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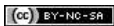
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o conceito de pesquisa blue sky

Celso Scaletsky, Gustavo Borba

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Celso Carnos Scaletsky is an Architect, Doctor in Architecture, professor at the Design Post-Graduate Program at the Unisinos School of Design.

Gustavo Borba is an Electrical Engineer, Doctor in Production Engineering, professor at the Design Post-Graduate Program at the Unisinos School of Design.

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Abstract

This investigation relates design process to systemic thinking and focuses on the first stage of design process, on a kind of research called blue sky research. This research corresponds to a form of organization of references to the project. This special kind of knowledge uses the concept of *constant* proposed by professor Flaviano Celaschi. According to this concept, there are patterns of human behavior that repeat themselves throughout history. The designers can represent these patterns, called constants, in many different ways in each time period. The project set up for an enterprise and the study about the blue sky survey concept developed in it are thus analyzed.

Keywords: design cognition, design methodology, design process, image

This article begins with the assumption that design process can be associated to the concept of systemic thinking. From an initial approach on systemic thinking, we present a design process model to, in the end, discuss a real case which the model was applied to.

The Cartesian understanding related to modern rationality and to analytical thinking advocates the understanding of the whole from an accurate analysis of the existing basic elements in the system. The origin of modern rationality is related to the Scientific Revolution (16th and 17th century).

Among the main researchers of these times, there were the fundamental contributions of Kepler, Copernicus, Galileo, Descartes and Newton. In the center of this theory there is a mental model related to the necessity of applying a rational way of thinking and testing ideas. This perception caused a rupture with Ancient or Aristotelian science (Kasper, 2000).

According to Ackoff (1981) the main characteristics of the way of thinking consolidated by Newton can be synthesized in the content of four terms: analysis, reductionism, determinism, and mechanism. The analysis comprehends the perception that an investigation of a phenomenon can be seen from the understanding of the individual parts separately. Considering the reductionist theory, any phenomenon can be explained considering particular causes and moving to more general ones. Determinism advocates that the relation between phenomena and between the parts can be reduced to simple unidirectional causal relations.

Although the understanding of the world from the mechanist metaphor has great importance for scientific evolution, different approaches were developed in order to try to understand the existing complexity in social systems. According to Ackoff (1981) the theories related to systemic thinking made efforts to understand the 'organized complexity' as dynamic networks of interactions from the notion of system. Forrester is considered one of the forerunners of the systems theory. For him, a system can be identified as "...a group of parts operating together to accomplish a common goal".

According to the author, this concept is basic for the understanding of the existing social and organizational realities, highlighting the importance of the structure (or theory) for comprehending and interpreting in any field of knowledge. Therefore, without an organizational structure, knowledge is just a collection of observations, practices and conflicting incidents. Forrester (1968) proposes the existence of two types of systems to explain the dynamics of these relations: the open and the closed systems. The open systems are those which the outputs respond to the input elements, but do not influence them. The closed systems, or systems with feedback, are characterized by a constant interaction between the results and the system inputs. From these concepts, the author highlights a series of social systems as systems with feedback loops, translated into cause-and-effect relations.

The notion of systemic thinking as an understanding of a phenomenon is quite relevant when applied to design processes. The design process must be seen in its totality, as a whole and the Cartesian thinking, related to modern rationality, does not solve the complexity inherent to the creative process.

Capra's notion of 'organized complexity' (apud Kasper, 1998) reinforces the existence of various types and different levels of complexity that can be described or captured by the concept of system. The cause-and-effect relations help us to better understand the typical phenomena of every design process that starts from actions and construction of parallel paths that will be tested and validated by the designer.

From our previous considerations, we believe that the design process begins with the use of non-linear tools and methodologies to understand the functioning of different social systems, considering the interrelation of their variables. The representation of models capable of translating design systems has always been the object of scientific research in design.

Various representations are possible to be done to this process. The current investigation departs from one of those representations. It divides projects in two major stages: one called *metadesign* and another called *projectual*. In this representation of process, the *metadesign* stage takes place as a knowledge platform that supports and guides project activity (Moraes, 2006). According to Dijon de Moraes, this stage does not aim to formulate ideas, precious and concrete outputs or artifacts. We understand artifact as something artificially built by man, as for example a shaver, a building, a service or even an experience. According to Moraes, the idea of the metaproject is inserted in a highly dynamic, constantly mutating space that is characterized both by the complexity of the act of projecting and the complexity of contemporary society. All these models of representation of the projectual act are evidently characterized by nonlinearity, redundancy, as well as by its elliptical cycles. Every model of the complex process of creation will be imprecise in the origin of the process there will always be an open and not well-structured problem. The stage following the metaproject corresponds to the development of the project itself, with its traditional strategies.

