

Interactions for Design

The temporality of the act of use and the attributes of products

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Abstract

Commonly, and since its inception, the methodology of Industrial Design has considered the "use" of goods as a unique and timeless dimension when seeking to define the characteristics of products, this means that the requirements, features and functions of the products (tangible or intangible) raised in the design process, focus on the main person-object interactions, omitting secondary moments of interaction, such as maintenance, installation, removal, etc.. This work proposes a way to address the interactions between users and objects and provides a theoretical proposal for a classification based on "situations and events of interactions" that are inserted and repeated throughout the life of objects, and so possessing both such importance to the user as the same primary function, and thereby becomes a key to control the definition of the attributes and functions of all kinds in the products.

Keywords: *industrial design; interaction; "use" situations; function definitions.*

Introduction

Through their own methodologies, design as a discipline has introduced tools for defining functions and product requirements, thereby gaining greater control over the creative process, originally almost exclusively fruit of inspiration or experimentation. However, these methods often have not considered the diversity of interactions between people and products, naming these interactions generically as "use" even though this term is largely associated to the moment in which users interact with the product so that it perform its main functions and not with the wide variety of situations occurred during the "product life" in which interactions occur also with users, whether they be physical, sensorial or exclusively cognitive.

If we review the most popular design methods such as collected by Cross [1], it is quite hard to find references to the use and interactions with products beyond the main functions some of which may suggest the user how to interact with the product (see example [5]), but there is no specific and direct consideration of the various interactions between users and objects in a temporal context that is across the life of the object, and throughout the temporality of the "usage " act itself, understood as a summatory of interactions of various kinds.

Aims

Considering the foregoing, and under the hypothesis that greater definition and categorization of the person-product interaction will also allow better control of the attributes proposed for new products, the central aims of this work are:

- A brief review of academic literature and the main proposals in the area of analysis
- Categorization of the different situations of human-product interactions.
- Put forward an initial model for the integration of this categorization with traditional methods of industrial design

Materials and methods

To carry out this work we have used two methods of approach to the study area:

We have previously established a theoretical basis to review the literature addressing the central issue, which has been summarized and presented to different professionals.

These professionals have participated in an expert consultation, which has served to define the proposed model and particularly the different situations and interaction events. It has consulted 12 experts, industrial designers and industrial engineers with at least 10 years of professional experience, 5 of whom are also professors at universities in Chile and Spain. They have issued their proposals separately, integrating these proposals in this work by the research team.

Functions follow Interactions.

There is sufficient academic evidence of the increasingly frequent and active use of the different interactions that users have with their products over time of possession as a key to get a more complete vision 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), [3] states that "the interaction is the key aspect in understanding and designing product experiences." Baudin [4] mentions the phenomenon of "tactility" as the intrinsic human need and capacity for, with the simple conceptual idea of a product, start to project and experience the tactile and physical dimension of it, even through gestures and movements in empty space, interacting with an imaginary product and considered key to communication between design teams. In addition, according to [5] is during the use of a product that people relate to the attributes of it and receive a variety of benefits, being effective or not, generate some level of satisfaction, enjoyment, gratification, or otherwise dissatisfaction. There are numerous authors who place the interaction as the central component of the relationship between users and devices [6] [7] [8].

Divide and conquer

Most of the existing and most spread design methods [1] seek to reduce complexity in order to facilitate the definition of the attributes of the products according to different needs identified, achieved by analyzing the various problems of the development of a product separately. The analysis of interactions with the products is not immune to this "split", thereby showing that the term "use" is insufficient to express the complexity and breadth of the subject. Now will be presented a brief review of some research that posed a division of use in different user-product interactions and propose appropriate tools for integration into the design process:

Ball & Tasaki [9] for the study of attachment that people develop for particular products are five stages in which this attachment is developed, established and declines, showing both the existence of different ways of interacting with the products in each one: pre acquisition, early possession, possession mature, pre-and post-dispossession dispossession. The authors suggest that although these stages can vary considerably between different products are applicable to all situations. This proposal defines two fundamental aspects in the study of interactions with the products, its temporary position starting before purchasing the product and extending beyond the split up, and the universality of the steps proposed, regardless of the type of product analysis.

Adank & Warell [10] propose a technique called "experience sampling continuum," which seeks to define the end-user concerns described in the basic model of emotion Desmet [11]. It uses a token system that users must complete interviewed. The authors claim that this technique allows to take into account the subjectivity, intimacy and temporal characteristic of the interaction through the definition and observation of the different stages that represent

specific interactions within the person-object continuous experience in the use of a product and further understanding of the role of each of the five senses in the process. For them, these interactions are part of a continuous dimension, ie recognize this temporal dimension in the whole act of use.

The tool "Question Tool" [12], developed as part of the technique of materials selection for design MIPs (Materials in Product Selection), is the main function to generate a dialogue between different actors in the design process on sensory aspects according to phases identified in the user-product interaction: First Contact, Testing, Transportation, Unpacking, Use and Rest. Designers, clients and others involved in the design process and discuss the interaction imagine that the user will have with the new product in each specific phase.

