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Generative design: experimentation on identity signs analyzed in the Portuguese tourism posters from 1934-2014

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Abstract

The research is developed around the national identity problematic characterized by the bibliographic review, and built from several authors' visions, such as Eduardo Lourenço, António Quadros, Eduardo Prado Coelho, José Miguel Sardica among others, all of which are clearly summarized by José Gil words which considers that, in addition to a disbelief in Portuguese identity derived from the global crisis, it has long been evident and aggravated the loss of the image of itself (Gil,2009).

With the objective of identifying identity values that over the last eighty years have been recurrent in the graphic communication media, namely the poster as a way to advertise Portugal, either through tourism or national promotional campaigns, we intend to build a matrix that identifies signs and meanings of the elements that have composed the touristic posters production in Portugal.

This study results in the application of the identitary symbols into a generative, interactive and co-creative model. The matrix is the basis to the development of a generative system with parameters that form the narrative for the co-creative process. Initially, it is intended that this platform becomes a mean for the reflection and the validation of the symbols signaled in the study.

Keywords

Design, Generative, Identity, Portugal, Co-creation

1 Introduction

The purpose of this study consists on an “exercise” to identify one or several icons that represent an identity for Portugal. The object of the study was defined by its essential characteristic, the capability to bring together a specific “look and feel” to the image that identifies Portugal, especially the ones present in Portuguese touristic posters. Furthermore, all the information we analyzed through the semiotic interpretation in this kind of graphic compositions and communication mechanism, allowed us to obtain data in order to build the imagery and narrative in a generative platform.

We also consider that the study of Portugal’s tourism posters can be an important contribution from this research by showing these posters’ peculiarity, and developing a conceptual model of semantics interpretation, validated by stakeholders and professionals. The approach undertaken in this research is not limited to a response to a problem, it also opens to the Community, in which the experimentalism of the medium is a facilitator to a difficult issue to deal with. Thus, the object of this research is to create means to debate and discuss these forms, from their manipulation to their deconstruction, through a narrative composed by actions that secure the graphic values used in the communication of Portugal, particularly within the tourism posters.

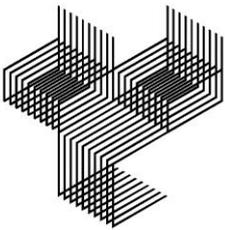
2 Literature Review

In a constant quest to position Portugal in the world, imagery is poorly developed, empty of history, context and identity. By looking from the outside in, the premise of an immune or exemplar looking is not always reflected, and it fails to fulfill the whole image. It’s not the purpose of this study to identify an icon that represents, as a whole, an identity for Portugal, but to possibly identify the signs used to represent Portugal in the period comprised between Estado Novo and our days.

Also, it shows that the identifiable graphic elements cannot exhaust on themselves the elements that repeatedly used are not likely to be questioned, manipulated and transformed in an exploratory exercise of reflection and design? According to Bourdieu, "(...) the quest for the 'objective' criteria of 'regional' or 'ethnic' identity should not make one forget that, in social practice, these criteria (for example, language, dialect and accent) are the object of mental representations, that is. of acts of perception and appreciation, of cognition and recognition, in which agents invest their interests and their presuppositions, and of objectified representations, in things (emblems, flags, badges, etc.) or acts, self-interested strategies of symbolic manipulation which aim at determining the (mental) representation that other people may form of these properties and their bearers" (Bourdieu, 1989).

The understanding of the meaning of images/icons/symbols, on the part of a person’s collective, the study of semiotics, which has its origin in the issues of linguistics and "semiology" with Ferdinand de Saussure in early 1900s. Underlying the semiology and semiotics, there was an interest in understanding the relation between the components of the sign, by Peirce.

“The representamen signifies an object, which in turn conjures up a mental concept, the interpretant, in the mind of the reader. However, when we consider meaning we must recognise that this triangular process may happen more than once from one starting point. To use Peirce’s terms, the interpretant



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resulting in our mind from the first representamen can then become a further sign and trigger an infinite chain of associations, where the interpretant in one sequence becomes the representamen of the next sequence" (Crow,2010)

The forms can not be exhausted in their representativeness because if they did, abstraction would have never been the object of reflection in the drawing. They can indeed set some parameters /rules which are fundamental for understanding their way.

The processes that currently exist for Computer Graphics not only contemplate the fact that technology has become increasingly more immersive, but also how it became a vehicle of exploitation of drawing with automatisms that allow you to explore other ways in addition to the usual dynamic interaction with the technical means of drawing. Bohnacker reinforces this idea in the explanation of the meaning of generative design.

"Generative Design is the decomposition of the Design process into a limited amount of steps, rules and parameters, and their combination into an algorithm, respectively the combination of several algorithms into a program. A program is able to run countless interactions and generate a large amount of individual images or other graphical products" (Bohnacker, 2009).

As Pearson (2011) indicates, the work developed by artists' human procreation is an expression of our humanity and individuality. From the technological point of view, the author should create a generative methodology that, on one hand, has to be autonomous but also, on the other hand, interactive with the Community. The creative has to create rules and parameters that include random or semi-random (semi-random), in order to achieve greater freedom of results, which emit, but doesn't disengage the plausibility of the original objective. After the drawing of the interaction, the automatism is placed in the background, being the interaction of the user's action.

The generative design is procedural. The development may not be conclusive or closed, but it is focused on the process and implements an aesthetic system, both combinatory and random. The generative design can be both combinatory and interactive, or associate both techniques. The interactivity and participation are not mandatory in an experience of generative design, but as a basis, a multiplatform opportunity to participate and interact is an important feature.

"A generative system in itself is not necessarily interactive (...). The extra effort involved in installing control elements (buttons, sliders, etc.) is worthwhile, so that each parameter can be manipulated in real time" (Bohnacker et al, 2012).

In this way, as Sanders defines, a process as generative design allows to a moment of co-creation in co-design because it requires the participation of designers and experts who complement each other in creative processes. The interaction becomes a means of allowing access to a design's new part, wherein the exploration is accessible to co-creative processes, its customization, and also a bi-directional communication between any intervenient interested in interacting (Sanders, 2008).

This is an acceptable process for exercising the search for national identity values, and these systems handle two variables, on one hand the parameters and rules, and on the other, the combinatorial and improvisation.

For Galanter (2003) and purists, the influence of the art object is in the definition of what art is, so that it may transform over time, but it is defined by being a subset of potentially multiplied results. The authors focus on these complexes, in systems designated areas of complex and complex science theories, which is the difference between chaotic and random systems (Galanter, 2003).

3 Research Method, Models and Instruments

The methodological process applied in a first data collection phase was qualitative and quantitative, taking into account the collection and documentation of tourist events through publications, libraries, including the National Library and the Tourism Archive of Portugal, as well as the medium digital web. The study was focused on the identification and cataloguing of a sample of 117 tourist posters. These were then analyzed according to a methodology originated from the theories of Charles Peirce on the relations established between the semiotic meaning (interpretation), significant (representation) and the object (referent) and also from the method of Martine Joly that sets an image as a sign belonging to a sub-icon and the qualitative analogy between signifier and referent, i.e: the image is not an icon but it is an iconic sign (drawing, photo, painting), an image that contains formal reference qualities (color, shape, proportion) and metaphor (ratio from qualitative parallels).

To Crow (2010), this method is important because throughout the study, the use of photography was intensified, particularly in the 1990s, and it was necessary to associate the interpretation of the viewpoint of the connotation and denotation. But, in order to transform the results from the semiotic study to visual dichotomies, in this research we identified two models that crossed with a new interpretation: The Model of Algirdas Greimas and Model Leborg (Leborg, 2004). The first one is created by the opposition of those relationships and thus aims to identify the form/formless and abstract/no abstract (i.e: establish relationships between complementary terms, contrary terms and contradictory terms). The second one is about the content and it identifies four concepts: abstract, concrete, activities and relations.

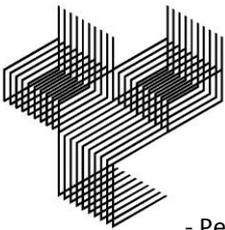
The design of this study is on these signs and symbols that do not close. On the contrary the interpretative dimension and identity value playing in the minds of citizens open for a new range of interpretations and imagery, without losing the identity. On the first result of the matrix, Portugal's tourism posters feature various aspects that are consistent with the objectives:

- Representative, or so considered - by the designers of that time - representative of the national identity values;
- Framed by a temporal factor with a possible identification with the beginning of the construction of 'Portugalidade' (the image of Portuguese Nationality) imagery;
- Marketing and communication strategy in tourism development and the communication of Portugal for internal and external audience;
- The variety of representation techniques and iconographic themes;
- Semiotic characterization for the construction of an identity matrix;
- Significance of all the elements together;
- Significance versus function vs propose;
- The transformation of the poster communication after the civil revolution on April the 25th.

To interpret, design and implement the designed model for the purpose of studying and developing into a generative platform, we structured the following frameworks:

A - SEMIOTIC FRAME:

- Development of the analysis matrix;
- Selection of the Portuguese Tourism Posters;



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- Perform the analysis of 117 Posters according to the defined matrix;
- Extraction of the results;
- Transform the most relevant signs and symbols into simplified graphic icons;
- Apply the semiotic model to the results analysis;
- Develop the co-creation research kit to provide to the stakeholders
- Signs, semiotic model and narratives.

B – RUN THE CO-CREATIVE WORKSHOPS FRAME

- Provide the kit to the stakeholders for their feedback and critical analysis;
- Run a personal deep interview with each stakeholder;
- Analyse all the stakeholders feedback;
- Define improvement points;
- Make the improvements.

C- GENERATIVE CONCEPTUAL MODEL

- Based on the Flying Wedge Model from Laurel, we have developed a conceptual model for the beginning of the generative design and the result is the combinatory informed.
- The interaction is a result of immersion between Order, Chaos, Programming and Random.

4 Results

As a result of the analysis and assignment of indicators, the matrix revealed some evidence regarding the development of tourism events over the years:

A- Most of the posters do not express visually the season and yet, the most pictographic evidence is relating to the summer and spring.

B- There is a clear predominant representation of the sea / the shore / the coast, with the remaining regarding field, beach and buildings.

C- In the matrix the colors were identified in three levels: blue is the predominant color because it represents the sky and the sea; the second color is white, representing the unprinted area on the surface; the third colors are green, yellow and red, exactly in this order, and these are the other colors with more printable area.

D- Most of the posters have a dynamic character portrayed in the composition.

E- The layout placement grid is not 100%, due to the fact that there is a predominance of white.

F- Most compositions have a single or depth plan, and portrait a balanced relationship of distance and proximity with what is represented.

G- The shadow is a present element in the compositions and it is predominant.

H- Identification of some patterns in waves, chess, buildings, heart of Viana do Castelo, topology of the field, ornaments, Barcelos' cock and geometries, and in most patterns there is no repetition, even rhythms.

I- The mostly represented forms and icons, are the sun and then the sea, boats, beaches, buildings, roosters, fishes, mountains, skylines, boats sailing, corners, ornaments and sunflowers.

J- The font is normally s / serif and it dominates the headline with the word Portugal.

It was also possible to identify the most representative icons in the sample, which resulted in 39 schematic, simplified and structural drawings, a semiotic model and the final narratives.

In order to validate the results and identify their identity relationship with Portugal we developed a script in order to be subjected to a set of professional design stakeholders.

With the support of the Research Group Ideas(r)evolution, from UNICOM/IADE, it was asked to teachers/designers, from the institution and from outside the institution, to validate the results through a co-creative process. For this process, a script was designed to be analyzed, where stakeholders validated the interpretative semiotic frame and its respective results, the parameters of interactive narratives, the generative platform, the interpretive drawings, the generative capacity and generative actions.

Thus to conclude, it was possible to confirm/revalidate the results of the workshop, resulting in the selection of 14 icons, where the most representative of Portugal, in the positive quadrant, are the Quinas, the heart of Viana do Castelo, Barcelos' cock, the sun and the Sunset. The less representative of Portugal were buildings, landscape, patterns, craft and decorations.

Then, the semiotic model was redesigned and it showed a better reading of the various dimensions, that is, from the most formal to the least formal, from the abstract to the less abstract, from more Portugal to less Portugal, dividing further illustrations of the photo.

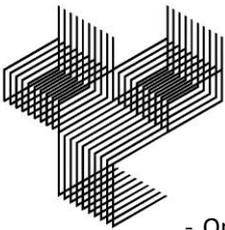
5 Generative Platform

The results were programmed in a generative platform that we consider to be a primary experience of this research (1.0), in order to assume postmodernist and deconstructivism systems that revolutionize the process of thinking about the procedure in order to articulate complex social and institutional processes, instilling a necessary research into more exploitative practices of design, listing the positive and negative aspects. In this process we considered the random factor for user experimentation not depending solely on parameters of built narrative in addition to the generative process, combinatorial and improvisation are two random logic already applied to computer media, which are constantly changing but for the parametric/generative design the method can be combinatorial, interactive, or both.

Taking into consideration the design of interactions (stories) resultant from the workshop, which in some of the elements calculated in the analysis matrix have been restricted and programmed through Processing (JAVA) and the second narrative already identified above. The platform is structured on the right side of the icons, with ways to access the base forms, and the left side structured with the narrative manipulation, which parameters allow:

- Mirror: duplicates the image once or twice;
- Dynamism: to transform the lines of shapes based on a straight, allowing to create momentum for the stylization of forms;
- Structuralism: moves the ways in the Y-axis and X-axis on the layout area;
- Rotation: allows the shape rotate 360 ° on the same route;
- Radiation: allows you to zoom in and out the form in the layout area;
- Saturation: allows to intensify way through the line width of the form;
- Colors: green ranges, yellow and red for the trace of the medium;
- Background color: range of blue as an alternative to the white layout itself;
- Random: works with an on and off, since it functions as a control function that runs on the above parameters again according to a repeated algorithm.

In the end, the user has a choice that makes the interaction clear and returns to redo, or record in two ways:



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- Online records and the result may be saved with their identification at home online - <http://slplataforma.tk>, becoming part of the wall of experiments;

- Offline records and the result is saved in PNG format on the platform file.

The platform is available to design students and colleagues to experiment, and the results were extremely diverse. The only premise requested was to develop the interaction so far that it continues to identify the coherence of form as an identity element of Portugal. The sample will continue to increase, since the process is continuous.

The analysis matrix applied to the posters identified several parameters that have not been fully used, but that in the near future, it will have continuity and development in future versions of the platform. We believe that the presented version 1.0 can still progress to 2.0 with respect to the interaction parameter greater through the narrative not yet contemplated in this version.

6 Conclusion

From this study it was possible to collect two types of conclusions. At the first part of the research there are several issues related to the instruments' development for the posters and strategic communication of a country that might still be revised and reintroduced into the study. The second part is the introduction of new narratives and data information on a 2.0 generative platform.

From the 30s to the 60s it is noticeable an iconographic and territorial diversity by multiple artists/designers who did the illustration of the posters. Vibrant colors and geometrical shapes created diversified rhythms, influenced by the avant-garde of the time. It was characterized then by the vividness of ways, with the sun always picture pictured in the frame. There is a greater concern in identifying local identity values as through shapes, clothing, symbols or scenery. From the 60s to the 70s, communication was quite appealing with the slogan "Visit" along with landscapes, people and culture. Shooting begins to be used as a resource and to counter the illustrative object so used until then, making it even more effective to the representability of the regions. And from the 70s to the 80s, there was a concern in showing the popular culture, objects, sea, sky and locations.

It is noteworthy that after the April 25th Revolution there is a recovery of some of the most popular topics like close-ups of the cultural roots of the country. There is no conductive line in 1977 and beyond, on the use of photography to a wide range of photography and representativeness of Portugal. This style extends until later, slightly altering it, lettering the word Portugal. In the 80s there is a resumption of illustration, featuring the landscape diversity of the territory. In the 90 years it is reflected in the imagery, the power of globalization and it builds up a communication that identifies the position of Portugal in relation to the rest of Europe - geographic location (European ports), also because of the transferring of the development of communication in Tourism of Portugal to international agencies that are, however, hosted in Portugal. Photography is the message being complementary tag lines and a teaser to encourage the discovery of Portugal.

In the development of this study, it is clear that there are two distinct processes contributing to the scientific community, as an experimental model:

- On one hand, the semiotic model along with the interpretative matrix which can be applied to other studies where the purpose is to identify, from sources, factual evidence of symbolic values, as the object of study in this document - Touristic Posters From Portugal;

- On the other hand the platform as a mediator in a co-creative process for the exercise of generative exploration of an emerging language for a design of reflection, turning into a cyclical process of upgrade, hypothesis and logic *What if*.

The model can be applied to the exploration of other shapes, patterns, symbols, marks, etc; provided it is submitted to the two cases, with parameters defined for the their purpose. The goals to achieve with the future research in version 2.0 are the following:

- Working online for full participation of all stakeholders for a maximization of the concept of co-creation;
- Application of more parameters representative of the results of the study of signs, more detailed;
- Possibility of combining shapes in the same layout;
- Upload files resulting from the possibility of interaction at the platform, for new interaction by other users;
- A more dynamic wall, to create a community of exploitation of the platform and the subject of debating Portugal's Identity.

It will be of interest to create a greater flexibility in the use of the file and more specific parameters, which approximates to further characterization of the identified results into the matrix.

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Synthesis of the Arts: The Project of Architecture in its Relation with the Process of Design. Carlos Tojal, Manuel Moreira and Carlos Roxo (1960- 1974): *Multipiano*, a case study.

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Abstract

Within the Theory and History of Material Culture, as well as the Theory of Design, this project relies not on essayistic, but on historiographical based investigation, strongly founded in documental sources. Aiming to reveal inedited documentation, actions and agents witch may contribute to the comprehension of the place of design, has of the culture of project oriented thought within the Portuguese context, it assumes as its object of study the architecture studio *Multipiano* – therefore, framing the problem of Design in Portugal from its process point of view, rather than from its object.

Established in Lisbon around 1972 by the architects Carlos Tojal (1929-2015), Manuel Moreira (b.1933) and Carlos Roxo (b.1935), three architects known by the “Three Wonders” epithet, *Multipiano* and its interveners guard witness to several moments of national projectual culture. Between 1961 and 1974, Tojal, Moreira and Roxo have jointly developed a vast and coherent project-oriented and ideological body of products: demarcating up from *Beaux-Arts* contemplation, ideal Deco, or Modernist interactions to embrace projectual materialist dialectics, extending yet the concept of useful by structurally integrating artistic thinking along the social utopia of design; to be later overtaken by market.

Keywords

*Portuguese Design History, Synthesis of the Arts, Projectual Culture in
Portugal, Material Culture, Design Studies.*

Introduction

Objectives

Within the context of the history of material culture, as well as the theory of design, the present PhD project aims primarily to provide new data on Portuguese Design History. An intention achieved by the unveiling of inedited documentation, actions and agents able of contribution to the understanding of the place of design, as well as that of project oriented thought and culture, within Portugal in the comprised period.

The PhD project inquires the relation between the architectural project and the process of design, focusing in Portugal between 1960 and 1974 – a period of “affirmation and development of design in Portugal”¹. Another goal is to reflect on bauhausian practice of *Synthesis of the Arts* within the Lisbon circle in the period in question.

The case study and its chronological boundaries

The object of the study is the *Multiplano* architectural atelier. A studio established in Lisbon around 1972 by the architects Carlos Tojal (1929-2015), Manuel Moreira (b.1933) and Carlos Roxo (b.1935) whom, between 1961 and 1974, jointly developed a vast and coherent project-oriented and ideological body of products.

“Originally a medium-sized architectural studio, Multiplano has gradually evolved into a complete design bureau handling a wide range of design, engineering and architectural projects.

By introducing new techniques and working methods [...]. For each commission a team of specialists is formed, to operate, as far as possible, on a free and flexible basis. [...] architects, civil engineers, painters, interior and industrial designers, graphic artists, quantity and equipment surveyors and other qualified technicians.” (Multiplano, 1972).

The state of the art and the relevance of the study

This investigation comprises an original survey, since no more than brief references in general studies are found about the mentioned architects work², along with a few personal testimonies within *Arquitectura* and *Binário* magazines.

¹ See (Souto, 2013,1 and 2012-2015).

² By the hand of authors such as: Ana Tostões, Gonçalo E.O. Moniz, João Paulo Martins, Jorge Manuel Simões Alves, Rui Afonso Santos or Vítor Manaças.

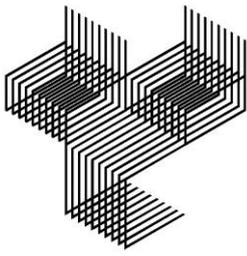


Figure 1. *Multiplano's studio: Largo de Santos, nº13,1º, Lisbon. Reception aspect with sofa designed by painter Rogério Ribeiro (1930-2008) (according to Arch. Eduardo Martins³). (Sandra Antunes)⁴*

Methods

Supported by strong historiographical and applied research methodology, considering “[...]design as a social and historical phenomenon” (Walker,[1989]1990,1), this is an original historical research survey. It assumes as its primary source the *Multiplano's* archive of drawings, manuscript and typewritten documents, which Sandra Antunes found in December 2013 in the care of Architect Eduardo Martins (by those days responsible for the housing cooperative *Percurso*, the *Multiplano's* studio successor at Largo de Santos, nº13, 1º)⁵. The testimony of the interveners and their personal archives are also assumed as primary sources. The drawing of a national and international time line helps on the contextual questioning of the facts and the observation of conclusions, documenting and regulating the final analysis in the face of incomplete or displaced memories dictated by the interveners. All collected statements are subsequently validated by the interviewees. Access to *Multiplano's* archive also allows a less idealized view of the work process, over the consideration of the role of market and regulatory authorities in the design process, enabling the look beyond the canonized design object or its romanticized author.



Figure 2. *Multiplano's archive at Largo de Santos, nº13, 1º on December 2013. (Sandra Antunes)*

³ A former collaborator of Tojal, Moreira and Roxo, since the *Mãe d'Água's* studio.

⁴ This space was dismantled in February 2014. The above mentioned sofa was collected at MUDE, Lisbon.

⁵ IADE-U is now *Multiplano's* archive trustee depositary, until the national archive of architectural and urban heritage (safeguarded by the information system for the architectural heritage (SIPA) of institute for housing and urban rehabilitation (IHRU) within Forte de Sacavém archive) may be able to welcome it for public consultation. SIPA/IHRU - Institution to which Carlos Roxo has already bequeathed his architectural drawings archive.

Synthesis of the Arts: The Project of Architecture in its Relation with the Process of Design. Carlos Tojal, Manuel Moreira and Carlos Roxo (1960-1974): Multiplano, a case study.

The preamble of my investigation lies in the survey pronounced by Maria Helena Souto at MUDE⁶ regarding her research project “Design in Portugal (1960-1974): the actions, actors and repercussions of the Art, Industrial Architecture and Industrial Design Nuclei of the National Institute of Industrial Research (I.N.I.I.)”⁷ and the subsequent debate on preservation of the Portuguese design heritage; combined with the fact of my working within an architectural space that has always aroused my interest. Only to find out, by searching its archives, that it was the first joint work of Tojal, Moreira and Roxo: by 1961, the school building of Penafirme’s Lyceum Seminar⁸.

Fellow researcher, between August 2014 and June 2015, within Helena Souto’s project⁹, I acquire the knowledge within Portuguese Design History arising from a path she has been braving since at least 1992¹⁰. Such residence has also grounded the methodological bases for the investigation which I now aim to conclude.

According to the methods of the Social and Human Sciences, this project has been structured in two main nucleus. The first – of heuristic character – for the archive inventory and classification of actions, interveners, clients, regulators and their actual contingencies, plus collecting relevant testimonials. The second – hermeneutics, considering design history has the history of material and immaterial culture – to the production of knowledge able to underpin future research: by observing semiotics principles; framing and comparing the facts, plus constructing interpretative analysis of the drawings, the work, the actions and writings of the interveners; collecting and interpreting the body of concepts in presence (or absence) and trying to understand its impact on architecture, design and project-oriented culture in Portugal.

Results

The Work

Among the work documentarily attributed to the studio in report, the following pieces are observed: 1961 – remodelling *Loja das Meias*, Lisbon (Silva, Tojal, Moreira & Roxo, 1961, 19) and project to the school building of *Seminário Liceal de Penafirme* (Penafirme’s archive); 1963/70 – remodelling *STOP*, Lisbon (Multiplano’s archive); 1964/67 – *Rualdo* and *Instituto Luso-Fármaco*, Lisbon (Duarte, 1968, 15, 20); 1965/67 – *Banco Fonecas & Burnay’s* filial,

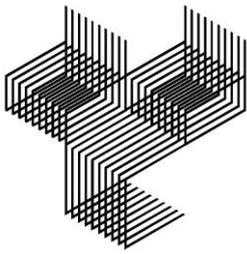
⁶ Lisbon’s museum of design and fashion (MUDE), on May 2013, within the debate on “Preservation of Interiors and Modern Design in Portugal”, by occasion of the exhibition “INTERIORS. 100 years of Interior Architecture in Portugal (1900-1999)”.

⁷ See: Souto, M.H. (Principal Investigator). (2012-2015). *Design em Portugal (1960-1974)* [...]. [online]. Retrieved from <http://www.iade.pt/unidcom/designportugal/>

⁸ Seminário Liceal de Penafirme, Torres Vedras, Portugal.

⁹ To study the nucleolus which led to the institutionalization of the discipline of design among us, from the time when the economic context of the Second Post War compelled the Portuguese New State’s dictatorship to develop the industrial sector (the decades of 1950, 1960 and the beginning of the 1970’s) to the Portuguese revolution in 1974.

¹⁰ Souto, M.H. (1992). «Design» em Portugal 1980-1990 – Dispersão Pluralista. *Enciclopédia Temática Portugal Moderno, Artes & Letras*, 99–117. Lisboa: Pomo.



Oporto (Duarte,1968,12); 1965/70 – remodelling *Grande Gala*, Lisbon; 1965/73 *Castilho 50*, Lisbon; 1967 – *Café-Restaurante da Amura*, Bissau; 1967/68 – Port Administration of Bissau; 1967/71 – *Traje*, Lisbon; 1968 – remodelling *Fábrica Portugal* store, Lisbon; 1968/69 – remodelling *Farmácia Liberal*, Lisbon; 1969 – remodelling *Casa Agricola Santos Jorge*, Lisbon; 1969/73 – remodelling *Lavores Femininos*, Lisbon; 1969/1974 – remodelling of *Camisaria Moderna*, Lisbon (*Multiplano's* archive); 1969/70 – *Betesga*, Lisbon (*Multiplano's* archive and Simões,1970,158) and *Crédito Predial Português's* filial, Oporto (Duarte,1971,16); 1970/71 – *Rocia*, Lisbon (IHRU and *Multiplano's* archives); 1971 – *Traje* (Duarte,1971,16), *Dally* (*Multiplano's* archive) and *Meia-Lua*, Lisbon (Duarte,1971,15); 1971/1972 – project to *Simopre* building, Rua Barata Salgueiro/Rua Castilho, Lisbon (Lamas,1979,29); from 1972 onwards they were responsible for numerous remodelations in *Banco Fonsecas & Burnay's* filials; 1973 – *Torres do Tejo* project with Emery Roth & Sons Architects (EUA); about 1973 – contest for Vilamoura's port urbanization; 1973/75 remodelling *Chrysler*, Lisbon (*Multiplano's* archive).

The collaborators

As one of the most regular collaborators of Tojal, Moreira and Roxo, at least since *Rualdo stand* (1964/68) and until the group scission in 1974, the painter Rogério Ribeiro (1930-2008)¹¹ is observed. In 1974 Rogério Ribeiro assumes coordination of the group working on the curricular restructuring of ESBAL in the area of design, to the installation of the Industrial Design of Equipment Course (Ribeiro,1999,2)¹².

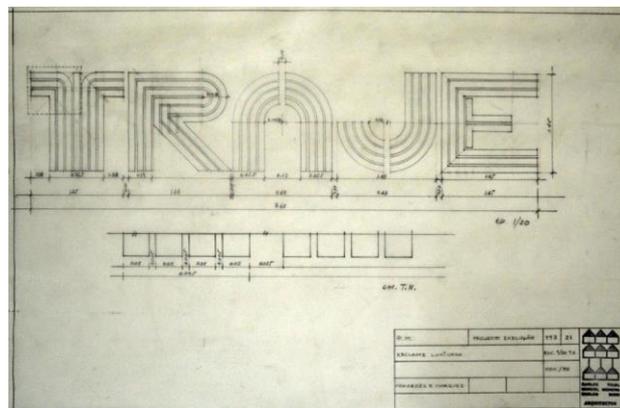


Figure 3. Carlos Tojal, Manuel Moreira, Carlos Roxo (1970, November). *Prazeres e Marques*. Execution project. Luminous advertise. Graphite on vegetal paper. Firmed and dated. *Multiplano's* archive. (Sandra Antunes)

¹¹ Licensee in painting by Lisbon's Fine Arts School (ESBAL) in 1959 (Macaças, 2007).

¹² Rogério Ribeiro is one of the several names whom beside Daciano da Costa, António Sena da Silva, Jorge Vieira and Sá Nogueira has collaborate in Frederico George atelier from the end of the 50's (Alves,2003,5). Since 1967 Rogério Ribeiro integrates the team for the study, preparation and assembly of the Calouste Gulbenkian Museum (Ribeiro,1999,7), it is architect José Aleixo da França [Sommer] Ribeiro who invites him (Alves,2003,24). In 1961 he is a teacher of Painting and Technology at Escola de Artes Decorativas António Arroio and in 1971 an assistant in Painting at ESBAL. In this same year he assumes de assembly of the exhibition of Italian industrial design *Compasso d'Oro* – presented at Industrial Fair of Lisbon (FIL), from the 9th to the 15th of December 1971. From 1974 to 1996 he also assumes the coordination of Industrial Design of Equipment and its representing at the Scientific Board of ESBAL (Ribeiro,1999,2,5).

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Between Tojal, Moreira and Roxo collaborators are also identified, among others: the painter and ceramist Querubim Lapa (1925-2016) (Silva, Tojal, Moreira & Roxo 1961,19); the sculptor Lagoa Henriques (Duarte,1968,12)¹³; the painter Jorge Pinheiro (b.1931) (Roxo,1974,102); the painter António Mendes de Oliveira (Lamas, 1979,29)¹⁴ *Multipiano's* logo creator [ab. 1972] and collaborator of *Cooperativa Praxis*, represented in the 1st and 2nd Exhibition of Portuguese Design¹⁵; the designer Dario Romani¹⁶ (born in the Italian city of Lucca) or the landscape architect Júlio Moreira (b.1930) also a collaborator of *Cooperativa Praxis*, represented in the 2nd Exhibition of Portuguese Design. Collaborators named in *Multipiano's* archive to the period in study are also the architects: Alberto Aires Mateus, Armindo Espírito Santo, António Gamito, António Mateus, Carlos Monteiro de Oliveira, Eduardo Martins, Eduardo Rebello de Andrade, Francisco Sequeira, João Paulo Bessa, João Pinto de Oliveira, João Sardinha, João Vaz Martins, Jorge Silva, José Manuel Fava, Nuno Lopes da Silva; Pedro Brandão; Raul Santiago Pinto or Vasco Campos.



Figure 4. António Mendes de Oliveira. Sketch for Simopre's Logo (detail) [ab. 1972]. (according to Arch. Eduardo Martins). Graphite on paper. *Multipiano's* archive. (Sandra Antunes)

The conceptual body in presence

The concept of architecture as a "Visual Art"¹⁷ as that of "Scientific Aesthetics" enounced by Carlos Roxo in 1963, witness his will to legitimate architecture as an art¹⁸; his decenter from the self unexplained expression in the search for a perceived language operating with the basilar elements to the visual communication; and his aim for the questioning of all projectual decision in opposition to an idealistic or technicist concept of architecture –

¹³ Whom between 1960 and 62 is besides Daciano da Costa, Frederico George and Roberto Araújo in the "basic design course" which, being refused as a teacher candidate to ESBAL, Daciano da Costa undertakes in is atelier (Souto,1991,105).

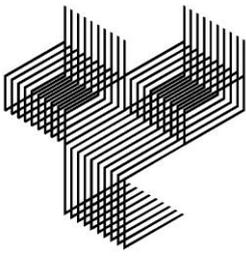
¹⁴ António Eduardo Teixeira Mendes de Oliveira (1944-1993). Death registration 319 of 1993 from the 3rd Lisbon *Conservatória*.

¹⁵ Collaborator also of *Editores Moraes* alongside José Escada, Sebastião Rodrigues, João Rodrigues, Duarte Nuno Simões, Alda Rosa, Moreira Rijo or Victorino Correia Martins (Tamen,2006,8).

¹⁶ Mentioned as decorator, while working at Daciano da Costas's Atelier Between 1968-1969 (Martins, 2001, 316).

¹⁷ Which Carlos Roxo introduces after quoting Gropius in *Alcances de la Arquitectura Integral*. (Roxo,1963, preamble).

¹⁸ In a time when the architect should sign his projects as "the technician responsible".



demonstrating awareness and method of a science of design, reached through objective findings rather than personal interpretation.

In 1968, on the 101st issue of *Arquitectura* magazine, Tojal, Moreira and Roxo sign a manifesto which concurs in the same direction: they favor the social environment, and consequently life and *the man of human condition*, the common man, as the protagonist of the reality to be considered by architecture and all aesthetical language.

Along the period between 1960 and 1974 two stages are clearly distinguishable in Tojal, Moreira and Roxo activity: a period lead by Utopia (corresponding to the experimentalist freedom of a studio working mainly with private commissioners for ephemeral stands remodeling) and a period lead by Market and the specialization of knowledge (from around 1972 on when, under the society *Multiplano*, they officially associate with *Banco Fonseca & Burnay* and its real estate agency *Simopre* – who bears the final approval of many projective decisions).