The metaproject can also be divided in two big parts. On one side, the contextual researches aiming to build a dossier characterized as a company and market dossier; on the other side the research we call *blue sky*, the core interest of our investigation. The result of the blue sky research corresponds to the dossier of trends for innovation.

The big difference between the contextual researches and the blue sky research is the degree of proximity to the project brief. Contextual researches keep a strict/close relationship with the project problem. Technical aspects, consumer profile, and the market where the problem is located are examples of this kind of research. The blue sky research, on the other hand, has a more peripheral relation with the brief. It will bring other kind of knowledge to the context of the project that will help the conceivers to construct and reconstruct the initial problem. It is certainly necessary to find points of contact between the project problem and this view extended to other productive sectors.

The blue sky research was defined by Cabirio Cautela (2007) as an open and non structured process of previously constituted connections aiming to reveal and systematize a series of inputs and stimuli useful to the project. The blue sky researches can be associated to the concept of cross fertilization, as being at the same time a searching and germination of tacit knowledge process brought into the project by the designers. We plant and harvest elements that are useful for the guiding of the project. This kind of knowledge construction is hardly obtained when only logic-deductive processes are used. Blue sky intends to find opportunities in other contexts that are not covered by contextual researches. This conscious and organized action tries not only to find visual or formal stimuli, but also solutions to project problems in other market sectors. This kind of relation involving dimensions external to the specific reality being studied reinforces the understanding of

this kind of research as related to the concept of open system. According to Bertalanffy (1975) a fundamental characteristic of an open system is its capacity of keeping its organization through continuous exchanges with the environment. In the described context, the system influences and is influenced by external elements.

A technological solution for a sail boat can give insights for the real state industry. Materials for the textile industry can serve as models for a new way to use a household appliance. A new trend in fashion or in the supplies for the computing hardware industry can help in the conception of new sound systems.

To Alessandro Deserti (2007), the idea is to find a system of opportunities more than a system of connections. The blue sky research intends to imagine and allow for the construction of possible scenarios for the creation of artifacts. We can create many scenarios and each one of them can in turn create many project concepts. In this article the concept of project is not an abstract idea of project. The term concept is used as the representation of a first materialization of an idea or answer to the project problem. The concept, in this adopted sense, will be tangible even when representing a service or an experience design.

The blue sky research, according to Cautela, must identify strong and weak signal around the context of the project that will help in the construction of project scenarios. The concepts, relevant to the scenarios of the constructed projects, would be in the interface, on the border between the metaproject and the project stages, according to the design process being discussed here.

One of the difficulties faced when one tries to organize this kind of extended look to other focus of interest is to find the correct direction. The description of a concrete case of a blue sky research for a company in the south of Brazil and the concept of "constants" will help us in the investigation and to better understand some traces of how this look can be constructed. In the following chapter the case of Sander Industry is presented.

1 The Sander project development

The Sander Company counts with over 80 years of existence and is specialized in the transformation of horns and bones into combs, buttons, handles for pocketknives, covering ceramics, among other products. From the serial production of objects to handcrafted objects and from the simple bone that becomes a dog toy to the sophisticated buckle of women's shoes, Sander products are high quality. However, the company was undergoing financial difficulty because its products value is the lowest in the value chain. This, plus the Brazilian exchange crisis in 2007, created an unbearable situation for the company. Great amounts of commodities are produced by Sander daily and exported to countries such as the US, France, Germany, and Australia. It was amidst this threatening situation that Sander sought the Design Center of the School of Design at Unisinos for the development of a new product.

