FLUX: Design Education in a Changing World

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The enhancement of the time, quality and strategic adequacy dimensions of product design processes: a doctoral study in its first stage

Abstract

In Portugal the Product Design Processes display several inefficiencies that result on the bad performance of the products in general. Therefore I have initiated an investigation about design processes that hopefully will conduct to the development of a design methodology that will match design education practices with industrial ones.

On this work of research, that is now on its exploratory research phase, and that will be presented in the future as a doctoral thesis, I have chosen has supporting theoretical paradigms those of Donald Schön (1983) – The Reflection-in-Action theory - and of Herbert Simon (1996) – the Rational Problem Solving approach. I believe that, even though at first sight the paradigms stand on opposite sides of the epistemological spectrum, they may contribute together to the development of a methodology that will improve the studied dimensions if I attend to the developments proposed by Hans Georg Gadamer (1986) in the Hermeneutical field that are quite useful on the transposition between both paradigms. The recognition of design as hermeneutical rather then epistemological is a key aspect of my approach to design's methodology that can be improved if we assume as Kees Dorst (1997) proposed that design education requires the combination of the two paradigms.

The new methodology that is being developed in this research assumes that "design problem" and "design solution" have a co-evolution and can not be seen as separate moments. Especially in what concerns wicked or ill-defined problems it is a matter of developing and refining both the formulation of the problem and ideas for a solution, in a constant iteration that includes analysis, synthesis and evaluation processes.

Time, strategic adequacy and quality management in the design processes will be addressed in the proposed new methodology supported by the use of 'case-based design' (based upon experience that is used to facilitate retrieval and use) and 'constraints posting' (a method of formulating and propagating values, constraints and structure).

The investigation will be conducted both in academic field and companies through surveys, interviews and ethnographic studies. These field experiments will occur with final students of the product design courses working with problems proposed by some of the most relevant Portuguese industrial Firms which is a new situation in terms of teaching methodology.

Hopefully this work will contribute to the enhancement of design education in our university in what concerns design methodologies and the dialogue with industry and other stakeholders.

Key Words: *product design processes; design methodologies; design education*

Introduction

The basic reason that underlies the option to follow the product design processes of both students and industrial firms is the identified deficient relationship between design education and industry where knowledge flows are reduced and is evident the gap between education's priorities and industrial ones, in terms of the design practices, if we attend to university's internal evaluation reports and probation reports where that reflection is made. This is common to European higher education in general if we focus to EC (2006) analysis of "Why European higher education systems must be modernised?" In that memo it is stated that "The performance of developed economies is closely

related to their ability to create, disseminate and apply knowledge. These three poles - education, research, innovation - are known as the 'knowledge triangle'. Unfortunately, Europe has fallen behind in all three parts of the knowledge triangle, and needs to improve its performance in each of them. The problems with Europe's universities centre on the following:

- European higher education is fragmented into (what are often) small national systems and sub-systems, without effective links and bridges between them;
- National regulations are too often over-detailed, and this diminishes universities' responsiveness to changing learning and research needs emerging from markets and society;
- Universities under-use the knowledge they produce because they and business still inhabit largely separate worlds; (…)"

In fact our Faculty's Design courses (that started in 1992) have now changed its curricula and adapted its structure according to Bologna Process having used that adjustment moment to amend the 'state of art'. There was a clear problem in the practice of designing where in most cases is not formalized and less interiorized a methodological approach to the problem that results on uncertain final solutions in terms of quality, producibility as well as strategic adequacy.

It was noticeable, in general terms, a deficiency of coherence and consistency on final products and that, I suggest, can be partly attributable to the circumstance of the enormous investment in time and reflection being made without the use of methods that structure thought, stimulate reflection and conduct to the systematization of concepts and information. If that was done a good conceptual, functional and productive frame would be consolidated and that would free 'mental space' and time to creativity necessary to the generation of the best informed solutions.

Therefore it is urgent to understand how is made the knowledge management and how decisions are taken and that also embraces the study of how is accessed the 'problem definition' and the 'problem's structure' in a design process.

Portuguese context of product design industry and its environment

Based upon my personal experience and knowledge as a designer and a teacher as well as in the information presented in the Evaluation Report produced by the Design Course of our University in 2005 and on Portuguese Design Center (CPD) analysis it is possible to translate the actual situation of product design industry, in a synthesized way, as presented in Figure 1 that reveals the main involved stakeholders, its relationship and existent frailties.

The use of different tones of lines – light grey, medium grey and black – serves the purpose of identifying what is knowledge acquired directly from the "real world" (light grey) and knowledge that results from the study, reflection of an interpretation of that "real world" (medium grey) . The black line identifies a type of knowledge that is the synthesis of both knowledge previously referred and that characterizes the actions undertaken by designers.
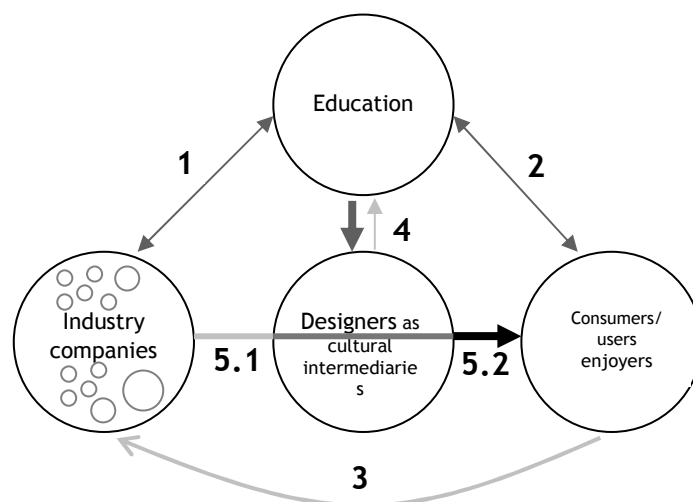

Figure 1

1 and 2 – The relationship between intervenient Industry/Education and Education/Consumers are not optimized since we observe that, on one side, there is a reduced interaction between them, on the

other side, the knowledge flows between parts derive not from direct and in time observation but rather are result of indirect readings or supported by indirect information sources.