Russo, Boess & Hekkert [3] state that experiences consist lasting moments in time in which a person interacts with a specific product, these moments are called episodes of interaction and in turn these are made up of sequences of events interaction. The authors also note that the experiences are often intertwined and can occur simultaneously and that the anticipation and / or the memory of experiences generates both a new experience.

Instances and Events in Person-Product Interactions (I.E.P.P.I.)

A common assumption in the reviewed literature is to consider that the divisions established for interaction between user and product follow each other, and once developed give way to the following to do not happen again. Since the various user-object interactions are not necessarily successive practice, and many of these "stages" are interleaved and repeated numerous times both in entire product life and sustained interaction that is required to use a particular product has chosen the term "situation" refers to a period of time and space where there are certain "events or events" determined, in this case interactions between people and objects, and may or may not happen again as the most appropriate. This non-linear temporal interactions between people and products is precisely what should be studied.

The interactions with the products are dynamic and variable over time, especially those lasting [13], this dynamic also explains the multiplicity of functions that a product plays in addition to its main task. Often the primary benefits can be equated or displaced secondary functions which originally may become more important for users, as for example with objects that have a high symbolic value and are often used as decoration for their aesthetic qualities rather than functionally . Is the case of known "*Juicy Salif*" citrus juicer designed by Philippe Starck, and is also the case in principle less glamorous products like pots and kettles that are no longer used for its basic purpose or held in "non-use" or "break" , becoming ornament.

IEPPI Table.

The following table provides a classification for "instances and events in person-product Interactions (IEPPI)" describing the implications of each, and especially its importance in the process of defining the characteristics of the products. Have been distinguished six broad Interaction Instances (II) in the product life, which at the same time are subdivided into Interaction Events (IE) more specific in their nature but also wide in its applicability to all types of products. Through some concrete examples deepens in the contribution of the SI in the development of greater control on the definition of characteristics of the consumer products, these examples and situations are not restrictive, but part of the current development model. The IEPPI scheme it is proposed to be equally used in obtaining a greater depth, specificity and diversity in defining characteristics of all types, functional, emotional, economical, etc.

Table 1. Summary of the proposed events and instances. (next page)

Instances	Events	Definition	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, 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 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 when 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	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 contact anymore	The user remember the product that once possessed, reminds the user experience and feel satisfied, etc.	Remember the first car and the experiences with the product

IEPPI characteristics.

Complementing the above table it is worth mentioning some salient features in the diagram Situations and Events raised.

We preferred the term acquisition of the product upon purchase to the first I.I. 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 , such as a gift or a finding.

The idea that the interaction with the product is started before the first physical contact with the product or sensory impairment has been expressed by several authors [3], [11], [14] referring to fantasies or anticipation that users perform on experience of interaction with a product not yet acquired. Therefore be regarded as the situations and events that involve this type of interaction is not related to a specific unit of the product but with a general idea.

The primary interaction as such is a complex situation that can easily be subdivided into many actions and events [10] and that is different depending on which product is observed, including secondary conditions such as personalization and manipulation.

In many cases the installation or the first time that a product "works" is more important in terms of interaction that the entire product life. The installation of a lamp is more complex and meaningful than simply turning it on or off daily [19], being surpassed then the basic interaction use by interactions which by definition would be minor and could easily be little considered in the design process product. The contribution that the scheme seeks to achieve resides precisely in influencing the design process to ensure consideration of all the moments of interaction and the consequent development of attributes that properly handle each one of them. For example, for a simple product like a brush, the time of Rest can occur simply by leaving it at the edge of the container of paint while is not actively used, an event for which the product can be specifically prepared, perhaps with a groove or ridge to ensure its stability or avoid dripping paint. On the other hand, the event of Storing of the brush will occur when it is no longer used for a longer period of time and hang from the hole specially made for this in its handle.

Users are often more willing to take care of the product to which they feel emotionally attached [21]. Coincidentally products designed taking into account the different SI that facilitate and provide a rewarding experience stimulates the user to link such events not only in active use, but precisely through interactions of Conservation, as the cleaning and maintenance that complement the primary use and have great importance in the relationship that can make products and users.

Conclusions

Considering the almost exclusive use of the products and functional aspect to be analyzed to determine the characteristics and functional attributes of these, brings a series of problems, both for the teaching of Industrial Design, where students develop projects that ignore many interaction situations and not develop an understanding of the amplitude of functions and the various facets that exist in the use of products such as professional practice, particularly in small or inexperienced design teams, where the product development process is not bypasses many processes of revision and correction as large enterprises and can be overlooked quite easily more details.

There is then a need to bring a solution to this methodological deficiency, first through the development of a definition and management of the process of user-product interaction, and then through validation and subsequent integration of that order in the general outline of the methods of design, as a complement to them, in order to accentuate the control, especially on the factors associated with the timing of comprehensive experience using the product.