Discussion

Observing the Project of Architecture in its relation with the Process of Design, in Portugal in the period in question, it is not primarily a discussion about the object and boundaries of design, but rather the discerning of a quest to implement methodologies that may question the design project, by promoting dialectical interaction between all the objective knowledge embedded in it: exact sciences, arts, technology, human and social knowledge, operating in favour of social development and the common man's welfare. For it is mainly the expanding of this attitude by working through problems that holds significance in this period of our history.

By the seminal action of Frederico George¹⁹ (1915-1994), within the Lisbon circle design assumes the Bahausian globalizing nature. To George the battle of utilitarianism in architecture is won, so, he surnames the architect of “visual artist”²⁰ and professes “the integration of the emotional value, among the material functions of architecture”²¹ (George,1948,23). A confluence point with Tojal, Moreira and Roxo's practice, with several examples of organic articulation/shared methodologies with artists/ artistic knowledge.

Dissertating in 1999 to the obtainment of the Associate Professor consideration in Equipment Industrial Design, at Lisbon Fine Arts Faculty, Rogério Ribeiro defends that in such context “[...] the nature “industrial” is a consequence, not a rule.”²² Signifying, he secures, “[...] the integration in the whole where painters, sculptors and communication designers are formed[...].”²³ (Ribeiro,1999,11). To him, between designer and user, industry introduces the businessman – moving in different fields of interests. A fact that

¹⁹ Studied by (Souto,1992).

²⁰ “artista plástico”.

²¹ “[...]a integração do valor emocional, nas funções materiais da arquitectura.” (George,1948,23).

²² “[...]a natureza “industrial” é consequência e não primado.” (Ribeiro,1999,11).

²³ “Esta inserção significa ser integrado no conjunto de matérias “ditas” comuns ao longo do curso onde se forma também pintores, escultores e designers de comunicação.” (Ribeiro,1999,11).

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legitimizes the need for humanistic, ethical, cultural, social and aesthetical knowledge, acting in defence of the student, by providing him safe means of contemporaneity and innovation (Ribeiro,1999,17).

In his investigation on the practice of Industrial Design in Portugal, supervised by Rogério Ribeiro, Jorge Alves notices that among the initial group practicing design within the architecture studios, in Lisbon, the majority were painters and sculptors from ESBAL. A typology that contrasts to Oporto, where the practice of design develops by architects (Alves,2003,43) so that in 1974, while in Lisbon the Communication and Equipment Design are formed, in Oporto only the Communication Design it is (Alves,2003,69,214).

Here are some facts which, by act of further analysis, can lead to additional answers on the concept of *Synthesis of Arts* and its persistence within the Lisbon circle of action.

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Design Culture, Animation and Storytelling

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Abstract:

This proposal is set on the domain of Design Culture, of narrative animated films, on the contemporary period, in the geographic area of Japanese Animation, specifically looking into the work of Hayao Miyazaki and Studio Ghibli's films and the arena of consumption. The objectives are to define the design culture of the agency/studio, the design culture of the project, authorship, the design form, the design structure, pace and the intrinsic characteristics that comes from the design narrative of this geography and if different from others areas, relating object and consumers, and defining the role of design on the territory of global transformation. As a result we intent to create a designed model of Ghibli's films narrative design structure, which enables a comparison with others films and models and obtain results on the design culture of Studio Ghibli in the modernity of our Culture.

Keywords:

Design Culture, Storytelling, Animation, Studio Ghibli, Hayao Miyazaki

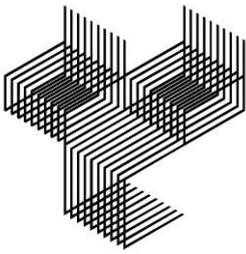
1. Introduction

1.1 Human Nature, Cognitive Process, Visual Culture, Design Culture

Human Nature. We address in this introduction storytelling as a process of our human nature. The process of organizing thoughts and emotions, into a structure, that we shape in units of time, and then tell, in an oral, written or visual form is inherent to us. It constitutes an early process of humans to communicate, survive and develop culture. This one capability distinguishes us from others animals, collecting something meaningful and reflecting the vision of our times. Since early cave drawings from the Paleolithic period (20.000 years ago), Homer's ancient Greek poems *Iliad* and *Odyssey* (from around 800 B. C.) a reference to the old narrative poems, the early reference of Plato (428 B.C.- 348 B.C.) on his work *Theory of Forms* (or theory of Ideas) or his metaphoric *Allegory of the Cave*, *Republic*, (380B.C) stories have been told, showing us the path and understanding of storytelling. Aristotle (384 B.C. - 322 B.C.) early on his time, theorized on his book *Poetics* (335 B.C.), the concepts of plot (*mythos*), character (*ethos*), diction (*lexis*), thought (*dianoia*) spectacle (*opsis*) and melody (*melos*) in one the earliest "dramatic theories" known to our existence.

A whole is what has a beginning and middle and end. (Aristotle, Poetics, 335 B.C., published by Perseus Digital Library, 1450b27, (2006).

Cognitive Process, Experience, Memory, Emotions, Engagement. Storytelling has been an intrinsic process of our evolution in the discovery of meaning and emotion. Individuals, in an equation of time, place, and form, unfold a story within a believe system and culture. We can mentally travel backwards and access episodic memory, or we can mentally travel ahead and plan future events. We don't remember all the seconds of our lives, but fragments of it, memories within a structure which sculpts our identity. Memory, experience, engagement, emotions and well being are important elements for the study of narrative design. Kahneman (2012), defines the idea of *two selves*, the *experience self* and the *remembering self*. The first one experiences, while the second one, selects and structures important moments of change in our memory. These selected units of time, are then boned into the skeleton of structure, reflecting our choices, saying who we are, what do we like, or what do we want tell, making our internal story. Brown defines in his study (2009), another important concept: *play* as a crucial element, needed to our development, well being, openness and learning, translating our ability to engage in a action without any specific purpose, developing physical skills, sensations, defying curiosity and promoting change and creativity. When watching a film, we play the game of identification and reaction with characters, situations, values, we imagine, we take decisions, and we



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develop our inner story from what we see. Csikszentmihalyi, (1990), develops the idea of *Flow* as an experience of well being, motivation, happiness, immersion, creativity. When watching a film we engage in a immersion experience, we forget all around us by simply focusing on the story, engaged and carried by meaning and emotions. Goleman (1995) marks important considerations regarding emotions, cognitive process, concepts of empathy, social engagement, expressions, gesture, reaction so important for narrative.

Culture. Culturally, storytelling projects new challenges. It opens the door of desire, social commentary, critic of society, judgment, hopes and a way of living. To a certain extent, storytelling reflects and shapes our culture and provides a conscience by shaping choices of creators and consumers. The creator does it with his intentions and the audience with choices, by viewing, reviewing, criticizing, choosing, going back and forwards on their Tv sets, voting, making social commentary, paying Tv services and video on demand, going to cinema and deciding what they want to see. In both perspectives (creator and audience) culture is shaped with decisions on content, design structure of narrative, design form and design culture. Is it a reaction to society? Is it a mirror of identity? Is it comfort that we are looking for, when society breaks down and war or political instabilities grow bold? Is it humor, justice, moral ambiguity, fantasy, imagination, judgment, irreverence, aspiration, etc. What does storytelling tells us of our collective conscience in our times? What is the design culture of our times?

From Visual Culture to Design Culture. Since the 1990's, narrative evolved to the form of screen culture and consumption of visual form, specifically related with the earlier discovery of photography, film, animation and the boom of Tv and internet. Design narrative reflecting our human nature and cultural evolution, redefines design culture, within specific geographies, agencies, objects and audiences. The context of our proposal is set on the relation between structure and design narrative from Studio Ghibli and the evolution of our culture in the area of Design Culture. Ghibli's films conquest east and west in an era of globalization and consumption, screen culture and created a Design Culture which so much reflect a geography of Japan, but which also gained global recognition, box office success, huge positive review from critics, filmmakers and audiences, Oscars awards and fans all over the globe. How are these films reflecting a design culture of our times? What are they saying from their design narrative that are so appealing to our world, and reflects so much our modernity issues? How is shaped and designed? What is the transformation role of the design regarding Studio, films and consumers? Julier, (2006) enlightens a good perspective on the concept of Design Culture.

Visual culture partially has emerged from art history through its incorporation of cultural studies. Material culture's provenance is in a mixture of anthropology, museum studies and design history. The term Design Culture has been employed in journalism and the design industry itself. (Julier, 2005, p.76)

To embrace Design culture as an academic discipline requires, therefore, a different sensibility than that of Visual Culture. In the first instance, it forces one to move beyond the enervated position of the

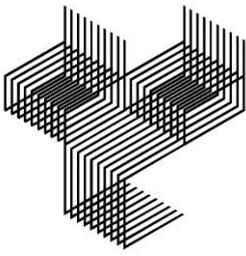
detached or alienated observer overwhelmed by images. Instead, a Design Culture inquiry traces a cartography that exposes and analyses the linkages of artifacts that constitute information flows and the spaces between them. Second, while one might dwell on individual artifacts, this process requires these to be relationally to other artifacts, processes and systems. Third, it may be mobilized not merely as analysis, but as a generative mode that produces new sensibilities, attitudes, approaches, and intellectual processes in design practice. (Julier, 2005, p.76)

Margolin,(2002) suggests an emergence and need for studies on design and culture, enhancing the transformation and relation between industry, object and audience in order to comprehend contemporary design and modernity. Mitchell (1994), and Mirzoeff, (1998) defend in their studies, that modernity unfolds an evolution of mass consumption of images, visual experience, entertainment as a representational cognitive process, being the screen a dominating element of perceiving our identity and culture. Industries, objects and consumers are aligned with specific markets, brands, media, trends, consumption, making the form and Visual Culture an ingredient for the Design Culture. Design Culture becomes an intrinsic expression of our times, the way we see, project, consume, but also what does generate back, what channels, what recreates. Design Culture embraces the role of redefining and transforming individuals and territories, and embraces the idea of communication through different medias, levels, surrounding us with new meaning.

2 Storytelling, Film and Animation

2.1 Animation History. Animation Theory. Essence of Animation

Film and Animation were born with a simultaneous beginning around 1800's and emerged from the early industrial inventions which made the birth of motion possible. Although, at its essence there are shifts of value, form and structure. The emerging variation of optical experiments and optical toys that followed this idea, such as *Kaliedoscope (1816)*, *Thaumatrope (1825)*, *Stereoscope (1825-1830)*, *Phenakistiscope (1832)*, *Stroboscope (1832)* *Zoetrope (1834)*, *Kineograph (1868)* were crucial discoveries for the birth of motion. The 1st successful photograph in 1826, in France, by Nicéphore Niépce (1765 -1833) was a technical and intellectual revolution. Eadweard Muybridge (1830-1904) and his contribution with the capture of human and animal figure in motion (1878-1885) improved the knowledge and the study of movement. In 1889, in France, *Théâtre Optique*, came to life by Émile Reynaud (1844 -1918), who was able to deliver 15 minutes of images with illusion of movement. In 1891, Thomas Edison (1847 - 1931) invented the moving camera and in 1895, the Lumière Brothers invented the moving picture films making the 1st film in the history of cinema. It was called "La Sortie de l'Usine Lumière à Lyon". Film and Animation had on Bendazzi's view, (2016), a similar and simultaneous chronologic beginning. They were born from the same principle: a sequence



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of frames in time. In live action it came from photographed pictures and followed a “true life performance” and in animation from “frame by frame drawings”. Among film and animation theory the difference between both forms, arouses many debates on the definition of animation, as if an area of film, or a technique, or as an intrinsic different process of a frame by frame, which conveys a different form. Eisenstein, formulated on his book *Method* (2010), a few concepts regarding animation theory and Disney films. He theorizes on the concepts of Animism, Totemism, the transformation and freedom of the line, conveying plasmaticity (fire and water elements), plasticity, the freedom of ossified form etc. He positions animation in a concept of the *eternal becoming*.

The rejection of the constraint of form, fixed once and for all, freedom from ossification, an ability to take on any form dynamically. An ability which I would call 'plasmaticity,' for here a being, represented in a drawing, a being of a given form, a being that has achieved a particular appearance, behaves itself like primordial protoplasm, not yet having a stable form, but capable of taking on any and all forms of animal life on the ladder of evolution. (Eisenstein, 2010, p.117).

2.2. Animation and Studio Studio Ghibli's Context

Animation and Studio Ghibli's films are situated within narrative animation. Different from abstract or gestural forms, Ghibli's films follow a narrative structure, with plot, character change, characteristic also from live action film narrative. It also combines characters and objects free from ossified form, as creative and extravagant creatures, imaginative tones, dream like sequences and magical atmospheres, although not as exaggerated as the elastic “rubber-hose”, style from Disney. Ghibli's films convey a profound approach to themes, combining traditional with modern elements of society so important for the study of Design Culture. It conveys a narrative language where characters convey an internal psychological depth very different from the Disney “gag” style. Themes echoes profound emotions, environmental issues, the horrors of war, loss of innocence, values of family and loyalty, courage, self sacrifice and a strong need of freedom and often are set in a “naturalistic” scenario with rules of space and gravity. In Ghibli's films present a solid and stunning level of aesthetics, detailed design, as well as a gracious innate and heroic journey structure where the slow pace and expressions of characters, stay very close to human existence. The action takes a synched pace with reality. It respects the time of the character to achieve a stage of emotion or understanding.

3 Time, Structure and Form

3.1 Design structures of Storytelling in Film and Animation

In narrative form, structure is the vehicle that tells the story, where the character came from (backstory), the psychological need for the character to move forward, the

conflicts that the character endures, the journey, the climax and the outcome. Some of the most developed and common structures, such as used in the Hollywood system were defined by Christopher Vogler, *The Writer's Journey*, (2007), Syd Field, with *Screening Workshop*, (1999), Michael Hauge, with *The Hero's 2 Journeys*, (2003), Robert Mckee, with *Story*, (1997), Linda, *Making A Good Script Great*, (1984) (Seger, (1984), Jonh Truby, *Screenwriter workshops*, (1990). A visualization of some of the narrative structure give us a glimpse of possible models and cross models.

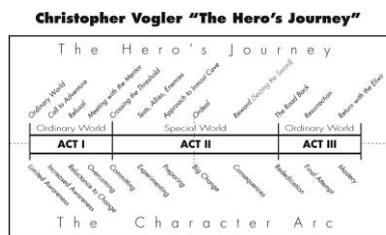


Fig. 1: Christopher Vogler Model (2007)

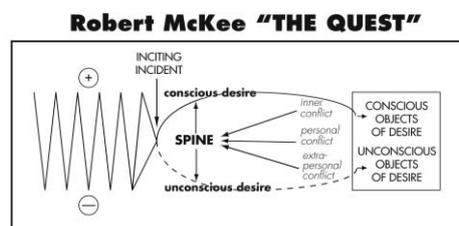


Fig. 2: Robert Mckee Model (1997)

4 Investigation, Purposes and Methodology

4.1 Design Culture

4.1.1. The **area** and domains of our investigation of Design Culture are: Designer, Production and Consumption, enhancing the concepts of value, practice and circulation.

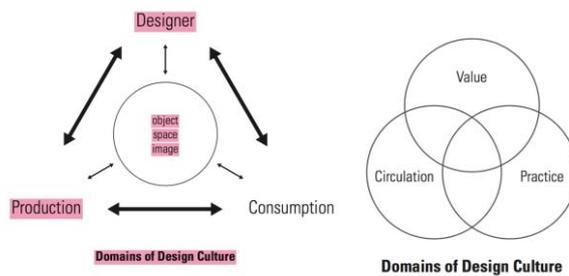
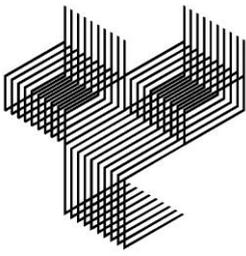


Fig. 3 e 4: Design Culture Model from Guy Julier (2005)

4.2. The 3 levels of analysis regarding Design Culture Concept:

4.2.1. **Design Culture:** As a process of making animation films, enhancing the production agency (Studio Ghibli), the collective way of working, where the director is part of the team in a whole, designers and production team, enhancing the culture of the studio, the management plan, the intentions of targeting audiences, their creativity, authorship, reform processes and differentiation.



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4.2.2. Design Culture: As the film itself, the formalistic elements, the structure of the narrative: value, symbol, objects, character change, plot, time, pace, cinematographic style, design, craftsmanship, harmonic aesthesis. What are the intrinsic characteristics that comes from this part of the globe and the different from others areas and cultures?

4.2.3. Design Culture: As a dialogue between creator's and consumers, the changes that come out of this relation to one side or the other. Who is influencing who? How is the film itself an object with values and an experience that demands change. How is the narrative changing habits, culture and transformation and global new trades. How are Miyazaki's films targeting so many ages from youngsters to adults, globe wise?

4.3. Methodology:

We intent to define our methodology, analyzing the variables of content such as evolution of narrative, character change, time, pace, tone, mood in order to construct a resulting model of narrative inherent to animation films of Studio Ghibli. As a first step in our approach we intent to construct visualization models regarding character development and alignment, analyzing the common 7 plots, which can enable us to compare different films and different models of narrative, to obtain convergence and divergence key aspects on the models. Intrinsically to the analysis of content and narrative are the formalistic aspects of the film, such as color, characters, spaces, machines, authorship, originality, and the unique culture of studio Ghibli. This analysis intends to dive in the culture of this geography of Japan which is unavoidable but also trying to see it in a global scale of its success.

4.1.4. Context of Analysis:

The context is confined to the contemporary era between the 1980's and recent days, with a preceding moment of the boom of TV. Some examples are: *Heidi of the Alps* (1974), *Conan, the boy in the Future* (1978), *Nausicaä of the Valley of the Wind* (1984), *Laputa: Castle in the Sky* (1985), *My Neighbor Totoro* (1988), *Grave of the Fireflies* (1988), *Only Yesterday* (1991), *Porco Rosso* (1992), *Whisper of the Heart* (1995), *Princess Mononoke* (1997), *Spirited Away* (2001), *Howl's Moving Castle* (2004).

5 Conclusion on the objectives of the proposal

5.1 Design Culture, narrative design, structures of visualization of Ghibli's Films

As a main objective we addressed in this proposal the study of the Design Culture, within the geography of Japanese Studio Ghibli's films. The design culture of the studio, the project culture, the film narrative, values and the relations with consumers. We also address the transformation role of design on shaping these territories of global consumption in modernity. We addressed a construction of a design model, with the

analysis of data which enables us and enlighten us to understanding of the design culture and narrative structure in the modernity of our culture.

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Design Doctoral Conference'16

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Paper is not dead. The value of sketchbook.

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Abstract

This paper is about Sketchbook inserted in the Science and Art field. The sketchbook has had a central role in the creative thought process. Many times acting as a secret and personal space where ideas are tested and unblocked. It generates thoughts and helps to support and feed the individual creative process. The sketchbook is a critical vehicle where one starts the observation and reflection of the world around us. These are some of the sketchbook inherent aspects. It is fundamental to understand the sketchbook in its overall usefulness, function and purpose and how it changed and expanded throughout History and how important is this manual practice in pedagogic ways.

Establish an agreement that use drawing as a operative tool in a classroom circuit and understand wich is the most powerfull tool for drawing. We need to compare the manual tools with the hole new technology that you have at our disposal.

Keywords

Paper, creative process, thinking, digital, design.

Introduction

Is sketchbook still alive?

The word sketchbook makes us think simultaneously of the act of drawing and the book as itself.

What is the sketchbook actual activity? These days, it has earned a principal role for designers, painters, architects, musicians, and many other professionals.

We have to consider if there is a change in tradition, if there's a sense that we are losing to new divergent approaches and even if the sketchbook tradition will keep its place.

We see the new digital era and there is a feeling that new pedagogical capabilities must be developed in the professional and academic universes (Scrivener 2007).

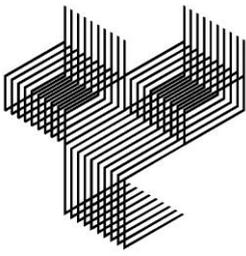
The importance of paper is obviously debated in the academic circles because, from a teacher's point of view, there is a necessity to use "traditional" tools that are reflected in reasoning and exploration of ideas.

METHOD

It is unanimous, for this theme and subject, that a consensus is difficult to reach. And, because of this, it is extremely important to have a clear idea of the intended study subject.

This paper aims to reach what Scrivener called "idea sketching" and it means, in this case for a designer, that it is the first freehand tool that allows us to externalize.

This paper takes interest in the first drawings of objects or ideas that designers have in their minds.



There is a study (Scrivener (1997)) concerned with the structure of drawing and if, from it, structural evidence in behavior could also be inferred. A debate was started with other investigators (Department of Art and Design at Derby University (UK)) and a mutual consensus was reached: there was no possible consensus.

This, was the result of this collective effort and it was emphasized that it was only a scratch in the surface. But Scrivener expects that this study will show that there actually is structural thought in sketching, which is predictable in a way, but it must be better analyzed. For us, this subject should be more debated in classroom and focus with the students and their needs.

David and Goliath.

We have at our disposal all the computer graphics tools. The digital era doesn't regress, it continues evolving. If so, we have to know what are the right tools to help designers.

There are related factors (Bradshaw, 1999) that without having a common thread, won't work: sketching, creative object, knowledge, creativity and computer. We can think that this could be the right order?

We can go back then fifty three years to witness the birth of the first computer with a graphic system, created by Sutherland in 1963 which was called Sketchpad (Scrivener, 1997).

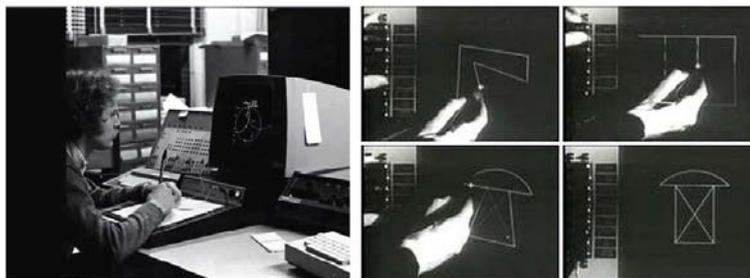


Figure 1

Font: in *Drawing from visual thinking* (Scrivener, 1997)

Scrivener highlights this invention from 1963 for it was a tool that would still have to be perfected and molded to real needs. And, when perfected,

it would be just a question of time to bring upon the disappearance of freehand drawing.

But it is believed, that in an initial phase, the creation of ideas is maintained through sketching. Studies done in architecture have shown that despite of having computer conceptualization tools available, the most often used resource by architects was freehand drawing (Torreano, 2007). After all these years, we can still observe that many designers and architects, among others, still use freehand drawing as their main creative process tool.

This can be, maybe, because of lack of training in computer tools or perhaps because of a much more complex reason related to how the drawing process is more suited to the knowledge process and creative exploration. There is an unequivocal relation between drawing and knowledge.

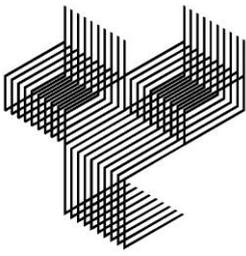
Verstijnen is a Dutch investigator that studied (Sketching and Creative discovery. Des Stud 19:519-546), in 1997, cognitive psychology fields and the cognitive limitations that made us resort to drawing in order to better explain ourselves .

In a first stage, facing a simple test (image 1-a, b and c), it is possible for us to explain with words what kind of geometry we are thinking. We can feel that it isn't necessary to draw. Within a reasonable limit, it is easy to pour out a solution to a test just using our minds. This is called synthesis.

This study found that drawing serves as a support for analysis. For image 2-b, there was a bigger difficulty to solve the test using just the mind. This was because it was generated a very particular situation with two objects (a much more complex geometry).



Figure 2



Verstijnen image from Sketching and Creative discovery.

Verstijnen (Sketching and Creative discovery. Des Stud 19:519-546) says that this requires analysis, since the triangle is made of three sides and the square made of four, in order to create a new shape it is necessary to break these elements. This research showed that this would be difficult to solve mentally without resorting to drawing. The author argues that we are good at observing alternatives, and that, when we externalize (sketch), it becomes easier to explore them.

What is important, to sum up this study, is seeing that knowledge and drawing are related. We draw not just because of our limitations but also because drawing is as a cognitive support.

DISCUSSION

Sketching is without a doubt an important subject. Most of our professional and artistic references use drawing as a tool. We can observe how these designers do their sketches and we see that the drawing quality varies in most cases. What interests them is getting quickly to the point. Efficacy is more important than a clean and pretty drawing. The sketch happens for a reason, we are able to focus on key points, which makes it essential for a line of thought.

At the start, we are communicating an idea. And the sketch is the perfect vehicle to express it to others.

When sketching, we are just representing details that we want to highlight and leave, intentionally, other details that may compromise the idea. We make a clear and fluid communication.

Bill Bruxton in *Sketching User Experiences*, says that the level of fidelity of our drawings reflects the depth of our thought processes (Buxton, 2007).

An idea that is more defined opens the way for a more detailed drawing. Drawing can also be used to register what we are seeing. Observation drawing, more than an annotation of what we see, is an effort to collect

Paper is not dead. The value of sketchbook.

and an observation exercise. It makes us think on how things are done in order to better register them.

Besides having drawings that can help us think, they can also serve as a creative process tool.



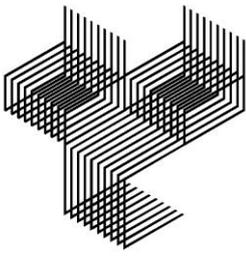
Figure 3

Example of two different devices both from Moleskine. The first image is the Smart Writing Set and the second image is the Paper Tablet.

(font: moleskine.com)

Conclusion

I leave open the digital theme. A good example, and also a good marketing strategy, is the Moleskine company that is market leader on notebooks. They offer a wide range of products and are also aiming for the digital universe. They offer a solution in which we still have to buy a physical notebook (Fig.3) but with a slightly different configuration that allows the connection to a smartphone or tablet and upload our creation to the digital world. We would like to see if it is possible to introduce new technology in the classroom. We can see that the students are up to the high technology, and sometimes they don't understand the value of the sketching as a tool to develop new ideas. So we think that could be interesting to bring some new devices to the classroom and see if it is accepted by the students. We have to understand in this study if the digital tools are only a simulacrum of the manual tools or if it captivates the interest of drawing from the part of the students.



There's a study, called Paper beats digital in many ways (Dooley, 2010) that states that there's different behaviours between the users of digital and paper platforms. And this study discovered that there are significant differences in the way our brains process each of the two types of information, the digital and the print. For the human brain is easier to retain the information that is directly printed. It's easier to understand, more memorable and it takes less effort for the brain to process. So, to reach a success in the creative process, we think that both situations could be tested with the students in the classroom.

“Moleskine was born as a celebration of thinkers, artists and writers of the past who wanted to create freely in the streets or when on the move. Echoing this heritage the Smart Writing Set is for today's creative professionals, knowledge workers and students who want to keep on developing their ideas on paper first – wherever they may strike - and still remain digitally connected.”

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Communicating to Generation Y: new communication channels in cultural events

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Abstract

With an increased importance of cultural experiences for Generation Y in the Western World, such events are attractive opportunities for brands to connect to consumers. Given the ever growing level of advertising clutter, which causes advertising avoidance, it is valuable to define a new communication channel for brands to connect to their target group in a non-intrusive way.

This research is conducted during a PHD programme, fuelled by the author's interests in marketing and co-creation. A co-creative methodology Ideas(R)Evolution will be used. This is an action research methodology, for which a theoretical background is given. A research plan is presented, consisting of five phases, the first being a literature review which is currently ongoing.

Keywords

Experience culture, action research, communication channels, generation Y

This article was written in the framework of the PHD on Design programme at IADE-U. It aims to sketch a research design topic, with indicative research questions, an exploratory literature review and a first look at possible research methodologies. Following the Golden Circle logic by Sinek (2009), which helps to convey ideas, this paper will answer three basic questions: why, how and what.

1 Why?

The author has an background in marketing and advertising. He studied marketing and business management, during his studies he worked as an intern at the Ideas(R)Evolution research project at Unidcom – IADE-U. In his professional career, he works in the media sector. Marketing is his main field of interest. Exploring this field further during the PHD programme, an interesting gap in scientific research was found, which will be the topic of this paper. A PHD on Design, more specifically Design Thinking, is a perfect way to use less traditional research methods to analyse, ideate and modelise a research topic. In a co-creative way, the interests of all stakeholders will be analysed, resulting in value creation for the whole community.

1.1 Generation Y wants experiences

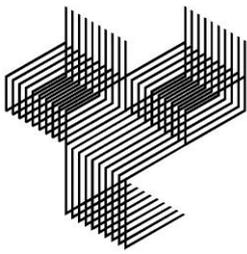
In the current day and age, there is a shift from ownership to experience. According to Pine & Gilmore (1998), the consumer is more interested in living an experience, rather than owning certain items.

In the post-industrial Western world, most people have a sufficient income that allows them to satisfy more than their basic needs such as food and shelter. With this, they turn to higher needs, such as status or self-development. (Maslow, 2013) In the past decades, this meant consumers would purchase extra goods. (Mankiw & Taylor, 2011)

The ownership of these luxury goods had two distinct advantages: they can be a status symbol, and provide the owner with extra comfort. This importance of luxury goods meant Marketing has focussed on analysing the interactions between companies and consumers in this goods-orientated market. (Ghosh & Varshney, 2013; Griffith, Yalcinkaya, & Rubera, 2014)

However, in recent years, there has been a shift of focus from owning luxury goods to hedonistic experiences. Generation Y indicates they find more pleasure in going to concerts, visiting expositions or taking on travels. These experiences leave the consumer with an intangible memory, much more than any physical artefact. (Bucuță, 2015) One of such hedonistic experiences that has seen ever increasing popularity over the last years, is music festivals. (Shepherd, 2016)

Generation Y can be defined as the group of people that were born between 1980 and 2000 (DeVaney, 2015), though it is worth noting not all authors exactly agree on the exact



start and ending dates (Leask, Fyall, & Barron, 2014). Other elements that can be used to define a generation are age or shared experience of certain significant historical events (Smith, Clurman, & Yankelovich Partners, 1997). In this paper, Generation Y will be defined as those born between 1980 and 2000.

1.2 The advertising overload

Consumers live in a world saturated with advertising. It is everywhere around us, in print media, on television and the radio, on the street, on the internet, ... This constant flow of messages is one the reasons that many people have a negative perception of advertising (Anderson & de Palma, 2013; Hammer, Riebe, & Kennedy, 2009). Many people even attempt to limit the amount of advertising they see, for example by installing an Ad-Blocking program on their web browser. (Adobe & Page Fair, 2015)

This advertising overload means that traditional advertising channels lose their value for brands to reach their target consumers (Ha & Litman, 1997): if the channel is negatively perceived, this can also impact the perception of the brand that uses it (Knittel, Beurer, & Berndt, 2016). Therefore, companies are interested in new ways to connect to consumers.

1.3 Connecting the dots

The goal of this research is to connect these two facts. Given the increased focus on experiences and the negative perception of traditional advertising, can a new channel be found that allows brands to communicate to their target consumers by being present on such events?

2 How? Research methodology.

The research methodology has a significant impact on the study: it is the lens through which a research looks at the topics that will be analysed. (Dresch, Lacerda, & Cauchick Miguel, 2015)

Broadly, research methods can be identified as either quantitative or qualitative. Quantitative research aims to generate quantifiable data that is readily analysable - numbers. Qualitative research on the other hand, generates data requires different methods to be understood – words. (Sekaran & Bougie, 2014, p. 3).

Sekaran & Bougie (2014, pp. 5–6) further indicate the difference between pure research, which examines a topic and generates scientific knowledge for the sake of it, and applied research, which is research that is conducted with a very specific problem in mind.

One form of applied research is action research. Action Research was defined in 1964 by Kurt Lewin as a research method in social science that includes both theory generation and direct impact on the system that is researched (Kemmis, 1980; Mathiassen, Chiasson, & Germonprez, 2012; Susman & Evered, 1978). Many authors have discussed action research: for every academic that is pro (Zhang, Levenson, & Crossley, 2015), another has criticism (David, 2002; Jonas, 2014). Action research has been applied to many different situations studied by social sciences, such as education (Kemmis, 1980), management

(Zhang et al., 2015), design (Thering, 2011) and even health care (Sherer, 2014). It is however seen as a valid way to create robust knowledge (Coghlan, 2011) and add value (Ozanne & Saatcioglu, 2008; Zandee, 2015).

This PHD research will be conducted using the PHD promotor's Ideas(R)Evolution research methodology, which is "an evolutionary research project with an integrated human centred approach to innovation, based on Design, Marketing and Creative Intelligence focused on Co-creation and Dialogue." (Mateus, 2013)

This methodology consists of several phases, each with specific tools and goals, which are adjusted to the project where they are being applied. (Mateus, 2015)

A further in-depth analysis of the Ideas(R)Evolution methodology is beyond the scope of this paper, for several reasons:

- Specific tools will have to be developed during the research. Given the participative nature of action research, one cannot foresee the details of the needed tools: they must be developed when the need arises.
- Gaining an in-depth understanding of research methods is an integral part of doing a PHD programme. If the researcher could already perfectly describe the future methods in the first phase of the programme, it would have little value.
- The limits of this paper in terms of size do not allow further exposition.

3 What?

3.1 Research plan.

The research will consist of 5 phases.

3.1.1 Literature review

Relevant scientific literature is sought for, analysed and compiled. Different authors can have different points of view, which can give refreshing insights. By summing up what is already known about a certain topic, a solid foundation is set for the researcher's own input. (Reay, 2014; Ribeiro Serra, 2015)

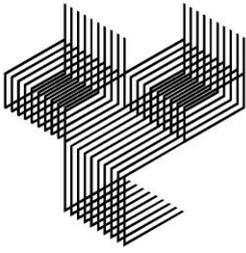
3.1.2 Pre-conceptual model

Via information gathered in the literature review, a pre-conceptual model will be developed.

