressing their own perspective; the use of just one interactive - and meaningful choice - can be used to stress the meaning behind opposite possibilities. Sometimes, gameplay is a metaphorical performing action of an authorial content, where there are no choices, but interaction sequences with the representation, to unveil story and authorial content. The way expressive dimensions of video games are designed -

the degree of interactivity and the possibility to interact and change storytelling and/or the visual representation, the way it happens (one interaction, multiple choices, metaphorical interaction), create the background for the definition of a two-axis spectrum of meaningful play experience. The level of engagement in playful multimedia could be both tied to open form of gameplay, where interactivity allows players a range of possibilities to enact their own story, versus *close* form of gameplay, where rules and mechanics aim at leading players towards a specific vision and story. This spectrum is intersected with *ambiguity* versus *storytelling*. Some video games are not focused on explicit story, but for example only on an experience mechanism, a multisensory feature. Other video games have interactive storytelling as a strong component for communicating authorial content and visions. As third result, the research reflects on the creative processes leading the creation of authorial video games: author's needs of expression from one side, and cultural and artistic requirements from the other one. Taking inspiration from autobiographical events, historical and cultural references, other form of art like literature and cinema,

an experience mechanism or emotional mood, video games are crafted to provide a digital communication space where players can engage in experiencing something/someone else's story through experimental design mechanisms.

These observations on creative processes introduce a final research outcome: players' engagement as empathy process through interactive and multimedia experiences. Despite meaningful play is out of our control as designer, the thesis doesn't only reframe meaningful play as a sense making process engaging players, but it also connected meaningful play to the possibility to reach empathy with author's vision. Indeed as final step of the research process, I realized a preliminary set of interviews, in form of informal dialogues, asking players to narrate their experience after they played the prototypes I realized. Different results have been achieved according to the nature of the prototype (the creative processes governing the design phase and the mechanism of play employed), and according to players' previous experience. A deeper and clear statement of empathy towards the story proposed in the artworks ("I've been there, I know the feeling of

the author") or more ambiguous response for open form of video games prototypes, demonstrated how the video games I realized could be engaging at different levels according the creative processes and the design technics employed and so the kind of play experience set and achieved.

In conclusion the dissertation investigates design approaches to the design of experimental/authorial videogames to reframe the approach to the design of meaningful experiences. Going beyond the idea of meaningful play, the thesis reframes meaningful experiences as sense making processes that engage the final audience at different levels and through different expressive techniques towards an authorial content. By this way the design goal is not how to achieve meaningful experience, but how to create an engaging interaction with a multimedia artworks exploring diverse creative processes and diverse expressive dimensions of interactive multimedia.

MOVING IN THE DIGITAL ERA: ENVISIONING INNOVATIVE INTERIOR SOLUTIONS FOR FUTURE DRIVERLESS CARS IN RESPONSIVE URBAN SPACES.

Zilvetti Marco – Supervisor: Prof. Fausto Brevi

Over recent years cities have undergone major change as technologies applied to the urban environment become more pervasive. In the early 1990s the expansion in the use of the Internet led researchers to predict the 'death of distance' and the decline of cities. Despite such forecasts, the world's urban population has grown rapidly over the last 60 years and by 2008 more than half of all people lived in metropolitan areas. This percentage is expected to grow to 70% (5 billion people) by 2050. The widespread use of electronic devices is dematerialising the physical world and urban areas are undergoing significant changes as networked digital technologies drive socio-cultural dynamics. Cities are supporting both individual and collective necessities as innovative solutions are taken from conception to inception.

The term 'smart city' has been used to define responsive built areas in which pervasive technology enables real-time data exchange, networks and collaboration. However, and despite these technological advances, several issues continue to severely impact the lives of city dwellers – many of which relate to transportation i.e. traffic congestion, pollution, parking availability

Solutions to these issues must be efficient, safe and sustainable. In this respect, and while public transportation systems (trains, busses, trams etc) have a crucial role to play. It is highly likely that cars will continue to play a central role in urban mobility, particularly for the 'last mile' and other within-city journeys. The use of groundbreaking driverless technologies has the potential to enable innovative commuting solutions, both outside and within cities; driverless vehicles could provide a major contribution to road safety, optimised vehicle use patterns and hence reduced pollution and improved traffic flows. The widespread use of driverless vehicles, especially if shared, could result in highly positive impacts both in terms of transport conditions and overall living standards.