1.1 Definition of the brief

Design and project are two very close words, and this topic has already been quite developed. The two words may be used to describe both a creation process of something that does not exist in time (the act of projecting something forward) and to describe the result of this process (the project). Moreover, design is used to describe a relatively new professional activity whose frontiers are not well-defined. In professional courses based on the project's culture, the creation process is many times associated with a complex problem-solving process. Such problems have two characteristics: first, not being well structured; second, being open. Considering these characteristics, approaches that consider the relations between the parts (systems theory) and not the local optimization (Cartesian thinking) are more relevant. Design problems are not well-structured because they are usually vague and full of contradictions in the beginning. They are said to be open because a single problem allows for several solutions, which many times are all valid. For Herbert Simon (1991), the problem-solving process could be translated as an investigation in the interior of a huge maze of possibilities, a maze that describes an environment. Donald Schön (1994) goes further in the fields of knowledge related to the culture of design and says that in applied sciences it all depends on the understanding established when one decides on the objectives to be achieved. If the latter are steady and precise, the decision to act may present itself as an instrumental problem. However, if they are confusing and conflicting, one cannot even talk in terms of a 'problem' to be solved. A conflict over objectives cannot be solved by using (classic) applied research techniques. On the contrary, it is through the structuring of the problematic situation that one may organize and clarify the goals to be achieved and the possible means to reach them; it is not a technical process". For Flaviano Celaschi and Alessandro Deserti (2007), this process is closer to being characterized as problem finding, that is, the search for directions towards which innovations may be guided, or even problem setting, the characterization of the problem to be solved taking into consideration the complexities of contemporary life. The construction of what design calls design brief is an essential creative preliminary activity that will conduct the process towards the stage of problem solving.

In the case of Sander Company, this process was not different. The first articulations helped understand the context of risk the company was undergoing. The brief was characterized by the need of imagining a new

product to be developed, one of greater added value that would work as a pilot that could affect all the rest of the company.

1.2 Carrying out of the studies

Three researches were conducted for the Sander project. The two first tackle the definition of the profile of the company and its productive materials/processes. These two are briefly commented herein because they are not the object of discussion of the present paper. These two researches refer to the contextual researches previously commented. Prof. Felipe Campelo characterized the company as "being bought" by costumers but has difficulties in "offering itself" to the market. Nevertheless, Sander's success in international fairs showed the potential of its supply. On its turn, the research conducted by Prof. André Marques identified the two main productive processes related to bones and horns. The great waste of noble raw materials called attention and decisively influenced this work.

The blue sky research was the third study conducted by Prof. Celso Scaletsky and jewel designer Moema Debiagi. This study is discussed in detail in item 3. The study pointed to some behavioral trends that were tackled at the workshop to develop project concepts.

1.3 Rebrief

The studies conducted and the close contact with Sander led to what is usually called rebrief. We observed that the creation of one, two or three new products would not be enough. Within the concept of product-system we decided to guide the workshop towards the realization of a system of components with its own identity, one that could be adapted to different contexts of use, for example, something similar to one of the connection images made by Azerra Company, present in the blue sky study. In 2007, at a lecture for the Specialization Course on Strategic Design, Venanzio Arquilla from POLI.Design of Milan defined in a nutshell these two concepts as the whole of products, services and communication (the product-system) with which a company places itself in the market and in society and shapes its strategy and its offer". This position demands designers to see beyond the classic action of design – focused in the product that is being developed – and articulates services, communication, and experiences that may be associated to it within a previously idealized strategy.

Combined these pieces or components generate completely different products that are adapted to particular realities. Similarly, the new guidance indicated that this system of components should preferably be manufactured either with daily production residues or by means a more rational use of basic raw materials. The transformation of "waste" or low added value products into precious objects became the conceptual image of the project.

1.4 Workshop

The workshop lasted for 3 days; around 10 professionals and students were divided in two groups; each group generated a "competing" concept for the project.

Concept 1 – Links

From the definitions presented by the studies and the formulation of the rebrief, group 1 based its work on the idea that company materials established a link between past and modernity and that the formulation of the new system of products should reaffirm this aspect. In the end, this relationship was conceptually called *link*. The group developed a system of links that could create varied products through the combination of metallic bolts and other accessories. This system will be traded as mounting kits. Thus, the product-system was characterized in the idea of the kit (product), in the way to trade it, and this lead to a fun experience of mounting and combining pieces (experience), creating a strong and easily recognizable identity in the image of links (communication);

Concept 2 – Sander Homeskin

Having the same basis as group 1, Group 2 sought to mark Sander with a new and strong identity (communication). The proposition sprung from the realization that the company already developed surfaces manufactured from bones or horns (checked ceramics of approximately 2.5 x 2.5 cm). However, Sander was not recognized as a company that develops these products. The developed concept proposes that Sander presented itself to the market as a company that makes surfaces and generates trends. Annually, Sander could launch a new surface line that, contrary to what happens nowadays, would have a name and a brand. Thus, the company would advance one step in the productive chain. To exemplify this concept, 6 new surfaces that could be characterized as the 2008/2009 surface line were imagined.