3.1.3 Pre-experimental pilot

3.1.3.1 One event case

A first case study of a cultural event will generate data to test the model. It is worth noting that Coghlan (2004) contrasts action research to case studies: the former is participative,



the latter is not. In the context of this paper, a cases is considered an application of the theoretical model.

3.1.3.2 Stakeholder workshop

Considering the co-creative nature of the methodology, a workshop with stakeholders will generate data for implementation and elaboration of the model.

3.1.4 Evaluation & improvement of the pre-conceptual model

Based on the input from the stakeholder workshop and the data of the case study, the pre-conceptual model will be elaborated and improved.

3.1.5 Conceptual model validation

3.1.5.1 Case studies

Five cases will generate new data that can be tested with the conceptual model.

3.1.5.2 Improvement & validation of the conceptual model

Based on the data from these case studies, the conceptual model will be validated and improved where possible.

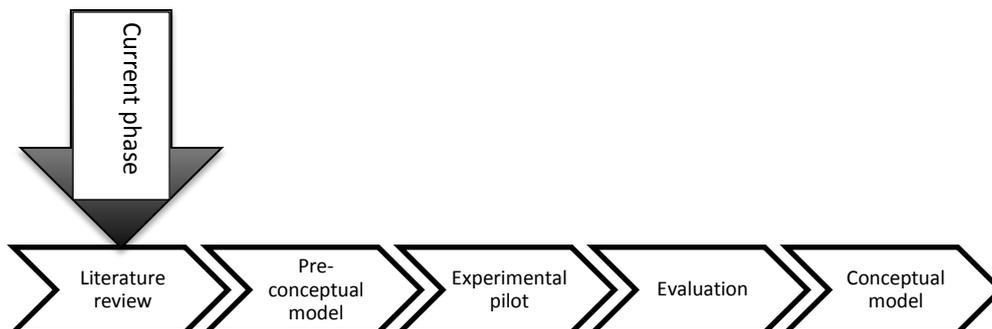


Figure 1: Research plan (source: author)

The research is still in an early phase: the researcher is performing a literature review. Given the iterative nature of this kind of academic research, it is not impossible that certain elements of the research plan will be altered during the actual research itself.

3.2 Research questions

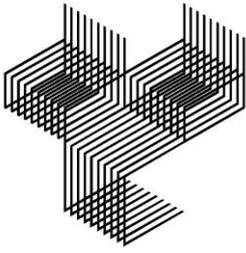
1. Which are the opportunities for innovation in communication in cultural venues or during cultural events, targeting generation Y?
2. What are the characteristics of such an innovative communication channel? Such characteristics could be: model, design, process, lay-out, drivers,.

4 Conclusion

The goal of this paper was to present the background of the PHD research of the author. It indicates his background and motivation. With an increased importance of cultural experiences for Generation Y in the Western World, such events are attractive opportunities for brands to connect to consumers. Given the ever growing level of advertising clutter, which causes advertising avoidance, it is valuable to define a new communication channel for brands to connect to their target group in a non-intrusive way. Research questions have been defined. A research plan with five phases was laid out, which will implement action research methodologies. The first phase, a literature review, is currently underway. Feedback obtained at the IADE Doctoral Conference where this paper will be presented will be invaluable to further elaborate the research plan and methodology.

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Design Thinking Canvas methodology: using canvas with cards to innovative artifact design

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Abstract

This article aims to describe the Design Thinking Canvas method, developed in Design Department of UFPE to guide teams while developing artifacts with innovative features.

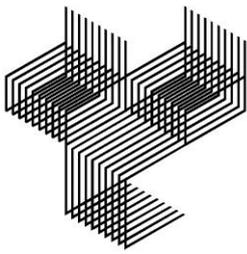
Keywords

Design, design thinking, business canvas, methodology, innovation

1 Introduction to the Design Thinking Canvas

Design Thinking Canvas (DTC) is a methodology created to guide teams during the development of artifacts with innovative features, aiming to create and develop a concept, and also to establish a business model. It was built over the last 10 years from research developed in the Game Design Research Laboratory [GDRLab], part of UFPE's Design Department, in works (such as Credídio 2007; Neves et al. 2008; Neves et al. 2010; Malcher et al. 2010; Oliveira et al. 2010; Alves 2012) and validated on its current stage by several projects and academic research (such as Araújo 2013; Vargas 2015). The DTC is based on the design thinking concept popularized by Tim Brown (2010) and uses a canvas inspired by the business model canvas for companies created by Osterwalder (2012) and the business model canvas for products by Maurya (2010). The popularization of these two canvas models used in technology-based

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companies motivated the studies of the DTC to apply the same format in the design process. Specifically to guide the digital artifact market of Pernambuco (Brazil) in search for innovation, dialogue between multidisciplinary teams, the good use of digital technologies available and coping difficulties related to time and budget, from a design-based knowledge, construction of virtual environments, interactive media and information technology (Neves, 2014).

A business model is a conceptual tool which contains a set of elements and its relations that allows one to define and express a company's mode of earning money (Osterwalder 2004). Both business model canvas used as a reference in this work proposes a set of information that should be taken in consideration and a structure to organize and visualize it. These models are a kind of descriptive map formed by decks (trays) of information. Osterwalder's Business model canvas proposes nine types of information: [1] Key partners; [2] Key activities; [3] Key Resources; [4] Value Proposition; [5] Customer Relationship; [6] Customer Services; [7] Channels; [8] Cost Structure, and; [9] Revenue Stream. However, those canvas methods only propose what should be filled in the canvas (Araújo, 2013), and not how to fill it. The DTC uses specific design methods and techniques to fill those information, associating a specific design method such as the Persona Technique (Cooper, 2003) to types of information such as Value Proposition, for example. The aim of this article is to present an overview of the DTC and its main stages and processes. Discussions about a specific method or technique used are published in related work such as Malcher (et al. 2010), Oliveira (et al. 2010), Alves (2012), Araújo (2013), Vargas (2015) and others yet to be published.

2 How to apply the Design Thinking Canvas

The DTC support iteration and to ensure clarity throughout the process, facilitates multidisciplinary work and benefits from the usage of cards with essential activity data to be used during the process, what should facilitate the reuse of information between projects and teams.

The DTC process is organized in four phases that accompany the project life cycle: [1] Observation, where the product usage scenario is defined, as well as target audience characteristics (persona), possible opportunities and competitors. These informations can be seen at the yellow boxes of figure 1; [2] Conceptualization, where ideas are generated, evaluated and selected. These informations can be seen at the blue boxes of figure 1; [3] Configuration, where decisions are made to define product's function(s) as well as its form (aesthetic). These informations can be seen at the red boxes of figure 1, and lastly; [4] Publication, where the product is launched and validated with the consumer market, who responds with metrics and feedbacks which can be used to increment new iterations of the product. These informations can be seen at the green boxes of figure 1:

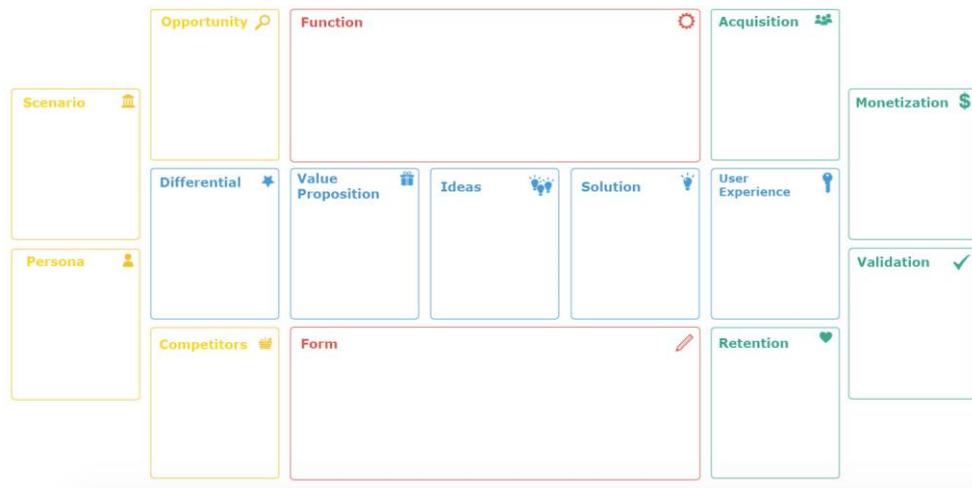
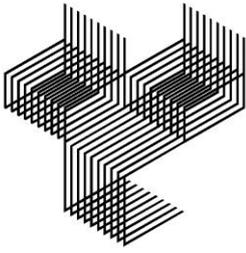


Figure 1. DTC canvas (Adapted from NEVES 2014)

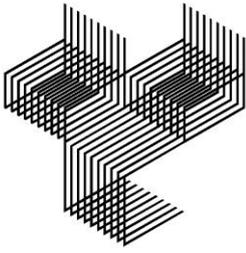
2.1 The Observation phase

This first phase consists of contextualizing different environments where the artifacts will be inserted. It was built based on the Persona Technique proposed by Cooper (2003) and on the competitor analysis proposed by Baxter (1998), which were adapted to DTC on the works of Oliveira (et al.2010) and Malcher (et al.2010), respectively. On this phase, is necessary to construct a **Scenario deck** composed of cards with information about different physical spaces and the public that attends them. There are four cards: WHERE - details the scenario environment; WHEN - reports when the scenario occurs; WHO - describes the human profile of interest to the scene; WHY - sets out the reasons why this scenario was chosen. As it can be seen with an example of project for a diabetic app:



Figure 2. Example of scenario for a diabetic app (Adapted from NEVES 2014)

After the construction of the scenario, is essential to seek information about the subjects that can enhance the creation of the artifact theme. In this perspective, a



Persona deck must be created, with cards that represent a typical user of the artifact to be conceived and its main activities associated with the project's context. There are two types of cards: PERSONA - the card about a character who represents the profile of the consumer target and ACTIVITY - cards with activities of the persona that can be associated with the project.

Also in the Observation phase, we adopted one method to identify opportunities. This **Opportunity deck** is constructed from observation of problems faced by users in the context of the projected artifact. The main problems observed are listed and registered in auxiliary cards created around a main card where we describe what opportunity will be the focus of the project.

Complementarily, **Competitors deck** is also developed, with cards containing information regarding the existing products on the market that could compete with the one to be designed. These cards serve as a catalog, consisting of an image of the product and a brief description of its operation.

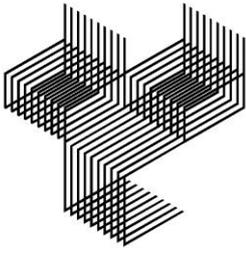
2.2 The Conceptualization phase

This is the second phase of DTC and, according to Neves (2014), the more creative stage of the design process. It is composed of methods that facilitate the creative process such as Brainstorming, Brainwriting and Zwicky Box, listed and adapted in Neves (et al. 2008), inspired by data obtained during Observation phase. Following, heuristics were created to evaluate ideas generated in this phase and consolidate the most appropriate, seeking an innovative solution, based on the Heuristic Evaluation Method proposed by Nielsen (1993) and adapted to DTC by Breyer (2008).

The phase starts with the **Differential deck**, that aims to position the possible artifact in face of the competition, in three categories (cards): TECHNOLOGY - should indicate some technology element in the device that differentiates it from competitors; MARKET - is due to list market factors such as price, availability, among others, to differentiate themselves from competitors; and DOMAIN - should be explored by searching for differential factors within the domain in relation to the state of the art. At the end, all differences should be integrated in a clear and direct way, to serve as a guide during the following stages of idea generation. The differential cards should interact with the cards of competitors.

Still in this "blue" phase, the **Value Proposition deck** uses a method aimed to position a particular artifact in relation to its competitors in a value curve. The characteristics of the competitors and those indicated in the differential phase make up the initial list of characteristics that defines this value curve. It should be taken into account: EXCLUSIVITY - when the artifact brings unique features that promote different experiences in relation to all competitors; COMPETITIVE PRICE - when the device offers the same experience with more competitive prices; FOCUS - when the device is directed to a particular context where competitors are not present.

It should be also developed an **Ideation deck**, two techniques are suggested.



First, the design team can use the morphological box adaptation, which is structured by cards from other stages of the process (persona, activity and value proposition) plus two cards of reference, one of a nature element (bionic) and another with one element produced by man (kinetic). The intention is to stimulate the team think "outside the box" to generate ideas. Three characteristics, considered relevant by design team, can be listed on each card, which begin the construction of new ideas by the association of some features. As it can be seen with an example of project for a diabetic *app*, in figure 3:

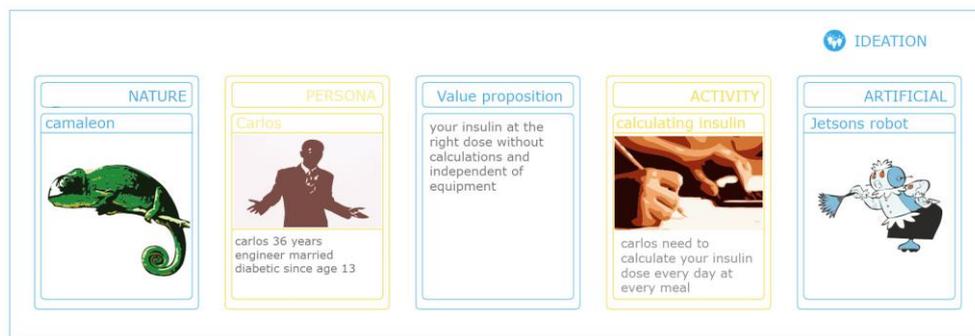


Figure 3. Example of ideation process (Adapted from NEVES 2014)

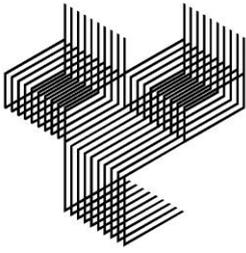
Other ideation tool is the brainwriting technique with a paper form containing one adaptation the 635 method developed in 1960 in Germany. In the process of generating ideas the number of participants is free and the cards developed during the Observation phase is used to provide background information. The cards must be arranged in the respective tables, facing down, with all participants of each group sitting around. All the cards have to be dealt, read and discussed by the participants. The selection of ideas with the greatest potential to meet the technological, economic, social and cultural user expectations is made using basic heuristics of Design Thinking (NEVES, 2014).

In **Solution deck** these heuristics guide the evaluation of each idea and compare them in fundamental ways. Every idea has to answer the following heuristics: Is the idea feasible from a technological point of view? Is it viable from an economic point of view? Is the idea desirable for the defined user group? And lastly, is it defensible from a legal point of view? Every idea should be assigned a Fibonacci score according to the answer to each heuristic's question, and the ones which have obtained the highest totals are considered relevant in the solution process.

In possession of the ideas with the best scores, one **Experience of Use deck** should be built, it appears like a storyboard of the artifact use. The intention is to create a kind of visual narrative describing the artifact use (NEVES, 2014).

2.3 The Configuration phase

Subsequently, we have the Configuration phase, represented by the red color. There are iterative cycles to materialize the idea, with no limitation to the number of cycles



needed until a satisfactory result is achieved. This phase begins with the description of the artifact's basic operation, a technical description of features for main user's actions when using the product. In **Function deck** it is necessary to describe the user's main actions with the artifact. The actions chosen to represent how the system works should be based on certain activities to the persona. Because of this, personas and activities cards appears in this board. The **Form deck** uses some references cards representing the aesthetic of the personas repertoire. These cards will guide the morphological configuration of the artifact and the design team should list concepts as: LINE - defining lines of references as being straight, curved, organic, geometric, simple, complex, etc.; COLOURS - set the type of color palette that are part of the imagery of persona repertoire; TEXTURE - should point the kind of texture with which the persona lives in their day to day, for example, plateaus textures, smooth, rough etc.

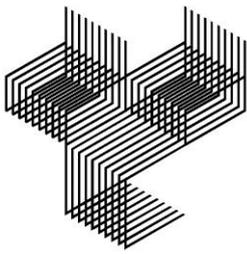
2.4 The Publication phase

Neves (2014) points out that a portion of the market still believes that the design team work ends with the artifact configuration described above. But, in DTC the creative team must consider strategies definitions to guide the release of the artifact. This is a bilateral phase because involves planning, that interferes on product launch and its also induced by it. In this sense, three groups of strategies related to the launch of the product are defined during the project: ACQUISITION - strategies that directly involve attraction of users; RETENTION - strategies that aims to keep the user faithful to the artifact; MONETIZATION - strategies that could differentiate the business models of the artifact.

In the **Acquisition deck**, there are cards with questions about strategies and indicators, to be answered in the purchasing cards present at the top of the deck. According to Neves (2014), one of the key success factors of an artifact is the planned and adopted strategies to attract the attention of potential users. For this step, one needs to create charts that links strategies and acquisition of indicators to be incorporated into the artifacts at the time of publication.

In **Retention deck**, strategies and indicators are defined to keep users loyal to the artifact after the acquisition. This strategy is important, according to Neves (2014), because increasingly, consumers have been treated as fans of the artifacts produced. Markets such as games, rely heavily on the potential of artifacts to keep its users loyal to maintain financial sustainability. Another concept in design thinking is extracted from the need to make economically viable product, because some retention strategies may require adjustments to the product. That is why the DTC suggests that they need to made during the design process and not after product release (NEVES, 2014).

Thus, it is the **Monetization deck** to assist the team in financial planning to maintain the project. Still in the publication phase, it is suggested to perform validation of the strategies of the three decks attached to the product launch. With the results, the



design team may suggest corrections to the artifact or to the acquisition, retention and monetization planned strategies.

This **Validation deck** is constructed from a set of six heuristics (functional, aesthetic, cognitive, symbolic, social, motivational) to be applied by people that match each of personas' profile, as a survey or interview. To mount this validation, which explains the level of acceptance of potential users, it is necessary to ask questions and quantify the answers.

3 Considerations

In 2013, one version of the methodology was launched as an app for iOS, initiating a virtual network with institutions from over 90 different countries, that uses it on trainings, workshops and real innovative design.

The DTC is in validation process and is being used in the digital or physical products market in several design segments, with significant volume of downloads that indicates its usage around the world.

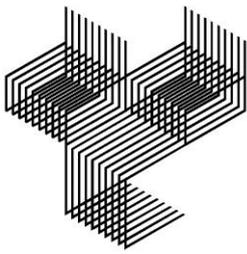
The Design Thinking Canvas is a methodology of easy application, in the moment that all the functioning of each phase is dominated, the logic of each deck and the specific methods and techniques for the construction of the cards.

Some results from disciplines that applied the DTC indicate that the methodology can and should be used in the teaching of design, especially regarding the search for innovation in addressing contemporary issues.

The market results also demonstrate that the DTC is good for innovative product ideas and fulfills its function of "gamifying" the design process, making the design environment more interesting and multidisciplinary.

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Branding and Rebranding in contemporary age

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Abstract

This work aims to present the intentions of a PhD study about the dynamics of rebranding strategies implementation and its relevance in expanding or readapt the brands business in a visual context, in order to be able to find appropriate strategies and design processes to provide bases for further academic studies, for entrepreneurs, and mainly for designers and marketers by its primary role when setting rebranding processes.

Thinking about brands, in the perspective of the visual system, based on the presentation of the theoretical framework of concepts like brand, branding, visual identity and rebranding, aimed to identify and systematize the related concepts, as well as raising questions about the challenges handled by brands when facing visual and strategic change processes.

Methodologically the work will use a qualitative methodology based on a literature review and the presentation of some cases in order to exemplify and show how these concepts are being implemented worldwide and give tools for designers and marketers when implementing rebranding and redesigning strategies.

It is intended to present contributions to approach projects of rebranding and redesigning brand systems. Whether through simple visual changes or profound strategic ones brands should be connected with their “statement” and have elements that create the notion of family.

Keywords

Brand, branding, visual identity, rebranding, graphic design

1 Introduction

“... takeovers, mergers, globalization, all these affect business – and therefore businesses and their brands have to change too.” (Olins, 2008, p.55).

In contemporary societies, the market is extremely complex and competitive, due to the variety of brands and products vying for consumers' attention, forcing companies to adopt new attitudes toward how their brands are perceived.

It is essential for brands that want to succeed to consider that in modern societies the spirit of times has changed. Technological developments, fashion and the constant changes in contemporary visual culture compel brands the need to follow those changes and trends. (Olins, 2008; Wheeler, 2009)

It is in this context that rebranding has gain importance in the last decades in business and in academic environments.

Repositioning, revitalizing or redesigning an organization or a brand, is an extremely challenging and a risk involved process. It thus becomes important to find tools and mechanisms to minimize those risks.

1.1 Introduction of the study area

The study intends to focuses on the visual components of rebranding as a strategy in the branding management business process. Rebranding has emerged as a significant feature of contemporary branding strategies therefore It has been increasingly applied by brands that intend to change.

According to Olins (2008), there is always a reason for changing a brand. A loss of market share due to increased competition or poor performance. Looking and feeling out of date. A merger or takeover, or e new CEO who wants to make a fresh start are view as needs to change.

Considering that brands sometimes require drastic or subtle changes and that rebranding is the tool for helping companies in those processes it is intended to deepen these areas of study as a basis to understand the challenges faced by all the professionals involved.

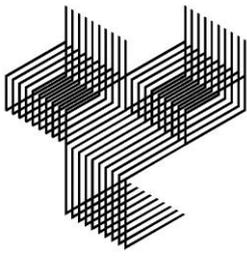
Today design, marketing and human resources are considered an integral part in brands construction and reconstruction processes.

1.2 Research aims and goals

The study aims to answer the research question: What is the relevance of rebranding in expanding or readapt the brands business? It is intended to find appropriate strategies and design processes to provide bases for further academics studies, for entrepreneurs, and mainly for designers and marketers by its primary role when setting branding strategies. Through the presentation of case studies a practical view is presented on how these concepts are implemented by companies worldwide.

In order to fully answer this research question, the following objectives have been set:

- Understand what makes a company or a brand feel the need to change the identity
- Perceive that if by changing the identity, brands gain or lose costumers
- Identify what is the relation with visual trends
- Explore how to minimize risks when changing the identity
- Apprehend when to do it and how to do it



With the view to try to give answers to the primary questions it is intended, based on a literature review, to study concepts of branding, rebranding, refreshing and redesigning territories. We intend to explore the systems and methods of authors such as Wheeler (2009) and Olins (2008) in order to help to identify the risks and gains of rebranding. The presentation of some practical cases, in order to exemplify and show how these concepts are being implemented worldwide will indicate positions to take and give tools for designers and marketers when implementing rebranding and redesigning strategies. It is also intended to make a contribution to the university and the enrichment of specialized personal knowledge.

1.3 Research relevance

We are surrounded by brands in our daily lives both personal and professional. Brands tend to influence the behavior of consumers, mold cultures and have the ability to influence the choices of social groups of our society. (Olins, 2008; Raposo, 2008; Wheeler, 2009)

Contemporary societies live in a climate of constant change. Brands that tend to ignore change by refusing to adapt can lead to obsolescence. According to Olins (2008), although sometimes it is the right thing to do, changes can bring risks. Minimize those risks through effective tools and processes will be of vital importance for entrepreneurs, designers and marketers when setting rebranding and redesigning processes.

The markets have experienced hard times and companies struggle to survive. In times of crisis brands tend to invest in the difference to excel competition. Rebranding can be an answer.

1.4 Methodology

Spite of being in an early stage of our study it is considered appropriate to adopt a qualitative methodology¹ with essentially a non-interventionist approach. However the possibility or need to interviews should be considered during the work process (mixed methodology).

It is intended to realize how rebranding strategies are created and developed in order to identify the most effective methods and procedures. Deepening state of the art which involves a literature review and case studies that are relevant will help to formulate an hypothesis that would lead to conclusions. Cross data from literature review with case studies is crucial to achieving the goals of this and future works.

2 Theoretical framework

2.1 Brands

In our society there are brands for products, services, places, religions and people (ex-libris). Brands are an ubiquitous phenomenon in modern societies, they are everywhere.

The most traditional definition of brand is the American Marketing Association and is based on their visual attributes:

"A name, term, sign, symbol, or a combination thereof, with the intention to differentiate a seller or a group of them, and to differentiate them from the competition" (Kotler, 2000, p.426)².

¹ This is a methodology defended by Rosa, 2012, for design processes

² Translation of the authors from Kotler, 2000, p.426

However they are increasingly those who argue that a brand is much more than a logo or corporate identity. Brand is (or should be) confidence, passion, sense of belonging and security. They are synonymous with quality assurance, evoke desire and sense of belonging. They represent a whole set of unique values that help build the identity of its users (Lipovetsky, 2007; Gomez e Stodieck, 2012).

The current success of the brand lies in its ability to create emotions: "The aim is no longer to sell a product, but above all a way of life, an imaginary, values able to string together a thrill" (Lipovetsky, 2007, p.81).³

The brand not only communicates a set of attributes and benefits for buyers, it expresses the values and positioning of the product on the market.

The brand, as a graphic element, strengthens and facilitates memorization of companies being considered as a strong competitive advantage. As institutional identification is already something ancient, reflecting the need for man to be socially recognized as a distinct being. According Gomez e Stodieck (2012), a graphic mark is a visual sign, with the function of identifying an entity.

Having a strong and solid brand is a commercial necessity but also important to win and keep customers. In this context emerges branding, a construction and management tool for brands, a strategic process of marketing and management progressively more important for companies.

2.2 Branding

Branding is responsible for creating and managing brands, which is, in the current context of the global market, a challenge for professionals. It has become an essential tool for the survival of brands in a society saturated with information, where the understanding of its position and its consumers is prevalent before the others. This is a complex process that involves several areas of expertise, such as design, marketing and management.

"Branding started being used by companies, both in Europe and in the United States in the mid-twentieth century, as a consumer product brand management tool." (Cameira, 2014, p.2)⁴.

For Olins (2008) the terminology of branding is in a state of flux, like almost everything to do with the world of brands. The continuous and profound changes we have witnessed social, cultural, technological and in the market, are constantly changing the rules in most activity sectors. Therefore:

"In recent decades branding has become a priority for the management as a result of consensus around the idea that brands are one of the main assets of companies." (Mendes, 2014, p.19).⁵

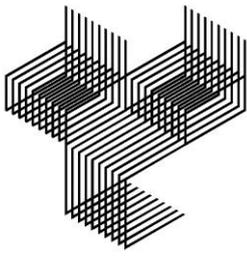
According to Kotler and Keller (2006), branding is much more than to name a brand but make it credible with certain promises about how to live the experience with the product or service. It is essential that the branding finds ways to manage the brands so that they reach the heart of consumers and not so much the reason because the act of purchase is mostly emotional.

"The contemporary Branding model is based on a creative and innovative model, uses design thinking - collaborative activity that integrates professionals from

³ Translation of the authors from Lipovetsky, 2007, p.81

⁴ Translation of the authors from Cameira, 2014, p.2

⁵ Translation of the authors from Mendes, 2014, p.19



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different areas - and aims to resolve problems identified at the stage of research and diagnosis to drive more precisely and assertively to strategy and positioning of the shares. " (Hiller, 2012, p.135).⁶

Branding involves a series of activities that work towards building the brand. These activities are part of the naming, design, communications, market research, positioning, financial assessment and legal protection.

2.3 Brand Identity

The outward expression of a brand – including its name, trademark, communications, and visual appearance – is its brand identity and is fundamental to consumer recognition and symbolizes the brand's differentiation from competitors. A company's brand identity is how that business wants to be perceived by consumers.

"Brand identity is tangible and appeals to the senses. You can see it, touch it, hold it, hear it, watch it move. Brand identity fuels recognition, amplifies differentiation, and makes big ideas and meaning accessible." (Wheeler, 2009, p.4)

Brand identity takes dispersed elements and unifies them into a system comprising basic elements (name, typography, symbol and colour) which are the pillars of the visual system and supported by complementary elements (imagetic, form, movement and sound) that support the Identity (Oliveira, 2015). The system builds on cohesive brand architecture, encompasses a unique visual language and utilizes specially designed colors, typeface families, and formats. The identity system synthesizes vast amounts of information and advances immediate recognition of the company and supports brand attributes across various media. "Regardless of the medium, the applications need to work in harmony." (Wheeler, 2009, p.142)

2.4 Corporate Identity Systems

According to Raposo (2008) creating an identity that individualizes the way the company or the brand want to be perceived is difficult mostly because the differentiating factors depend on others (public, distributors, etc.).

Various authors found possible ways to control and structure corporate identity management strategies according to different systems. Raposo (2008) emphasizes David Aaker, Kevin Lane Keller, Scott M. Davis, Joan Costa and Wally Olins. For Raposo (2008) all these authors argue that a strategy will only be successful if it is well understood and managed consistently by the company.

These corporate identity management systems, with their basic and complementary elements, seek to understand the brands through identity signs and propose means of control so that they are cohesive and coherent with the corporate values.

2.5 Design as a Branding support

Design is an activity directly linked to the capitalist system and the transmission of ideas, therefore, plays a key role in wealth creation and perception of forming judgments (Forty, 2007), in addition to being part of our culture and have a very important role in their dissemination as "sets up communication and creates identities" (Schneider, 2010 p.9).⁷

⁶ Translation of the authors from Hiller, 2012, p.135

⁷ Translation of the authors from Schneider, 2010, p.9

For Forty (2007), design has a strong influence on the way people construct thoughts, the way they behave and are located in society. It is part of our culture, even having a significant role in our conception of the world [Weltanschauung].

Design has the function of creating brands with life for unique and individual experiences:

"It is through design that products or services take shape and become functional and attractive in the eyes of your potential users. They are designed to entice the buyer and that is the true purpose of any brand " (Daniel, 2011, p.16).⁸

Design has evolved and today is considered an integral part of brands construction process, surpassing its mere visual creation or appearance. According to Martins and Merino (2011), the field in which design works transcends the creation of products and graphic pieces as isolated elements, and became part of an entire system as a recognized management process.

As for brands to be prepared to have their image up to the competition, design has to be integrated in the various processes within organizations. Design can contribute, due to its interdisciplinary thinking method, in adding value and identify new opportunities for creation targeted and universal products.

According to Wheeler (2009) design plays an essential role in creating and building brands but also in recreating them. Some brands are forced to change, as mentioned before, due to different situations and in these cases a rebranding process is required.

2.6 Rebranding

Rebranding is a marketing strategy in which a new name, term, symbol, design, or combination thereof is created for an established brand with the intention of developing a new, differentiated identity in the minds of consumers, investors, competitors, and other stakeholders (Olins, 2008; Raposo, 2008; Wheeler, 2009).

A process of rebranding involves changes not only in the visual identity but more deeper in the values, positioning and philosophy of the brand or organization.

Changing something that already has a culture, a tradition, an attitude and a reputation is a challenge that businesses tend not have to go through. However Olins (2008) defends if one organization shifts to a new direction – due to merging, acquiring, divesting, being privatized, going through massive technological and cultural changes – the probability is that their brand will also need to change and be seen to change.

Rebranding is needed if:

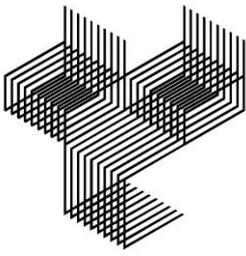
- The brand is no longer current, effective or working for your audience
- The target market or the business has changed
- The business is preparing for growth including a merger or acquisition

3 Case Study's

As case studies, in a primary phase of the investigation, two contemporary processes of rebranding were chosen because of their totally different approaches, New York city brand and Worten, the national market leader in the areas of home appliances, consumer electronics and entertainment.

In 2007 Wolff Olins agency made the rebranding of the New York city brand. It marked a great impact by fully breaking with the 1977 earlier brand.

⁸ Translation of the authors from Daniel, 2011, p.16



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This new identity reflects the essence of this United States city in its cultural, ethnic and ideological diversity with a complex, very rich and dynamic visual language.

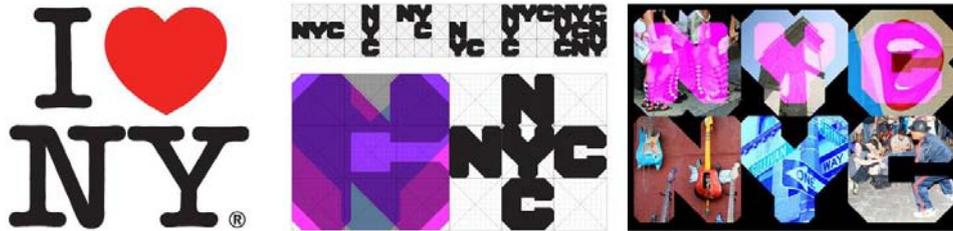


Figure 1. NYC Logo

Despite the diversity the brand has a graphical structure supported on a regular and very strong quadrangular simple grid. This grid allows the deployment of the brand in vertical and horizontal direction, as well as compositions with various scales of letters.

The typography used is very strong, extra bold, which allows a whole game of images on the inside, with a capacity of future expansions adapting to the contemporary trends in a hyper realistic image culture.

All the elements of the visual system (typography, color, images form and movement) support and reinforce the brand language in its visual dynamic and multiplicity. However, the notion of family and Visual unit, important for the strength and coherence of the system is still present.

Recently Worten made a rebranding, refreshing and debranding of the brand. The company wanted to present a new visual identity which resulted in the refreshing of the logo and the "W" icon. The changes in the logo were very soft. The typography was updated with a more modern graphic design. In this refreshing process the shape of the logo as well as the color remained - red with white lettering. To the icon "W" was given perspective and began to appear on all communication and used independently of the logo. This debranding process was a bold decision, but having the target consumers recognize the company regardless of text will create a sense of community and security intended by Fuel agency.

The basic elements of the visual system (name, typography, symbol and color) create a cohesive brand language although this coherence is a little lost when combined with the complementary elements and their application in communication materials.