3. The relationship between Industry and Markets depends upon sector having solid ones resultant from a constant follow-up actions and a permanent attempt of anticipation actions undertaken by the industry that faces consumer's needs and desires (it is the case of energy sector) and fragile ones mostly manufacturing industries.

4. The relationship between Education and Designers happens at two distinct moments: a) the moment of designer's educational formation that is build upon explicit knowledge and that lacks of an actualized perspective of the practice of the "labour world" as well as displays a clear distant look of the market and users; b) the moment designers go "back to school", a return related not only with the fact that most of the teachers are recruited in the labour-market but also because in several occasions professional designers are invited to participate in pedagogical activities promoted by the education institutions.

5. Finally it is characterized the fundamental axis that structures objects existence and that is dynamized by Industry that seeks, through designers as artefacts creators and cultural intermediaries, a materialization of consumer's needs and desires. Here I made the option of dividing it in two sections the relationship representation assuming as more correct to see designer's role taking place in between industry and consumer's relationship, given its role of mediation and intermediation in the process. This intermediary role conveys responsibilities and high capabilities because it is imperative to match in a harmonious way interests of different nature. It is supposed that a real value creation will occur to both interlocutors – industry and consumers – and it will be a designer's job, as an expert, to create that *momentum*. The fact that there are two moments in this relationship (5.1 and 5.2) is justified in some extent because I believe that through design's intervention firm's outputs present effective value-added products to final consumers.

In what concerns the relationship between Designers and Industry the assumption of Design as 'a company's strategic resource' is a reality in the last 15 years of design management literature (see Design Management Institute articles of this period) but has William Faust (Fitch CEO) pointed out:

 "Design is in the middle, between companies and customers. As it should be… The only people who value design at this level are the designers. While design has gained some respect over the last decade with mainstream business leaders, it is still the most undervalued and most misunderstood discipline in corporate business. (…) So how to explain this sorry state? (…) designers don't speak the language of business …"

In fact there are clear problems with a correct integration of the activity and its professionals inside Portuguese companies and part of those difficulties are due to educational inefficiencies.

Portuguese design professional use context has been studied for the past 15 years by CPD that regularly publishes under the name "The Design Observatory" the result of the studies they have made. The last results obtained from data gathered by means of a national survey launched by CPD (2003:30-31) both to designers and industrial companies in 2002 reveal among other things that:

- Even though having a background education in product/industrial design, 40% of the designer's representative sample develops graphic design.

- The labour opportunities depend more upon market request rather than education background. The fact that product/industrial designer's labour market is less dynamic is related with endogenous and structural characteristics of Portuguese Industries.

- The deficit of knowledge from Portuguese society in general about what design is, the deficient regulation of the activity and the absence of knowledge from industrial world of how to integrate design in production and communication company's strategies are aforesaid as the most important problems that affect activity's development.

Supporting theoretical paradigms

I have chosen as research supporting theoretical paradigms those of Donald Schön – The Reflection-in-Action Theory - and of Herbert Simon – the Rational Problem Solving approach. The first one is based on a constructionist view of human perception and thought processes and is supported by *tacit knowledge,* a concept of Michael Polanyi (1966:4) that defended that "we can know more than we can tell". The second one has its roots in the positivistic epistemology that claims being objective knowledge of reality the only possible source of knowledge. Both paradigms are important in its theoretical support to this research. In fact, I totally agree with Dorst (1997:168-169) when he

demonstrates that "both paradigms deliver relevant descriptions of design-as-experienced (…)" and that "the properties and limitations of each of the two paradigms are such that they could be used in combination (…)"

Empirical evidence resultant from Dorst (1997: 83-150) work showed that are a few factors to consider in the so called "designer's interpretative behavior" namely:

- The design project's goals and decisions tend to described and presented to all stakeholders with precision in order to reduce implicit data and 'subjective' interpretation;

- The "subjective interpretation" is determinant when we have to deal with ill-defined problems in order to give sense to it.

- When a design project gives or demands freedom of choice on designer's part he depends upon its own perceptions and interpretation of the problem. In this case the design activity is better described in terms of a reflection-in-action activity.

- Designers spend considerable amount of time at the beginning of a project trying to define the type of problem they deal with. They do it in terms of constraints of the problem that impose itself to the freedom of defining personal goals. Some designers reveal to be more confortable with an 'objective' approach to problems others with a 'subjective' one.

In fact through interpretation that can be both 'objective' and 'subjective' one it is possible to better access to design activities. We know that the type of dominant interpretation varies not only throughout the different phases of design activities but also in terms of design situations. Ultimately the decision upon the need of using 'objective' or 'subjective' interpretation throughout the design activity depends upon the designer itself.