The two generated concepts were reworked on after the workshop was over. Details were added to each of the products, and the result became a publication. This was the moment of valorization of workshop results. The work printed with the two concepts was given to the company and is to become a project development for its production. Besides the concepts, the most important result of the work was to show the company the need of a new market position and to indicate ways to reach do it.

2. The blue sky study for Sander Project

Up to this point, the development of the project carried out for Sander Industry was presented. However, the main objective of the present paper is to discuss the concept of blue sky research. The present paper is a continuation of previous studies focused on the definition of mechanisms that can stimulate and favor the generation of design ideas.

This study focuses the first moments of the project in which concept designers aim to identify opportunities for their projectual action. Here we are close to the moments that Jean-Pierre Chupin (1998) called navigation or dream or that Dijon called metaproject. Our intention is to propose mechanisms that reconcile the intuition of the project designer (hardly programmable) with elements that are defined by many authors as "facilitators of thought" (Gosselin, 1998).

Often such mechanisms are based on less direct looks, which seek references in other domains that are not directly articulated with the design problem. This type of research is many times associated to the idea of lateral view or a blue sky research. In general terms, a blue sky research seeks examples and stimuli in order to, by means of transferences through analogical thinking, obtain indicatives of possible scenarios for the construction of answers to a design problem. Scenarios are spaces or possible worlds; they are not necessarily materials, where designers may "act" in search of answers to the brief.

We have presented (Scaletski, 2007) how according to our investigation the two forms of above-mentioned studies may be organized and represented through concept maps. According to Joseph D. Novak (2006), concept maps are graphical tools used to organize and represent concepts and their links or relationships. For Novak, this way of observing and organizing exiting knowledge makes space for the creation of new knowledge. In the context of the present investigation, the new knowledge will be the possible scenarios where a designer may create. Thus, concept maps may work as a support not only to represent studied elements in the first stages of the project but also to work as leverage for the generation of ideas. Experienced designers usually draw simple maps and graphs and after that group them by topics or affinities. Little by little, project scenarios are constructed. Concept maps represent a support tool for analogy thinking, which consists of important factors to solve design problems. According to Hernan Casakin (2004), analogy thinking is a process of identification, mapping and transference of knowledge between a problem (target element) and familiar and known paradigmatic situations (source elements). As it is proposed here, the construction of concept maps as an articulation between concepts (represented in the maps by us) and its propositions may work both as a tool to represent analogies and as a tool to provoke new analogical thinking.

The first contextual researches sought to identify the current Sander costumers, products supplied, and equipment used in production. A first approximation led us to identify some key words that could work as concepts. Figure 1 shows how these concepts were represented in a concept map constructed by means of Cmap software. At that moment, the project idea consisted in the construction of a system of components that could be combined in many ways and applied to several areas, such as fashion, home, or free gifts. Later, workshop participants opted for focusing on home products.

During the construction of this map, many difficulties in the representation of images were observed. Analogical visual thinking is an important aspect for the type of proposition made by us, and in the continuation of this investigation a solution for this problem should be sought. On the other hand, the easy handling of Cmap software makes concept organization a simple and efficient task. The diffusion of this resource via web is another factor of interest since it favors the communication between the professionals who work in the development of this product line. In the initial moments of conception, computerized support tools for the project must possess this quality.

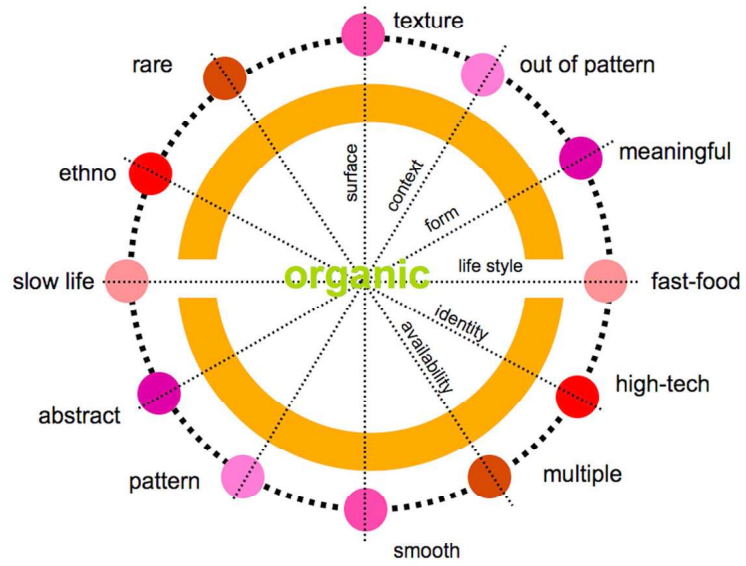


Fig. 2: Doze palavras-chave e seus eixos opostos. Fonte: Escola de *Design* Unisinos

| | | |
|--------------|---|--|
| Life style | Slow life  | Fast-food  |
| Identity | Ethno  | High-tech  |
| Availability | Rare  | Multiple  |
| Surface | Texture  | Smooth  |
| Context | Out of pattern  | Pattern  |
| Form | Meaningful  | Abstract  |