4 Final Considerations

Due to the need to follow changes and trends of modern societies brands are currently compel to face challenging rebranding and redesigning processes.

Repositioning, revitalizing or redesigning an organization or a brand, is an extremely challenging and a risk involved process. It thus becomes important to find tools and mechanisms to minimize those risks.

The two case studies presented, with very different approaches, served to reinforce the relevance of the theme but also its complexity either it is a simple visual change (Worten) or more profound strategic one (New York city brand).

It is intended to study how rebranding strategies are developed in order to identify the most effective methods and procedures for creating cohesive visual systems with its basic and complementary elements.

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Emotion and Mood in Design Thinking

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Abstract

This paper discusses the research scheme to detect and analyze emotions and moods in Design Thinking projects.

It describes why emotions and moods might be important to optimize Design Thinking processes and tools to get better efficiency and smoother collaboration and teamwork.

The research plan is drafted and the first pre-research observances are presented.

Keywords

Design Thinking, Emotion, Motivation, Collaboration

1 Introduction and Research Idea

„Design Thinking is a problem solving methodology especially well-suited for investigating ill-defined problems that is human-centered, possibility-focused, and hypothesis-driven. It is a style of thinking that combines empathy for the users and immersion in the context of a problem, creativity in the generation of insights and solutions, and a data-based experimental approach to assessing the quality of solutions.“ (Liedtka, 2013)

Design Thinking (DT) as an approach to problem solving and innovation is typically based on a process to reach new and fresh solutions for the posed challenge (e.g. Brown, 2009; Kelley & Kelley, 2002; Liedtka & Ogilvie, 2011).

All these Design Thinking methodologies use processes with several phases and a multitude of tools, leading the creative teams through various tasks to reach their demanding goals. After consolidating the teams, the core process steps are: Analyzing the challenge, creating ideas and validating the solutions, labeled by Tim Brown as “inspiration”, “ideation” and “implementation” (Brown, 2009, p. 16). The methodologies developed in Design Thinking extend this core to facilitate the task and to encourage creativity. So a Design Thinking process goes through a set of phases.

"Each of these phases is different, and it's important – if only for the morale of the team – to recognize that each *feels* different and calls for different strategies." (Brown, 2009, p. 64)

Design Thinking projects are prone to deal with wicked problems (Rittel & Webber, 1973, pp. 161–167) and thus very demanding. The function of the diverse tools is to keep the team highly motivated and focused on the detail task of the phase.

The research project discussed in this paper works on the assumption, that the *feel* Tim Brown mentioned above, can be designated as emotion or mood.

On this basis the research idea is:

Each step in the innovation process driven by Design Thinking needs a certain emotion/mood – how can you keep and modulate it through the whole process?

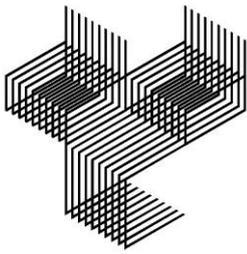
Research Question

How can the moodbase of a design thinking tool be determined? How could a specific tool be optimized to support/activate the desired mood?

Sub-Question a: Every phase of the design thinking process needs a special kind of mood/emotion to be successful.

How can the appropriate mood for every phase be specified?

Sub-Question b: Depending on the task, each phase of the design thinking process needs tools that lead the team to a special mood/emotion/mindset.



How can these tools be determined?

Sub-Question c: Depending on the team structure, the team leader needs to select the tools to nudge the mood to achieve better and more efficient results.

How can he/she identify the appropriate nudge?

Sub-Question d: Individual team members have to be nudged from their mindset to merge better with the team.

How can a member be individually motivated to change his/her mood?

2 Emotions

2.1 Emotion and Mood

From a biological view, emotions have the function to ensure the survival of the species.

To do this, emotions motivate, activate, evaluate, regulate, prepare and communicate (Häusel, 2009, p. 15). Thus evoking the right emotions can activate recipients to great performance and better the results of every project (Häusel, 2013, p. 28).

Basic emotion like anger, sadness, surprise, disgust and joy are created through Neurotransmitters and subconsciously processed in the limbic system of the brain (Beck & Joseph, 2015). Those basic emotions are mutual to all human beings and detectable through the same facial expressions worldwide. Paul Ekman developed the facial action coding system (FACS) that detects patterns to reveal human basic emotions (2007, pp. 1–17).

But emotion is not only a subconscious process. Emotions trigger feelings that are mental images, consciously developed through thought processes and not revealed to the observer. “Emotions play out in the theater of the body. Feelings play out in the theater of the mind.” (Damasio, 2004, p. 28).

A mood is, according to Paul Ekman a state of mind that lasts over a longer period of time. Unfortunately “Moods don’t have their own signal in either the face or voice” (Ekman, 2007, p. 50). We tend to laugh more often when we are happy, but not constantly.

Hans-Georg Häusel developed a functional holistic structure that maps emotions, feelings, moods licensed under the name Limbic[©] Map referring to the crucial function of the limbic system in emotional processes (2013, p. 30). At present, it is planned to use the Limbic[©] Map as the basis for locating and evaluating the findings in the research conducted. The context of mood is still to be analyzed and brought to coherence with emotion, for now setting mood as a higher status combining feelings with personal values and ways of conduct.

2.2 The emotional journey

Design Thinking processes are extremely versatile changing from divergent to convergent tasks, from analysis to synthesis, from experimentation to structured phases, from holistic

views to discussions of minuscule details, thus demanding an ever changing mindset and workstyle from the project members (Brown, 2009, p. 64).

As mentioned above, the tasks and tools used in the diverse phases should, in the view of the research question, be optimized to support these mindsets. As a discussion base for the research, the researchers created a first approach to the changing emotions/moods during a Design Thinking process on the basis of the Stanford d.school model (<http://dschool.stanford.edu>) showing the volatile jumps from phase to phase called “the emotional journey” (see Figure 1).

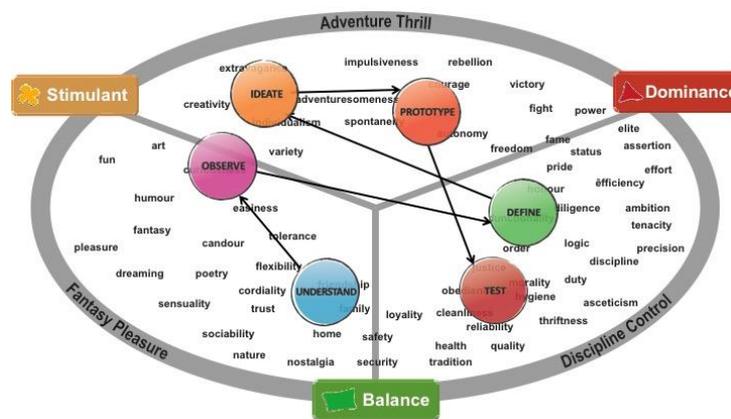


Figure 1: The emotional journey on the Limbic[®] Map (adapted by Heidi Weber)

As the research will be based on the models of ideas(r)evolution (see Figure 2), this emotional journey has to be adapted on the stages and phases of this method. The evaluation and – if possible – correct definition of the key points is the first task in the ongoing research.

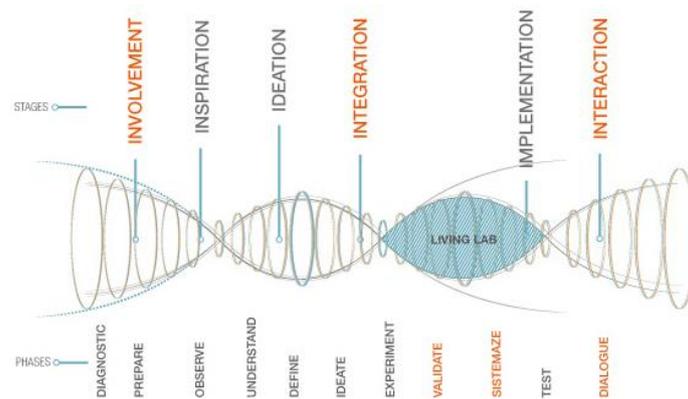
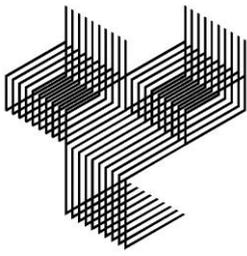


Figure 2 ideas(r)evolution methodology model (Mateus, 2016)



3 Research method

The concise planning of the research method is still to be done. At the current state, several methods are evaluated and thought through.

Besides literature evaluation, the research is planned as co-operative inquiry and action research.

“Co-operative inquiry is a form of participative, person-centred inquiry which does research *with* people not *on* them or *about* them. It breaks down the old paradigm separation between the roles of researcher and subject.” (Heron, 1996, p. 19)

The research will as well consist of heuristic evaluation using quantitative and qualitative interrogation methods.

It is also in consideration to use automatic emotion recognition to show the walk through different states through the DT Process. This was tested in the pilot study described below.

4 Pilot study

4.1 The basis

In order to get first insights in the research process a pre-research was conducted.

In an intense 3-day Design Thinking session with a class of students of the study program InterMedia (communication design) at the university of applied science in Vorarlberg (Austria) the following investigation was carried out:

1. Observation of the process (Américo Mateus, Heidi Weber)
2. Asking the participants to mark the emotion they sensed in each step of the DT process
3. Shooting photographs of the participants (each minute through the workgroup sessions) and analyzing them with the emotion detection system of Microsoft Cognitive Services (‘Microsoft Cognitive Services - Emotion API’, 2016)

The Design Thinking session was conducted to teach the students about Design Thinking and to lead them through their first DT-session. The project was based on the ideas(r)evolution methodology (see Figure 2) using its 6 stages.

The class consisted of 13 participants with different cultural backgrounds.

4.2 The sensed emotions - results

11 of the participants handed in the form with the limbic map and their sensed emotions.

The results differed widely. Some saw the whole process intensely in one area of the limbic map, others translated the wide variation of tasks into broad spread emotions.

Reviewing the results extracting each stage, showed more insights. Again some stages evoked different emotions in the students, but in some stages, the results clustered.

4.3 Automatic emotion recognition - results

During the 3 days of Design Thinking, more than 2000 photos of the working participants have been shot. All these images were analyzed with Microsoft's Cognitive Services ('Microsoft Cognitive Services - Emotion API', 2016). The service uses multilayered deep learning technology for several highly intelligent services like in linguistics, image, and sound analytics.

All those pictures were optimized and scaled to fit the demands of the analyzing program. Then a program was developed that sends all the pictures to the service and gathers the results in a database. Finally, the data of 27032 recorded emotion-statuses were analyzed.

In each picture, the emotion API detects discernible faces and determines its emotional expression. Figure 3 shows an example for one of the analyzed pictures.

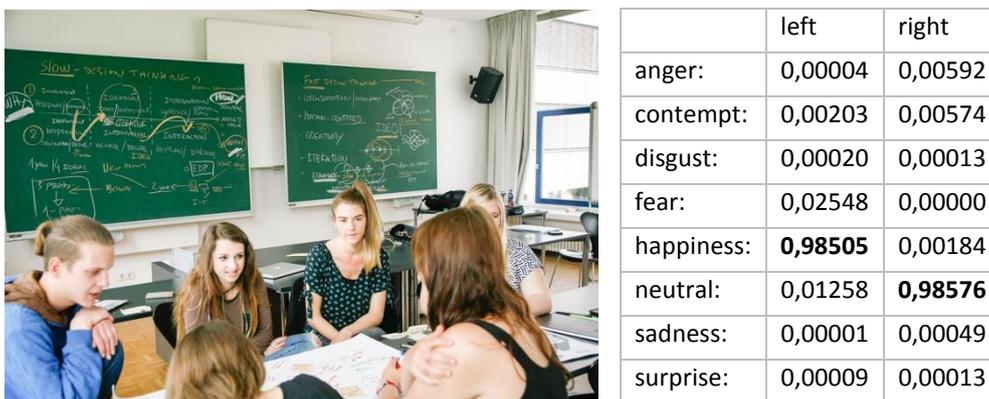


Figure 3: research with emotion detection - example picture and determined emotions (photo by Heidi Weber)

A first analysis of the given data showed, that the predominant emotion was "neutral". Of the other values only "happiness" and "sadness" had frequent values above 0.25 (Figure 4). These showed up in waves during the sessions. The interpretation remains to be done.

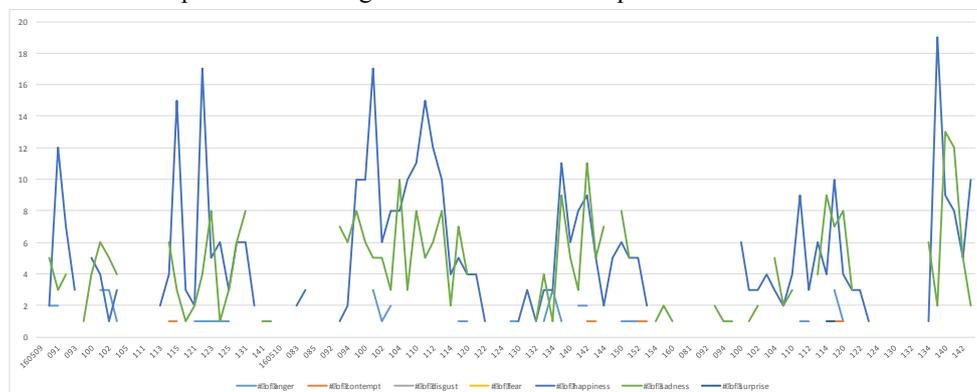
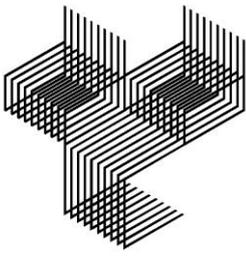


Figure 4 First data analysis – count of emotion values above 0.25 (without "neutral")



4.4 Discussion of the pilot study

While observing the DT project, discussing and reflecting the results, the following main conclusions occurred.

There seems to be a great difference between the mood/emotion shown and the mood/emotion felt. The photos that showed the students mainly with stern to neutral mien but talking to them, they were telling us, that they had fun and found the days highly creative. The anonymous written feedback to the lecture also was similar positive.

This effect might be based on two reasons: First, the detection system only gives us the very basic emotions and thus do not match with the wide variety revealed in the limbic map. The system also seems not matured enough to decipher slight emotions and tends to bias to neutral settings.

Second the research is not really looking for emotions but moods. As moods don't show facial signals (see 2.1) they are harder to discern. So a system that only analyses our facial expression now and then is not appropriate to help us here.

The learning environment (with phases of intense information presenting to the students) might also tamper the result – presumably tending them to the discipline control area of the limbic map. The first aim of the class used for this pre-research was to teach the students how DT works. So they have to process a lot of information in between the DT-phases. This might veil their state of mind and the way they would feel and act if they could concentrate on the DT-process itself.

The visual representation in the limbic map seems to work well with the participants. It still is to prove, if this works for other participants who are not so visual minded as design students. But is promising and might be a good element of evaluating the research.

5 Conclusions

The next step in this research process is the deeper analysis of the data gathered from the photographs, the comparison with the limbic map survey and the evaluation of the suitability of this method for the research.

The first attempts are not promising. The heightened occurrence of emotions other than “neutral” in some time frames during the DT session might indicate an enhanced agitation. But what this means is still to be discussed.

It may even be inevitable to challenge the selection of the Limbic Map as the appropriate mapping system. Notably for the survey forms a more intuitive basis may be appropriate. For example, the Geneva Emotion wheel ((Scherer, 2005, p. 723) has to be considered. On this basis, the research plan and the desired representations can be sketched in further detail.

Remark: An exceeded proposition was contemplated:

In times of globalization and world spread cooperations, it is mandatory to provide a web-based solution for design thinking processes. Besides having a repository for all the documents and interactions happening, it is crucial to create and maintain a moodbase that supports the process. How must a web tool be designed to support a specific mood/emotion? Is this/What is possible over cultural borders to work worldwide?

This research undertaking would without much doubt exceed the thesis and is therefore withheld.

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Power to the Users: Meta-Design Approaches and Visualizing Participation towards Change

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Abstract

Participatory culture rises within a networked society powered by personal media and ubiquitous connectivity. Everyday consumption and production of content is associated to customization and remix strategies by prosumers, including misuses and grass roots, in such extent that we are currently facing a moment where amateurish and transmedia practices become more relevant than the imposed top-down distribution. Convergence culture introduces such horizontal partnering of leading roles that imposes a radical cultural shift on the media system, shaping it towards what people want it to be. Users become the definite engine of participatory culture, not only because they consume products, but also because they add value by sharing and increasing their circulation and, in most cases, also contributing to their improvement by participating in the iterative design process. Furthermore, Meta-Design interdisciplinary frameworks start to consolidate as a response to the growth of participatory practices and the need for more suitable methodologies to incorporate the non-specialized user into mainstream endeavors as a co-designer of systems, services and products. Additional to the use of technical tools to support the visualization of user behavior, there is also a large space for design intervention inspired by meta-design approaches, with the aim of fostering co-creation and promoting collaboration and engagement within heterogeneous groups and communities based on social capital.

Keywords

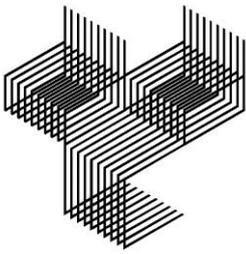
Information Visualization; Meta-Design; Network culture; Participatory culture; Transmedia

1 Introduction

Users' role and relevance on the 21st century has been facing a reconfiguration into a more active and valuable contribution, to a point where boundaries between designers and users tend to blur, and sometimes even disappear, in favor of more dialogical experiences and exchanges. Specially when new media and online tools provide the same technical instruments to common users as to creative professionals, and media industry is increasingly being shaped by user-generated content. Furthermore, we should acknowledge the fact that, within different contexts or tasks, we can assume different roles as users, according to our level of skills or familiarity, that can range from passive consumers or novices, to experts or even co-designers. In this sense, working with users, not only as testers of products and services, but as co-authors, can translate into unforeseen directions as well as promote social engagement and active citizenship. The current research highlights participatory practices and information visualization approaches as key instruments to better understand and perform in our networked and media-based culture, with the purpose of transmission of design thinking and improvement of visual literacy within heterogeneous groups and communities based on social capital.

2 Internet and Personal Media supporting Participatory Culture

The shift of attention from objects to processes and open systems by the 1960s, together with the democratization of computer-based activities and the burst of digital revolution in the turn to the 80s, operated a significant impact on sociability patterns that have led to increasing audience participation, consolidated by the Internet. Connectivity, collaboration and distributed working defined the appeal of the global communication platform in the early 90s, targeted to a massive audience. After the turn to the new millennium, blogging was one of the phenomena that contributed to the beginning of a more collaborative phase named as Web 2.0 (term popularized by Tim O'Reilly in 2004) following the increasing social engagement with media and user-generated content, that benefited enormously of broadband, as well as the ubiquitous connectivity introduced by mobile web, Wi-Fi and cloud computing. Nowadays, participatory culture is highly based on the use of *personal media*, opposed to mass media, which takes consumer media production to its own rights, empowering individuals through the use of more affordable personal computing, image and video devices that everybody can use. Manovich (2008) highlights this shift of the Web from being a publishing medium of the 1990s to a communication medium in the 2000s, propelled by social media platforms suitable for media-based interactions and also resorting on *mashups* (appropriation and transformation of discrete pieces of existing material repurposed through creative editing



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and mixing). Everyday consumption and production of content is therefore associated to a customization and remix culture as a “tactic” – term used by Michel de Certeau in the book *Practices of Everyday Life* (1980) to indicate the actions developed by individuals to “inhabit” and make things their own, finding their personal ways of expression and sociability. This concept, applied to online space, soon was adopted by the industry and brands that turned subcultures into marketable products of lifestyle. Furthermore, users’ behavior online is being tracked to improve user experience (UX), target sales and segment advertising strategies but also as means to better understand participatory culture driven by user-generated content and its dissemination.

In the book *Internet Galaxy* (2001), Manuel Castells states that the network society is established on a social and global economy based on what he calls “informationalism”, having information as the main source of productivity and knowledge. Within this society a significant change is reflected on working patterns developed in a fluid and mobile transnational context, described as a “space of flows”, which turns the very individuals into networks. For the sociologist, these subjects configure a new type of worker, aligned with the *Millennial’s* features (a young generation of born-digital individuals, also called *Generation Y* linked to digital technology, social media and networking), being multitasking nomads that quickly adapt to a global work environment and upskill themselves according to the market’s demands. In the manifesto “We, the Web Kids” (2012), Piotr Czerski, highlights as advantage points and building blocks of the identity of this generation the skills to access, filter and process information in a smooth and operative way, establishing the basis of P2P (peer-to-peer) communities, claiming the right of freedom to access information and culture. Czerski (2012) refers to the Internet as a natural and “permanent layer” of their “expanded reality” that is being transformed “with them and through them” in a global networked culture.

Affiliated with the idea of Pierre Lévy (1997) of a distributed human network, based on information and communication technologies, also Henry Jenkins (2006) used the term “collective intelligence” to label the dynamic cluster of active users that combine knowledge, skills and resources to dictate the future of the shared space of the Web, side-by-side with media industries. “Convergence culture” (Jenkins, 2006) is thus all about this horizontal partnering of leading roles that introduce a radical cultural shift on the media system, with both top-down and bottom-up decisions to shape media towards what people want them to be. In this sense, users become the definite engine of participatory culture, not only because they consume products but also because they add value by sharing and increasing their circulation, establishing connections with other contents and people, and in most cases also contributing to the improvement of products and services by rating, commenting and even participating during the iterative design process. These “prosumers”, coined by Alvin Toffler (1980) as users that produce and consume content, within a globalized society overloaded by information, turned into the emergent type of user of the Web 2.0, as they engage with content by their own means of customization

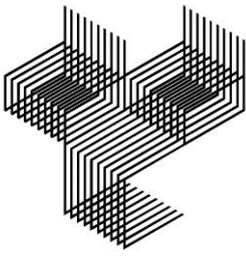
and sharing of existing information. Therefore, causing direct impact on the market as a network of active nodes that powers Web's dynamics. Such tactic of feeding and connecting scatter information across different media platforms to achieve a unified entertainment experience is labeled by Jenkins (2011) as "transmedia storytelling". This engagement and participatory practice, follows the existing media flow of information as well and foster co-authorship, specially by fiction fans, according to Jenkins's research on fandom phenomenon.

3 From User Centered Design to Meta Design Approaches

We live in a 'infosphere' where data flow and exchange is the basis of our daily communication, mainly mediated by information and communication technologies (ICT), whether being on a professional, academic or leisure context (Ramos, Mealha, Lélis, 2015). The very ICT systems have been adapting their scope to more experience-centered frameworks, in order to meet the needs of the emergent type of user, that is simultaneously consumer and producer. We are currently facing a moment where amateurish content, which is meaningful for the users that produce it and their network of contacts, becomes more relevant than the imposed top-down content, which significantly enhances the role of users within communication systems.

Since 1988, Donald Norman proposed a User-Centered Design Methodology (UCD), founded on methods and techniques leading to the central idea of designing based on the evaluation of usage behavior and experience, having the users' mental model in account, which led to defining principles to guide design practice. Such UCD methods, used for research and commercial purposes, have been further developed and normalized by European Standards (ISO) in order to assure consistency and quality on the process of designing focused on usability principles (which overall look at measuring the effectiveness, efficiency and satisfaction of users when interacting with any system). However, there is a clear distinction between the abstract or ideal user envisioned by the author/designer and the real users that apply their own tactics of use on both commercial and cultural artifacts, sometimes including subversive uses or simply misuses, whether deliberate or caused by the lack of skills or familiarity towards a given product (Manovich 2001). Many of these non-predicted usages can result into interesting approaches that pushed limits further and disclose a whole new world of creative possibilities. Consequently, the *millennials* and *prosumers* represent the current model of user who feeds the global networked economy that, as an open system, relies simultaneously on predetermined rules and experimental grass roots.

Meta-Design frameworks, usually defined by the first class activity of 'designing the design process', concurs with the emergence of these participatory practices and the need for



more suitable methodologies to incorporate the non-specialized user into mainstream practices as a co-designer of systems, services and products. Meta-Design resorts on interdisciplinary teams, getting together to think and discuss the processes of doing/designing at the very moment it takes place, amplifying communication and reducing semantic and practical gaps between members that are altogether novices, expert users (also named as power users), designers and other specialized staff, depending of the nature of the projects. Seminal insights about this empowering of end-users and improvement of systems according to our society's current standards, have been developed by Gerhard Fisher and Elisa Giaccardi since 1984, who have been conducting empirical studies to support foundational theory for Meta-Design frameworks, specially towards the development of interactive programming environments, designed to accommodate collaboration as truly open-systems, being co-adaptive as the result of users contribution (Fisher & Giaccardi, 2004). One of the major differentiating aspects about Meta-Design (MD), while comparing to regular design process, is the maximization of 'use time' and implementations of rewards. While in UCD approaches users participate at 'design time', while conducting all the iterative process before launching the product, MD acts also during 'use time', implementing the SER Model (Seeding, Evolutionary Growth and Reseeding) co-authored by Fisher in 2002, which places the users as designers, in order to promote shared-creativity that set the background for a new design culture based on social capital.

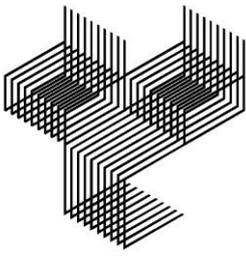
Lélis and Mealha (2011), acknowledged such meta-design frameworks to propose a computer mediated system (CMS) where internal members of an organization can contribute by experimenting and co-creating brand artifacts, providing an holistic attitude to brand knowledge and motivating engagement as well as development of a sense of belonging within the working context. This innovative research for creating a model for "Participatory Creation of Brand Artifacts", is focused on the use of a technologic platform to improve brand knowledge and also creativity and visual literacy, empowering non-specialized individuals in order to support "user-generated branding" (Burmam & Arnhold, 2009 apud Ramos, Mealha & Lélis, 2015) or "Branding 2.0" (Bass, 2007 apud Ramos, Mealha & Lélis, 2015) within the existing social branding practices. The result is an online Participatory Brand Center, that is being developed as a co-creation open-system designed for users inside a community (in this case Universidade de Aveiro) to be able to build-in branding artifacts, consolidating the idea of Brands as evolutionary systems (Lélis, 2014).

4 From Visualizing Participation to Fostering Change

The journalist and infographics expert Alberto Cairo (2013), departing from Edward Tufte's legacy on data visualization and information design, claims that visualization should be regarded as a technology, insofar it is devised to perform a practical or cognitive task,

functioning as an extension of ourselves – pouring from the idea of media as “extensions of man” proclaimed by Marshal McLuhan since 1964. The intent of Cairo is to highlight visualization not as embellishment but as ‘insight’ emerging from data, therefore he labels visualization and infographics as “functional art” (Cairo, 2013). In these regard, we can establish a correlation between visualization and design thinking, in the sense that both expand the scope of perception and cognition, present on the several stages of design process, whereas infographics or information visualization also communicate to the readers/users by providing a visual evidence they can interpret, explore and analyze. The power of visuals was also previously acknowledged and remarkably translated into a practical concept by Otto Neurath, that designed ISOTYPE – International System of Typographic Picture Education (1936), proclaiming the education of the masses and humanization of knowledge by means of showing connections between a variety of subjects, depicted by a universal pictographic language, through which he tried to retrieve to education the attractiveness it had lost in favor of entertainment. The project appeal resulted not only from the aesthetic quality of the visuals, illustrated by Gerd Arntz, but mainly of the ability it to clarify and make understandable complex information. Mapping visual complexity to represent and filter relevant aspects within data was assumed as focus of research and practice by the Portuguese designer Manuel Lima (2011), prized in 2009 as ‘one of the 50 most creative and influential minds’ by the Royal Society of Arts. Additionally to published books on the topic, Lima has developed an ongoing online collection of examples of visualization of complex networks – *Visual Complexity.com* – that constitutes a powerful resource and showcase of visual insights about a wide range of subjects.

In a society where everything is no longer one-dimensional, but rather networked and process-based, as a product of a permanent and collective construct, there is a need to explore means of dealing with such disperse information, in order to draw and visualize possible and meaningful connections, as well as communicate them to a broader audience. To pursuit this task, digital systems and tools bring together a significant contribution as far as the processing and analysis of big data sets. Tracking and visualizing the users’ behavior and content circulation gained prevalence on research likewise in Cultural Studies, Marketing and Design. The monetization of user behavior act as data-source for multiple projects, ranging from commercial applications to artistic work and cultural studies. Lev Manovich’s state-of-the-art research, which led to the funding of Software Studies Initiative in 2007, is currently focused on the development of graphic visualization and analytic techniques to study cultural artifacts, dynamics and processes based on the concept of “turning culture into data”, coined by himself in 2005 as “Cultural Analytics”, inspired by both commercial software and artistic projects (Manovich & Douglas, 2011). Some of the most recent projects of Manovich research lab provide new



graphic cityscapes modulated by social media lens: *Selfiecity* (2014) approaching emotions by the collection and analytics of ‘selfie’ photos published on Instagram in five global cities, and *On Broadway* (2015) focused on a single street of New York but feeding from multiple data sources, like Instagram, Twitter, Foursquare, Google Street View, among other Census provided information (Manovich, 2015). All these projects emphasize the potential of user generated and shared data to achieve visual representations that deliver macro and micro views, as well as yet invisible patterns, leading to newer and richer insights over ordinary aspects of everyday culture, that can also be understood as collaborative and collective perspectives and constructs.

5 Final Remarks

The reference framework proposed in this paper, focused on participatory practices derived from information visualization techniques and meta-design approaches, support the ongoing research on the development of a visual and collaborative methodological model, grounded on the Internet’s technology and socio communicative paradigms allied to the power of visualization as a reflexive tool to disclose and depict new or invisible perceptions over our world. Information visualization, can also be considered as a meta-tool of design thinking, as it can be used to design the very process of designing and visualizing. Together with meta-design frameworks that mediate instead of control, from the beginning of the conceptualization process and endure throughout the lifespan of the project fed by the input of users as co-designer, both emerge as strong foundations to consolidate the perspective of design in the 21st century, grounded on a more informed and critical social participation. However, participation does not rely exclusively on the use of technical tools. There is a large space for design intervention inspired on meta-design approaches that reinforce the potential of motivational drive and commitment when people come together around a shared mindset. Such approaches can promote hands-on strategies to work in collaboration with users, fostering real co-creation and the ‘inhabiting’ of the environments they are inscribed, shaping and improving their experience of both online and offline spaces, against the so called *digital divide*, referred to global asymmetries between countries, communities and also generations. Change is already happening, when users and designers come together sharing knowledge and skills. As designers, we just need to be opened to such opportunities of sharing and exchange, and focus on improving the design of the design process, making it as engaging and meaningful as possible for all of us – powerful users.

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Evolutionary design – a proposal for the conceptual model

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Abstract

This paper is an observation on evolutionary theories presented throughout time in methodologies approach from different subjects and circles, and how Darwin's theory of the evolution of species is at their origin. After this historical analyses, this paper's intent is to understand the next step for the creativity process and how Evolutionary Design can be the path to the future. Therefore there was a need to look at the evolution of processes over time in six scientific areas, in order to delineate the next steps in the theories of evolutionary design. Finally, a first proposal for a conceptual model that interconnects design, technology, science and systems is made.

Keywords

Evolutionary design, methodology, Darwinism, evolution, model

1 Introduction

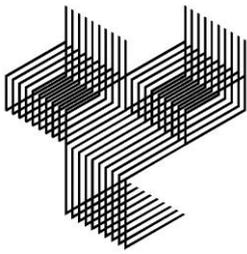
Throughout time the world was designed as a finished design. Once the designer finished the project it was transferred to the producer as

Evolutionary design – a proposal for the conceptual model

something that stopped evolving. The cities were designed foreseeing how they would come to develop but failed to understand the evolution of the spaces and of its behaviours. Services were drawn predicting what could the user's needs be, ignoring what could fail along the interaction. (Brown, 2012a) Currently, Tim Brown has been talking about changing from "Newton's world" where design seeks prediction and a complete system, to Darwin's approach "who encouraged us to think about constant evolution, emergent change". (Brown, 2012)

By referring to Darwin's theory of the evolution of species, neither Tim Brown, nor John Z Langrish "suggested that design is somehow genetic". (Langrish, 2005) Thinking the evolution in design is thinking in evolution of ideas and as Langrish mentions "the Darwinian evolution of ideas is called "memetics" that had its origin in the "concept of self-replicating ideas called *memes*" disseminated by Richard Dawkins. (Langrish, 1998) We can relate this to the need of a more anthropological process requested by Tim Brown, where the designer shifts from thinking objects as the design of things to "think about *designing behaviours*" by understanding people's actions, emotions and needs. Thus the designer can have a more important insight: "that the behaviour of those around us significantly affects our behaviour".(Brown, 2012) This is why it is important to think how "information flows": how can we have more information from a complex system and design it to have more improvements in the innovation of design process? (Brown, 2012)

For Artemis Yagou, the History of Design ought to be the reflexion of an interaction with the other. For her good, design doesn't mean an "ideal form" but the ones that have "evolved through adaptation processes within particular social, economic, and technological contexts."(Yagou, 2005) And Tim Brown (2012) denotes that the evolution is dependent of interaction and, for that, design needs a system that lays principles and guidelines for the intelligence development of evolutionary systems where we can develop algorithms that allow us to selectively improve the design of a product, service or system. At the end of this paper, a first approach to an Evolutionary Design model that is centred on research and on interconnection of six scientific areas is made.



2 The selection of species and memes

To explore Evolutionary Theories there is a need to have a scientific perspective and consequently to talk about Darwin's natural selection of species and Dawkins' evolution by meme.

