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Designer's education to user's definition process

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Abstract

Correct identification of human capabilities and limitations is essential when designing objects, activities or environments that must facilitate the accomplishment of User's activities. Such identification task is performed routinely in the disciplines of human factors, particularly Ergonomics in Design, given the relevance of that aspect in the correct definition of the characteristics that mediate between users and the system in which is immersed. Day by day numerous technologies, methods, strategies and techniques are developed, that in addition to existing ones, are intended to facilitate the approach to define who the User is, by detecting and analyzing her or his skills and limitations, ways of thinking and behaving when exposed to various stimuli and circumstances leading to an expansion of human knowledge and provides invaluable input to Designing but such tools, techniques and technologies are often quite distant from design practitioner, meaning, it requires working with other fields specialists to usefully incorporate information for design process. Design education should be transdisciplinary.

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1. The Professional Design Activity

Design is a complex task. According to Bloom's taxonomy (and subsequent revisions), this of the Design, is a thinking skill that is found in higher levels of knowledge, meaning that it requires integrated cognitive elements in the presence of knowledge combination, skills, attitudes and values to achieve it.

Among the main knowledge design professionals requires having in its collection, with some differences depending on the specialty of design to which it relates, is that of usage of tools and physical and intellectual instruments associated with verbal and graphic communication such as drawing, modeling scenarios or to describe interrelationships and interactions between different elements in their designs.

Meanwhile, some of the fundamental values that are promoted the designer should acquire are the impetus towards sustainable development and towards social responsibility which by the way, any human activity should consider in their daily work. However, given the wide variety of products, spaces, services or messages that can be designed, the diversity of fields of knowledge that provision to decision-making in the design process is vast so, it is important to emphasize the ability communication with other professionals designers must have. This is an issue that will be addressed later, but now only is shown as necessary to carry out interdisciplinary work, fundamental to this profession.

Methodologically, organizing the work of design as a process helps making possible to distinct and to address in a timely and individualized manner such diverse fields of knowledge, doing this through the various stages or phases of the design process. However, due the recursive or iterative quality every design process has, is encouraged to “restate” those fields of knowledge already addressed, in an iterative process in which those are questioned and assessed and new designs are to be refined.

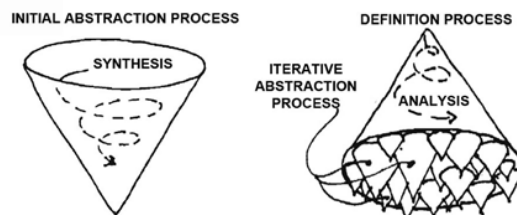


Fig. 1. Iterative design process. Adapted from Sánchez [2].

This way it can be seen there's a wide range of variables to consider, which in turn can be assessed through multiple filters. This situation can quickly lead to a designer or design team into analysis paralysis if do not having appropriate tools to rank them and deal with it.

Previous arguments just highlight Designers have to enrich its education not only in the projection field, but to use instruments coming from different disciplines that aid the design process being capable to apply it and process the acquired data, doing such different tasks fluently and rapidly as contemporary projects demand.

A specific project can “include” topics such dissimilar as material UV resistance, thermic or lighting environmental characteristics, biocompatibility of products or User's particular perception of aesthetics fashion and so on. Here it will be focus just on User's (biological, psychological, social or affective characterization, and the application of it during evaluations) cause observed from the Ergonomics system approach¹, one of its four subsystems is the User and so, not being affected by which specific field of design is, meaning to know Users² in a deep manner will always be needed when designing, this is an outstanding input on the design process.

¹ Ergonomics systems consist of four subsystems: specific Users, doing particular activities, with certain objects in a defined space.

² Here relies the argument that support the continuity of applying the term User instead of Human, cause it is more accurate when referring to a specific human, the human who is Using; By naming him or her as User, is not intended to reduce his humanity, nor the complex relationship between all his or her characteristics.

2. Users approach

How does a Design team approach Users? And what for?

What for could be easily implied; Because Users are those who will interact with any designed product. Although this is so evident so frequently, during the development process, asking Users or testing with Users, real Users are forgotten. In part such situation could be attributed to a belief that to complete a design process it is enough what designer things or knows about Users.

Abstract or idealized User's characteristics are just useful (but not enough) when generating design proposals at the synthesis process like in brainstorming or even in scenario generation, but are not enough when analyzing it.

It is mandatory to approach Users in deep. This assumption carries out to how to do it. Following a User Centered Design (UCD) approach is so recommendable to complete this undertaking, because any modeling done about what a User is, thinks, or the way he or she would reacts is just that, a model¹, and only when confronting real persons into all ergonomics system (Activity, Object, Environment and the User itself) is when emergent information² arises and then, actual evaluation data can be collected.