Definition of the research's problem

As stated earlier in this paper my research problem is the product design process that usually presents a lack of efficiency that result many times in the bad performance of final products. One of my doctoral proposal statements suggests that the reduced efficiency is due mainly to a bad management of the creative process especially in respect to time management, its total quality management and strategic adequacy. The resultant final solutions usually present one (or more) of three different types of inefficiencies:

- Technical-productive – which is unacceptable nowadays and indicates that are problems concerning technical aspects education and its link with company's production processes and techniques.

- Adequacy to market needs – that reveals the absence of a correct alignment between company's strategic vision and goals and final consumer perceptions, needs and expectations;

- Product formulation as a cultural agent – the designed products are not related with consumption culture and it is vital that designers assume the task of understanding how people make sense and interpret the objects they design, and how it is possible to create new experiences to people having a product as an agent to it.

Research's Goals

The main goals of this research project are:

- The achievement of a description of design processes among design students and professional designers in order to identify both gaps and contact points;

- The development of a methodology that will improve time management, strategic adequacy management and quality management in design processes;

- The definition of new tools and teaching methods that will better serve company's expectations about design's profession.

- The promotion of a more effective interaction between design's education and industrial Portuguese companies.

The fact is that in what concerns Portuguese Design Education we are more or like in the same situation as Great Britain in the eighties. We denote a gap between design education and the "labour world" and due to that fact we aim to develop methods and tools that will contribute to the development of the design education system in the way proposed in London by the Royal Society of

Arts (RSA) (1980) in its "The Capability Manifesto" that stated that: "" There is a serious imbalance in Britain today in the full process which is described by the two words "education" and "training". The idea of the "educated person" is that of a scholarly individual who has been neither educated nor trained to exercise useful skills; who is able to understand but not to act…This imbalance is harmful to individuals, to industry and to society… There exists in its own right a culture which is concerned with doing, making and organising and the creative arts (and) the formulation and solution of problems… Educators should spend more time preparing people in this way for a life outside the education system. The country would benefit significantly in economic terms from what is here described as 'Education for Capability'."

Research's approach and methodological design

The research's methodological design is seen in practical terms as an open process subjected to iteration during its course.

In methodological general terms I aim that this research will be able to translate the praxiological and hermeneutical aspects of product design processes. The synthesis of the research framework is presented in Figure 2.
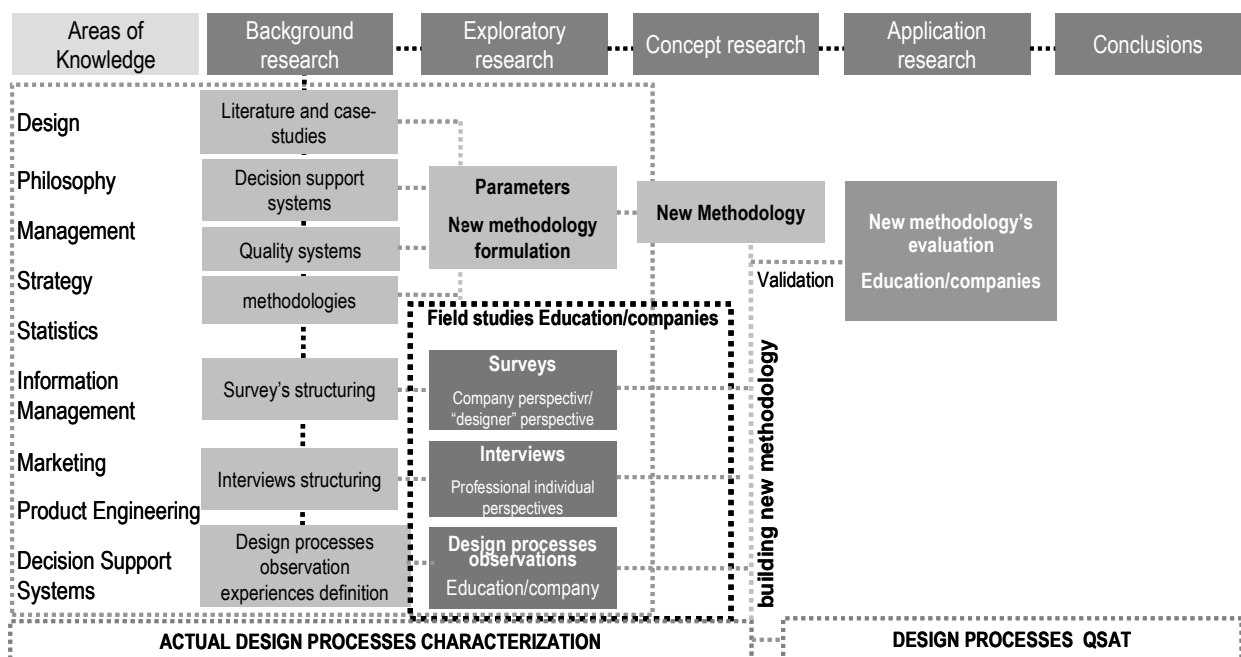

Figure 2 – Synthesis of the Research Framework

The use of ethnographic studies as one of the chosen methods to investigate project design processes is related with the intention to gather a detailed observation of designers in action in order to achieve to a critical vision of the product design project's practice and results through the qualitative characterization of designer's processes in respect to their sensibility, ideas and modus *operandi*. Another reason that has preside the methodology's choice was the fact that design discipline never coded in a systematic way its practices in order to include a critical reflection based upon ethnographical methods analysis.