When Darwin talked about natural selection, he knew that for some "winning characteristics" to be passed on to other generations it would have to be passed on "through the medium of a something". But as Langrish pleads Darwin didn't place his theories in genes or genetics, which he knew nothing about. (Langrish, 2004) Later, in the 1930's, "biology achieved a synthesis of the ideas of Darwin with the ideas of genetics and the mutation of genes to produce neo-Darwinism." (Langrish, 2005) The replication problem of Darwin was answered by the definition of genes, as well mutation solved the problem of natural selection by explaining the source of different variations.(Langrish, 2005)

Realizing that humans are now different from other animals, Richard Dawkins went beyond biology to explain the idea of replicators, which he has given the name of *meme*. *Memes* is understood as a replication system that transfers and potentiates strengths to perpetuate in a new existence. For Dawkins, this break from the animal world was made by the acquisition of cultural capacity by human beings, that "now have a new type of evolution in which genes have been joined by another kind of replicator". As Langrish refers to in his paper, Dawkins' *memes* were "ideas about pots, arches, clothing and also religion, fashion etc." For the author, Dawkins sees *memes* as "units of cultural transmission." (Langrish, 2005) Richard Dawkins advocates that replication of genes enables the evolution of life, including genetic transmitters and cultural transmitters. (Yagou, 2005)

For Langrish, *memes* are not sealed in the cultural transmission, he defends that to have progress *meme* should be defined as biological entities and "identifying different kinds of *memes* with different ways of competing and different ways of being transmitted."(Langrish, 2005) Refuting some of Dawkins ideas, Langrish also doesn't perceive *memes* as units but as patterns that are created in the human mind.(Langrish, 2005) A complex idea or an image are assembled in the brain as pattern connections made by synapses that enable this linkage. The way a person experiences the

moment defines the way synapses design the circuits, that can be modified and evolve as experiences are made. (Damásio, 1998)

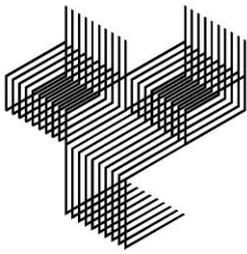
Considering Langrish's (2005) idea that "the mystery of our existence involves the mystery of technology", there is a need to define the *memes* that can be used in an evolutionary perspective in technology.

3 From Evolutionary Biology to Evolutionary Computation

The best evolutionary design system by Peter Bentley is the Natural evolution.(Bentley, 1999) Throughout "hundreds of millions of years" the biological design evolved in a dense complexity in order of performance and efficiency. In nature complexity and simplicity can be found in the structure of the biggest animal as well as in the microscopic life form, "every living thing is a marvel of evolved design." (Bentley, 1999)

Is human design influenced by this complex and simple life form that has been improved throughout the years? As far as biology is concerned "it is becoming clear that many human designs have existed in nature long before they were thought".(Bentley, 1999) As the examples given by Bentley:" pumps, valves, heat-exchange systems, optical lenses, sonar." (Bentley, 1999) Realizing that design problems were solved under the influence of biology, it's understandable why and how Computer Science relied on biology to develop systems, algorithms and programming. Although the biological system has gained in the way it handles complexity and adaption through evolution, these systems fail because their mutations are caused by random improvements. This system's evolution can have some "guiding principles" but "guiding intelligence" hasn't been found yet. As a reply, humans have joined the qualities of Evolutionary biology and of Computer science to generate what is called Evolutionary computation. (Bentley, 1999)

Once we embrace that improvements are random in the "selective emergence", we can create something from the ability of evolutionary reproduction and from the ability to develop intelligent systems. (Brown, 2012) Tim Brown refers to "genetic algorithms" and Peter Bentley calls it "Evolutionary search algorithms", both represent the influence of the evolution in nature. The way algorithms search and reproduce for a



solution is "an analogy with natural evolution" and we can find this representation in software design.(Bentley, 1999) There are parameter values that are defined "but you don't know in advance what the optimal version of that piece of code is going to be." (Brown, 2012) The algorithms are being used in different subjects as architecture, engineering, design and art. As an example, Brown refers to the art work of the sculptor Theo Jansen, sculptures made out of PVC plumbing pipe and that move on their own. (Brown, 2012) According to the author, Jansen didn't identify the result when he "designed an algorithm and it kept iterating and iterating until it created the most efficient foot and hip mechanism."

4 From Design History to Design Practices

"Good designs are not ideal forms, but expressions of ideas which have evolved through adaption processes, to fit particular social, economic, and technological context."(Yagou, 2005, p.6)

Artemis Yagou advocates that the artefact can be regarded as cultural *memes*, for its ability to replicate and propagate ideas through imitation, modification and competition. The way Design History has been taught has influenced the design process, and therefore changing design practices is required to adopt an "evolutionary Open Source model". (Yagou, 2005)

The conception of design in Modernism was based on the functional principle that "form follows function", the famous phrase uttered by architect Louis Sullivan, where the object's perfection was accomplished by predicting the function based on the designer's aesthetic preferences. (Yagou, 2005) In History of Design we can observe that the demand for achieving the perfect form "went side by side with eugenics", this "pseudoscientific thought" that supported the idea of the best human creations were naturally selective. The Streamline Design is another example of endeavour for following Darwin's principles, where simplification leads to achieve the "Ideal Type". Both principles were misinterpretations of Darwin's principles.(Yagou, 2005)

As Artemis Yagou defends, Evolution doesn't mean perfection, but change and ability to adapt, Design is changing and adapting to new models, that

Evolutionary design – a proposal for the conceptual model

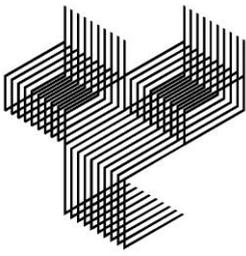
are more open and lay on the human centred approach. (Yagou, 2005) Tim Brown corroborates that there is a need to have an openness to the world where design works in a participative and open way. (Brown, 2012a) The designer has to cooperate with society giving sense to things rather than defining things. People look for a “sense of identity” to bring back their values so that society starts to increase the value of the designer, that now has the duty to readapt the economy and production to products’ sustainability.(Guellerin, 2013) Reviewing the explanations for the evolution of Darwin, where the function adapts to Nature, the product is also constantly repeated and suffers changes over time, influenced by a process of continuous and cumulative design, as well as collective.

5 Conclusion

In conclusion, designers should get closer to different scientific approaches to ask the right question and draw better hypotheses, actual experiences and share learning. To discover unmet needs, the designer has to be a researcher in anthropology, ethnography, or psychology, and should analyse real-time data through technology to uncover how individuals and groups really think and act, which is an essential part of innovation.

The mind-set should be that design is never completed, the user has to participate in the development of the design, thus interaction leads to evolution.(Brown, 2012) Evolution for collaborative design does not just mean listening to consumers, but the world that surrounds them also has an analytical perspective "in the microcosms of everyday life and the macrocosms of global flows".(Guldi, n.d.) The spatial concept of physical boundaries is evolving and so is our relationship with space. At the end of this paper there is an attempt to understand how we can use this "Spatial Turn" to empower the designer with more information and knowledge.

Regarding to the bibliographic references made over this paper and searching for the next steps in the theories of Evolutionary Design, a first proposal for a Evolutionary Conceptual Model is made based on the research through the evolution of processes in the scientific areas of Design, Computer Science, Biology, Social Sciences and Humanities, Design History and Business and Management. In the proposed model there are



three layers that exemplify the purpose to research evolution over time of each of the six scientific areas. With this observation, a triangulation and interconnection of information and data is suggested, in order to realize the influence between different scientific fields in the innovation process. (see figure 1) What will be the result: An application in design practice? A platform based on an algorithm? Or a participatory or networked format?

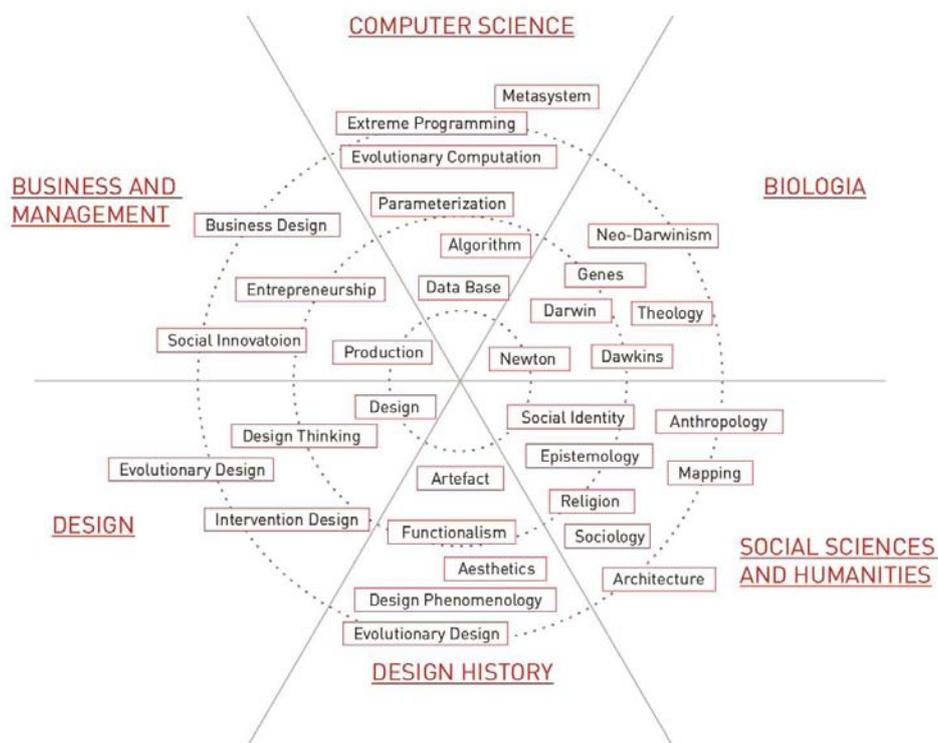


Figure 1. Evolutionary Conceptual Model by the author

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Digital Color Conversion with ICC Profiles in Skin Tones: the Color Mapping Algorithms

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Abstract

Thesis proposal: this paper summarize the relevance of the theme, the theoretical framework and the methodology to adopt. Digital color conversion occurs among Color Profiles, small digital files similar to color catalogs that encompass the information about the colors possible to reproduce or achieve. The color conversion must always be fine-tuned using one of four different algorithms to remaps colors and also by an important option, the BPC (Black Point Compensation), used to recalculate the darkest colors. The possible combinations of algorithms and BPC can produce seven different results for the same original using only one Color Profile. The aim of the thesis is to evaluate and compare the results of these different color conversions using a set of skin tones that are representative of the human race. The color deviations will be calculated with the DeltaE CIEDE2000 formula. The results will be systematized and treated quantitatively. This treatment will focus on (i) calculate a set of quantitative indicators and (ii) perform a set of statistical tests in order to impart meaning and guarantee the reliability statistical conclusions obtained (iii) use the approach of artificial neural networks to find patterns and perform behaviors predictions of the color conversion methods.

Keywords

Design, Color Management, Color Profile, Color Algorithm, Skin Sample

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1 Introduction and theme relevance

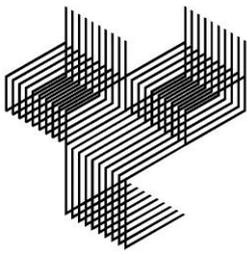
In the perspective of a digital user, Digital Color Management is embodied in the use of ICC profiles, Color Profiles in compliance with the regulations of ICC – *International Color Consortium*, an international organization that regulates and supervises the production of Color Profiles. Moreover, in professional areas like Design or Graphic Industry it seems to be considered sufficient the choice of the right Color Profile; that's to say that the mindset is that the right Color Profile is the quality assurance.

However, each Color Profile can produce many results, depending on how is configured to perform, so in reality each Color Profile can produce as many results as options existing in the software that activate and controls the Color Profile. In other words, there is no "absolute true" in a Color Profile and a user can and should fine-tune the color conversion. In fact, one of the options is not really an option, is the basic set of calculations that the Color Profile should use to identify and converts the colors – let's call it the "Math", because they are sets of equations called *Color Mapping Algorithms*. In brief, even if the software that controls the performance of the Color Profile is as basic as it could be, it always have these "Maths" available, because the user must always choose the set of equations to use, the Color Mapping Algorithm... if the user didn't choose, one of "Maths" must be active by default.

So, why can't be only one Algorithm? The experts consider that there is no perfect "Math" to deal with the color transformations that a Color Profile carries, so the responsibility in the choice of this best "Math" is delivered to the user. This is the first problem, because is not clear why and when a user should choose one of these "Maths".

Another important concern is related with Design of Communication and the Graphic Industry. There are several international norms and ISO's to regulate the quality of printing, trying to standardize the quality of the reproduction. The norms about color reproduction to validate the quality of a machine have some tolerance related to the fact that they produce in mass, so some color deviance can be expected; that's to say that to an industrial printing machine some deviation of color is tolerated, is normal. However, since a graphic work is previously produced by a Designer in a computer, they have already transformed the color, perhaps with some deviation of color due to is "Math" choice – let's call it the "Wrong Math". That's the second problem, because if there is a previous "Wrong Math" the color deviations will be cumulative with the acceptable tolerance in the printing machine and will exceed the normal deviation.

Finally, the information available about the possible deviations that can occurs with a "Wrong Math" in the normal process of work of a Designer is scarce. That is the third problem, because additionally, there is no norms or ISO's to regulate the quality of the color transformations carried by a Color Profile.



In sum, related to Digital Color Management and in the context of the present thesis proposal, we enunciated 3 problems in the perspective of a user: (i) lack of information about when and why use different Color Algorithms (ii) bad choices of Color Algorithms can have a greater impact than expected because they can accumulate with the normal tolerance of color deviation in printing systems (iii) in the normal process of producing graphic objects, there is a lack of information and/or studies about the impact of bad choices of Color Algorithms.

The aim of the thesis is to evaluate, analyze and compare the results produced by the Color Algorithms, measuring the color deviations occurred with a sample of skin tones representatives of the human race.

2 Theoretic approach

2.1 Digital Color Management

In Digital Color Management are considered prerequisites a colorimetric characterization of devices, a color modeling and calculation system as well as a set of techniques and color mapping algorithms. The goal of the management of the printing industry color applied is to sustain the appearance of colors in the different stages of production and between the different peripherals that represent colors (Berns, 2000). For a user, it is only necessary that the software used is consistent with the ICC regulations and use an integrated CMM – *Color Management Module*, which after user configuration establishes an automatic standard for the sustainability of color in the various production stages (Fraser, Murphy, & Bunting, 2005).

Essentially, a CMM uses ICC profiles to standardize the graphic designs. In the color conversion, the CMM performs two steps with each color: the first transfers the values to a mathematical color model that represents all discernible colors in the Electro Magnetic spectrum. In a second stage it is used a CAM, a *Color Appearance Model*, specialized in adjusting the colors according to the human sensitivity (Fairchild, 2013). This binomial transform (Color Model and CAM) needed to calculate the final colors is called PCS – *Profile Connection Space* and his performance has a major role in the final result.

To optimize the PCS calculation is necessary great coherence between the CAM/CMM in use and the CAM that was previously used to calculate the existing colors in ICC profiles – there are many color calculation formulas algorithms that can be integrated into a CAM and can dramatically influence the resulting colors (Fairchild, 2013). Nevertheless, the ICC organization does not recommend any specific CAM to create ICC profiles.

2.2 ICC Color Profiles

An ICC Color Profile is a set of data that characterizes a color device like a printer or a television, or characterizes a color space as in some RGB profiles, like sRGB. These files are similar do color catalogues and carries the information about the quantity and attributes of the colors they can reproduce or achieve and they are activated by a CMM. The

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International Color Consortium (ICC) was established in 1993 to create the framework for the Digital Color Management. The reference standards for the construction of profiles are created by ICC, but the specifications do not define any workflow for professional printing nor describe the specific requirements for software that integrate ICC standards. Moreover, do not impose any particular standard of quality, both in stages of production or the final result (Homann, 2010).

2.3 Color algorithms and the option BPC

Color Gamut defines the colors that a digital graphic object contains. In a Color Profile, *Gamut* is the possible universe of colors that can be achieved by the Color Profile. By *Gamut Mapping* consider the color adjustment process so that their representation is possible in a peripheral or color space (Fairchild, 2013). A problem arises in a color conversion when the set of original colors do not have, at least in part, equivalent in the destiny. In this situation, the colors that are not common are called *Out-of-Gamut*, colors that are not possible to make in the output. The Out-of-Gamut calls for a decision: how to find the best color to replace the one missing? That's the mission of the Color Algorithm.

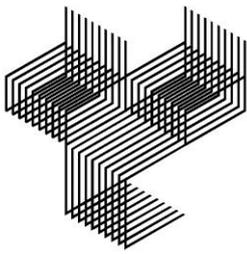
For the ICC profiles are available four Color Mapping Algorithms: *Absolute Colorimetric*, *Relative Colorimetric*, *Perceptual and Saturation* and each one is expected to produce different results (Green, 2010). An important option can be added to modify the behavior of these algorithms, called BPC – *Black Point Compensation*. Created by the Adobe Corporation (Adobe, 2006), was later reviewed (Saguer, 2013) and in 2015 was launched the normative "ISO 18619: 2015" to regulate his implementation. The mission of the BPC is to deal with the darkest colors using a non-linear approach (Brinkmann, 2001), preserving the sensation produced in the human sensibility (Homann, 2010).

In sum, a Color Mapping Algorithm must be use do decide "how to" select the best color in the set of colors available in the Color Profile. Since there are four algorithms, the same original can be transformed in four versions. Because the BPC is not compatible only with the Absolute Colorimetric algorithm, the addition of the BPC to the other three algorithms can produce, for the same input, a maximum of seven outputs for the same Color Profile.

The color transformation between Gammas – different catalogs of color – is one of the most sensitive areas in the Color Management, because of the implicit notion that there are "always" colors Out-of-Gamut. The reason for the existence of several algorithms and options is not an option for plurality – in fact, none of the existing Color Mapping Algorithms is effective enough to be considered as a standard (Green, 2010).

2.4 Measuring Colors

The evaluation of the difference between two sensations is considered a qualitative assessment – some of the five human senses such as hearing and vision need a metric or a evaluation scale that quantifies the differences between perceptions; this type of metric is



called JND – Just Noticeable Difference (Palmer, 2002). However, is not possible to argue that the phenomenon of color perception is only physiological; colors are cognitive and psychological complexes and it is not plausible to assume a principle of neutrality in the evaluation of color or of their differences. In the assessment for each individual, the researchers consider two principles in building a JND (Berns, 2000): (i) Perceptibility, the degree of noticeable difference between two colors (perception); (ii) Acceptability, the cognitive and cultural tolerance difference (judgment). In the evaluation of chromatic differences, *Acceptability* has an important role and can be extended to other diverse factors which came to be called *Commercial Acceptability*: human perceptibility can have very small values when compared to the industrial processes and it is therefore necessary to extend the range JND, to become economically viable for a product (Berns, 2000).

To calculate the color dissimilarity there are several possible equations and the result is represented as "Delta E", " ΔE " or "dE" and the default value is JND = 0. The CIEDE2000 formula (or DE2000) is the most recently recommended for the printing industry. Although since its launch in 2001 continues to receive constant refinements (Sharma, 2005) up to the latest color appearance model CIECAM02 (Tastl et al. 2015), the CIEDE2000 intended to be adopted as a scientific standard. For a standard dE difference tolerance it is plausible to consider a default value of JND=2 or even higher as appropriate to support also the Commercial Acceptability.

3 Thesis proposal

3.1 The choice for a color sample of human skin tones

The ICC profiles are studied for an operating excellence with existing standard samples, with which various organizations standardize the equipment behavior and qualitatively assess the results of the color changes carried by the Color Profiles. When these profiles are made available to the general public they are already optimized for the set of transformations that are known in advance, that will be subject to scrutiny by the scientific community and user groups. In sum, the Color Profiles are build and optimized using a specific target, like FOGRA or UGRA – using an exaggerated metaphor, is like doing an academic exam with a previous knowledge of the questions.

We considered that will be important to our experience the use of a different set of colors, avoiding the optimization of the Color Profiles for specific targets; in fact, they should be good enough for any color. To this, we decided to find a set of colors that, unquestionably, could be considered important for everyone in any professional area that deals with color. That's why we decided to use a target made by human skin tones – we think that the importance of this colors is implicit and obvious, so needs no further justification.

For the target of skin tones we considered two requisites: (i) use the best possible catalog of colors (ii) ensure that the colors of skin tones are in the normal range of human vision.

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The first requisite was to build the best sample, a set of colors representative of the human race. Although the skin tones are important for several areas, like cosmetic, publicity or medicine, there is no catalog of colors of the humans. When they exist, they are proprietary solutions – not available for the general public – and/or they don't have studies validating the colors defined. Moreover, an investigation from the CIE – *International Commission on Illumination* (the international authority on light, illumination and color) on the theme skin tone colors, evaluated the scientific research and existing databases with skin tones. The CIE report (Xiao 2012) found absence of good practices in data collection procedures and reveals the necessity of common criteria in the measurement and organization of such data. As so, we are at the moment considering that our “best choice” is the use of the commercial catalog *Pantone SkinTone™ Guide*, specifically build to represent the human skin tones. Although a Pantone™ can't be considered a color order system, they have color consistency and a considerable practical value (Hunt & Pointer, 2011).

For the second requisite we found a study (Changizi, Zhang, and Shimojo 2006), that was focused in the evolution of the human eye, because if humans are trichromats (we use 3 color sensors, the Cones) most mammal are dichromats with only two color sensors. The hypothesis was, in brief, that since humans are social, it will be important to have the ability to discern the slightest changes in the color gamut of human skin tones, because changes in color flesh reveals diseases, intentions etc. The study concluded that human vision is able to discern the slightest changes in the color gamut of human skin tones.

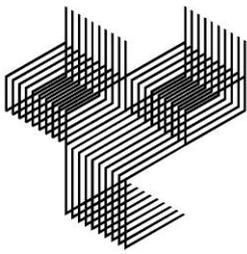
3.2 The proposed experience and methodology

3.2.1 Resume

We intent to evaluate the differences in the algorithms combinations by comparing the results of color transformation. The color sample to compare is a set of skin tones of the human race. The color analysis is done by DeltaE (dE) value calculation for a standard JND used in the printing industry, the CIEDE2000. The results will be systematized and treated quantitatively. This treatment will focus on (i) calculate a set of quantitative indicators and (ii) performing a set of statistical tests in order to impart meaning and guarantee the reliability statistical conclusions obtained. Additionally, a graphical analysis of the different behaviors will be combined with metrics and tests to support our findings.

3.2.2 Metrics dE (Delta E)

The qualitative Delta E (dE) metric established is as follows: $dE < 1$ is the optimum range; $1 < dE < 2$ is the acceptable tolerance and $dE > 2$ is the noticeable difference.



3.2.3 Analysis indicators

Used 4 indicators as follows: (i) Average: arithmetic average of the total sample, (ii) Max: absolute value of color with greater dE (iii) Top 90: 90% of the colors with smaller dE are averaged, (iv) Worst 10: 10% of the highest dE colors are averaged.

3.2.4 Calculations and approach to results

In addition to the mean indicators, we intent to use a set of tests to ensure statistical significance to the set of conclusions from experiments as follows: (i) Test Pearson Correlation Coefficient to evaluate linear relations between batches, (ii) Test Standard Deviation and Coefficient of Variation to evaluate data dispersion, (iii) Test Null Hypothesis Wilcoxon to evaluate the independence of groups of data and (iv) Test Null Hypothesis ANOVA (analysis of variance) to estimate the representability of closely mean values.

3.2.5 Other possible approach to results

At the moment, we are starting the study of ANNs – *Artificial Neural Networks*, trying to evaluate his possibilities in the context of our study. ANNs are processing methods (algorithms or hardware) that are modeled emulating the neuronal structure of the mammalian brain. At the moment we are considering the use of ANNs in two tasks: (i) To find patterns with the use of SOM – *Self Organizing Maps algorithms* and (ii) to make prediction using of BPC – *Back Propagation Counter algorithms*. We hope in the near future have a better knowledge of the topology and the architecture of the ANNs that will be most appropriate to the problem addressed in the context of this thesis.

3.2.6 Steps of the experiment

3.2.6.1 The default sample of skin tones in sRGB profile is converted to an ICC profile.

The conversion is made by the Color Management Module CMMAdobe. From each algorithm is created two versions, with and without BPC, resulting in 7 outputs.

3.2.6.2 Each of the 7 Outputs is compared with the original

Comparison is made using the formula CIEDE2000 in the software “PatchColor”. From each is generated a TXT file containing (i) the profile name, (ii) the algorithm, (iii) the LAB values for each color and (iv) the dE CIEDE2000 value for each pair of colors compared.

3.2.6.3 Data analysis

The data is imported into Microsoft Excel software where the calculations for the metrics are made (as referred in “7.3 Analysis Indicators”). The resulting metrics are evaluated and organized by its value dE (as referred in “7.2 Metrics Delta E”). Further analysis will be made using statistical methods (as referred in “7.4 Calculations and approach to results”).

3.3 Brief considerations and thesis objectives

The seven possible outputs arising from the combination of Color Algorithms with the BPC option are the core of this thesis proposal. If the existence of several solutions/algorithms

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could be understood as a good practice, they also represent a problem for a user, because the responsibility of achieving the best solution is delivered to him. Moreover, is not possible to know a priori which algorithm or combination will produce the best performance so, to assess the “best choice”, each user should try all the combinations in each project... assuming that a user has knowledge, skill and tools to evaluate each result. We propose two main objectives for this thesis: (i) evaluate the performance of each Color Mapping Algorithm and compare them (ii) evaluate the homogeneity and constancy of each Color Mapping Algorithm among the different ICC Color Profiles.

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Coworking: Open and Informal Design Classroom

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Abstract

Education has always been a universal matter of discussion for those who teach and also for those who learn. This discussion has now become especially urgent since the advent of new technologies and their implications for education. Design education is no exception. It can be said that most of the global discussions on Education establish a common diagnosis: the failure of educational models based on formal learning, pre-programmed and pre-formatted approaches, disconnected from practice and from digital technologies. Learning Design has, since its inception, a strong practical component, laboratory and experimentation. However, the education models presented today doesn't seem to alter decisively the social and spatial shape(s) of the classroom. Along with education, work also undergoes profound changes. Its dematerialization, through the ubiquity of the Internet and the portability of computers, generates new kinds of professionals and innovating workspaces – Coworking spaces. Consequently, coworking spaces start to contaminate all aspects of work, learning or leisure. One can now work at home; in public spaces; at different leisure outdoors; and even at school.

This paper focus on how higher education in Design can benefit from a coworking approach towards a new classroom based on the learning processes observed in those spaces.

Keywords

Coworking, open design, design education, informal learning, classroom

1. On Coworking and Design Education

1.1. Coworking – timeline history and forecast

Brad Neuberg coined the term coworking in 2005. He was working both as a freelancer, working independently, and as a consultant for a company. Neuberg started to feel the gap between “the freedom and independence of working for myself along with the structure and community of working with others” (Neuberg, 2014). That gap was filled with the idea of a kind of space that would gather other workers, allowing the structure he was looking for. Therefore, the coworking movement started because people were in need of each other to collaborate and share resources. The first spaces were born in the United States and then spread to virtually everywhere in the world. As to the term itself, it is interesting to note that it is commonly written this way, without a hyphen. In fact, it’s a practical way to differentiate it from the term “co-worker” which refers to people working at the same company. Instead of “co-working”, the new term “coworking” implies collaboration and sharing within the same space, keeping your individuality and independence but not working alone. It also implies one of the coworking fundamental aspects – diversity [of people, age, religion, professions, gender, etc).

Ten years later, it is now obvious that the proliferation of the coworking movement is largely linked to two fundamental reasons:

- The ubiquity of technology providing easy and wireless access to the internet;
- The profound changes in the way we work (Suarez, 2014).

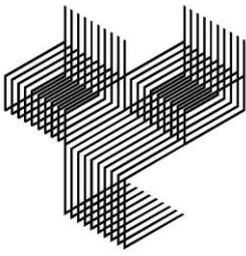
[Deskmag](#) is the leading source of information on coworking. They run every year a Global Coworking Survey. The 2015/2016 results show a positive outlook, evidencing the ongoing expansion of these spaces (Foertsch, 2016): 10,000 coworking spaces will open by the end of the year.

1.2. Coworking and Universities: natural partnering?

“COCO is a dream accelerator — a destination for building your venture and exploring new ideas in the company of other creators.

We offer memberships that provide access to multiple COCO spaces, meeting venues, and educational and social events.

Whether you are an independent, an entrepreneur building a startup, a small business owner or a corporate innovator, COCO is a place to imagine and pursue what’s possible.” (“Home - COCO | Coworking and Collaborative Space,” n.d.)



This is how [COCO](#) presents itself. A dream accelerator aimed at all pursuing a new path for their career or wanting to embrace and participate in a “community of dreamers, creators and doers”.

Will Coworking Spaces Be The New Classrooms? (Cagnol, 2013). This was the title of an article published in 2013 by Rémy Cagnol at the Deskmag website. Cagnol establishes a natural connection between school and coworking by noting that students are used to working on their assessments at coffee shops, libraries and other public places. A coworking space would be a natural option for them because it would somehow merge their familiar spaces like home and school. A coworking environment as a new classroom would allow the students to work and learn with the benefits of regular coworkers. That means working in a comfortable and informal space; work and study when and for as long as they need; get familiar with the local entrepreneurship ecosystem; learn by experience and observation from the community; put theory into practice; and the opportunity to look for internship and even job positions.

Hence, should the University provide for coworking spaces inside its facilities? Or instead promote local partnerships with existing coworking spaces?

Although this kind of partnership and evolution is interesting and valuable, it doesn't solve two major issues of today's Design Education. The classroom remains basically the same, with the same binomial human layout – many students and one teacher – which is now considered an obsolete setup. The other issue is critical: diversity. In a coworking space one can find all kinds of professionals and experts, of all professional areas, ages, genders and cultures. That is the fundamental aspect behind the operational success of coworking spaces. Diversity allows coworking spaces to be places of creativity and innovation for those involved with their communities.

Knowledge is now open to all and widely available. A new paradigm is emerging, based on the possibilities technology has opened to us all. We can now customise our education or, to be more precise, *hack* it (Price, 2013, p. 162). This means that it is possible to fully customise one's education. Everyone can now learn from everyone else. Even the traditional roles are shifting. A teacher can follow a course proposed by a student, a coworker, an expert or a peer.

1.3. The Future of Work and Learning

Knowledge is now open to all and one can learn from all, that is what the Internet gave us and what is changing our practice as teachers and students. However, this apparent wide array of possibilities also poses new questions and addresses new challenges. Who is teaching whom? Who's learning from whom? Who are the natural competitors for schools and teachers? A new reality arises when a young kid, not even enrolled with a University course can in fact attend a online lesson on any Design subject at his own time, pace and

space [and from one of his design heroes]. How can the traditional and static school compete with Youtube®? Is it worth to try to compete? And for how long will school keep the pace? Open Design, just like Open Source proposes some challenging disruptions in Design Education, namely the absolute and the classical premise of Design – originality. This premise is connected to the pre-internet concept of singularity and uniqueness of the designer's work which is now in total counter-cycle with a more collaborative, shared and open model of acting. In the introduction of Open Design (Abel, Evers, Klassen, & Troxler, 2011) MARLEEN STIKKER says:

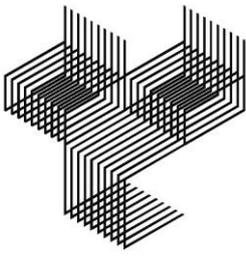
A similar schism is strikingly evident in education. As a media student, you might finish your degree without ever having made anything yourself, or being responsible for a product. You may have spent your time studying games made by other people, instead of learning to make good games. As a vocational student learning a trade, you might end up sitting at old machines the whole time, never getting to see a 3D printer, or only encountering these relevantly recent developments at the end of your education, or in an external module instead of in the core programme. (Abel, Evers, Klassen, & Troxler, 2011, p.29)

Coworking spaces are organically open collaborative shared work and learning places, well positioned to respond to a fast growing contingent of the new digital and nomadic students to whom learning is more about a peer-to-peer experience than the traditional classroom. Learning from each other is an informal and effective way provided that the dynamics of groups are observed. Being inter-generational, coworking spaces also provide an effective lifelong approach to what is learning in the XXI century.

The future of work may be hazy (what aspect of the future isn't?) but certain broad themes seem clear. Fast-paced careers will demand lifelong learning. And as knowledge-based jobs increasingly come to the fore, innovation and the engagement and integration of all aspects of the self that drive it will be more valued, an artificial separation between personal passions and daily work more of a liability. Both trends suggest that these coworking spaces may be on to something by bringing education closer to work and making it an ongoing process. (Stillman, 2012)

1.4. Learning processes at Coworking spaces

We saw before that learning processes at coworking spaces are mainly related to informal learning as described by OECD. Although outlining this is not a consensus position, the



OECD (Organisation for Economic Co-operation and Development) describes three different types of learning (OECD, 2015):

Formal learning: Organised; structured; learning goals; intentionality of gaining knowledge. This is the learning situation found at formal education systems as well as formal training proposed at professional work environments.

Informal learning: Never or self-organised; no planned goals or learning outcomes; non-intentional; learning by experience. This is the learning situation one can mostly observe at coworking spaces where learning happens in a peer-to-peer experience.

Non-formal learning: Not consensual at all; mainly organised; can have learning goals but not always; intentional or proposed; both formal and informal learning without overlapping.

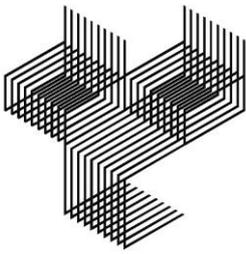
Informal learning seems to fit at the antipodes of the actual Design Education formats, in fact at the antipodes of any higher education formal institution. A new classroom based on a coworking setup (physical, human, social) would have to achieve an apparently difficult and fragile balance – students must learn; teachers must teach and the school must keep its central role in Education.

