

INTERACTION FOR EMOTION

THE DIFFERENT INSTANCES AND EVENTS OF INTERACTION BETWEEN PEOPLE AND PRODUCTS

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ABSTRACT.

Many of the methods used in the field of industrial design to define the products features considered the "usage" of these as a unitarian and timeless dimension.

This means that the requirements, features and functions (tangible or intangible) raised at this step of the design process often focus only on the main person-object interactions, omitting moments of interaction that could be called secondary, such as the maintenance, installation, transportation, moments of "no-usage", etc.

Based on a review and analysis of existing research, this paper presents an initial theoretical proposal to classify interactions based on "Instances and Events" that are repeated throughout the life of objects, often gaining more importance to the user than main functions, and thereby becomes a key aspect of industrial design methodology in a specific way to control the definition of the diverse product dimensions, particularly the emotional aspects that these involve.

Keywords: design and emotion; industrial design; interaction design; use situations; product functions definition

INTRODUCTION

From the gradual development of an own methodology, the discipline of product design has evolved in various aspects, such as, management of production processes in the design cycle, understanding the expectations of users and particularly the establishment of methods for defining functions and requirements, thereby gaining greater control over the creative process,

originally almost exclusively the result of inspiration or experimentation. Notwithstanding, these methods often have not considered the diversity of interactions between people and products, naming these interactions generically as "usage" and not with the wide variety of situations of *product life* span in which there are also interactions with users, whether they are physical, sensory or cognitive exclusively. In conducting a review of some early design methods to formally raised - as the simple method described by Bruno Munari (1983) or more complex proposals such as those made by Cross (1989) and Pahl, Beitz, Feldhusen, & Grote (1984) or more modern as defined by Ulrich & Eppinger (2011), it is equally difficult to find further or explicit references to the use and interactions with the products.

The categorization is made only from the point of view of a "*design problem*" and main functions that the product performs to solve this problem, some of which may suggest to the user how to interact with the product (see e.g. Chen & Lee, 2008) but there is no specific and direct consideration of the interactions between users and objects that includes the temporal variation of the interaction over time among the more conventional methods of Industrial Design. Conversely, it is possible to find a greater concern on the issue in the context of the current known as "*emotional design*" (Desmet, 2002; Jordan, 2000; Norman, 2005) which brings together a wide variety of models and methods. The central issue of *emotional design* is the incorporation of affective dimensions to the design process, so that the products do not exist solely as functional entities, but their users awake feelings and emotions that enrich the relationship between people and objects, and create a more enjoyable and meaningful experience. This

trend is a response to the growing confirmation that users in fact, require these features into the products, not just their technical efficiency (Hekkert, 2001).

To help provide a solution to the deficiencies raised, this article proposes, in the first part, a review of existing research, particularly from *emotional* perspective and later, the establishment of different person-product instances that consider the diversity of interaction over time, and under an universally applicable categorization, beyond the "*basic use*" of products. At the end of the article is presented a model for the integration of this categorization with conventional methods of industrial design and ideas for further research.

This work focuses only on the life span of the product in which there are interactions with the *end user*, and even though we could considered those who assembled or manufactured these products as being their *first users*, they have been omitted, because these user-product relationships are neither voluntary, nor stable over time, which is part of the phenomenon to be analyzed.

FUNCTION FOLLOWS INTERACTION

In most current approaches to industrial design, it seems clear that the main function is not the key factor that controls the definition of product shape. Hereby the old design principle which states that "*form follows function*" (Sullivan, 1896) may continue to be valid, but only if the concept of "*function*" is raised in a very broad manner and it has to consider the variety of functions available in products (for further details on the kinds of functions see, for example Aurisicchio, Ortíz Nicolás, Childs, & Bracewell, 2011 or Crilly, 2010) and the diversity of interactions involving these functions.

There is abundant evidence of the increasingly frequent and active use of the interactions with the products as key instruments to obtain a greater control of the design process.