In what concerns other methods to be used this research study integrates surveys and interviews addressed to design students and to professional designers and industrial managers that are crucial to define the way design, its nature, methods and practices are thought and evaluated. The interviews will also serve the purpose of identifying and consolidating quality criteria of product design projects and possible project tools based upon time management and strategic adequacy management to be tested throughout the experiences.

The work to be done with companies will be developed inside a research project planned for the next three years with the title *"Design as a company's strategic resource: a study of the impacts of Design"* that was funded by Science and Technology Foundation (FCT). This research project is developed by a multidisciplinary research team that includes the knowledge areas of economy, management,

design, engineering, statistics, and artificial intelligence. This enlarged study includes the analysis of company's design processes of a representative sample of Portuguese Manufacturing Industries.

The research experiences will have three formats: passive observation of design practice processes in a classroom environment – where the teacher will work, as usually, as a tutor, that will provide students with required information and guidance; practical experience with the intervention of an expert panel composed by professional designers and industrial staff and, finally experiences made with individual students in a room, with a specific brief, with a time limit of 2.30 hours for the accomplishment of the task, that will serve the verbal protocol analysis (VPA).

The problem's formulation will have the participation of industrial designers and industrial managers that will have a determinant role in its definition as well as in the evaluation of the proposed solutions. Among other things I aim to identify how is thought and put in action the macro and micro structure of student's and professional's design methodology, how are decisions taken and which are the critical points of the process (the ones that will conduct to relevant changes).

The quantitative methods are crucial to describe important parameters of the experiences such as task time execution, number of iterations in the process, type of action undertaken etc.

The research tools that support the ethnographical studies of the experiences undertaken by the 4th year students of design course are synthesized in Graphic 1.
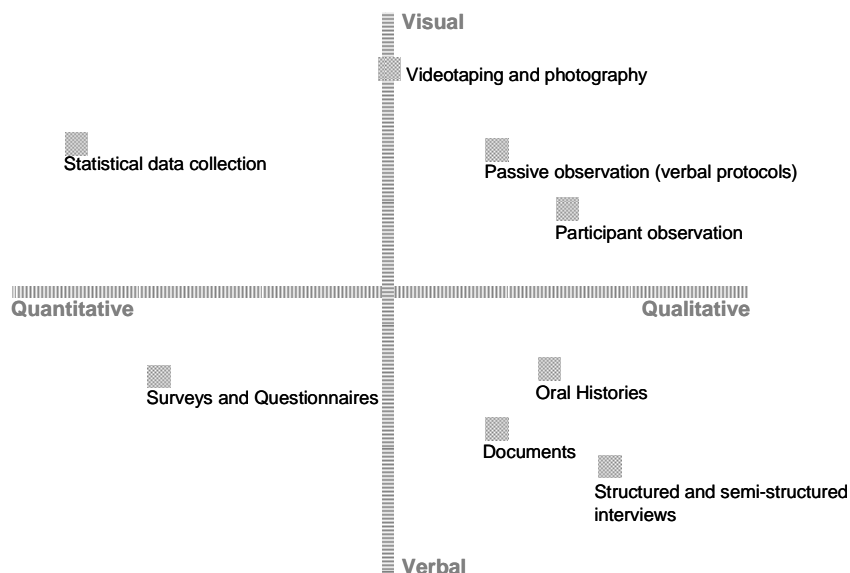
Graphic 1 – Research tools for conducting academic ethnography (adapted from Brenda Laurel, 2003:33)

Key issues to the construction of a new methodology

The new methodology to be developed aims to ensure that designers will be able to engage in design processes having a real improved time, strategic adequacy and total quality management of it.

I assume in this study that the nature of design activity is constructive, normative and creative. Design is seen as a process that develops a synthesis pattern in which solutions are actively constructed by designers.

It is also important to be conscious that, as Rittel and Webber (1984:135-144) observed, the design problems are usually 'wicked problems' meaning that they are not problems for which all the necessary information is available being, therefore, not susceptible to an exhaustive analysis. Thus we have no guarantee that the 'correct' solutions may be found. In this context a strategy focused in the solution seems preferable to a problem's focused one. It is always possible to analyse the 'problem' but designer's task is to produce 'a solution'. Being so, it is only in terms of conjectured solution that the problem can be contained within 'manageable bounds' as advanced by Hillier & Lieman (1974:4-11). What designers tend to do is search or impose what Darke (1979:36-44) named as a 'primary generator' that both defines the limits of the problem pointing out to its possible solution. A primary generator is a conceptual element or idea that results from the first perception designers have of the design situation and that frames future design decisions.

Another aspect to take into account in the new methodology construction derives from Foucault (1971) thinking about the fact that our knowledge is nothing more than the result of a process including a) the experience (conscious or unconscious) of stimuli in a 'specific sequence up to the given moment' through our senses and, concurrently, b) the continual processing of these stimuli 'in the same specific sequence' within the 'dynamic' framework of memory (conscious or unconscious). Two important elapse from this. First of all, because knowledge is depending on senses and memory it can not exist without a body. Secondly, because knowledge is dynamic and inter-processed it may take different forms depending on the 'sequence of stimuli', e.g. if stimuli X comes before stimuli Y (and Y is processed with the experience of X) knowledge may be different than if stimuli Y comes before stimuli X (and X is processed with the experience of Y). This implies that what we know is highly dependent on where we have been meaning not only physical places, but also 'place' as a position where physical aspects, institutions, discourses, languages and so on come together. For us to successfully communicate what we know is also highly dependent on where we have been and where the person we are communicating with has been.