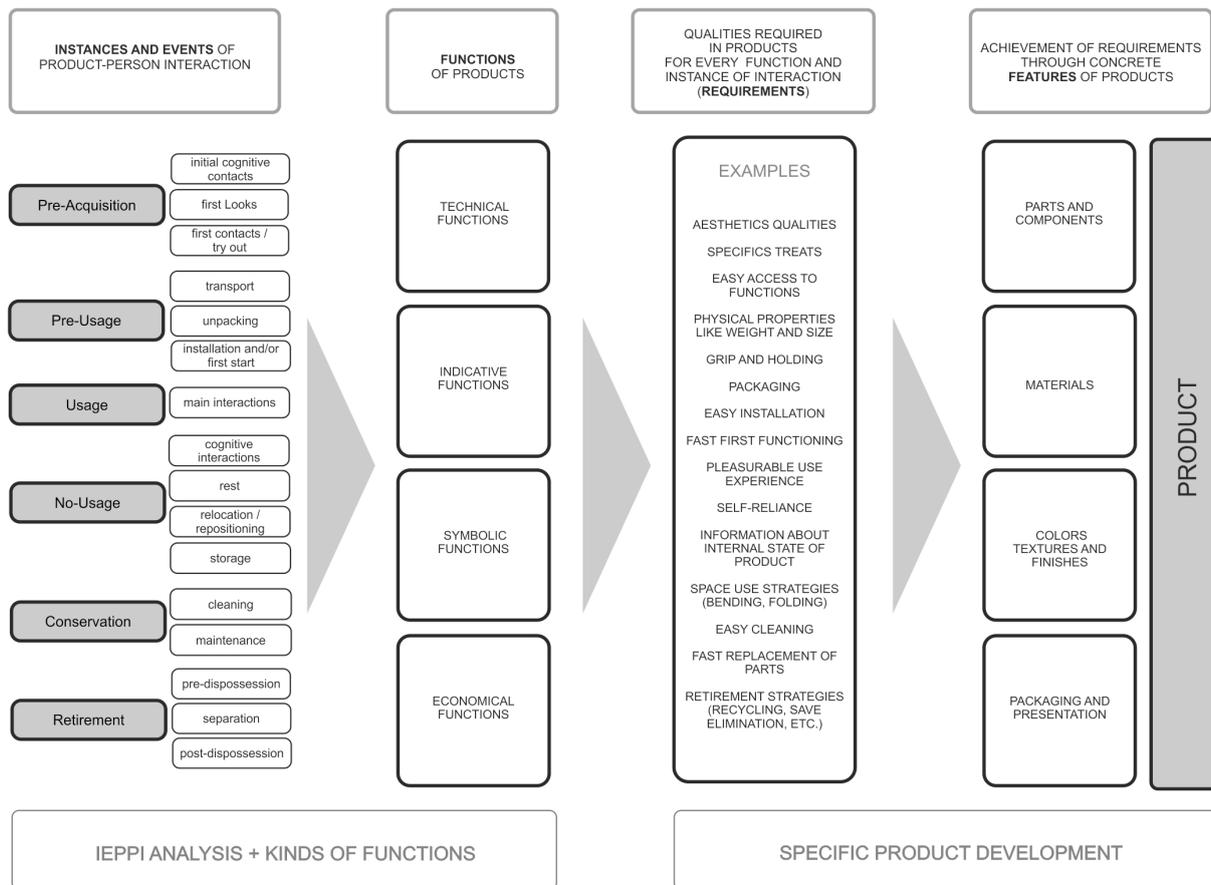


Figure 1. Basic model proposed for the integration of IEPPI in the design process and product development, combined with a generic method for definition of functions, requirements and attributes, based on those proposed by [1].

In Figure 1 are inserted situations and interaction events early in the process of analysis, relating them to various types of functions, allowing further enrichment and expansion of the resulting requirements and characteristics of the objects developed, thereby optimizing existing methods rather than replace them or modify them radically.

The determination and analysis based on the model of interaction situations and events possesses features that make it suitable to be inserted into most design methods, especially those based on analysis and determination of functions. It is a simple model to understand and implement and can be measured using quantitative measures of achievement that will make the right product to meet the various functions required in each of the situations of interaction.

Future research

The boundaries of the proposal presented in this paper are those of any initial proposal, and its true scope will be recognized at the current stage of research on its application on two areas: professional practice and design education, for example, the model has been implemented experimentally with positive results at the level of design education in industrial design career at the University of Santiago in Chile, and Universidad Tecnológica de Chile INACAP during the years 2008 and 2009 and subsequently in 2011 and then in the current courses, increasing dramatically the number and specificity of the requirements defined by the students for products of different nature, simply by making tables and surveys contrasting functions of

practical, technical, symbolic, economic and indicative with each one of the interactions situations and events. We are currently working on quantitative validation of the results obtained using the model IEPPI and the development of specific tools to facilitate the integration of this model in the design process in companies and design teams, and to enhance their integration in teaching design. According to what was observed so far, it is possible to assume that the model will have greater value to small businesses and interdisciplinary design teams, working as a catalyst for dialogue and creativity.

Although the model involves and requires developing a more detailed design process and therefore longer in time and more intellectually complex also stimulates creativity and rigor in analyzing the products and their attributes obtaining the desired level of control, without reaching levels of complexity practically unenforceable for companies or small teams as happens with advanced methods coming from engineering and QFD, TRIZ or similar.

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