Looking further to what happens at coworking spaces, a preliminary evidence is that the non-intentionality of learning is an effective way to learn. Many studies and authors have produced extensive investigation in this field. More research, within the scope of my doctoral studies, will have to compare different dimensions of what is learning in order to fully understand the dynamics of this desired new design classroom.

1.5. Conclusion and next steps

Further investigation will require an ethnographic, auto-ethnographic (ie from the investigator's own experience) and cyber-ethnographic studies, watching and participating in both physical and online communities of these spaces. Such a qualitative research implies fieldwork research based on detailed and direct observation of those communities; a direct participation in its daily life; and in different kinds of interviews (with coworkers, students and stakeholders). As auto-ethnographic research we mean collecting data from our own perspective and thoughts resulting from the direct interaction with the existing communities of both coworkers and students/teachers. The main goal would be to experience and record the same daily pattern of these communities through data collection using classical ethnographic methods like field notes and observations; informal and in-depth interviews; visual research such as video/photo essays and/or other documentation. Because this kind of data collection often result in

simultaneous analysis we plan compiling field notes; visual documentation and interviews as a day-by-day story, describing events, plot(s) and characters in a chronological order.



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Basic Design meets Virtual Reality: A tentative methodology

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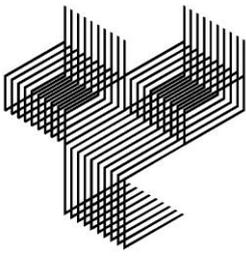
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Abstract

Basic Design is a discipline with a propaedeutic character, that usually takes place at the initial formative period of the design students. Despite its relevance, Basic Design remains an unexplored field regarding the impact of the new technologies (e.g., VR - Virtual Reality) in teaching-learning process, whose positive contributions are already well-known in multiple educational fields. Currently, a conventional (analogical) methodology is used at a Basic Design rooted discipline, named Laboratório de Design 3D, in IADE. In this context, we are conducting a research to explore the contribution of VR for enhancing the learning of Basic Design contents. Therefore, this paper presents the global methodological approach applied in the study and its underlying theory, with emphasis on the tools (e.g., questionnaires and virtual environments). Grounded on the Cognitive Flexibility Theory, two VR-based tools developed for the study will provide the opportunity to interact virtually with 3D structures. A quasi-experimental methodology will allow to compare two groups, consisting of 24 students each. The first group (i.e., control group) will use the non-digital conventional methodology (verbal and 2D images) while the second group (i.e., experimental group) will use a hybrid methodology (VR plus verbal and 2D). Results regarding the impact of the VR-based tools will be based on students perception of motivation and barriers to creativity expression, as well as their performance.

Keywords

Design Education, Basic Design, Virtual Reality, methodology approach



1 Introduction

The XXI century design students print a changing point into current teaching methodologies, which demands new learning environments and adequate teaching methods, prompting new pedagogical approaches (Gu, Gul, & Williams, 2010). At the core of design education programs, Basic Design remains one of its main components (Findeli, 2001; Boucharenc, 2006; Cetinkaya, 2014).

1.1 Basic Design

Basic Design discipline was born within Bauhaus School (1919-33), specifically addressing the initial formative period of the designer by promoting a holistic, creative and experimental methodology with respect to the fundamental principles of design. The pedagogy of Bauhaus emphasizes the human development, which Gropius and Itten brought to design education, influenced by Dewey, Montessori, Steiner, Piaget, Froebel, Pestalozzi and others (Fontoura, 2002). Constructivism Learning Theory, besides sharing with Basic Design its origin, reflect on the discipline the central idea of Piaget, that learning is built in the subject-object interaction, and Dewey's notion of "learning by doing". Internationally implemented and adapted to the present times (Cetinkaya, 2014), Basic Design develops more an attitude than a profession, being considered the best pedagogic tool for developing visual intelligence in the present century (Findeli, 2001).

1.2 Basic Design rooted discipline: Lab D3D

Grounded on Basic Design pedagogy, the currently adopted methodology at *Laboratório de Design 3D* (Lab D3D), was revised and updated by Fernandes (2013; 2011). With a broad frame of reference, Lab D3D corresponds to a cross propedeutic training to the three main design areas: graphic; product; and interior design. It aims the incorporation of an investigation method for complex systems generation that rely on student engagement in creation/construction of three-dimensional, hand scale, abstract forms, mainly using the hands. Functional aspects of the objects are not taken in consideration, as well as most components of a design project, including color and texture. The course focus the incorporation of design patterns, applied throughout the three exercises.

1.3 Virtual Reality as a learning improvement tool

Virtual Reality is characterized by enhancing the interaction, immersion and imagination, resulting in different levels of presence (Burdea & Coiffet, 2003). These factors, along with the degree of intrusion and discomfort caused by the devices (e.g., nausea, eyestrain, proficiency with navigation techniques) result in a variable degree of presence, which aims to be high. The presence can be defined as a convincing sense of being in the virtual world, allowing the evaluation of more advanced aspects of interaction, as behaviours or emotions, with good ecological validity (Rebelo, Duarte, Noriega, & Soares, 2011).

VR technology is currently used in a broad range of applications, such as games, movies, simulations, and a few main focus are training, education, collaborative work, therapy and learning (Lanyi, 2012). It is presently reinforced the growing importance of VR, either for abstract concepts learning, observation of phenomena at different scales, and participation in events so far impossible to witness, either for reasons of safety, costs, or distance (Abdelaziz, Riad, & Senousy, 2014). It is also acknowledged the impact of VR-based tools (e.g., games, simulations, virtual environments) for improving learning outcome gains, (Lee, 2011; Merchant, Goetz, Cifuentes, Keeney-Kennicutt, & Davis, 2014).

VR-based tools also promote learning transfer (Bossard, Kermarrec, Buche, & Tisseau, 2008) and encourage diverse ways of thinking through the observation from multiple perspectives (Lee, 2011).

1.3.1 VR technology for Lab D3D

Our pedagogical approach at Lab D3D faces the announced inevitability of VR presence in the future of design education (Colucci, 2011). However, the discipline remains unexplored regarding the application of new technologies (e.g., VR) in the teaching-learning process (Neves & Duarte, 2015). Considering the support of VR technology for phenomenon simulation, it could affect imagination and motivation of the students. Also VR-based tools can be positive for overcoming some difficulties noticed by the first year design students, such as the engagement in the manual tasks and the emotional connection with the abstract structures. The validation of this statement is the main goal of our study which will provide the means for assessing the impact of VR technology at Lab D3D. The specific objectives consist in developing and validating the experimental setup (i.e., facilities and equipment), the metrics, scales, tools and procedures for data collection.

1.4 Cognitive Flexibility Theory for VR-based tools, at Lab D3D

The Theory of Cognitive Flexibility is based on the Constructivist Learning Theory and deals with the acquisition of advanced level of knowledge in complex and ill-structured domains, as well as the transfer of knowledge to new situations (Carvalho, 2011). According to its authors, the learning process should create the opportunities for opening the range of possible uses of a concept, thereby, enabling its use in more different ways, consequently, affecting flexibility for solving new situations (Spiro, Feltovich, Jacobson, & Coulson, 1992).

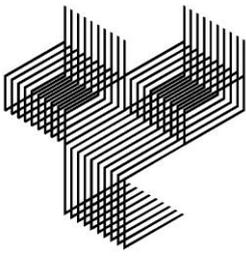
Supported by the Cognitive Flexibility Theory two VR-based tools present to the students new situations where the morphogenetic process and related concepts (already introduced in the first exercise) can be more deeply comprehended. These derive from Gui Bonsiepe's (1992) specific techniques applied in design practice and design learning: "*Formal synthesis – formal coherence creation*" and "*Controlled form creation processes*" (1992, p. 221).

2 Methodology

2.1 Quasi-experimental methodology

This research employs a quasi-experimental methodology, which is frequently adopted in educational settings, requiring no random selection of participants (Creswell 2013). Two first year classes from the design course, aged between 18 and 24 years old, are selected for a control group (24 students) and for an experimental group (35 students). In this sense, the first group doesn't use any of the VR-based tools, but a non-digital conventional methodology (verbal and 2D images). As to the second group, two different situations will apply VR. Therefore, a hybrid methodology (VR plus verbal/visual) is being used. It will be measured students perception of motivation and barriers to creativity, as well as their performance results on the exercises.

Two VR-based tools are developed for allowing free interaction with 3D abstract



structures in a semi-immersive environment. The students can move the structures and also walk around them as if they were physically present. Therefore the challenge can be understood at each one's own pace, according personal specific needs, using multiple perspectives and points of view. Also different materials, textures and light effects provide the feeling of real life conditions and interactions.

2.1.1 Stimuli

The main objective of Exercise 1 is to introduce the morphogenetic process for modularity and pattern creation using 2D form. This exercise has the purpose to level student's knowledge. Thus, no VR-based tool is administrated as long as it lasts.

Exercise 2 employs the same morphogenetic process for the generation/construction of one 3D modular system (i.e., three physical abstract structures) where aesthetic quality, diversity of effects and structural consistency are required. In this exercise a VR-based tool is developed. Six 3D structures are used, grouped according two modular systems. System 1 (structure A, B and C) and system 2 (structure C, D and F) can be manipulated by changing seven variables which are: scale; rotation; translocation; observer position; animation, material; and light. The details button reveal the characteristics of each structure according the theoretical concepts introduced in the first exercise. In the interaction with the structures, a pair of students explores the visual effects. There is no sound in the VE. The VE was a closed room, containing a single 3D structure positioned in the middle (fig.1 – right image).

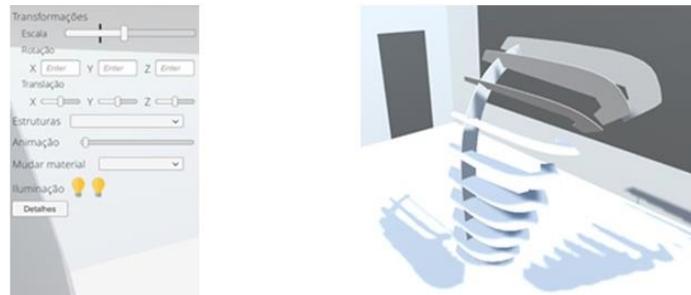


Figure 1. Interface of the VR-based tool (left image) and structure A, (right image).

Finally, Exercise 3 requires a single 3D structure which apply the already mentioned principles. However, the creation process will use, not a coupling of separated pieces, as the previous Exercise, but a single plan. During Exercise 3 a VR-based tool is used, similar to the previously mentioned VE. The main difference is the inclusion of different environments and the exploration of a single structure in each one of those.

2.1.2 Experimental Settings and Virtual Environment

An Acer H6510BD 3D Video Projector presents the VE (Virtual Environments) with the 3D prototypes. The structures are designed using 3D Max and then exported to Unity. nVIDIA (model 3D Vision2) shutter glasses is used to see the VE in stereoscopy and a camera to record each session. Students are free to visually explore the structures by manipulating it using a mouse. Pressing the left button of the mouse allowed to go around the structure. In order to change the scale, translation, rotation the interface on the VE is used (Fig 1 – left).

The projected image's size is 1.72m (horizontal) by 0.95m (vertical), with an aspect ratio of 16:9. The observation distance between the screen and the participant is 1.50 m,

resulting in a 35.2° of vertical field-of-view (FOV) and 59.7° horizontal FOV. Students remain seated during the experiment. The professor stands behind the students inside the room, which is darkened to prevent any external light interference.

2.2 Measures

2.2.1 Demographic questionnaire

In this questionnaire, demographic information (e.g., gender, age), a question about students' expectations regarding the discipline, and a final question about previous contact/interaction with Virtual Reality are asked.

2.2.2 Perceptions of Barriers to Personal Creativity Inventory

These questions intend to evaluate the perception of university students about the barriers that influence creativity expression. Through a 5-points Likert scale (1 "I completely disagree" to 5 "I completely agree"), 44 questions address the creativity barriers in four factors: emotional (14 questions); personal motivation (12 questions); time, opportunities and resources (10 questions); and social (8 question). This questionnaire was adapted and validated to Portuguese population (Morais, Almeida, Azevedo, Alencar, & Fleith, 2014).

2.2.3 Creativity level

A single question addressing the level of creativity perceived has the intention to complement the Perceptions of Barriers to Personal Creativity Inventory. It is asked in the beginning and at the end of the semester how creative students consider themselves.

2.2.4 Self-perception of Creativity and Motivation Inventory

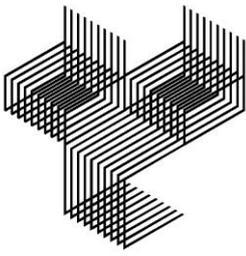
This questionnaire is based on the Perceptions of Barriers to Personal Creativity Inventory. Also, the questionnaire assesses motivation, according the Instructional Materials Motivation Survey (IMMS) (Keller, 2010). Following the ARCS model, as applied by Wei, Weng, Liu, & Wang (2015), the questionnaire includes 19 questions for motivation, in the four categories: attention (5 questions); relevance (4 questions); confidence (4 questions); and satisfaction (6 questions). With this inventory, we aim to assess student's perception of the barriers to creativity and motivation while performing the exercise. It used the same Likert scale from the previous questionnaire.

2.2.5 Performance

Students performance is analysed and assessed by a group of three independent researchers, experts in Basic Design. This evaluation follows the defined criteria for the discipline evaluation (i.e., technical, analytical and aesthetic capacity). Researchers analyse individually the exercise performed by each student and assign them a quantitative grade. In the end, the three researchers compare the grades assigned to each student. All discrepancies are discussed in order to achieve an agreement.

2.2.6 Video analysis

The procedure is video recorded for analysing students behavioural responses. The videos are watched individually by three independent researchers according a behavioural observation grid created for the study. This grid includes the number of times the students move towards the structures and/or try to grab them (due to 3D effect), verbal expressions, communication between the two students about the VR experience, and



questions during the presentation.

2.3 Procedures

A total of four moments are considered in the quasi-experiment: the characterization of the sample (1); the levelling of student's performance and perception of creativity and motivation (2); and measuring the impact of both VR-based tools (3) and (4) (Fig.3).

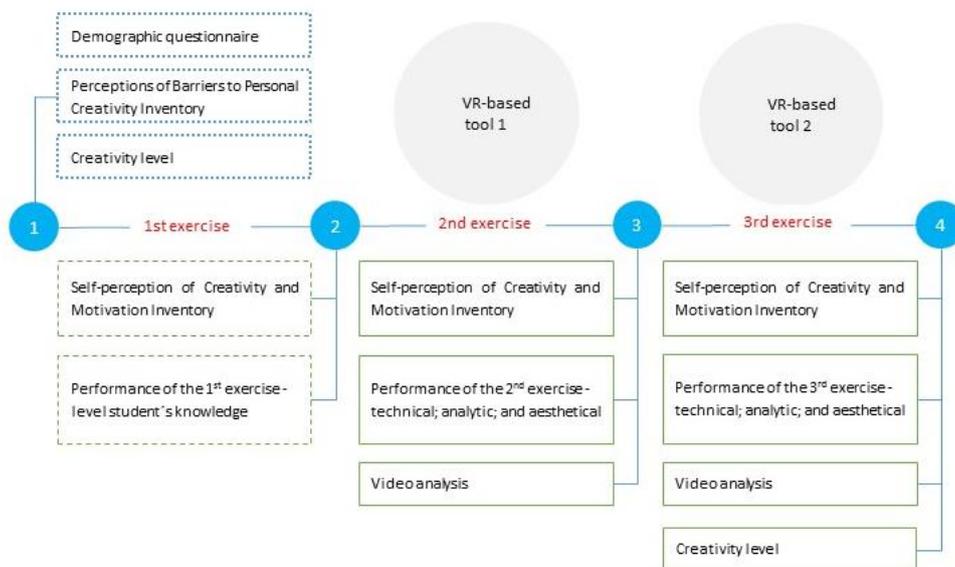


Figure 2. Scheme of the experimental procedure.

3 Final remarks

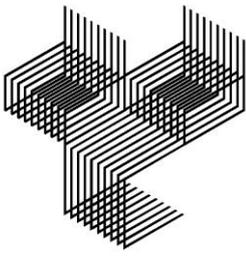
In order to explore the contribution of VR technology to Basic Design we defined a methodological approach which is presently being applied in the context of Lab D3D discipline. The first of those tools was already presented to the students, with the objective to introduce the second exercise of the semester. The second tool is being prepared and will be presented to the students in the course of the third exercise. The analysis of questionnaires, videos and the performance results of both second and third exercises will reveal the impact of the VR-based tool according a quasi-experiment approach. Two groups will be compared (i.e., the control group and the experimental group) on the perception of creativity barriers; perception of motivation; and performance. Results will be available by the end of the current semester.

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Strategies for Managing Change in Digital Products for Healthcare systems

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Abstract

Information systems of stable markets (e.g., banks, insurance companies, public services and healthcare) have been gaining relevance and size for the past 30 years. Analog processes are progressively losing ground, as digital systems are becoming more trustworthy and safe. At the same time, IT has allowed the interaction with the processes/tasks to become multi-level and multi-user giving rise, therefore, to complex systems with large data sets. In this context, today's information system owners and maintenance providers face several challenges. Thus, this study intends to address the discontinuation of technologies, in IT systems for healthcare. This disruption implies total (re)engineering and (re)design of systems, with budget and time-frame critical constraints. The case study used is the digital product Globalcare. The aim of this paper is to present a literature review and to discuss a methodology proposal to investigate if visual design and information design can contribute to managing change process, and to identify some guidelines.

Keywords

usability; interaction design; pattern design; it systems; healthcare



1. Digital Products in the Stable Market

1.1. Stable Markets: Design Constraints

There are different triggers for the creation of Digital Products: trends, fashion or traditional needs. The focus of stable markets (Issing, 2002) product development companies concerns mostly the traditional needs of users, which products have an average of 20 years of usage, communities of users, many stakeholders involved and interfaces developed with other products, critical levels of usage and error exposure, non-stop software (scheduled time-frames for updates) and huge amounts of emotional user's relationship heritage. This type of products, nowadays, are situated in the Maturity phase (see figure 1) of Product Life Cycle. The Maturity phase provides to the system stability of usage, users are familiarised with the workflows and became advocates of the solution (usually they were involved in the identification and specification of workflows).

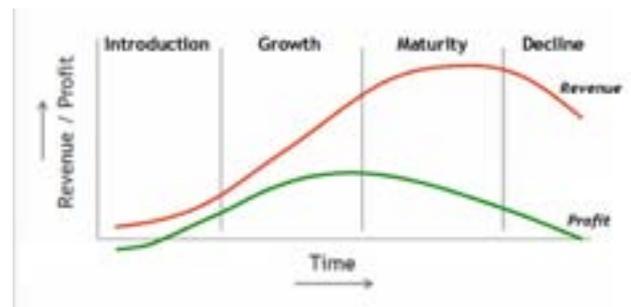


Figure 1. Product Life Cycle

The functional areas usually identified as stable market are: Governance (Public Administration), Banking, Insurers and Healthcare. These are the common areas of the invisible processes inherent of modern societies.

Traditionally, designing the interface and experience of usage of information systems characterised above, were determined by default themes and scarce configuration items provided by the technologies used for development. It's important to remember that such areas like User-Centered Design, Human-Centered Design or User-Experience began to appear in a few companies in the late 80's like Xerox and IBM due to identified concerns from software engineers, due to communication problems in between the user and the machine (interface). Interface and object customisation started with languages like HTML that allowed web designers to include special features and characters. Nowadays CSS classes can be applied to each object, helping to create visual languages adapted to each project.

Actually Design and designers are confronted with multiple challenges concerning the (re)design of this digital products. On one side, the need brought by technology break allows technology innovation (Christensen, 1997) which brings more possibilities of representation, on the other hand the amount of time of



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usage brings to the creative process *a priori* several constraints and requirements that need to be taken into account. As is possible to see at figure 2, Norman at his book *The Invisible Computer*, implies that for the same level of performance required by the users over time there is a shift in the relation to the product where firstly technology dominates in opposition to none and after some time of use, and also appropriation from the users, product performance achieves high results and the users start to expect the information system to give more than just data insertion or performance of simple and direct tasks.

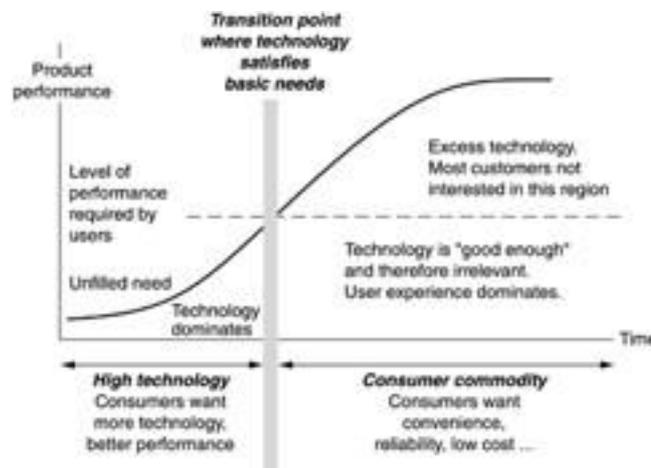


Figure 2. Relation between product performance and time of usage (Norman)

Therefore, for product management and roadmap is very important that user-experience and usability dominates this phase, which make more easy the relation between the end-users and new interfaces and/or updates.

1.2. Digital Products in Healthcare

Since software systems arrived to healthcare sector, they spread quickly into traditional data sources: hospitals, research centres, medical offices and insurances. Internet use and people's new lifestyle concerns dramatically projected a new reality: patient's networks. Examples like PatientsLikeMe with 120,000 patients in 500 different condition groups and ACOR with over 100,000 patients in 127 cancer support groups are significant cases of large communities that are generating data voluntarily shared between them and to the world (O'Reilly, Loukides, Steele, & Hill 2012). By means of wearable's and gadget devices, the Internet of Things (Bdeir, 2015, p.3), they are gaining increasing relevance due to a continuous monitoring (for example, iPhone attachment for measuring glucose, iWatch or Fitbit). This process is transforming raw data into very important predictive models and consequently tools in medical history records (like IBM Watson), helping in diagnosis procedures and in the



development of predictive models for analysis. A patient's record is a multi-level file. It has biometric data, therapeutic record, medical interventions and allergies, just to name a few. Today, all this information is spread over multiple data sources, raising issues on data integrity and confidentiality, which have been one of the major obstacles to the construction of platforms that provide overall contexts. The unique solution to this major issue of data gathering lays in integrated and systemic software approaches.

Projecting in healthcare IT companies context brings several challenges to its design based teams; e.g., the main user is not in direct contact with the system, because most of the significant interfaces do not interact to the final customer (the patient); the number of stakeholders involved is superior to "average" workflows (such as finance, public service, banking, insurance) as well as the level and type of interactions and micro-interactions; legal changes imply constant software upgrades and alterations; high level of criticality and severity; exponential amount of critical data; zero tolerance for error (due to unbearable life costs); high difficulty to standardise processes (is context-oriented as each healthcare facility has their own workflows); the patient is the most inconstant variable of the system, who brings unexpected inputs to the design process. In summary, the interfaces have to deal with all of these critical issues.

2. Case Study: Managing change in Globalcare system

2.1. (Re)Designing the product

The case study chosen for this research is the Portuguese digital product *Globalcare*, from Glintt. This information system covers all functional areas in the hospital environment: from Clinical (nurse, doctor, drugs prescription, exams ordering and archive); Patient Administrative System (hospital governance, patient admittance, billing), Pharmacy & Logistics (warehouse management, drugs circuit, hospital pharmacy management) and Business Intelligence & Analytics (data discovery, data reporting and dashboards).

With almost 20 years of implementation in both public and private hospitals in Portugal, *Globalcare* cumulated several years of emotional relation with its users.

The product *Globalcare* was chosen due to its present stage, which is the Maturity one (see Figure 1 for the Product Life Cycle). After all the years working with this product, with technologies used since the beginning (some of them are almost becoming obsolete), technology break of Microsoft Silverlight and actualisation of client's systems requirements where, some technology versions do not run in some current operating systems, for example Oracle Forms 6 (which is the basis for all the system), are the main triggers to this (re)factoring project of managing change. In the present days (re)designing for Healthcare scope, will demand an holistic approach due to issues such as bigger screen resolutions in desktop (web app), new gadgets that allow mobility (tablets) for consultation



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processes and light tasks, gadgets for monitorization (Internet of Things), large screens to place in situ for big pictures and native apps for small processes to help users to promote patient empowerment.

Beside the technology issue, there is also the problem concerning the multiple user interface. In fact, users have to open several windows to work, due to the interoperable characteristic of the system, which is a consequence of the different technology themes and look & feel interfaces developed and utilised through the years (see figure 3).

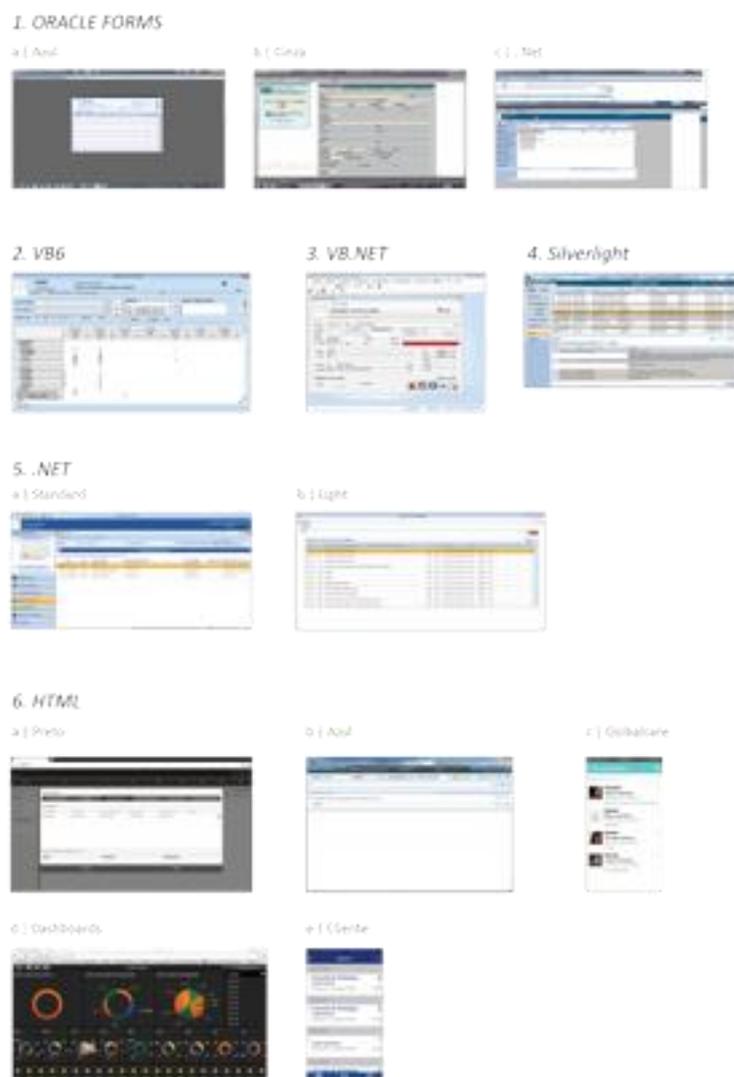


Figure 3. Glinttology - Phase 1 Identifying the state of art of product Globalcare



In order to approach the holistic process of (re)factoring the product *Globalcare*, the process which was called *Glinttology* and started in November 2014 (which intends to build a global language to the suite of interoperable products), was divided into 4 stages: (1) Identifying the state of art of the product *Globalcare* (see figure 3) and make a benchmark of the market and main competitors; (2) Usability Check-Up using the 10 Heuristics of Nielsen (with a sample of 700 hundreds representative screenshots of different pattern behaviours); (3) Design, Strategy definition of the several visual steps for making the transition (see figure 4) and (4) Development and Implementation, developed from the classic waterfall system development life cycle (Kushniruk, Patel, 2015, p. 146).

At the present moment of our research, we are at the (3) Design, Strategy definition of the several visual steps for making the transition. After the design process of the patterns, and several tests using small standalone modules that easily simulate closed workflows which allowed key-users Usability Testing (workshops of Cognitive Walkthrough and A/B Testing) it was possible to arrive to a stable UI library. Afterwards, it was defined with the Comercial team, Product Management team and Software Architects the strategy for the steps of the application of this new visual system (see figure 4 and Appendixes). This exercise implies also the system architecture (re)engineering.



Figure 4. *Glinttology* - Strategy Definition for Designing the transition through the different technologies and look & feel

3. Conclusions

In conclusion, as it is possible to see in figure 4, the *Glinttology* visual system was deconstructed into 4 phases (*Glinttology* meets Forms; *Glinttology* process redesign, *Glinttology* transition and finally *Glinttology*). This visual strategy was based on two dimensions: layout structure (regarding the different layout structures in figure 3, this is a considerable step forward) and colour. This



dimensions were identified after several iterations with internal key-users (specialists), key users identified by clients (specialists) and IT managers (clients). This methodology allowed an accurate analysis of the state-of-art of the product, as well as identifying the most representative issues both to clients (who buy the product) and end-users (who operate with the product).

At this stage some modules are being developed, and it is expected to be deployed till June 2016. This software developments will be implemented in identified clients (with identified key-users groups), and will provide to the study primary conclusions providing metrics (which will be collected through a spyware software). The development stage is one of the greater risk to this investigation, due to budget control and project management timing.

The main purpose is to assess if this visual strategy, combined with the workflow redesign, will have low impact for the users, contributing to fewer hours of formation, decreasing help-desk hours and increasing the ease of use of the system.

Regarding next steps, the first functional prototypes implemented in clients will deliver to future investigations useful insights from the effectiveness of the (re)design methodology of the product. From this first sample it is expected to identify the first group of guidelines, and applied them to the second batch of module's re(design), in order to define the final set of visual guidelines to manage change in digital products for healthcare systems.



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iTV Gaze-based Interaction Framework Design

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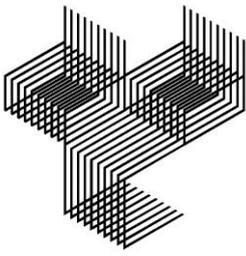
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Abstract

In this study a research framework is presented for an interactive television (iTV) interface using gaze-interaction as a possible interactional model. With recent technological advances, gaze-based interactions can be accomplished through eye tracking techniques in more reliable ways and with less intrusive methods. Next, a research design is proposed that enables the possibility of designing an iTV interface that can be useful for those who have limited or null motor skills or compromised hand-eye coordination.

Keywords

Interactive Television, GUI Design, Gase-based Interaction, Research Design



1 Introduction

Eye tracking technology has evolved in the last few years, crossing established boundaries and moving from a medical or psychological approach for studying human behavior, to an effective interaction model, adding new possibilities to existing interfaces through a gaze-based interaction, leveraging new paradigms on interaction design and compelling the reflection on graphical interface design guidelines. Majaranta and Bulling (2014) states in their findings that as technology evolves, new areas related with eye tracking widens the scope of gaze interaction. They also refer that nowadays “hot topics” are more related with pervasive eye tracking and pervasive eye-based human-computer interaction as found through prior studies (e.g., Bulling, Cheng, Brône, & Majaranta, 2012; Vidal, Bulling, & Gellersen, 2013; Zhang, Bulling, & Gellersen, 2013). Nonetheless, emerging areas are also noticeable, such as in automotive industry, attentive navigation, location awareness, information retrieval, enhanced visual search, human-robot interaction, and attentive intelligent tutoring systems (e.g., Jokinem & Majaranta, 2013; Nakano, Conati, & Bader, 2011; Zhang et al., 2013). Furthermore, regarding users with physical disabilities, through mobile eye tracking it’s possible to offer an additional sense of autonomy (e.g. in wheelchair control, tele-presence and tele-operation of technology) as found in Wästlund, Sponseller, & Pettersson (2010) and Alapetite, Hansen, & MacKenzie (2012) studies. Therefore, this kind of interaction techniques emphasizes a niche target: all the users with physical disabilities that, in somehow, have limited motor skills and compromised hand-eye coordination where the movement of the users eyes can deliver input for establishing a human-computer interaction. Moreover, other anticipated target is also all of those who don’t have the hands free at one particular moment or in environments where voice recognition isn’t appropriate to use. One main assumption pursued in this study is that as the iTV market grows¹ more users are permeable in having an iTV-set at home. Since traditionally the main iTV interaction paradigm is still mostly characterized by a *graphical user interface* and an *infrared remote control* (where user navigates through the interface with a remote control) the interactional possibilities are narrowed down considering the overall possibilities of recents iTV-set (Martins, Oliveira, & Pimentel, 2010). The traditional interactional paradigm is becoming unfitted as new iTV applications and services are released. Over this, eye-gaze interaction techniques may become a differentiator element in iTV systems since this approach may offer added value when applied in specific scenarios of limited motor skills and compromised hand-eye coordination - permanent or temporary - where a gaze-based interaction may offer more comfort and quality of life, re-empowering the user and giving back autonomy again in the usage of daily devices and, potentially, augmenting the user experience associated with controlling an iTV-set.