In the research conducted for the proposal of a tool for reporting interactions and experiences of users with the products (*EXITool*), Russo, Boess, & Hekkert (2008) state that "*the interaction is the key aspect in understanding and design experiences with these products.*" Baudin (2009) mention the phenomenon of

"*tactility*" as that intrinsic human need and capacity for, confronted to the simple idea of a product concept, start to project and experience the touch and physical dimension of it, even through gestures and movements in the empty space, interacting in advance with an imaginary product, and considers it key to communication between design teams. Among the many creative tools of industrial design, there are techniques such as "*Design movement*" (Klooster & Overbeeke, 2005) and "*Physical Fusion Design*" (Hummels, Djajadiningrat, & Overbeeke, 2001) that proposed the usage of imagined or actual interactions, through prototypes or mockups, as a theatrical choreography to help create products and project the interaction with them. It is also increasingly developing products specifically *from* the interaction (see for example Ross & Wensveen, 2010).

There is a direct relationship between emotions and pleasure that the end users can get from their products and the interactions they have with them. According to Jordan (2000) the pleasure comes mainly from person-product interaction; Suwa, Purcell, & Gero (1998) say that it is due to the use of a product that people relate to the attributes of it and receive a variety of benefits, which being effective or not, generate some level of satisfaction, enjoyment, gratification, or contrariwise, dissatisfaction. Other authors place the interaction as the central component of the relationship between users and artifacts (Arhipainen & Tähti, 2003; Hekkert and Schifferstein, 2008; Ortíz Nicolás & Aurisicchio, 2011).

DIVIDE AND CONTROL

Establishing methods like "pattern language" (Alexander, 1969) in order to reduce complexity and ease of understanding, the division and segmentation of the design process has been a constant for the tools developed in the area. All this is to *reduce complexity* and facilitate understanding. At the same time, the analysis of interactions with the products has not been oblivious to it, showing that the term "usage" is insufficient to express the complexity and breadth of the subject.

Here is a brief review of some research and applied proposals using different levels of analysis of user-

product interactions propose formulas for a correct understanding and integration into the design process: During the study of attachment that people develop for particular products, Ball & Tasaki (1992) distinguish five stages in which this attachment develops, establishes and declines, demonstrating both the existence of different interaction modalities with products in each:

pre acquisition, early possession, mature possession, pre and post-dispossession. The authors suggest that although these stages may vary considerably between different products, they are applicable to all situations. This proposal defines two fundamental aspects in the study of product interactions: the time period to consider, which begins before the product acquisition and extends beyond the separation itself, and the universality of the proposed steps, regardless the type of product being analyzed. Adank & Warell (2008a, 2008b) propose a technique called "*experience continuum sampling*," which seeks to define the end-user concerns described in the basic model of the excitement of Desmet (2002) which are seen as leading elements of the design and that identified during the interaction with the product, can form the basis for improvement. It uses a surveys system that the interviewed users must complete.

The authors argue that this technique allows to take into consideration the own subjectivity, intimacy and temporal characteristic of the interaction through the definition and observation of the different stages that represent the specific interactions within person-object continuous experience in product use, and the subsequent understanding of roles of each five senses in the process. For example, in the case of a *2-stroke garden trimmer* they mentioned seven stages: *preparation, refueling, loading line, starting, trimming, adjusting and storage.* For Adank and Warell these interactions are part of a continuous dimension and like Ball & Tasaki, they argue that these interactions begin before the user-product contact, and continue after the termination of this physical, sensory or cognitive contact, as users can fantasize about the features and properties of a product they want (Schifferstein & Spence, 2008) or remember how to interact with a product that they had already contacted with. They note some limitations to the technique proposed, for example,

this works better for existing products or already developed conceptually, and tends to support incremental improvements rather than radical innovations. This may be precisely because the technique requires the definition of *specific stages for each product*, in contrast to the previous proposal, rather than being applicable to the majority of the situations under study.

The "*Question Tool*" proposal (Van Kesteren, 2010) developed as part of the technique for materials selection in design *MIPs (Materials in Product Selection)*, consists in a set of cards with images and questions, whose main purpose is to generate a dialogue between different actors in the design process on the sensory aspects of phases determined according to user-product interaction. Each card corresponds to one of the phases that are illustrated with images related: *First Contact, try out, transport, unwrapping, usage, and rest.* The designer, the client, and others involved in the design process imagine and discuss how the user will interact with the new product in each specific *phase*; and also about the importance that the senses will have in the perception of materials and shapes. By using a predefined phase diagram common to analyze any product, forces design teams to consider the consequences of his design for each of them, *decreasing the chance of overlooking important aspects of the design.*

Russo et al.(2008) argue that the experiences are formed by lasting moments in time in which a person interacts with a *specific* product, these moments are called *episodes of interaction* and simultaneously, these *sequences* are shaped by *interaction events*. Furthermore, brief experiences are only made up of small numbers of distinctive interaction episodes. The authors also note that the experiences often are intertwined and can occur simultaneously; and that the anticipation and/or the memory of experiences generate a new experience at the same time.