Fig. 3: Exemplos de imagens de referência da pesquisa *blue sky*. Fonte: Escola de Design Unisinos (Uso para propósitos estritamente educacionais)

The organization and strategy for the construction of the *blue sky* research for Sander had a clear intention of associating the left column (slow, ethno, rare, texture, out of pattern and meaningful) with elements closer to those called organic. At first, slow, ethno, etc. would be closer to the basic raw materials of this industry. However, during the workshop some images similar to what could be called an artificial world came (unconsciously or not) to designers, in other words, some of the main ideas that later would become design concepts. The image of the metallic couplings and Lego itself clearly represent the concept of component system that may be combined and applied to several situations, such as proposed by group 1 in the workshop. On the other hand, images referring to textures seem to be closer to the second concept generated. It is quite hard to affirm with certainty the influence of one reference image or another. However, it may be affirmed that many times what seems distant to our design context ("artificiality") may be the key element to a project idea.

The *blue sky* research was equally important in the characterization and decision on the inherent characteristics of products made from horns or bovine bones mainly as to their formal diversity and irregularity. The position assumed was that no matter the product generated in this project these

characteristics would be considered positive factors that precisely set a significant difference to, for instance, plastic. The great challenge continues to be to identify methods and strategies at a moment of the project characterized by intuition.

3. The constant concept proposed by Flaviano Celaschi

To Cabirio Cautela (2007), there are some strategies for the organization of blue sky researches. The first is oriented to the productive sectors that maintain connections (indirect) with our working project problem. According to Cautela, it is possible to organize a research in 4 groups of reference: (1) productive sectors with a technological continuity with the project problem; (2) sectors with the same rhythm of innovation; (3) sectors orienting innovation in the same direction; and (4) sectors having a complementation with the problem project at the functional level. So we can imagine, for example, that a productive sector in which the concept of mobility is relevant, as in the case of notebook computers, can be a reference for communication systems in automobiles. We could think that an advertising poster for blood donation could serve as an element of communication to attract young people to embrace religious vocation. The way different organizations work their concepts, even if distant from each other, can be important elements for the project in search of innovation. Besides the four criteria listed above, Cautela suggests another form of organization based on the CMF (color, material, finishing) method. Following the CMF method, the blue sky research is similar to an aesthetical portfolio that can be applied to certain project problems. Researchers and students from Unisinos Design School have recently carried out a project for the designing of the visual identity for a region in the state of Rio Grande do Sul. In order to do that, the research tried to identify chromatic patterns by looking at the architecture, customs and products of that region.

However, it is important again to bring about the case of Sander Industry and the 12 concepts used for the search and organization of images that were source of reference in that blue sky research. Some fundamentals proposed by Prof. Flaviano Celaschi from Politecnico of Turin might help us reflect about this kind of research, making it go further in relation to the pragmatic indicatives proposed by Cautela. The concepts presented below were constructed from an interview delivered by professor Celaschi during the Congress "Changing the Change" in July 2008 in Turin.

For Celaschi we will find in the concept of "super constants" or simply "constants" one of the fundamentals for the organization of images part of a blue sky research. The professor highlights the idea that the concept of constants is not new. The philosopher Giovanni Benedetti (1530-1590) had already proposed a theory according to which history tends to repeat itself in a cyclical way. For Benedetti, cycles are organized in three phases or periods: "God's phase", theocratic, when men believe in the supernatural and that laws had a divine origin; then, there would be an "era of heroes" when the administration of justice would be in the hands of aristocracy; and finally, there would be an "era of men", born free and belonging to a system of justice that would guarantee equality. These periods reappear in historical cycles adapted each time to new temporal contexts.

The essential idea Celaschi tries to introduce argues for the existence of constant behavior throughout the history of humankind. Only the contexts would change. The dynamic models of behavior (constants) are expressed and translated differently each time. Men's desire for freedom is an example of a constant. Man constantly searches for freedom. Whenever he finds it he goes through periods of fear and will seek security. When searching security, man tends to feel imprisoned and the cycle restarts. It is in this sense, arguing for the existence cyclical movements in history, that Celaschi establishes a connection with Benedetti's theory. The freedom – security model would be an example of historical behavioral constant.