It is also a structural issue of the new methodology the assumption that 'design problem' and 'design solution' have a co-evolution and can not be seen as separate moments. Especially in what concerns 'ill-defined' or 'wicked' problems it is a matter of developing and refining both the formulation of the problem and ideas for a solution, in a constant iteration that includes analysis, synthesis, evaluation and decision processes.

Taking into account the above written the proposed way to frame time, strategic adequacy and quality management in the design processes supports the use of two general structuring aspects: a) 'case-based design' (based upon experience/memory that is used to facilitate retrieval and use) and b) 'constraints posting' (a method of formulating and propagating values, constraints and structure).

In terms of time management similar principles and structure of those existent in Critical Chain Project Management Method (CCPM) is to be adopted. As Zultner (2003: 10-18) defines it CCPM (a method developed by Eliyahu M. Goldratt in 1997) is a method of planning and managing projects that consider all tasks in a project as a system and puts more emphasis on the resources required to execute project tasks especially time. It also puts accent on the identification and minimization of the impact of constraints, a subject that is strongly connected with the structure of the new methodology.

In what concerns strategic adequacy the parameters to describe this aspect of the project will be defined based upon the critical cross information between literature and results from the field studies undertaken with companies.

The quality management of a design project will be sustained by the creation of a Design Project Quality System that is still being developed and that departures from Stoll's (1999:23-32) definition of 'Total Product Quality' that includes an internal and an external qualities. From that starting point I started to define the quality of a Project as 'final product' (that contains also an internal an external component) and finally I am working on the quality of a Project as a 'process' having among its definition parameters 'time management' and 'strategic adequacy management'.

Work in progress

This study is in its initial phase but there is work that has already been done. The research is in its background research phase (see Figure 2) but some of the preparatory work to exploratory research phase has already been done and ongoing. It is the case of pilot surveying. In fact the student's pilot survey has been launched and data was gathered and is being analysed. There are some preliminary conclusions to attend to, such as:

- Being time been evaluated by only 23,7% students as an important factor in respect to their performance in Design project's course, it was identified at the same time by 84% of the sample as a decisive factor in terms of student's low performance results. The reason appointed to that fact is a bad management of time in general as well as in what concerns project's process (92% of respondents).

- Students that keep a record of ideas (notebook) tend to find less difficult to manage time.

- Students that frequently resort to the construction of 3D models have a tendency to iterate less in the project's process and to have less time management's problems.

- The first action taken by students after the moment they are confronted with a brief is: to search for similar problems and its solutions (89%).

- Drawing software programmes usage are seen as a possibility to generate a greater number of ideas in less time (65%) but it also promotes a loss of control over the global time management (84%).

It is also accomplished the task of launching and collecting information through the pilot survey that addresses company's design assumption's and use. In this case it was used an online survey developed inside the research project named "Design as a company's strategic resource: a study of the impacts of Design". The construction and results of this task is the subject of a paper to be presented by the project research team in this conference under the name "An online survey Design to capture Portuguese companies' perspective of Design".

The 'Design Project Quality System' is being developed and it is in the phase of defining evaluation parameters to describe the quality of a project's process. The final definition of this system depends upon the results of both surveys (to students and companies) where questions about quality are asked both as closed and open questions.

Conclusions

In this paper I argue that it is possible to improve design processes in respect to its time, strategic adequacy and quality management. That I propose can be done through the creation of a new methodology based upon 'case-based design' (based upon experience that is used to facilitate retrieval and use) and 'constraints posting' (a method of formulating and propagating values, constraints and structure).

There are also a few benefits expected at the end of this research study that I would like to remark:

First of all I hope to achieve to a better definition of the "decision space" that will frame the design solution. This can influence positively the relationship between designers and final consumers reverting to the growth and understanding of the design discipline. If a better design processes management is achieved that will contribute to a better management of design as a company's strategic resource enabling the growth and development of companies in quantitative and qualitative terms;

Being this an incremental research study I aim to augment the national and even international knowledge about design processes in general and in particular the one applied to design education hoping that at this level a value-added is achieved not only in practical terms but most important in research ones.

I do consider the possibility of having real quality gains in what concerns design education in our university – being able to develop, in a sustained way, the capabilities of the students as well as of the services offered to the community in general.

Finally I point out the personal benefits in terms of knowledge growth in extension and depth.

There are also some success critical factors that must be identified and minimized reducing, this way, the risk of failure. The most immediate that I would like to point out are the experiences to be undertaken. In fact the success of the experiences depends heavily upon the performance of the subjects that are part of the different samples. On one side the nature and profile of the subjects has influence and on the other side the verbal protocols process implies the ability to interiorize and display an out loud though. These facts constraint in a certain way the chance of having quality data and subsequent conclusive and rigorous analysis of it.

Besides that there are other critical points in research such as the data analysis and its validation especially because there are several relevant variables in design processes that must be controlled; the phase of interpretation and verification mainly due to the task of finding significant implications in relationship between theory and practice; and also in the possible under-generalizations or over-generalizations that can occur.

My ambition with this brief paper is not to provide any answers; on the contrary my conclusions are more to be seen as open-ended reflections. The intention therefore is to argue for greater reflection on design processes, and in that way contribute to better understanding to the creation, sharing and transfer of knowledge.

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"…It's a poor sort of memory that only works backwards."
Lewis Carrol, Alice in Wonderland

Rita Almendra

The enhancement of the time, quality and strategic adequacy dimensions of product design processes: a doctoral study in its first stage

Research Area: Design Processes

**Research Problem**: Lack of efficiency of product design processes

Hypothesis: reduced efficiency is due mainly to a bad management of the creative process especially in respect to time management, its total quality management and strategic adequacy ;
A new methodology will improve the efficiency streightening the relationship between design's education and industry.