INSTANCES AND EVENTS IN PERSON-PRODUCT INTERACTIONS (I.E.P.P.I.)

From the reviewed research it is possible to draw some preliminary considerations and conclusions for an adequate analysis of interactions: Posed schemes should be generally applicable to

different situations and products, and not involve the recurrent need to analyze every possible interaction whenever it is intended to develop a new product. On the other hand it is possible to find a consensus on the existence of interactions beyond physical contact with the product, prior to acquisition and subsequent separation between user and object. A common assumption in the revised literature is to consider that the divisions established for the interaction between user and product goes one after another and once they are completely developed, they give way to new ones. Evidence of this is the use of terms such as "*phase*", "*step*" or "*stage*" to refer to the different specific interactions even though these terms refer directly to a sequence of events with a beginning and an end, in a defined chronological order.

Since the various user-object interactions are in fact not necessarily successive, as well as many of these "stages" are interleaved and repeated several times in both the entire product life span and in the continuous interaction that is needed to use a particular product. So, it is more appropriate to use the term "*instance*" or "*situation*" referring to a *period of time and space* where there are certain "*events*" determined; in this case, interactions between people and objects which may or may not happen again. The interactions with the products are dynamic and variable over time, especially those lasting (Russo, 2010). One example is that the predominant sense in these interactions varies between *sight* and *touch* from the moment the product is acquired, when is used for a week, a month or a year (Fenko, 2010). This dynamism also is explained in the multiplicity of functions that a product plays together with its primary function.

Often primary benefits can be equated or displaced by originally less important functions. These may become more important for users particularly in emotional terms. For example, for a young man who has recently received his first car, the washing time becomes a ritual of appropriation, which displays him to others as the owner, even when he does not still know how to drive properly. Nonetheless, the situation of interaction may not have been adequately considered in the design of the vehicle, e.g. some vehicles do not let you turn on the radio if the keys from the ignition are not in place, and others sound audible alarms if the doors are open (even with the

vehicle is stationary), which can be raised setbacks for the ritual.

IEPPI CHART

The following table (Table 1, next page) proposes a categorization of "*Instances and Events in Person-Product Interaction*" (IEPPI) defined through the observation of the total life span of different products, describing the implications of each, and especially its importance in the process of defining the products features. There are six broad "*Interaction Instances*" (I.I.) which in turn are subdivided in "*Interaction Events*" (I.E.) more specific in their nature but equally broad in its applicability to all types of products. Through specific examples the table show and delves into possible contribution of the IEPPI concept in developing greater control particularly in the definition of emotional characteristics of products, these examples and situations are not restrictive, but part of the current model development. Moreover the IEPPI propose also to be used in obtaining greater depth, variety and specificity in defining characteristics of all kinds, that is purely functional, and emotional or economic, etc.

IEPPI CHARACTERISTICS

Complementing the information displayed in the next page (Table 1) some aspects that are particularly noteworthy in the scheme of *events* and *instances* posed are mentioned below.

We preferred the term *Acquisition* of the product upon *purchase* for the first "Interaction Instance" because, as far as regards design as a discipline, a product must meet all functions properly whether it has been purchased as obtained by other means, for example as a gift or a finding, with extremely different emotional implications in each case.

The idea that the interaction with the product is started before the first physical contact or sensory impairment has been expressed by several authors (Desmet, 2002; Russo et al., 2008; Schifferstein & Spence, 2008) referring to the fantasy or the anticipation that users perform on the experience of interacting with a product not yet acquired. Therefore it must be considered that the instances and events that involve this type of interaction are not related to a specific unit of the product but with a general idea. The sense of touch, essential for interactions as first