The organization of researches aiming to identify useful trends or references for the project, according to the concept of blue sky research, could be accomplished by the identification of these constant behaviors. The constants are identified by designers, and when interpreted, translate their times. There are countless organizations trying to identify trends pointing to innovation. These researches are usually carried out in a very intuitive way or through purely statistical and quantitative methods inappropriate to the formation of trends. The act of organizing reference knowledge from the concept of constants intends to offer an alternative method. The method consists of "dressing" such behaviors with material from our own time. It is an interpretation process that will depend more on the designer's culture and experience than on intuition or "divine" illumination. The problem related to a blue sky research is then double: to identify the constants relevant to a specific project problem, and being capable of representing them in a contemporary context.

Flaviano Celaschi establishes a parallel between the designer's capacity of interpreting the constants and hermeneutics. The hermeneutics circle is traced from the objectivity of the phenomenon and from the subjectivity of the interpreter from whom we cannot escape: it is imposed to the interpreter to dislocate him/herself, to recognize his/her prejudices, to abandon all pretentious attempt to determine the truth in work or event, and to recognize the historical, contextual sense open to other truth. A design professional who carries out blue sky researches will be the one that will translate the understandable trends to the contemporary world.

To identify and interpret the constants corresponds to understand and reconstruct the briefing of a project and to establish a connection with the so called constant. An example of this kind of articulation refers to a project developed at the Polytechnic of Milan for a steel-plated door manufacturer. The company decided that it was important the launching of a new range of doors. It was at this project that the designers worked with the freedom – security constant. However, the company was trying to break up with this traditional image. When the concept of freedom was brought up the whole project changed direction. The non space that usually represents the door acquired a character of innovation. In the end of the project absolutely new ideas were launched for this range of doors. The search for references passing through a more ample look breaking up with the traditional way of seeing the design problem favored the establishing of non traditional solutions through typical behavioral models.

As already mentioned, in the project for Sander Industry the blue sky research was organized by 12 concepts. There was a permanent discussion about the articulation between man and nature. Afterwards, it is possible to establish a connection between artificial/natural with the concept of "constants". Man as a being that constructs artificiality in opposition to an untouched and pure natural world. All discussions departed from the following question: what are the characteristics that products made of bones or horns (natural) that differentiate them from plastic (artificial). This kind of reflection is not new. Throughout history man always moved back and forth between the desire of changing the world and stay in a preserved lost paradise. This discussion is really in evidence nowadays. We want a comfortable, innovative, technologically rich world, but at the same time we desire a world that compensates for the inevitable aggressions to the environment. We create problems, as Vilém Flusser (2007) would say, that respond to other problems, obstacles to overcome obstacles. The only solution for this dilemma would be a responsible attitude from the designer. The artificiality-nature constant should be interpreted in our times through responsible actions capable of guaranteeing the survival of the planet.

4. Conclusions

From the application of the method it is possible to notice a strong connection between the applied methodology and the systems theory assumptions. The idea of evaluating from different perspectives in order to better understand the problem and not to solve it is a characteristic of systemic thinking (Senge, 1990). This way, the evaluation of references not directly related to the relevant context allow for an enlarging of vision and the identification of different design possibilities. Besides, the perspective proposed by concept maps allow for the identification of co-relations between different variables affecting the problem, reinforcing the cause-and-effect relation and the perspective of co-relation between variables.

The whole work of construction of the so called blue sky research is based on an essentially iconographic research, with the image having an essential part. The image is important as an element hardly translatable by absolute truth. The image, as an element that allows for many interpretations. That is, image is, in this kind of research tool, the clothing that dresses the constant for its time. This research continues the research about the importance of visual references in the project process (Scaletsky, 2003). The investigation intends to formulate a method for the organization of this knowledge. We departed from the basic idea that argues for the existence of project methods or strategies carried out by those who develop a project. Those strategies are very often used in an intuitive way. The formalization of these procedures intends to create paths to facilitate creative processes instead of limiting them, a method for the organization of a project and visual knowledge basically aims to build a platform for the "launching" of ideas. One of the many possible methods is called blue sky research and it is the object of our investigation. The relevance of the "constant" concept remains to be better defined. Other proximal concepts as those of meta trends could bring other elements to our reflection.

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