2 Eye-gaze Interaction

According to Kyung-Nam Kim and Ramakrishna (1999) there can be found a great diversity of eye-gaze tracking techniques reported in literature already since the mid-seventies (Young & Sheena, 1975). On this subject, several studies were found focused particularly

¹ The global pay TV market is projected to grow from more than 900 million subscribers in 2014 to 1.21 billion by 2022 (Flynn & Hamza, 2015).

on electrooculography, (e.g., Kaufman, Bandopadhyay, & Shaviv, 1993), Limbus, Pupil and Eyelid Tracking (e.g., Baoshen & Qiu, 1994; Collet, Finkel, & Gherbi, 1997; Colombo, Andronico, & Dario, 1995; Ebisawa, 1998; Hutchinson, White, Martin, Reichert, & Frey, 1989; Myers, Sherman, & Stark, 1991; Stiefelbogen & Yang, 1997), Contact Lens Method, Corneal and Pupil Reflection Relationship (e.g., Baoshen & Qiu, 1994; Ebisawa, 1998; Hutchinson et al., 1989), Purkinje Image Tracking, Artificial Neural Networks (e.g., Baluja & Pomerleau, 1994) and Head Movement Measurement (e.g., Ballard & Stockman, 1992; Gee & Cipolla, 1994; Horprasert, Yacoob, & Davis, 1997; Stiefelbogen & Yang, 1997). Additionally, it's noteworthy that gaze-based interaction can be a faster pointing input system compared with the traditional mouse (Sibert, Jacob, & Templeman, 2000; Ware & Mikaelian, 1986). More recent studies (Fairclough, 2011) show that there are different levels of usage concerning eye movements and gaze direction interaction and that it can be applied on numerous situations. Respectively, is suggested a four-group classification from the most evident or intentional interaction (i.e. *active gaze*), to the most concealed or passive interaction (i.e. *context gaze control*), as presented in Figure 1:

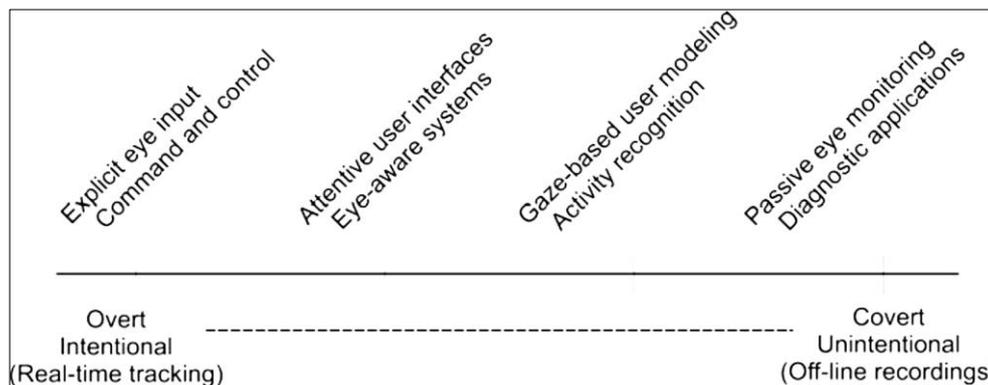


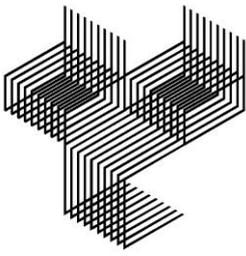
Figure 1. Continuum of eye tracking from intentional to unintentional systems (Fairclough, 2011).

2.1 Eye Tracking Techniques

On this subject, Majoranta and Bulling (2014) points out that most studies focus on a technical and physiological point of view, where vision acuity, eye movements, saccades, blind spots, are thoroughly scrutinized. Considering the vast existent techniques of eye tracking, it's highlighted three major ones: **1**) Videoculography (VOG); **2**) Video-based infrared (IR) pupil-corneal reflection (PCR); **3**) Electrooculography (EOG), where video-based infrared (IR) pupil-corneal reflection (PCR) proved to be highly accurate and the preferred technique for scientific domains.

2.2 Interface Design for Gaze-based Interactions

The reviewed literature on this topic widely recognized that eye-gaze interaction is a high viable interaction model in order to create interfaces for fast interaction. Moreover, Bates et al. (2007) and Donegan et al. (2009) research have shown also that gaze-based control can be particularly useful for people with severe disabilities in situations where the "eyes may be the only option to interact with the world" (e.g. whom who lost all motor control of their body). However there are several concerns on that matter already identified by



the scientific community as Heike Drewes (2010) exposes. The *Midas Touch* problem, identified by Robert Jakob (1990), indicates that a gazed-only interface causes dwell times that slows down the interaction process. Previously, Colin Ware and Harutune Mikaelian (1986) studies already shown that the best way to achieve a faster interaction is through the addition of other input modality (e.g. a key). Others points out that using the eyes as output for interaction commands may conflict with the eyes primary task - the vision - and that kind of use is an unnatural method, nonetheless, typing tasks works quite well (Zhai, Morimoto, & Ihde, 1999). On the other hand, Drewes (2010) reinforces that “*there are many reasons why is desirable to use gaze interactions in combination with existing GUIs*”, though designing an interface for eye-gaze based interactions will depend very much on the specific interactional goal, as seen further in *Table 1* where is displayed an overview of different eye-gaze interaction techniques and associated problems found, according to its specific goals. The first three approaches converges with the concept of *active gaze*, where the users voluntarily and conscious makes interaction decisions, meanwhile the last two, converges to the model of *gaze context control*, where the user is passive and it’s the system that provides the interaction through an extended array of “*smart*” sensors and pre-defined actions.

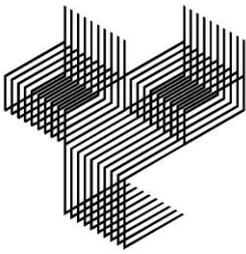
Goal / Advantage	How to achieve	Problems solved	Problems that stay
Extension of existing GUIs	Gaze for raw and mouse for fine positioning; Temporary enlargement of interaction items;	Existing GUIs use targets smaller than the accuracy; Extensive use of hand; Users cannot find the mouse pointer;	Calibration is necessary; No relevant speed benefit;
Fast interaction	Gaze, key and big targets;	Time needed for selection;	Calibration is necessary; Space limitations; New GUI development;
Public, hygienic and remote	Gaze gestures;	Need of calibration;	Gestures are not intuitive; No speed benefit;
Smart assistance	Attention sensors;	Amount of interaction;	Only simple interaction possible;
Smarter assistance	High level analysis of gaze data;	Stupidity of Computers;	Useful applications are still to research; Reliability;

Table 1. Goals and problems of different eye-gaze interface techniques (Drewes, 2010).

On this matter, Manu Kumar (2007) provides seven design guidelines based on the experience of design and evaluation through gaze-based interaction techniques, as follows: **1)** Maintain the natural function of the eyes; **2)** Augment rather than replace; **3)** Focus on interaction design; **4)** Improve the interpretation of eye movements; **5)** Task-oriented approach **6)** Active vs. passive use of gaze information **7)** Attentive User Interfaces. Nonetheless, Kumar (2007) states equally that are some challenges that should be taken in consideration when designing for a gaze-based system, such as: **a)** Noisy eye movements; **b)** Eye tracker accuracy; **c)** Sensor lag; **d)** *Midas Touch* problem; **e)** Maintaining the natural function of the eyes; **f)** Feedback.

3 Research Design

Accordingly with the previous stated and based on an extended literature review both on iTV and innovative interactive techniques and technologies - based on User Centered Design (UCD) methodologies - driven the following research question: **“How to allow interaction with an iTV-set on weak or null motor skills scenarios?”**. Consequentially, other questions come across, such as: **a)** Will eye tracking techniques be a suitable interactional model? **b)** If so, what kind of visual stimuli and graphical interface will suit best for a gaze-based interaction approach on an iTV-set scenario? In that order, the following research plan is proposed: **1st Stage: Requirement Analysis**. On this stage the documentation on this subject will be carefully studied, such as manuals and technical issues related to the area. Also will be applied direct and indirect observation in order to better understand the user main tasks. At the same time, a research on similar products should be done in order to establish benchmarks. In the end a semi-structured experience interview will take place in order to validate the requirements. **2nd Stage: User Research**. This stage will help to better understand the users and target audience. In that way, building *Personas* is one of the most suited UCD methodologies. One of this stage main objectives is to find patterns in order to apprehend user behaviors, motivations, attitudes, skills and so forth. **3rd Stage: Information Architecture**. Since that at this moment we should already understand the context of use and the user itself, these stage is focused on what users actually do to achieve the expected interactional goals. Through Information Architecture strategies, will be studied the logical organization and hierarchy of the content, according to the users interaction patterns. For that should be applied Task Analysis and Card Sorting methods aiding the design of the navigation map. **4th Stage: Ideation**. At this stage the interactional models will be conceptualized and prototyped according with the findings of previous stages. Therefore, sketching, wireframing, moldboard and conceptboard techniques will be applied. In the end will take place an AXE (Anticipated eXperience Evaluation) test in order to validate the interactional taxonomies, visual concept and advance with considerations of further developments as well. **5th Stage: Interface Design**. Based on mockups and considerations of the early stage it's expected to design the Graphical User Interface at this moment. For that, it will be consider several topics, such as shape, color, typography, iconography, menus, interaction, among others that prove to be relevant at that time. In order to validate the results it will be undertaken usability tests through paper prototyping techniques. After



will be conducted an Aesthetical Scale test as to perceive and found users perception of aesthetical pleasant. **6th Stage: Interactive Prototype.** The final stage is focused on the development and testing of an interactive prototype. After, it should be tested again with more participants through workshops and probe interviews. Then perform an Extended Usability Testing, where users emotional responses are collected in parallel to the Usability Test. All the above mentioned stages are expected to be developed through an iterative design process. At any moment if a test reveals modifications that inflicts changes on early stages, that should be reported, and proceed with a new iteration in order to apply the amendments. The final result will be an interactive prototype that facilitates the eye-gaze interaction with a iTV-set and the sum of all the reports of each stage. In the end it's expected to contribute to the scientific community with strong elements that indicate the level of user acceptance of an iTV GUI developed for eye-gazed interaction.

4 Further Work

As further steps within this research it's foreseen to continue the planned work as previously presented. For that, first it will be created all the protocols needed for the mentioned tests in order to prepare the specific conditions of each one of them. Also, it will be developed a detailed research on eye-tracking devices that best suits this purpose.

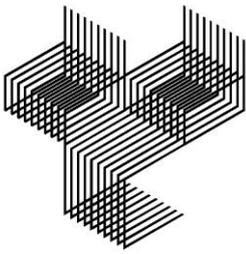
Acknowledgments

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Designing a gamification strategy to promote hand hygiene compliance

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Abstract

Hand hygiene has been suggested an important measure to combat the Healthcare-associated infections, which are associated to numerous deaths, each year, all over the world. However, despite all the efforts made, the compliance rates with the hand hygiene procedures are still lower than expected. Gamification strategies are recognized to have an enormous potential to promote people engagement. In this context, this paper presents a doctoral design project that aims to develop a serious game for training purposes, as part of a Gamification strategy to promote compliance with hand hygiene among healthcare workers. We present here the criterion adopted for the revision of the literature on hand hygiene in healthcare settings and gamification, which was conducted in order to determine to what extent the use of gamification strategies can help overcome the obstacles to hand hygiene, as well as the phases of the methodology designed according to the UCD (User Centred Design) approach. This project is being carried with the cooperation of a Portuguese hospital, where all the iterations will take place, with the support of the Infection Control Committee. We hope this project contributes for raising the compliance with hand hygiene guidelines in hospitals, reducing the risk of infections.

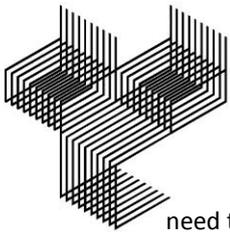
Keywords: hand hygiene, healthcare, gamification, project development, serious games.

1. INTRODUCTION

The scope of this study is Healthcare workers' failure to comply with hand hygiene guidelines. Throughout this paper we will explain how we expect to contribute to attenuate this problem, through gamification strategy, which is considered by the World Health Organization (WHO) a very serious and universal problem.

Hand hygiene is considered the most important measure for preventing Healthcare-associated infections (HAI) and the spreading of antimicrobial resistant pathogens (Boyce & Pittet, 2002) since it can help stop spreading infectious diseases. Therefore, great efforts have been undertaken to find ways to increase compliance with hand hygiene among health care workers (HCW), patients and visitors (Timothy et al., 2012). In this context, this research project aims at developing a gamification strategy for the promotion of hand hygiene compliance amongst HCW in order to contribute to the reduction of HAI infections. Upon reviewing the relevant literature, an increasing application of gamification strategies in healthcare contexts was noticed.

Many solutions are intended to promote wellness and consequently reduce the potential negative outcomes associated to unhealthy/risky behaviours (Pereira, Duarte, Rebelo and Noriega, 2014). Agreement these authors, presently, building a gamification solution is a multidisciplinary effort that seeks to solve a set of problems ranging from computer engineering, usability, interface design to marketing and others. This wide range of fields poses challenging difficulties for design teams, who



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need to have a broad knowledge of each of these disciplines and must be able to adopt a User-Centred Design approach.

Gamification strategies for Healthcare may be approached in two operating areas: monitoring professional actions and training / education. It is in this last context that we will develop this project. Being gamification of learning an educational approach to motivate students to learn by using video game design and game elements in learning environments (Kapp, Blair and Mesch, 2012), the design of a *serious game*, defined by Stokes (2005) as games that are designed to entertain players as they educate, train, or change behaviour, could be a good solution for a project that aims at professional training.

According to Ricciardi and De Paolis (2014), this technology can educate and train while entertaining users. This type of training can be very useful for health professions because it improves learning outcomes, creating a learner-oriented approach and is a stealth way of teaching. In some fields it represents an ideal instrument for continuous education, also in terms of costs because it is cheaper than traditional training methods.

In this context, the main objective of this project is to design a *serious game* for training purposes as part of a Gamification solution to promote hand hygiene compliance among Healthcare Workers.

The secondary goals are to assess and compare: a) The effectiveness of serious games on two groups, inexperienced vs. experienced professionals; b) The compliance intention rates from two groups (experimental vs. control), one using serious game/gamification and the other using conventional training methods.

Finally, this paper describes the various phases of the study, including a review of the literature on non-compliance issues and obstacles for hand hygiene, the potentials of gamification to healthcare, analysis of the elements and taxonomies for a gamification strategy in Healthcare, and the methodology phases according the UCD (Use Centred Design) approach. The accomplishment of this study is supported by a cooperation agreement signed between DGS (General Directorate of Health) and IADE on April 29, 2013 and is being developed in collaboration with the Hospital Beatriz Angelo (HBA), in Loures, along with this hospital Infection Control Committee.

1.1. HAND HYGIENE AND OBSTACLES TO COMPLIANCE

As a tool to prevent disease transmission, hand hygiene is considered the most important measure for preventing HAIs and the spreading of antimicrobial resistant pathogens (Boyce & Pittet, 2002). According to the model proposed by Sax et al., (2007), which was adopted by the WHO (2006), one of the recommended requirements is the actual compliance with five moments/opportunities in which the HCWs have to comply with hand hygiene procedures. The five moments are: 1. Before touching a patient; 2. Before cleaning/performing aseptic procedures; 3. After body fluid actual/risked exposure; 4. After touching a patient; 5. After touching the patient's surroundings.

A literature review on the subject allowed us to summarize the barriers and obstacles that can occur to hand hygiene compliance:

- **Lack of education and training** (non-existent or deficient training on the proper techniques and practices; unawareness of the existing Institution's recommendations);
- **Formal leadership and alerts** (poor perception of management and middle management's participation. Bad design of posters and/or displayed reminders, or lack thereof. Poor distribution and disclosure of rules and recommendations);
- **Evaluation and Feedback** (absence or poor observation and monitoring, in due time, inadequate transmission of information among professionals and between teams, lack of service meetings, email, internal TV system or institutional newspaper, etc.);
- Incentives and sanctions (Poor / ineffective leadership and Management Entities. Lack of positive role models.
- **Materials, Equipment and Professionals** (Deficient location and unavailability of substances and dispensing machines; Lack of professionals),
- **Socio-demographic factors** (Age – level of experience and resistance to changes; Gender [on average, men perceived more barriers than women]; Status/Professional category and area of care; Culture and tradition);

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- **Emotional Factors** (Attitudes: Non agreement; Lack of self-efficiency; Lack of expectations on the results; Behaviour: external barriers; Dissatisfaction – with the situation and with potential non-recognition).

In this regard, Pittet (2001) also points out that "multidisciplinary and multimodal strategies are needed to promote interaction among health professionals, improve individual and institutional practices, especially in high-demand situations, such as intensive care units, for high stress working conditions, and sometimes overcrowded or understaffed, and health care, and more easily accessible by major system change, easy and timely access to hand hygiene in a timely manner and the availability, free of charge " (p. 237-238), which leads us to believe that the gamification solution fits into these purposes.

1.2. THE POTENTIALITIES OF GAMIFICATION

Gamification is an informal umbrella term for the use of game elements in non-gaming systems intended to improve user experience and engagement (Deterding et al., 2011). In other words, gamification is about making use of the underlying principles of gaming and applying them to any non-game activity. The potential applications of gamification are considerable and can be addressed to almost any real-world problem. There are several examples of gamification techniques used in health, since is an approach which seeks to positively impact diverse wellness and health-related contexts, not only because it can get people more engaged and make them more responsible for their health-related decisions, but also because it can enhance the performance of healthcare workers.

Gamification has also the ability to transform the obstacles that may lead to behavioural changes, such as failure, into engaging, positively reinforcing and perhaps even fun experiences that encourage users to make sound decisions and activate the desired behaviour for the benefit of their health and wellness. Gamification has been used for many processes, for example, from diagnostics to treatment, from administration to side effects, from adherence obstacles to long-term care, and from education to training. The practice of medicine often involves tedious, repetitive, boring, and/or painful routines for both the practitioner and patient. Thus, with gamification, health workers can engage and collaborate more effectively, as well as administrative professionals can increase performance and customer service levels, all resulting in a positive influence across the activity (Pereira, Duarte, Rebelo and Noriega, 2014).

Graafland, Schraagen and Schijven (2012) identified a total of 25 articles which describe a sum of 30 *serious games* that are used to train medical professionals (e.g., surgical skills training) and group them for educational purposes, as well as commercial games for developing important skills which are relevant for medical professionals.

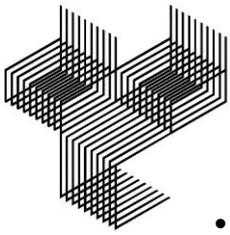
In summary, many of the barriers concerning the common lack of hand hygiene procedures by Healthcare professionals, can be corrected by implementing a gamification strategy, regarding the following advantages:

Individuals:

- Can positively affect the participants' emotional experiences (e.g., promote curiosity, optimism and pride) (Lazaro, 2004, p. 2);
- Can help them persist through negative emotional experiences and even transform them into positive ones and cognition can also be positively affected by providing complex systems of rules for players to explore through active experimentation and discovery (Lee & Hammer, 2011, p. 2);
- The time spent playing some type entertainment games can also enhance psychomotor skills (Read & Shortell, 2011, p. 1704-175).

Institutional:

- Can increase the participants' sense of identity and their social positioning (Lee & Hammer, 2011, p. 2);



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- Gamification is found to enhance communication, judgment and high-level social skills such as leadership and collaboration (Read & Shortell, 2011, p. 1704-175);
- Increase an individual's (e.g., consumers, patients, healthcare workers) fun, engagement and compliance, while accomplishing wellness and/or healthcare activities, with positive results on the healthy outcomes and costs of services (Lenihan, 2012, p. 233-235).

2. METHODOLOGY

As mentioned above, the proposed methodology is centred on the user (UCD-User Centred Design) and the guidelines for Interaction and Game Design methodology defined by Cooper, Reimann & Cronin (2007), being one of the main references in this subject.

It is organized in several steps, as specified later in this paper: a) Review of the literature: Hand Hygiene and Gamification; b) Analysis: Analysing and crossing data on the "Main barriers to hand hygiene and potential advantages of gamification" and "Analysing elements and taxonomies for a gamification strategy in Healthcare"; c) Data collection and creating personas: Focus group and Observing professional activity; d) Ideations and possibilities: Brainstorming, Creating Scenarios; e) Analogic Prototype: Iterative Analogic Prototype development and Pre-Prototyping; f) Iterative Digital Prototype development; g) Digital prototype implementation and evaluation.

2.1. Criteria for Literature review

The criteria for the Literature selection was:

1. Research for articles quoted by various authors in the field of gamification, in particular case reviewed by Deterding et al. (2011).
2. Articles already reviewed in Pereira, Duarte, Rebelo and Noriega (2014). "A Review of Gamification for Health-Related Contexts", and the not published articles: "The potential of gamification to promote compliance with hand hygiene among healthcare workers" and "Analyzing elements and taxonomies for a gamification strategy in Healthcare".

2.2. UCD and Game design methodology

According to Stone et al. (2005), User-Centered design (UCD) is an approach to user interface design and development that involves users throughout the design and development process. Taking a user-centred design approach should optimize a computer system's usability. This author points out four main principles: a) The active involvement of users; b) An appropriate allocation of function between user and system; c) The iteration of design solutions; and d) Multidisciplinary design teams.

According to Thimbleby (2008), UCD is one of the essential concepts in Human Computer Interaction (HCI), interaction design, usability engineering, interaction programming. UCD is based around the real and actual requirements of users, and typically involves task analysis, prototype development with users, evaluation, and iterative design.

2.3. Proposed methods

To perform this project and meet its objectives, we started the research with the following analyses:

2.3.1. Analysing elements and taxonomies for a gamification strategy in Healthcare

After a description of various elements and systems in gamification strategies, as proposed by recognized authors such as Deterding et al. (2011), Palmer, Lunceford and Patton (2012), Lenihan (2012), an analysis table was created for the data collected, based on Werbach (2012) model, dividing taxonomies in elements, mechanical and dynamic components.

The main objective was, through an analysis and taxonomy of case studies, to assess the existence of patterns or models that can be used in creating a gamification strategy for healthcare, and provided useful data that can be clumped together in a future model.

2.3.2. Data collection and creating personas

According to Cooper, Reimann, and Cronin (2007), Personas are not real people, but they are based on the behaviours and motivations of real people that we have observed and represent them throughout

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the design process. The Persona is a specific but representative, hypothetical archetype of the users, based on a study of the user's community. The personas are a tool to describe and articulate the views of the user, which become the standards for a software conception. Characterizing the personas, giving them a personality, a sense and a purpose in relation to the project, provide the design team with a precise way of thinking and communicating about how users behave, how they think, what they wish to accomplish, and why they want that the goal in constructing a set of personas is to represent the diversity of observed motivations, behaviours, attitudes, aptitudes, mental models, work or activity flows, environments, and frustrations with current products or systems.

Bearing in mind, the high complexity of the organizational structure of hospitals, which include very different professional groups and complex hierarchies, it is essential in the project, have a clear, precise and true potential users of the system, its characteristics, needs, limitations and expectations.

2.3.3.1 – Focus group

The first fieldwork to be done will be the performance of several *focus group* sessions to gather qualitative and quantitative data that are also essential to the creation of Personas.

Sample: 4 professional groups, in a total of about 40 individuals, 10 per group, with an equitable distribution for sexual gender, with a broad age range (e.g., 20 to 65 years), and representative of the population, will be invited to participate as volunteers. The criteria for the participant's selection shall cover all the professional groups: (a) 8 to 10 Nurses from various specialties; (b) 8 to 10 Doctors from various specialties; (c) 8 to 10 Technical professionals from various specialties; (d) 8 to 10 Auxiliary professionals.

Procedure: The procedure for selecting the participants must be coordinated with each group supervisor. Our team will conduct the sessions, based on a script. At the beginning of each session, an consent form is distributed, emphasizing the need for authorization for audio-visual capture, for data analysis purposes, ensuring total confidentiality and rigorous academic use of the data to be viewed only by people involved in the project (student and doctoral supervisors). The collected data will result from the outcome of the focus group sessions and an anonymous survey completed at the end of each session.

Material requirements and facilities: Meeting / training room with the necessary assets for the group interviews and audio-visual capture.

2.3.3.2 – Field observation of professional activity

This phase is crucial to determine, in loco and for the case of the HBA, what are the practical barriers to hand hygiene, which determine typical behavioural differences between groups. Also to describe the activity per group and determine what strategies each group develops to respond effectively, as well as

to determine what is the best time when the "game" could / should be integrated.

Procedure: The procedure for the selection of participants must be coordinated with each group supervisor. Data will be collected through observation notes.

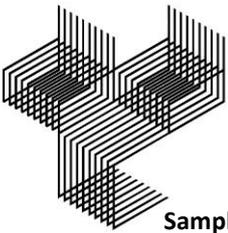
Material requirements and facilities: It should be provide access to facilities where professional monitoring of patients takes place (to be defined by the intervener hospital staff in the project), as well as places for recreation of the HCW.

2.3.4 - Developing ideas and possibilities

In this section, a smaller group of HCW (beta testers) will be engaged in creative sessions contributing with their own point on view on the matters their professional activity and game related themes.

2.3.4.1 - Brainstorming

The purpose behind the brainstorming session is to have as many ideas generated as possible. No idea is criticized, no matter how absurd it sounds. Any truly mad suggestions can be eliminated at the evaluation stage (Haberberg, & Rieple, 2008). This phase serves the purpose of stimulate a creative and spontaneous participation of the stakeholders' view on the use of a game in their professional activity.



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Sample: The brainstorming will be held with a Beta testers group, which should include doctors, nurses, technicians and assistants of various departments of the hospital.

Procedure: The procedure for the selection of participants must be coordinated with each group supervision. Data will be collected through observation notes.

Material requirements and facilities: Meeting / training room with the necessary assets for the experiment and interviews.

2.3.4.2. Scenarios

The scenarios will be created in this phase, focusing on the personas' activities, as well as their motivations and mental models, in which usage patterns are exhibited, and storytelling built.

2.3.5 - Analogic Prototype development

This phase is based on a methodology focused on the user with an iterative process using a wireframe paper prototype:

1. Submission and validation of a analogic prototype with a Beta testers group composed of professionals from various groups and services using various methods for usability: e.g., card sorting, talk/think aloud, SUS, NASA TLX;
2. Results analysis
3. Proposal Restructuring and redesign;

Sample: *Beta testers group*, including doctors, nurses, technicians and assistants of various departments of the hospital.

Procedure: The procedure for the selection of participants must be coordinated with each group supervision.

Material requirements and facilities: Meeting / training room with the necessary assets for the experiment and interviews.

2.3.5.1 - Pre-Prototyping

Designing interface elements and graphic environments. The Hospital will have no action at this stage.

2.3.6 - Digital Prototype development

This phase is based on a methodology focused on the user with an iterative process:

1. Submission and validation of a digital prototype with a *Beta testers group* composed of professionals from various groups and services;
2. Results analysis;
3. Proposal Restructuring and redesign;

Sample: Beta testers group, which should include doctors, nurses, technicians and assistants of various departments of the hospital.

Procedure: Participants are requested to experiment and evaluate the prototype.

Material requirements and facilities: Meeting / training room with the necessary assets for the experiment and interviews.

2.3.7 - Digital prototype implementation and evaluation

The evaluation will be done through the data collected with the fully functional game, related not only with the performance results but also the participation level.

Sample: Digital prototype used and evaluated by a large group of users (from all professional groups).

Procedure: After the written agreement of the participants, the recording of each session will be held through the video (e.g., images, sound). Participants should experiment and evaluate the Digital Prototype.

Material requirements and facilities: Meeting / training room with the necessary assets for the experiment and interviews.

3. FINAL REMARKS

To achieve the objectives, we follow the following goals:

What has already been achieved:

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- a) The theoretical basis of the topics addressed in this study come from a review of the literature, which served as the basis for the studies already carried out and above mentioned.
- b) Fieldwork carried out earlier: an experimental focus group session, in a hospital in Lisbon, with the participation of a 10 nurses group, having been previously prepared a script for the session and a survey. This experience was useful to provide the knowledge for future methodology.
- c) Meeting with representatives of the Hospital Committee of the HBA, for creating guidelines for the project proposal accomplishment.

Next steps:

- a) Proposal completion and submission to the Infection Control Committee. Occasional corrections will be introduced.
- b) After the proposal acceptance following Methodology steps will be carried on, starting with the fieldwork for collecting data and creating personas, according to the method and procedure described earlier in this paper.

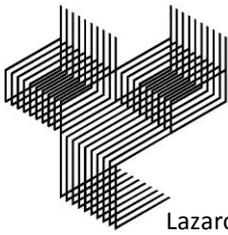
Potential study constrains:

- a) Ethical and legal obstructions associated with the data collection;
- b) Gamification being seen as an obligation, which would eliminate the essence of the "game" as a playful and volunteer activity;
- c) Administrative obstacles on the system of incentives and penalties implementation;
- d) Gamification being seen as a senseless or childish joke;
- e) Given the inter-individual differences, be able to obtain the necessary conditions for the state of flow for all;
- f) Costs associated with the development and implementation of the system;
- g) Management of the time spent by the HCW in recreational activities and the interference in daily activities;
- h) Mobile and wearable devices could be themselves a source of microorganisms propagation.

For future projects, we believe that this project or even its methodology model could be kept on and possibly adapted to other health organizations.

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Design and Collaborative methodologies: Would them be valuable to empower resilience of communities?

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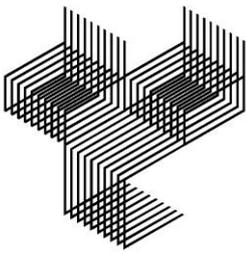
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Abstract

New scenarios in urban areas are transforming our society. Local communities are getting more vulnerable because of socio-economic stress factors that disturb their system. The result generates instability, uncertainty and insecurity in those communities. A new active and dynamic movement is flourishing seeking to counteract these negative impacts. The capacity to anticipate the trends of change, the risks and to bounce back through adaptation, evolution and growth, are actions that define a resilient approach to crises while maintaining their functional dimension. This is only possible with a collaborative approach allowing the development of synergies and tools to maintain a diverse, productive and sustainable system that will result in knowledge, skills and the improvement of competences within a personal, civic and social perspective. The article tends to prove that a) the collaboration between social agents with distinct scientific or other knowledge, but complementary results in the construction and / or rehabilitation of social, economic and environmental assets of communities and, consequently, a more sustainable existence ; b) the importance of methodologies of design and the designer for this dynamic and transformation; c) the relevance of this awareness and mastery of tools for that purpose by design students, even during training.

Keywords

*co-design, collaborative/active learning, sustainability, communities
resilience, social responsibility, social change*



João Bernarda

1. The urban society

Urban societies are subject to social and economic impacts that have evolved and became, in certain moments in time, particularly more aggressive. This phenomenon has been repeated over the centuries and man, in turn, keeps adapting and modifying, generating socio-economic solutions with varying degrees of effectiveness.

“The critics of the city always regretted loss: in the 19th century, it was the decline of order and customs; today, it’s the privatization of public space and the disappearance of the spirit of citizenship.” (Innerarity, 2006, p.136)

“Urbanity (citizenship, civilization) is something more than the form the European city and more, even, than the urban way of life.” (Innerarity, 2009, p.138)

But facing the reduction of life time in each cycle and its possible acceleration, there is a common feeling of growing precaution before an unknown future and, above all, the forthcoming change.

As Innerarity refers, the arrival of any innovation is always accompanied by the shadow of fear and we, instinctively, place the new within the boundaries of the monstrous; technical advances cause, almost automatically, their negative reversal. Future is not so secure and technology and science and innovation are associated with to danger, instability, destruction, and control. Prevention triumphed over the risk in the laws and science and in war around the forms of cultural pessimism which intersect in technophobia (right-wing or left-wing), in naturalist ecologism and elementary anti-capitalism. (Idem, p.140)

This reaction of deadlock and distrust can misrepresent the assimilation of the messages that are transmitted. Prejudice seizes the judgements of this future and possible connection or disconnection with new visions and predictions. The presence of this feeling of mistrust for the changes impending removes the possibility of envisioning new horizons and consistent opportunities in a community movement. The growing sense of interest focused on uniqueness does not create a firm basis for the future. The cooperative value is reflected already in the very genetics of living beings, as Richard Dawkins (1976) advocates in his book “The Selfish Gene”, referring that the rather complex interaction and collaboration with each other and with the environment is the only way for construction and implementation. There is an urgent need to motivate and blossom a collective and aggregator sentiment.

“Our current target seems to be every man for himself in the midst of impersonal forces coming from globalization, bureaucracy and technology, in a society without politics, without collective hope, unable to imagine and promote an alternate common future.” (Idem, p.151)

The vertical society does not arise to the heights of his fellow man. The proposal of the philosopher Daniel Innerarity is based on a horizontal intervention where interaction with social, economic and cultural agents in each context with a medium/long term vision is imperative in order to witness cohesive and sustainable results. The detachment shown by the citizens towards their habitat is also due to their awareness of the little influence of

their rulers and the multiplication of successive alternatives. Exception cases of motivation and community transformation, formed by ordinary citizens, emerge in consequence of the lack of visionary and consistent governance alternatives.

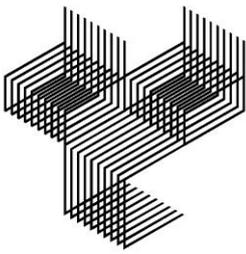
“The human is an identity that makes possible the presence of the incongruous that takes into consideration what others say about us, that worries about the exclusions one may be giving origin to and that is able to imagine the self in a different way.” (Idem, p.156)

2. The value of society in Nietzsche

As is common in dynamic realities in time, the social movements that we have been witnessing can relate to some of the philosophical currents of the past. This analysis aims to relate the times we live in with some concepts explored by the German philosopher Friedrich Nietzsche, cultural critic and analyst of the human condition. Defender of the self, he challenges the theological legacy extolling the capacities of self-fulfilment and overcoming. According to Wilkerson, the concepts of analysis where common points with the current situation that we experience on a daily basis can be identified are: “Nihilism and the revaluation of values”, “The human specimen”, “The last man” and “Eternal return”. (Wilkerson, 2016)

Nietzsche’s relationship with religion is narrow, in the sense that it rejects human evolution in the benefit a deity and highlights the significance of the values created by Man as a tool developed for his survival. Nihilism is present in the construction and renovation of values which, replacing those already outdated and inadequate to the human condition, reaffirm and enhance their creative capacity in a given moment in time. This breach of values is always in constant evaluation by future generations that suit them to their time and needs. In the weakening and meaninglessness of values, Nietzsche identifies two positions that contrast in the way they respond and react to phenomena.