Instances	Events	Definition	Description and Features	Examples
Pre-Acquisition	<i>Initial Cognitive Contacts</i>	Awareness of the existence of product, and development of product-related thoughts	Creating expectations about the experience of using a product or its features and benefits	Fantasizing about the new mobile phone, to be its owner, its appearance and performance
	<i>First Looks</i>	User-product visual contact, by direct vision or through on paper or virtual catalogs	First, and usually the only interaction with the aesthetic properties of the product prior to purchase	Visual appeal for a mobile phone model from the existing models range
	<i>First Contacts/ Try out</i>	Physical access to the product at sales point, exploration and manipulation	Occasional chance to physically interact with the product and try some of their functions before the acquisition	Ask the seller to try a product (laptops, pillows, etc.) physically to make the buying decision
Pre-Usage	<i>Transport</i>	Moving the product from the point of acquisition to the place of first use	The packaged product is transported before beginning regular use	Transfer of the packaged product from the store to the user's home
	<i>Unpacking</i>	Opening the product package	Moment of great emotional intensity for the user, who performs the ritual of "free" product for first use	Opening the case of an appliance, removal of their guards, perceiving at once its textures, aromas, weight, quality, etc..
	<i>Installation and/or First start</i>	Enabling product features, installation, preparation, assembly, and first use	Key event for the user experience, the product is assembled, connected and installed to run for the first time	Installation of a "ready to assemble" table, connect the cables and turning on a TV for the first time.
Usage	<i>Main Interactions</i>	Using the product and its primary functions	The product performs the main functions for which it was created and interacts with the user in various ways	Use the product, clean with a vacuum, cut with a knife, etc.
No-Usage	<i>Cognitive Interactions</i>	Development of thoughts related to the specific product that is already owned by the user	The user interacts with the product idea which already owns, recalling its functions, user experience, etc.	Remember the experience of using a product and prepare for re-use and experience their benefits and sensations
	<i>Rest</i>	Short period of time where the product does not perform its primary functions, but remains available for quick use	The product rests momentarily, the user turns it off or leave it for a while	Fold a mobile phone or a laptop, turn off a lamp.
	<i>Storage</i>	Longer period in which the product is stored and is not used for a while.	The product rests for an extended period, usually out of sight. Sometimes used as a resource to facilitate dispossession	Save a heater in the original packaging with the arrival of summer
	<i>Relocation/ Repositioning</i>	Moment in which the product is moved or manipulated to facilitate or allow its use	In this event the product is grasped, manipulated, slid or rolled to different places to carry out its range of active functions	Move a cleaner from room to room, reposition the sofa
Conservation	<i>Cleaning</i>	Product cleaning by user, deep (interior) or shallow (surfaces)	Removal of dust and dirt, superficial or internally	Clear a table using a cloth and furniture polish, wash a car, etc.
	<i>Maintenance</i>	Event in which the product is subject to simple repairs or replacements of parts	Replacement parts or components, application of lubricants, set of parts, etc. with little technical difficulty	Change a light bulb, lubricate a bicycle, and so on.
Retirement	<i>Pre-Dispossession</i>	Process of emotional and/or physical detachment from the product	Users are not separated from a product immediately, previously become detached from the product, physical and often emotionally	Keep a clock in a drawer, providing a old laptop without a defined period of repayment.
	<i>Separation</i>	Time of user-product final and physical separation	The product is thrown away, left for collection, sold, reused, or recycled	Throw a chair, bring a ink cartridge to recycling center, selling a old cell phone to a new user
	<i>Post-Dispossession</i>	Cognitive relationship with a product which does not exist anymore contact	The user remember the product that once possessed, reminds the user experience and feel satisfied, longing, etc.	Remember the first car and the experiences with the product

Table1. Summary of the proposed events and instances.

contacts or evidence is particularly close, because not only involves touch, but be touched by the product, creating an emotional relationship closer than its sole contemplation (Sonneveld & Schifferstein, 2008)

and it is also an important aspect in perception of materials quality, being decisive in persuading the user to continue trying out the product or purchase it (Sonneveld, 2004; Van Kesteren, 2010).

The event of *unpacking* is particularly intense in terms of the emotions aroused in consumers. Designers can create a controlled experience where the interaction among packaging, product and users can help the latter to develop a strong emotional bond. It is increasingly common in online reviews for new electronic products to find a special section evaluating the experience of removing the product from its packaging, an event called *unboxing* (see for example Lein, 2011 or “Unboxing the iPad,” 2011, details in *References* section). Moreover, in many cases the *Installation* or the first time that a product “works” is more important in terms of interaction and emotion evoking than the remaining life of the product, e.g. the installation of a lamp is more complex and meaningful than simply turning it on or off daily (Rampino, 2011). The basic interaction is a complex situation that can easily be subdivided into many actions and events (Adank & Warell, 2008a) and it is different depending on the product being observed, including secondary conditions such as customizing and handling.