Goals:

▪ Description of design processes

▪ Development of a methodology

▪ Definition of new tools and teaching methods

▪ Promotion of a more effective interaction between design's education and industry
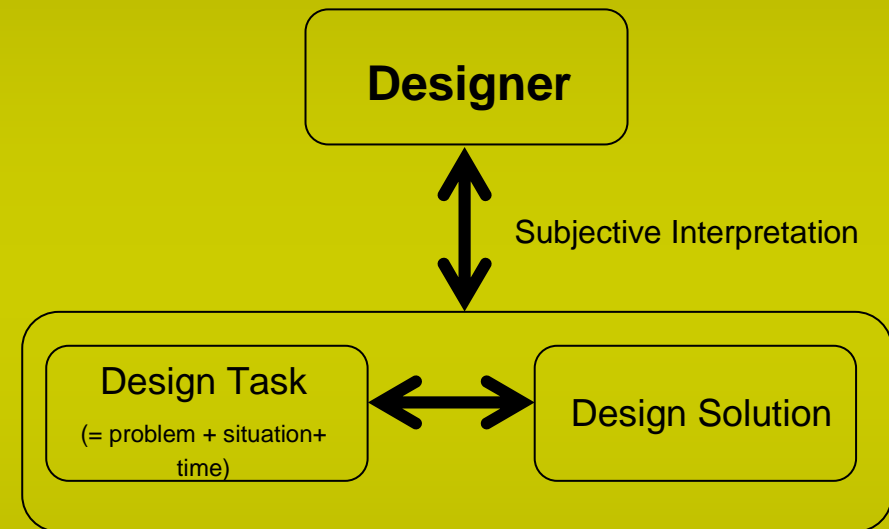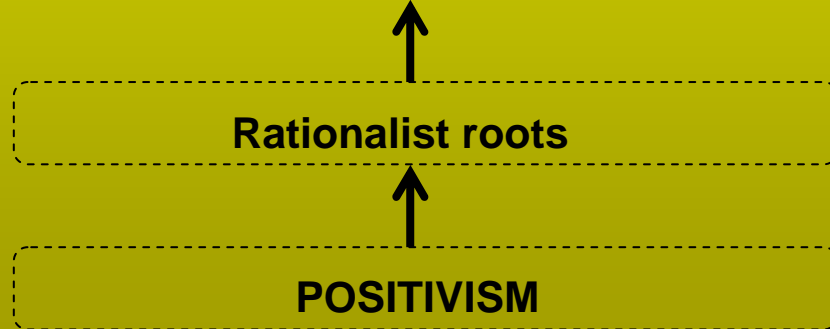
▪Small national education systems without effective links/bridges between them;

▪Universities under-use of the knowledge produced because it inhabits a separate world from business.