This stance of conformism and passivity, identified in the figure of “The last man”, makes for a day-to-day living without taking a risk, in a routine model with no action or reaction. This figure is neutralizes to the point of being considered a threat to evolution. In contrast to “The last man”, the philosopher presents the disruptive and transformative figure of the “*Übermensch*”, *the exemplar human being*. In this man he has placed the hope of overcoming the inherited pessimism. He puts him in the position of modernity’s benefactor due to his futuristic vision of a reformer model, passionate and emotional, affecting the lives of others who will follow his values in order to overcome the stadiums of insignificance and apathy. This figure is entirely related to the next concept in which Nietzsche relates values and time cycles in “The Eternal Return”. The association is direct to facts that happen, have happened and will happen again. In this concept it is possible to distinguish two characteristics that stand out and confront one another. The first characteristic can be measured by betterment capacity through repetition until perfection is achieved, a doctrine or teaching. However, it does not move away from possible consequences such as monotony and apathy which could jeopardize the creative ability and the will to search for new challenges. Another emerging feature of the concept of “The Eternal Return”, occurs through rupture where the cycle of successive and ordained phenomena suffers a shock that promotes the sense of novelty and through which the system is restored, according to reformulation methods or improvisation. This perspective of resilience, in response to the stagnation of the existing scenario, is crucial for the



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creation of new values and solutions in the search of a cooperative and supportive common good. (idem, 2016)

“Humans at times cannot flourish without arguing with others and learning from them about human flourishing. And so everything that can inhibit, frustrate or damage the exercise of powers of reasoning is a potential threat.” (MacIntyre, 1998, p.67)

3. Emancipation vs Citizen Passivity

The social sense of rupture means, in the opinion of Jacques Rancière, philosopher and social researcher, the act of emancipation. In a related language in terms of scenic art, Rancière questions the relation between the performative stage and the spectator, conveying this interaction to the public space.

In a first analysis, the author defines what it is to be a spectator and gathers a series of values that characterize him.

“First, to look is the opposite of knowing. The spectator remains face to face with an appearance, ignoring the appearance or reality’s production process that the appearance conceals. Second, to look is the opposite of acting. The spectator remains passively sitting in his place. To be a spectator is to be separated at the same time from the capacity of knowing and the power to act.” (Rancière, 2010, p.8)

The spectator-citizen is placed in a condition of passivity, since he only observes what is happening around him, without being given the opportunity to relate or intervene in this space. The show in itself is thought, staged, produced and performed without the contribution of the spectators and can generate distancing by its eventual inability to understand the message.

“Therefore, a fair community is one that does not tolerate theatrical mediation, one in which the measure governing the community is directly incorporated in the vivid attitudes of its members.” (Idem, p. 9)

The spectator-citizen should thus lose the distance to the stage and become a participant in the performance or action.

“What the man contemplates in the spectacle is the activity that was stolen from him, his own essence, made strange, turned against him and organizing a collective world whose reality is this same dispossession.” (Idem, p.14)

The welfare of each individual depends on the collective work and capacities of an interdependent society. The common good is not about specific goods, but about human values. It is this movement of solidarity and reciprocity that creates emancipation and awareness in a group with common goals, giving back the subject’s and his community’s identity as a social entity.

“This common power of the equality of intelligences, connects the individuals between themselves, makes them exchange their intellectual activities while keeping them apart from each other, equally capable of using the power of all to trace their own path.”(Idem, p.26)

The meaning of emancipation is thus and according to Rancière, the breaking of boundaries between those who act and those who see, of individuals and members of a collective body. The exchange of roles and occupations generates a new attitude towards society. The will to think, act and overcome became something inextricably linked to all classes, in general, and to all its members, in particular.

4. The increased powers of the communities

The term “communities” is understood as, groups of people spatially or virtually connected that share common interests. “Empowerment” refers to the process by which people achieve control over the factors and decisions that shape their lives, increasing their influence in building these capabilities and growing dominance over external factors. People may not be “empowered” by others; only they, themselves, can promote the willingness and the acquisition of skills. However, the referral process should be played by an outside agent, which will facilitate the process. (Laverack, 2008, p.14). The designer has the profile to be assumed as the enabler of this will.

The strengthening of community action skills is therefore more than the involvement or participation of communities. It implies the property of action that explicitly aims at social and political change. It’s a process that aims to renegotiate in order to gain more control in sharing the existing power. (Baum, 2008, p.499)

The Academies, because of their analytical skills and scientific knowledge are involved in this revival. A new territory is being formed by reciprocal respect between designer and other sciences and this phenomenon asks new tools for action. (Sanders, 2013, p.20)

These interdisciplinary innovation centers, when integrated in the communities, generate, through the combination of science and the “layman’s” knowledge, opportunities and new economic and social skills, promoting collaborative learning and transdisciplinary knowledge between the students and the local community and their interlocutors.

“Third, understanding how networked media supports a kind of play (playing) that allows people to navigate the complexities of a constantly changing world. What may be most important to understand is that each of these dimensions of learning are in the process of evolving in response to the demands of the 21st century. In a world of flux, knowing, making, and playing emerge as critical components of becoming.”(Brown, John Seely e Thomas, Douglas, 2009, p.3)

The process of transversal learning by experimenting (BIGGS R(Oonsie) et al, 2015, p.224) with the intervention in the community through a multidisciplinary model is transformative in the critical individual learning process.

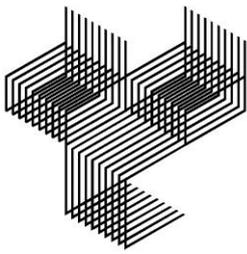


Fig.1 Southern Arizona decision-making processes



BIGGS R(Oonsie), SCHLÜTER M and SCHOON ML (2015). p.17

“People learn by doing. Telling people what to do is not nearly as effective as coaching them as they do it” (Norman, 2011, p.244)

5. The designer as “enabler” and internal resilience tools

“Indeed, at the time, there were people that from the hills of Mesopotamia, by observing the river’s counter current, were able to predict floods and droughts and indicate which channels to dig in the future, drawing lines on clay plates. Then, these people were called prophets; we call them project designers (designers) instead.” (Flusser, 2010, p.34)

The participatory approaches of “enablers” and interlocutors together in communities, and the articulation of active methodologies, encourage discussion and debate, resulting in growing knowledge and awareness of the common good, of convergent and divergent factors of the parties involved and of the power of influence of each party but also a higher level of critical and mutually constructive thinking.

In this context, the “enablers” develop internal tools of resilience from collaborative approaches, in a diversity of responses, that is, a system with polycentric capabilities able to create distinctive vantage tools. The involvement of all intervening actors in a broad and open way with the creation of discussion models and interacting platforms is needed. The social responsibility inculcated by the Academies in the intervening actors is reflected in the awareness of the changing patterns of behaviour and mentality in order to expand their knowledge bases. Different types and sources of knowledge must, together, achieve solutions through experimentation and commitment to a behavioural change for the sake of the “satisfaction of human needs”. (Margolin, Victor e Sylvia, 2002)

“A “locus” liable to congregate many of these concerns is the city where an increasing number of people live. Although few cities have their own Design department, this will become progressively more important for local authorities as they try to deal with infrastructure problems, population, energy conservation, waste, services and other aspects of civic life. The implementation of policies related to the “smart cities” – according to which municipalities seek to create technological systems to meet public needs – will further intensify the need for designers.” (Margolin, 2014 p.116).

Collaborative design methodologies empowers resilience of communities

The synchronization of the entities involved is the key to the success of each project. It is up to the designer the conceptualization of continuous co-creation infrastructures of a multidisciplinary partnership with responsible interdependence. In that way designers must provide the structure, an effective communication between the partners with the communities and a learnable social interaction. (Norman, 2011)

The designed organization is based on a social responsibility commitment to people, understanding and experiencing their daily life, culture, vulnerabilities and potential, responding to the diverse network of activities that fuels and generates dynamism in the territories.

“But they still have their role to play. On the contrary, because in contemporary society, their part, their role has “project professionals”, is more important than ever: the designers can enter into the diffuse field of design as moderators, bringing along their scientific skills, being able to create “visions of the possible” (the ability to envision something that does not exist, but could exist), and to make ups strategies to fulfil goals (knowing which steps to take to turn probable visions into actual solutions).” (Vellozi and Manzini,2010 p.49)

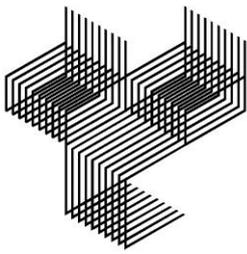
The street becomes an educational laboratory seeking to transform and promote new forms of knowledge by merging all agents expertise in an ongoing process. (Sanders, 2002, p.20)

Design universities should sensitize students to their role in the political society of men and how important are the tools achieved to a responsible action for human and planet wellbeing. (Margolin, 2014)

“Most importantly, they are places and communities that bring variety into the overall ecosystem, helping us to create a resilient planet where it will be possible for us and for future generations to live, and hopefully to live well.” (Manzini, 2015, p.202)

The knowledge acquired during the academic stage by the use of joint working methodologies with and for the communities with the local stakeholders makes design students better perceive the impact of the social and economic adversities on society and by understanding the constraints of the other agents involved in the process be able to manage and coordinate the complex creation exercises more effectively. The proposed procedures put designers in the center of action, structuring collaborative and sustainable methodologies in order to awaken a broad view of replicable and sustainable entrepreneurship. (Santos et al, 2013, p.12) This early awakening of a network construction will enhance more assertive professionals in their projects and the communities will gain effective tools for easier emancipation thanks to this involvement.

Reference tools and methods are being developed to achieve a closer approach to each single case, however, the need won't be felt unless researchers dive into people daily habitat, needs and their improved solutions. As Michael Polyani (1966, p.95) refers on his book “The Tacit Dimension”, human being as observer won't be precise on analysis and will reflect on his proposals. Only experiencing the problem by touching and understanding the reality he will understand and feel what is to be in need of something that can be essential to wellbeing.



We designers, must indwell the need.

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Design and anthropology in collaboration: The Give a Shit Project

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Abstract

Following paper discusses the need for innovative interdisciplinary approaches in finding the solutions for existing problematics on different levels of nowadays society. Paper particularly discuss importance of collaboration between anthropology and design and presents them as possible agents of change towards more sustainable society. With the example of the project *Give a Shit* focusing on issues related to toilets and human excrements paper demonstrates the importance of engagement of scientifically obtained results with society through different creative narrative practices. As well as it show the value and quality results of such practices.

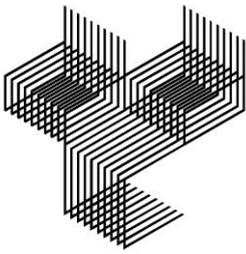
Keywords

Interdisciplinarity, anthropology and design, collaboration, change agents, sanitation and wellbeing, sustainability.

1. Introduction

In the era we live in we are facing drastic times of convergent catastrophes - social, environmental and ecological (Fry, 2009; Fuad-Luke, 2009; Bharna and Lofthouse, 2007; Dove and Kammen, 2015). Such situation demands primarily a holistic approach. The paper represents anthropology and design in collaboration, as an example of good practice. We live in a time when *radical innovative ways* of thinking and approaches to the

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problems and existing situation are needed more than ever and should be required as indispensable demands of society for society on all levels of its existence and interaction in academia, education, business, economy, policy and last but not least in our daily lives (Tonkinwise, 2015, p. 284).

Innovative radical approaches to the existing situation within society questions the fundamental values of society as a whole and it interferes in our daily lives on each and every level of our existence: the food we eat, the clothes we use to dress, the materials and transportation that we use, the way we think, how and what we create and design, etc. Even for a purpose of our own well-being and wellbeing of the planet Earth, every radical innovation (Amabile, 2003) represents quite *disruptive complex situation* not being easy to adopt and internalize on a societal level.

So what is the solution or what are the solutions toward this urgent need for change? What are the triggers for such a complete transformation? Is it the work of science to create a 'wake up call/wake up narrative' where it engages and empowers the society towards (sustainable) change? And if so, should science change the existing paradigm and methodology of its work?

Or is it, on the other hand, the role of business and policies to create new directives and new demands for the societal journey of every individual on the planet Earth (Manzini, 2015; Manzini, 2011, p. 356-360)?

2. Change agents

»Problems cannot be solved with the same mindset that created them.«

Albert Einstein

The results from the field and manifold scientific investigations are concerning and they are showing the need for an urgent change within our society. As Albert Einstein once mentioned, we cannot solve problems with the same mindset which created a problem and we cannot remain working and researching things as we did once.

Due to the knowledge and gathered information from our field research – and the awareness on existing issues, needs and problematics of society – academics and researchers should advocate for a change and represent a role model towards this (sustainable) change (Manzini, 2015; Manzini, 2011; Dias and Gontijo, 2004, p. 49-67). With it, science as such, is being questioned to make a radical change inside of our own paradigm to justify its existence and importance inside of current society and start to engage and co-create with society. Scientific paradigm shifts are as Thomas Kuhn states created from circular structure: normal science, model drift, model crisis, model revolution and paradigm change (Kuhn, 1996) and as such able to adapt to the need and

existing demand. Innovative models of co-creation, social innovation, engagement, collaboration and interdisciplinary approach are just starting their germination and are springing up¹ all over inside of different sciences.

Science is changing and the complexity of world issues is increasing, and the importance of anthropology and anthropologists and role of design and designers as change agents is increasing as well. As change agents we should »overcome potential resistance from other members of the organization and encourage them to adopt new practices« (Tonkinwise, 2015, p.289). If we want a change we need to change as individuals, professionals, groups and as a society. There are several competing paths proposed which »a radically new, more sustainable mind-set can be installed« (p.283). And even so »radical transformation seems possible, based primarily on social innovations that merely take use of existing technologies« (Tonkinwise, 2015, p. 289) and it can make a real impact and create a change only once the necessity is being acknowledged to have a force. » Social innovation could be much faster and more extensive; *though if, and only if, people can be convinced to change*« (p. 289).

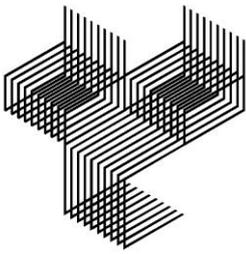
To be able to create a change we simply need actors who makes this change happen – change agents. Once experts, designers and anthropologist, researchers, educators and students become change agents - with the help of their educational, didactic and engaging, co-creating techniques - they establish essential parameters and prepare the ground for the acceptance of emergent innovation (Manzini, 2011, p. 357-359). With this approach we empower and engage individuals and the society to change. The same individuals potentially become change agents – visionaries and doers towards a sustainable future.

3. Mindset conversion with anthropology and design

Anthropological research, perspective and results can spur creative possibility, spark an idea, illuminate markets, make for more effective teams and frame a different set of solutions (Conti, 2015). On the other hand, designers are the ones who create and grow our artificial realities and our tangible and intangible worlds we inhabit and create the products, services and systems that we use.

From the both disciplines there are several discussions pointing out the importance of collaboration between these two – apparently - completely different worlds: anthropology

¹ Some of the Laboratories and projects: Project DESIS LAB, DIS Politecnico di Milano; Anthropologerne, Copenhagen, Denmark; Sustainable Every Day Project, Milan, Italy; L3 – Lisbon Community Laboratory; Anthropological Laboratory, Paul Rabinow.



(Schneider and Wright, 2006, 2010; Marcus, 2010; Basu and Macdonald, 2007; Cerwonka and Malkki, 2007) and design (Fry, 2009; Fuad-Luke, 2009; Bharna and Lofthouse, 2007; Manzini 2011, 2015).

In several design schools »teams of researchers, teachers and students are working on projects that increasingly involve other outside players and generate social consensus, political will and economic resources to become real-world, operative programs« (Manzini, 2011, p. 359; Dias and Gontijo, 2004) as anthropology arouses new kinds of collaborative approaches where anthropologist engage in different collaborative models in business and industry (Denny and Sunderland, 2014; Jordan, 2013), architecture, urbanism², design and the arts, among others (Schneider and Wright, 2006, 2010; Marcus, 2010) and engage different stakeholders on different levels. This kind of pioneer examples show us the way towards the impact and change that science should follow - innovative collaborative methodology, interdisciplinary approach and multidisciplinary engagement with co-creation.

In what follows, we are going to have a look at the project *Give a Shit*, where combined anthropological research and design-thinking and performative arts, result in an example of positive practice.

4. Example of applied results

Since mind-sets and worldviews are very immaterial, they need to be worked on and stimulated on at an unconscious level of our perception, using different narrative practices which can actually convince and integrate the individual in the participatory action.

With the example of the project *Give a Shit*, focusing on issues related to the toilets and human excrements we demonstrate the importance of collaborative interdisciplinary approaches in every step of the project, from the research on till representation of the alternative solutions for existing problems/issues – creating behavioural change, social re-organization and technological innovation within existing western system of toilet design (Korčulanin, Ferreira and Barbosa, 2015; Korčulanin and Ferreira, 2015).

The *Give A Shit* project is envisaged as a multidimensional awareness-raising platform focusing on taboo issues related to toilets and human excrements worldwide and its impacts. The project works with educational, interventional and artistical elements.

² See the project City Making, Zagreb, Croatia <http://www.citymaking.eu/category/aktivnosti-i-rezultati/>

Aiming for a final goal: the technological innovation within toilet design based on written guidelines and hints for re-designing of the existing architecture of sanitation.

The project advocates for the engagement with society on different levels, using different narrative practices to bridge the gap between science and society. With small 'steps' we propose the innovative creative narratives in combination with art – performance, photography, video, exhibition, media - as alternatives for engagement with society and participatory action in the public sphere.

Until now two Steps of the project *Give a Shit* were executed, which were reaching out in 16 countries around the world and they had join different stakeholders and expertise, as research group ID:Co.Lab at IADE-u and other initiations Sustainable Energy Youth Network and Science4Sustainability.

The first intervention, the *1st Step to Give a Proper Shit* is composed of a performance and interactive artistic installation and the *2nd Step to Give a Proper Shit* is reaching out through social media and innovative advertisement technics.

Public intervention *1st Step to Give a Proper Shit* is aiming to raise the awareness of the value we waste - water and human excrements, every time we visit the toilet. The installation advocates for toilet innovation and social reorganization of the existing western system of toilet design and urge for behavioral change related to the taboo subject of toilets and human excrements. Intervention is based on scientifically obtained results and ethnography research using creative artistic narratives to bridge the gap between taboo issues related to toilets and to human excrements in society - inviting each individual to take part in it. Public intervention represents the tangible sphere of the toilet issues where individuals can touch, smell, see and even take with them the precious objects, *Golden Poops*. The installation is composed from 130-150 pieces of Golden Poops relevant to the real size of human excrements (various sizes - they are all different but not bigger than 30 cm). The installation as well includes golden toilet, a Holy Toilet, which represents the center of the exhibitionary universe around which the *Golden Poops* are being exposed.



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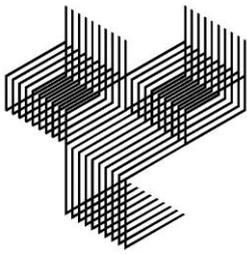


Figure 1, 2: Public intervention 1st Step to Give a Proper Shit, Praca do Rossio, Lisbon, 19th of November 2015. Visitors and pasers-by interacting with instalation. Photographer: Pedro Carvalho Fernandes

The 2nd Step to Give a Proper Shit is reaching out through social media and innovative advertisement technics where society is being questioned and stimulated to take actions through FB, Twitter and their personal networks.



Figure 3, 4: Interaction of individuals on FB and advertisement made for the World Toilet Day, 19th of November 2015.

5. Conclusion

»What we need today is not science fiction but social fiction, the capacity to imagine very different ways of living.«

(Tokenwise, 2015, p. 287)

Summing up, »the state of the world and the state of design« (Fry 2009, p. 4) as the state of anthropology (Dove and Kammen, 2015) and as science as a whole need to be brought together (Fry, 2009; Dove and Kammen, 2015) to be able to correspond to existing

demands and the needs of society and the environment. Demands and needs towards sustainable change on all levels of our life and society are needed more than ever before. With this reason, new ways of collaboration within different disciplines and innovative collaborative approaches between different stakeholders are vital parts of society being able to engage and create an impact towards a change. Different methodologies, innovative narrative practices and what is more, innovative curricular models including non-formal education and exploration of knowledge in co-creation within society are able to bridge the gap between science and society towards more sustainable future.

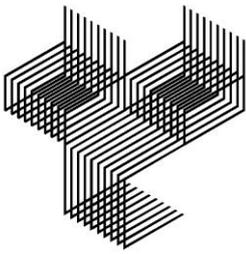
Seeing anthropology and design as change agents and seeing their collaboration fluent and naturally being 'adopted' we should start to create new paradigms and innovative operative programs where this exchange could happen more simultaneously between disciplines and between individuals being included into creative (design) processes – end users/ individuals, researchers, clients and independent organisations (see one of this examples inside of model *Living Lab*³).

We all create and design and to be able to design our better future we should converse our mind sets and raise the awareness on existing issues, for this interdisciplinary collaboration, social innovation and participatory action is indispensable part of our sustainable future.

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³ Innovative collaborative models <http://www.openlivinglabs.eu/>



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An ontology for conceptual design automation within agile projects

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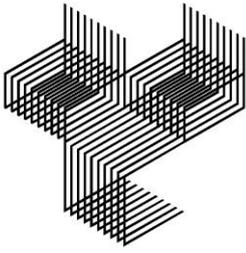
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Abstract

In order to avoid waste generation, Agile paradigm creates a need conceptualized as Little Design Up-Front, where design activity should be conducted in an emerging way. We hypothesize that Little Design Up-Front can be supported by the usage of computational tools for conceptual design. So we conducted an initial literature revision to analyze what has been the latest findings regarding the usage of computation within design activity. Accordingly, we developed an initial ontology that intends to map a specific domain (software apps) within an existing design methodology framework (Design Thinking Canvas). It was used to map a total of four hundred and ninety four entries in this domain, that can now be combined to generate conceptual designs. This is our first step towards conceptual design automation through computational intelligent agents, to which we present and discuss further developments.

Keywords

Conceptual Design, Design Methodology, Ontology, Artificial Intelligence, Design Knowledge



1 Introduction

Building on limitations identified by classical product development paradigms, agile methodologies employ very different theoretical constructs (Koskela & Howell, 2002). They bring an iterative functioning for product development, aiming primarily at speed and flexibility (Takeuchi & Nonaka, 1986). It arises from companies' need of innovation where, consequently, the gap between planning and execution for a given problem might be very wide (Schwaber, 2004).

There has been already several works exploring the relationship between design activity within agile projects. In doing so, researchers have pointed out that one of the most relevant topic in this conjunction is Little Design Up-front (LDUF) (Adikari, McDonald, & Campbell, 2009; Brhel, Meth, Maedche, & Werder, 2015; Silva, Martin, Maurer, & Silveira, 2011). It comes as a natural consequence of agile principles, whereby design work should be conducted in small chunks throughout the agile project. On the one hand, a designer is classically expected to create most of its specifications early on a project (Cross, 2000; Sohaib & Khan, 2010). On the other hand, agile methodologies employing LDUF tries to minimize waste generation during a project – large amount of designs being discarded or reworked in the future. In short, it is expected that all development activities, including design's ones, to be conducted in an emerging way.

A limitation that comes with this mindset is the occurrence of little to no discussion on the steps of problem definition or “product discovery” (Brhel et al., 2015). In other words, the very early definition of “what” to be implemented in a project still lags behind in terms of exploration or scientific contribution and it is typically mixed with the means or “how” to implement it (Owen, 2001). We will call this as “conceptual design” activity, a stage where any materialization or configuration of a product is yet to be done, but is equally important for the success of a project due to its possible future impacts.

We have previously discussed and summarized a number of results regarding Little Design Up-Front in order to restate its importance for agile projects, which also showed that a methodical way to address it is yet to be defined for design (Fernandes & Neves, 2016). It helped us define an overarching goal for our research. This paper is part of an ongoing PhD research that aims to automate and support conceptual design activity in order to address Little Design Up-Front. We hypothesize that it can be done by enabling a head start in defining product scope while giving total freedom for designers build on top of these initial suggestions at the same time. It tries to maximize Little Design Up-Front goals and minimize its shortcomings.

2 Related works

First of all, it is important to note that introducing computational tools to aid or support design process should not happen without acknowledging and controlling unwanted effects already identified, namely: circumscribed thinking, premature fixation and bounded ideation (Robertson & Radcliffe, 2009 apud Bernal, Haymaker, & Eastman, 2015).

Liddament (1999) states that computational tools usually materializes an “ontological reduction” in the sense that it only approximates reality while design is most of the time dealing with real-world entities or objects. A natural conflict comes from that.

Designers’ tacit knowledge, as unstructured as it is, has found very weak support in terms of computational tools and they have mostly been “design-centric” instead of “designer-centric”, in the sense that supporting product development usually overrides designer (as a user) needs (Bernal et al., 2015). These researchers have also shown that agent-based computations (our research focus) have not yet addressed important designer’s actions such as: forming analogies, co-evolving problem and solution, recalling conceptual structures and recalling recognizable problems.

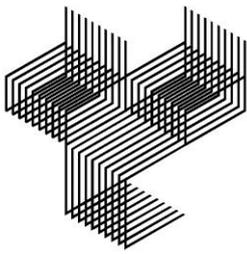
Baxter and colleagues (2008) argue that knowledge management should indeed expand itself towards design activity, as it can potentially free up companies’ resources in the search for innovation in competitive markets. They identified five types of approaches for classifying design knowledge management: computer-aided design (CAD) models retrieval, methodology, function, ontology and process. Likewise, Kitamura and Mizoguchi (2003) proposed a framework for device ontology as a way of achieving interoperable and consistent models among designs. They have applied it for functional decomposition of devices in very specific domains (e.g. fluid-related plants), and acknowledge that others are still to be developed. Also referring to engineering design, an interesting finding from Ahmed (2005) was that the experience of a designer affects how they express themselves about their activity and consequently the formulation of an ontology.

Considering the whole spectrum of design process, it is interesting to be able to convert functional mappings in configuration representations (Kurtoglu, Campbell, & Linsey, 2009). These researches did so through a software program that receives a functional model as input, processes possible combinations and generates configuration-based outputs, but still as a model. Nevertheless, their analysis showed that these configuration models helped designers during concept generation considering the metrics of: completeness, novelty and variety. These findings challenge some of the worries and limitations reported in the beginning of this section.

After reviewing these works, we can see that, albeit having already achieved relevant results, automating or supporting designers’ activity through computational has plenty room for contribution. Most of the studies focuses within engineering design and deals with functional representation of products.

3 Our ontology

As other researches, we will choose a specific domain for further developments. In our research we will focus on *software apps*. Our motivation comes from the fact that this segment has been a huge and extremely competitive market specially since the advent of massive platforms for digital content distribution, like: Apple’s App Store or Facebook.



Design Thinking Canvas methodology (Neves, 2014) will be our design framework to implement the computational concepts discussed here. This methodology was created and has been maintained by our research group (GDRLab), it has already been applied within several Brazilian companies aiming the creation of innovative products for the last seven years. Therefore, it was possible to historically collect and index several validated data points which reflects design knowledge around: desirability (user profile and needs), feasibility (technological capabilities) and viability (business strategy).

In this sense, we propose an abstract computational machine which employs two groups of intelligent agents: [1] first group with skills to search the Internet (or other database) and build a structured database related to our methodology and domain; and, [2] a second group of agents that make decisions and propose innovative artifacts. We intend to develop an iOS app for this abstract machine in the near future. In this paper, we are focused in the first group agent, as we are interested in formalizing the structure of our ontology, which will represent the design knowledge we intend to manage.

Creating an ontology is a way of making knowledge explicit and serves as a crucial step to make it machine readable (Cristani & Cuel, 2005). As of today, we built an ontology focused on software apps market. The data was structured in an xml format named as DTML (Design Thinking Markup Language). It has information about user needs, technology capabilities and business strategies extracted from real market data, as previously said. The DTML is composed by four XML files: [1] `personas.xml`; [2] `activities.xml`; [3] `features.xml`; and, [4] `arm.xml`. This is a widely used format within computational tools and allows a flexible modifications in the future ('XML', 2016).

The `personas.xml` files has customer's profiles. In each profile, there is a fictional representation with information like: name, region, social class, age, an image to represent the persona and some description of it. It reflects the results of previous application of Personas method (Hanington & Martin, 2012) using our methodology. Our database is initially comprised ten personas (see Figure 1 for an example).

The `activities.xml` has information about daily activities from personas' life. In each activity, the DTML provides a title, an area, a description and a list of personas that are related to it. Our initial database has thirty four activities (see Figure 2 for an example).

The `features.xml` has a list of app features. For each activity, we have about ten features in this file. In each feature, we have: an app reference (the app that originally has it), the description of the feature, the associated activity and three tags, keep, raise and create.

```
<persona>
  <name>James</name>
  <region>North America</region>
  <social class>Middle class</social class>
  <age>Thirties</age>
  <big area>BUSINESS</big area>
  <image>persona_james.png</image>
  <description>James is looking for a new job after working for 3 years in the Underwriting department of Acme Insurance. 34 years old, James is extremely active. He surfs twice a week in the summer and swims three times a week in the winter. He actively uses apps for business productivity, discovering job opportunities and business training. He usually goes to the gym in his free time.</description>
</persona>
```

Figure 1 – Persona entry example

```

<activity>
  <title>medicine</title>
  <big area>HEALTH</big area>
  <description>take medicine with controlled time many times a
day</description>
  <persona>James</persona>
  <persona>Mary</persona>
  <persona>Robert</persona>
</activity>

```

Figure 2 – Activity entry example

This tag categorization of each feature is done through the concept Value Innovation in the Four Actions framework (Kim & Mauborgne, 2004), regarding if it can keep, raise or create factors for value in this activity. Our initial database has three hundred and eighty six features. It results from previous iterations of Design Thinking Canvas using desk research method (Crouch & Housden, 2003) from success cases within apps domain. Figure 3 shows an example entry in our database.

The arm.xml has three lists of business strategies. One list with user's acquisition strategies, another with user's retention strategies and other with monetization strategies. It represent an adaptation from a product strategy framework developed by McClure (2007), which is widely used by software startups. Our initial database has sixty four business strategies (see Figure 4 for an example).

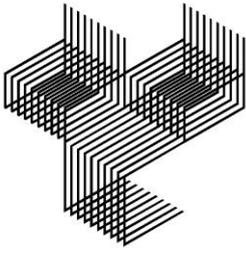
```

<feature>
  <reference>Snapseed</reference>
  <description>users can crop their scenes</description>
  <activity>photography</activity>
  <keep>yes</keep>
  <raise>yes</raise>
  <create>no</create>
</feature>

```

Figure 3 – Feature entry example

As a well-structured design methodology and data already existed, this ontology was constructed through a 'bottom-up approach'. It is a way of doing so by starting from existing concepts and later classifying (or generalizing) them (Cristani & Cuel, 2005). A set of computationally processable data is now possessed, consisting of a four hundred and ninety four entries within software apps domain. Accordingly, we expect to do further developments considering our major objective of design automation. It is described in the following section our next steps on that.



```
<arm>
  <acquisition>
    <strategy>Offers by email</strategy>
    <description>Ads based on mailing lists</description>
  </acquisition>
  <retention>
    <strategy>notifications</strategy>
    <description>Use push notifications</description>
  </retention>
  <monetization>
    <strategy>Sponsored content</strategy>
    <description>Content sponsored by brands, including in-app virtual
goods, or "limited-time only" features</description>
  </monetization>
</arm>
```

Figure 4 – ARM entry example

4 Further developments

As we have a structured DTML database, we can now develop an intelligent agent as iOS app that uses it. The agent will make decisions and propose innovative digital artifacts. In summary, the agent will select one persona and choose one activity from its daily life and automatically create the concept for an app considering this context. The suggested app will be structured through: (1) prioritized features related to that activity; (2) a set of business strategies considering acquisition, retention and monetization. These resulting specifications will also be manually editable in order to allow designers to unleash their creative power and intent. Also, as we already have a defined ontology, the middle-out approach will be adopted to maintain it (Cristani & Cuel, 2005), so new concepts can be incorporated according to our intermediate results.

In terms of scientific development, we intend to conduct an experiment in comparing conceptual designs automatically and manually (by a human designer) developed using the same computational tool. Their evaluation will be blindly conducted by design experts, considering *creativity, feasibility, viability and suitability* as criteria. Our intention is to see how they perform comparatively to each other.

5 Conclusion

The highly competitive and risky market for software apps has created a multilevel demand for more flexible models of work, where companies and their products must be constantly evolving and *pivoting* for differentiation in tentatively addressing user needs. Examples of these models are Lean Startup and its conceptualization of *minimum viable products* (strategic level) and agile methodologies, like *Scrum*, for managing product development (operational level) (Ries, 2011). We argue that Little Design Up-Front is one of Design's (as a discipline) most important counterpart within this context.

Therefore, we propose that in order to possibly address LDUF during product development, Design can make use of computational tools to speed up and formalize its knowledge that is applied to do so. As an intermediary step in achieving this goal, we

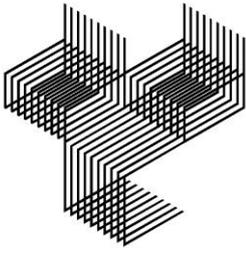
revised several related works to analyze their results and approaches to locate our contribution in the realm of computational support, aid or automation of design activity. Accordingly, an ontology for software apps was developed to index data points elicited during the execution of a design methodology, called Design Thinking Canvas. This is the first step in making all of this data machine readable to which we intend to develop an intelligent agent in the future. This agent will aid and automate conceptual design, we hypothesize that it will make designers' life easier in coping with Little Design Up-Front.

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