Driverless technology allows alternative vehicle uses to be explored – including the potential for the interior space to be used as a dedicated working or leisure environment, either shared or personal. However, vehicle manufacturers currently lack a clear direction with respect to these issues, and rather than focussing on urban mobility solutions the emphasis remains on luxury and exclusivity –

particularly with respect to vehicle interiors, the utility of which has, essentially, changed very little for decades.

Autonomous vehicles will be a key-driver in the realisation of innovative interior spaces, especially when designing products related to urban commutes and last mile mobility. In a time when the physical and digital realms are increasingly entwined, it is not merely a matter of providing a means of transportation, which satisfy people's needs and optimise commuting time. Improving living standards, safety and broad travel experience constitute some of the key principles driving automotive companies, transport providers and authorities in the implementation of their future business plans.

This research identified and addresses existing gaps in the design of the interior of shared driverless vehicles attended for use in the urban environment. In involved interaction with experts (including in the early stages of the design process) and potential future users. The methodology included both one-on-one structured interviews with experts in the fields of urban mobility and car design, and an online survey in which potential users were asked to express their opinions
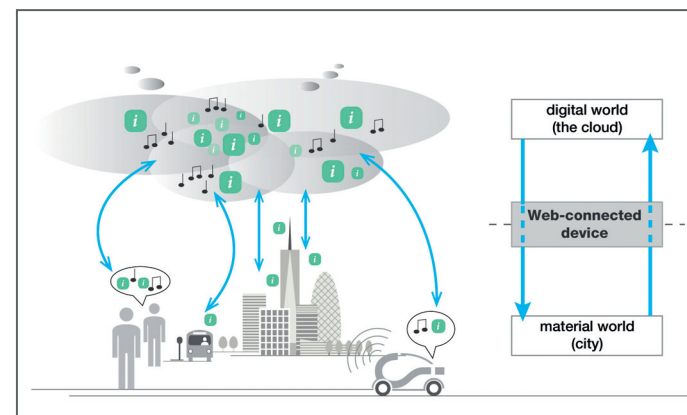
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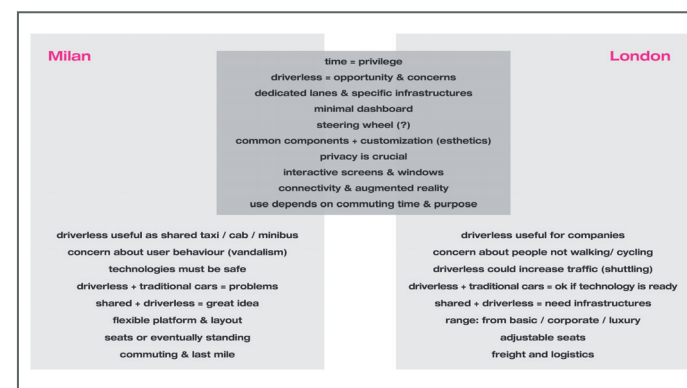
2. Main findings of the research

on a wide range of topics related to urban mobility and driverless vehicles. Design professionals (including those not specifically involved with car design) were also asked to consider novel approaches to the design of driverless car interiors, which have not been considered by the mainstream automotive industry Research was carried out in London and in Milan – cities selected on the basis of being representative of 1) a large city with a fully integrated transportation system (London) and, 2) a medium sized city (Milan) which is less well served by public transport and shows greater reliance on cars for within city journeys.

Results showed clear differences between London and Milan; surveys indicated that, in London, the main use envisaged for driverless vehicles would be for 'last mile' transportation e.g. short journeys from an underground station to a final destination. In Milan, by contrast, surveys indicated that longer journeys would likely be the norm with driverless vehicles acting as a key component in urban mobility rather than (as in London) a supplement to public transport. The implications of these findings are that a purely utilitarian, basic interior would likely be appropriate for widespread use in London, with a more multi-functional interior likely to be the

favoured option in Milan. There was considerable congruence in the results of the surveys of potential users and design experts – but conventional, 'business as usual' thinking, remained evident. The inputs from designers from non-automotive backgrounds are explored to propose innovative solutions for the interiors of future driverless cars.