For a wide variety of products, the proportion of time in which they are not given any use is far superior to when they are actually “working”. Van Kesteren (2010) referred this *Rest* event with times that the end user “leaves” a product for a period of time in a particular place, for example, leaves his cell phone on the table during the workday and mentions it is important to note how the product fits with its surroundings, as the designer must consider whether the product will aim to contrast and highlight or blend and merge with its surroundings. The German designer Dieter Rams exemplified this second option with the English butler metaphor: “*Products should provide quiet, efficient service when required and otherwise fade unobtrusively into the background*” (Heskett, 2005).

For a simple product like a brush, this “rest time” may occur just by leaving it at the edge of the paint bucket while not actively used, an event for which the product can be specifically prepared, perhaps with a groove or flange to ensure its stability or avoid dripping paint. Moreover, the event of storing the brush will occur when it ceases to be used for a longer period of time and hanging from the hole specially implemented in the handle.

Many products do not perform the functions for which they have been created in one place throughout its life. Even large products as a sofa, a washing machine or a dinner table should contemplate being moved from one place to another, e.g. during a simple change in the disposition of the home where they are, or what are the requirements of their own use. Often small items, or those for which *mobility* contributes to the interaction of easier use, are designed considering handles, or shapes to grab them and move comfortably.

Users are more likely to protect and care products by which they feel emotionally attached (Mugge, 2007). Coincidentally, products designed with the *Conservation* instance in mind, enable and provide the user a pleasant experience stimulating events of attachment not only in active use, but precisely through interactions events of *Conservation* Instance, as the *Cleaning* and *Maintenance* to complement the primary use.

The possibility of replacing the bulb in a lamp, fill the oil or water level in the engine of a car, or changing the coffee filter are actions that give the user some control over the products, a perception of interaction and active care of their possessions, while allowing a longer life and a more enduring emotional attachment (Chapman, 2005).

CONCLUSIONS

Consider the functional usage of products like almost exclusive aspect to analyze for control the process of determining the characteristics of them, brings a number of problems, both for teaching Industrial Design, where students develop projects that ignore many interaction situations and do not develop an understanding of the extent of functions and the various facets that exist in the use of products, as for the professional practice, particularly in small or inexperienced design teams, where the product development bypasses many of revision processes and correction as in large companies and more details can be overlooked quite easily.

This raises the need to propose a solution to this important methodological deficiency, first through the development of a process definition and directing the user-product interactions, and then through the