▪Universities with a diminished responsiveness to changing learning and research needs emerging from markets and society.
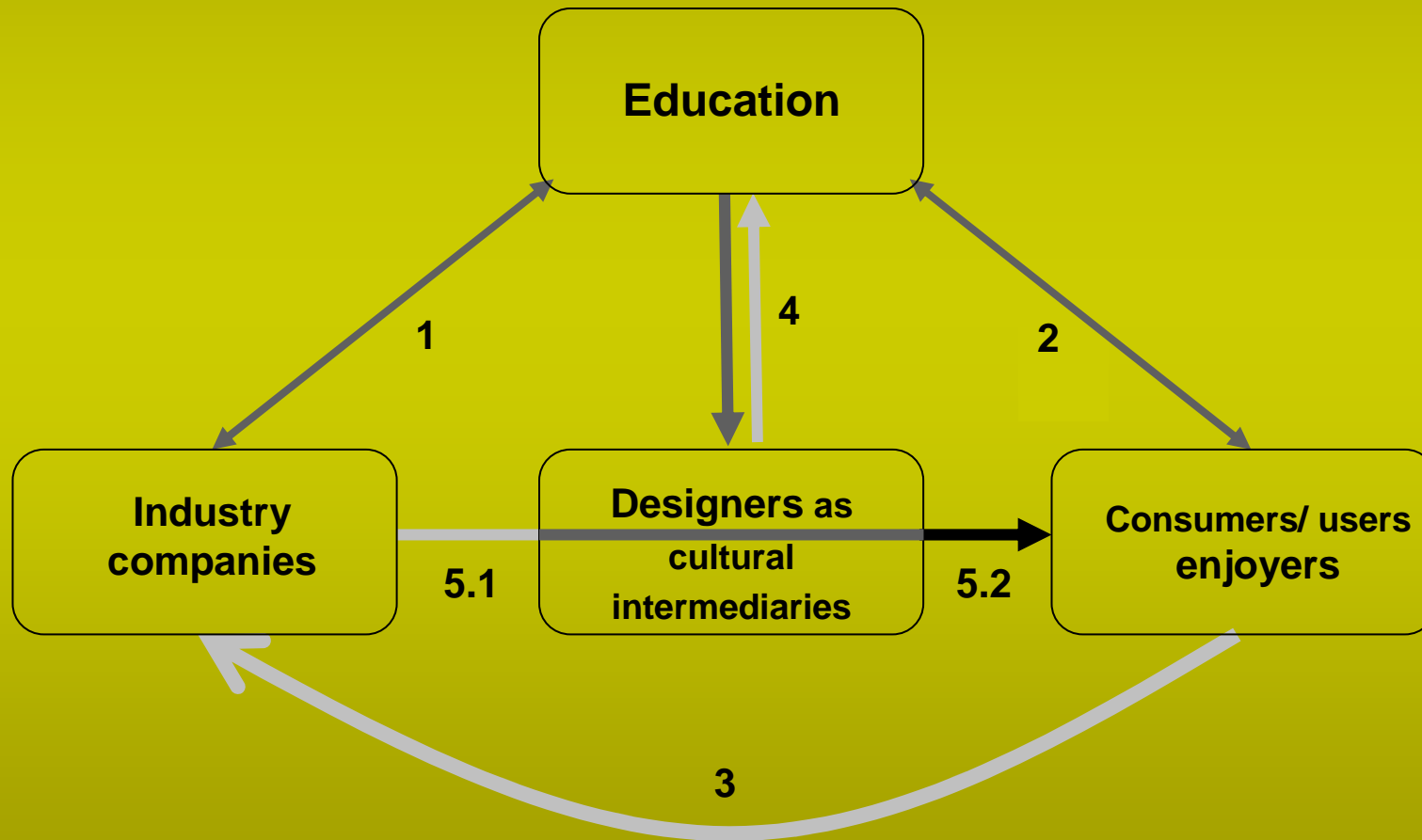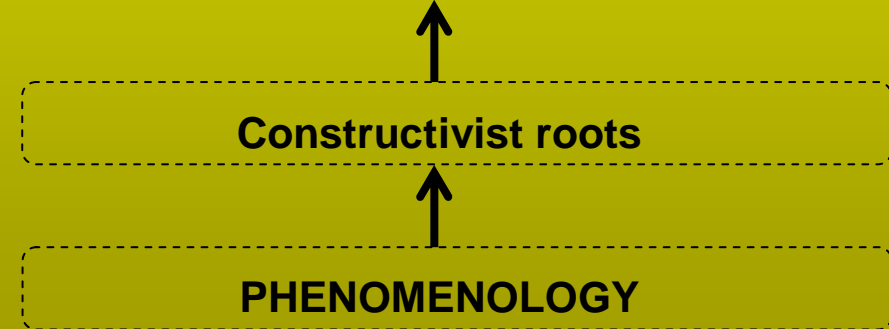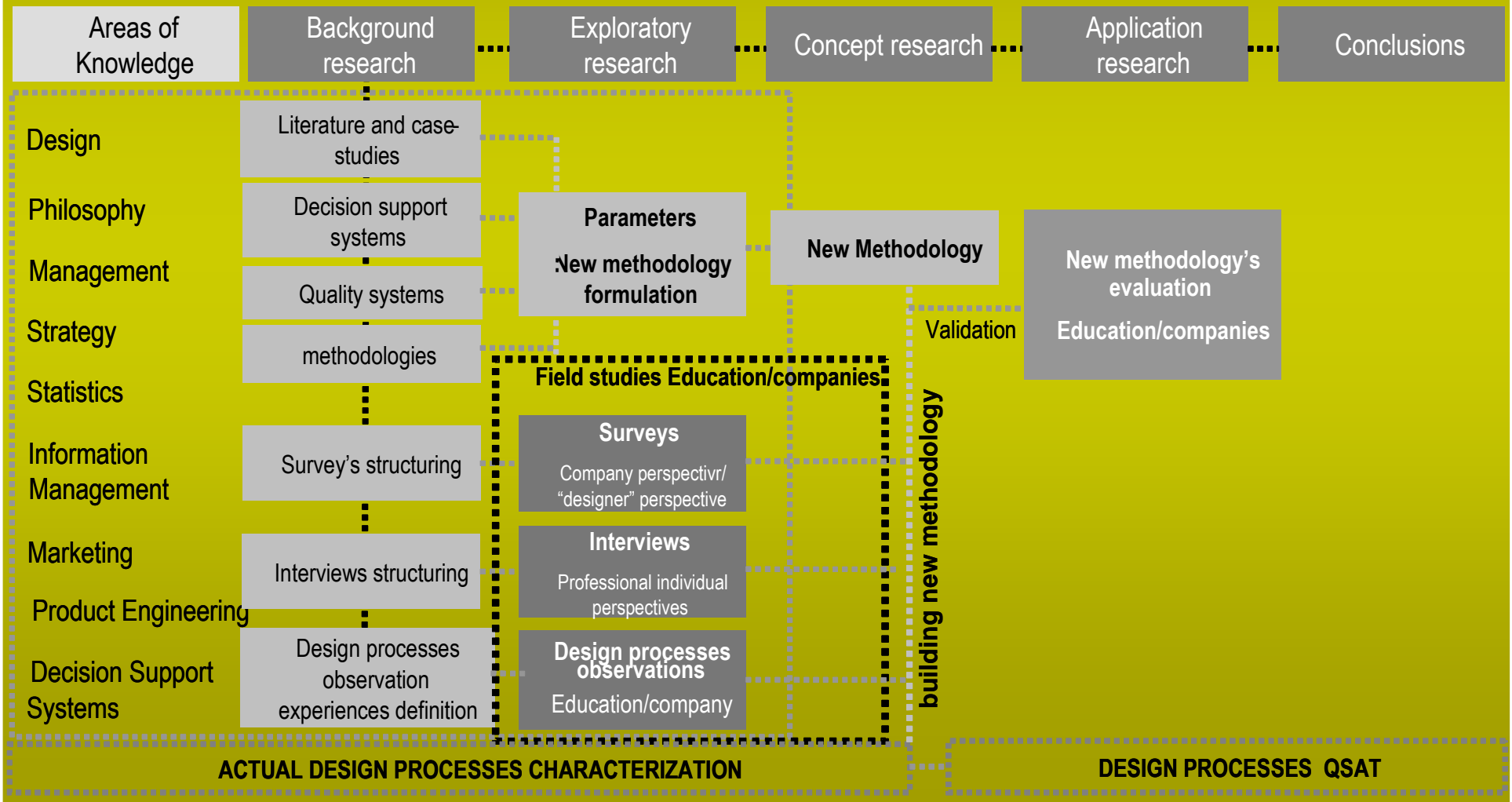
1. Supporting theoretical paradigms
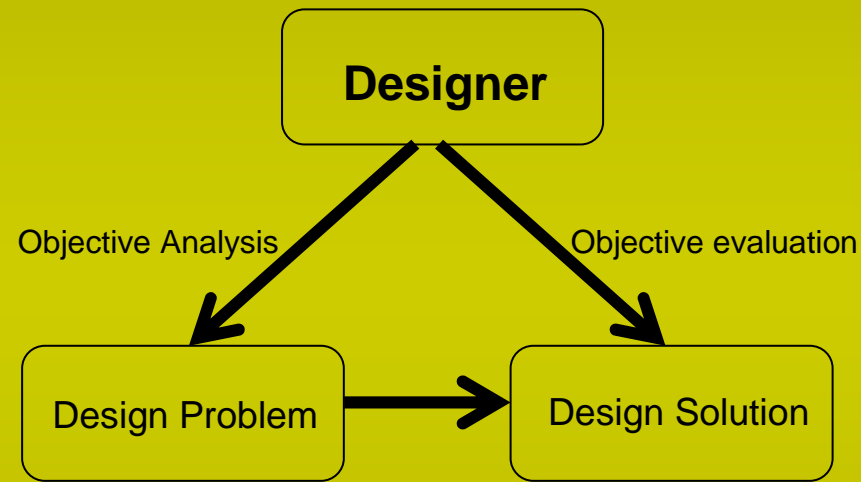
2. Research approach and methodological design