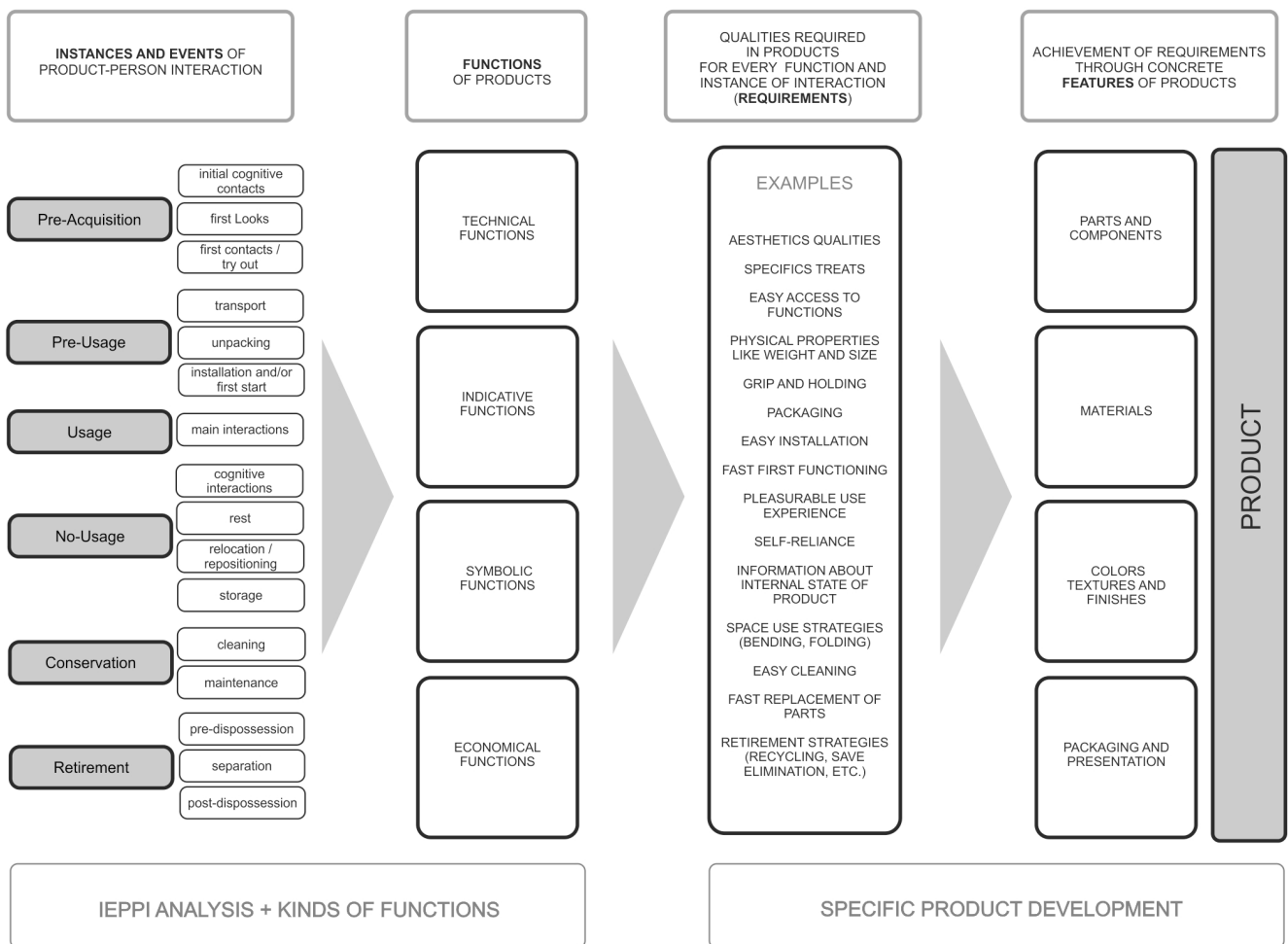


Figure 1. Basic model proposed for the integration of IEPPI in the design process and product development, combined with a generic method definition of functions, requirements and attributes, based on those proposed by Cross (1989b).

validation and subsequent integration of the foregoing in the general scheme of design methods, as a complement of these. With the aim of stress control, especially on the emotional factors associated with the *overall experience of using a product*, is presents a model (Figure 1) for the insertion of these instances and interaction events early in the process of analysis for the product design and development related to various types of functions, thus allowing them to enrich and expand the resulting requirements and characteristics of developed objects, thus optimizing existing methods rather than replacing or modifying them radically.

The determination and analysis based on IEPPI has features that make it suitable to be inserted into most design methods, particularly those based on analysis and determination of functions. It is a simple model to understand and implement. It can be measured using quantitative indicators of

requirements achievements pre-defined for the design teams, and facilitates the implementation of features that make the right product meet these requirements needed in each of the situations of interaction.

Although not all aspects can be controlled directly by the designers and several are domain of disciplines like marketing, should at least be considered in the design process

Both the IEPPI proposal as the basic model for insertion into conventional design methodology has been experimentally implemented with positive results at the level of design education in Chile, in the careers of Industrial Design at the *Universidad de Santiago de Chile*, and *Universidad Tecnológica de Chile (INACAP)* during the years 2008, 2009 and beyond 2011, dramatically increasing the number and specificity of the requirements defined by the students for products of different nature, and it is also validated in practice by professors who have participated in its implementation.

Currently it is being worked on quantitative and qualitative validation of the proposal, in the development of specific tools to facilitate integration of the model in the design process for companies (SMEs mostly) and product design teams, and to enhance their inclusion in the design education. Although the model involves and requires the development of a more detailed design process and therefore longer time and more complex intellectually, it also stimulates creativity and thoroughness in the analysis of the products and their attributes obtaining the desired level of control, without reaching levels of complexity practically unenforceable for SMEs or small design teams as with advanced methods derived from engineering and “hard sciences” like QFD, TRIZ and related.

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