- **Literature and case studies**

- **Surveys – students/companies**

- **Semi-structured interviews – students/companies**

- **Ethnographic studies - experiences - students/companies**

  - **Verbal protocol analysis – design processes**

  - **Passive observation of design practice in a classroom environment;**

3. Issues to consider in the new methodology

▪ Design problems are usually 'wicked problems', therefore, not susceptible to an exhaustive analysis;

▪ Designers tend to search or impose what Darke (1979:36-44) named as a 'primary generator';

▪ Knowledge depends on senses and memory and because is dynamic and inter-processed it may take different forms depending on the 'sequence of stimuli';

▪ 'Design problem' and 'design solution' have a co-evolution and can not be seen as separate moments;

▪ 2 general structuring aspects: a) 'case-based design' and b) 'constraints posting'

▪ In terms of time management similar principles and structure of those existent in Critical Chain Project Management Method (CCPM) is to be adopted.

▪ Definition of a Project Design Quality System having among its definition parameters 'time management' and 'strategic adequacy management'.

1. **Student's pilot survey** - some **preliminary conclusions** to attend to:

- 23,7% of the students evaluated **Time** as an important factor in respect to their performance in Design project's course;

- 84% see **Time** as a decisive factor in terms of student's low performance results; The main reason is a bad management of time in general as in what concerns project's process (92% of respondents);

- Students that keep a record of ideas (sketch book) tend to find less difficult to manage **time**;

- Students that frequently construct 3D models have a tendency to iterate less in the project's process and to have less **time** management's problems;

- The first action taken by students after the moment they are confronted with a brief is: to search for existent solutions to similar problems (89%).

- Drawing software programmes usage are seen as a possibility to generate a greater number of ideas in less **time** (65%) but it also promotes a loss of control over the global **time** management (84%).

2. Companies online pilot survey

- Integrates a research project named "Design as a company's strategic resource: a study of the impacts of Design". Funded by Science and Technology Foundation (FCT).

- Construction and results will be presented in this conference under the name "An online survey Design to capture Portuguese companies' perspective of Design".

- Launch and recollection of information through the pilot survey that addresses company's design assumption's and use;

3. 'Design Project Quality System'

- 'Design Project Quality System' is being developed and it is in the phase of defining evaluation parameters to describe the **quality of a project's process;**

- It departures from Henry Stoll (1999) **'Total Product Quality'** definition and ends up defining Total Project Quality that considers 2 branches: **quality of a design project as a final product**; **quality of a design project as a process**;

- The abstract of a paper describing this system,named **"Thinking the Design's quality – from product to project"** was reviewed and accepted by the Organization Comittee of the 2nd International Conference on Design Principles and Practices. 9-11 January. Miami Conference Centre, Florida, USA.

A few benefits expected at the end of this research study:

- Achieve to a better Knowledge management and decision taking;

- Reach to a more accurate definition of the "decision space" that will frame the design solution;

- Influence positively the relationship between designers and final consumers reverting to the growth and understanding of the design discipline;

- Better design processes management that will contribute to a better management of design as a company's strategic resource enabling the growth and development of companies in quantitative and qualitative terms;

- To augment the national knowledge about design processes in general and in particular the one applied to design education in practical terms but most important in research ones.

- Personal benefits in terms of knowledge growth in extension and depth;

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