There are several more attributes gotten from a UCD approach, like novel ideas generation during initial conceptualization, or highly accurate problem definition or even product configuration solutions coming from User's experience, just to mention some.³

As stated before, there exist many different ways of Users approaching, and is of remarkable importance to do it at the right moments, like at the inquiring and evaluating stages in the design process, because is in those moments were the identification of the profound Users characteristics are useful to design, either to get in touch with the problematic surrounding them, or to contrast anything related to the product development process, being it specifically pursued or residual or side effect that must be validated as positive outcomes of the product or service being developed.

3. Interdisciplinary Design and Transdisciplinary Education

Briefly stated above, Designer are instructed and trained on several topics and fields of knowledge, like material's mechanical or chemical issues, social and historical significance of material culture, or life related cosmovision about human activities. Those several grasps give them wide perspective about systemic problematics and allow them to get novel proposals, but in change, require them the ability to understand and deal with wide varied data.

Correct identification of human capabilities and limitations is essential when designing objects, activities or environments that must facilitate the accomplishment of User's activities. Such identification task is performed routinely in the disciplines of human factors, particularly Ergonomics in Design, which embraces the UCD approach.

Given the relevance in the design activity of Users Characterization, day by day numerous technologies, methods, strategies and techniques are developed, that in addition to existing ones, are intended to facilitate the approach to define who the User is, what he or she thinks, feels, desire and so on, by detecting and analyzing her or his skills and limitations, ways of thinking and behaving when exposed to various stimuli and circumstances; this is, the System in which Users are immersed.

This situation of course, leads to an expansion of human knowledge and provides invaluable input to Designing (among other beneficiaries disciplines); but in practice, such tools, techniques and technologies are often quite

¹ Models are a simplification of reality; a theoretical schematics or representation of a system or a complex reality, useful to abstract it and ease its behavioral comprehension and in some cases, prediction of future outcomes.

² "The notion emergent information is applied to characterize the complexity of information processes that proceed between determinacy and indeterminacy. Since information generation is a process that allows novelty to emerge, it is worth noting that it is not a mechanical process that can be formalized, expressed by a mathematical function, or carried out by a computer". Wolfgang Hofkirchner [1]

³ An excellent description of several UCD approaches and tools, its cons and pros from analysis of practitioner's use, was done by Karel Vredenburg et. al. in A Survey of User-Centered Design Practice, presented at the event Changing the world, changing Ourselves in 2002.

distant from being directly applicable by the design practitioner, meaning it requires support of multiple specialists (physiologists, psychologists, anthropologists and others) to apply those technologies and to translate the findings into useful (either objective or subjective, quantitative or qualitative data) approaches information for design process. It worth to state such support do not mean other specialists do the research job and then give designers the information acquired; on the contrary, advocates for an interdisciplinary research work, where designers take part along all the process.

Given it, is essential to train designer transdisciplinarily, providing this professionals not only inherent skills for designing process, but to interpreting specialized data involving technologies and methods that uses sophisticated equipment such as eye-tracker or biofeedback systems (both tools mainly focused on gathering physiological data), or when other research methods like ethnography (focused on cultural or Sociological Aspects) are used by designers as rich data sources, but it require specialized training and knowledge, so different to the skills promoted in design schools.

This of course is easier to say than to do. Because each discipline education has its particular difficulties, training time and itself are a professional activity, it seems to be almost impossible to train designers in all of those fields. Even though, by giving approximations –of more or less intensities or deepness-, designers would have better opportunities to deal with complex problematics, or at least to be aware of such complexity.

As almost any school of design can give its specific way of approaching users, would be extraordinarily difficult to state a universal method to do it. Nevertheless, it would help to remember as mentioned before, there are several ways and moments recommended to include Users along the design process, and that's why here is highlighted that mapping an spectrum of users characteristics, capabilities and limitations, will enhanced the pertinence of approaching different technologies, methods, strategies and techniques that are being useful to designers, and by expressing it when possible with exemplary cases, would be an initial way for getting designers involved into Users research methods.

4. Discussion

The design process is been permanently modified not only because products, messages or services required are each time more intricate or specific, but because the way of gathering incoming data necessary to the process is more and more complex (i.e. formulating or identifying user's needs in early stages, modeling or rapid prototyping design concepts in order to be tested and iterated, or developing global evaluations of final products, messages or services at the end of the process). Therefore, describing a wide range of objective or subjective approaches to define User's characteristics would help developing design study programs as well as would be a helpful tool for practitioners of design to be aware of where and how to look at when dealing with user's characteristics specifications.

References

- [1] Hofkirchner, W. (2011). Emergent Information some System-Theoretical considerations about an Integrative Information concept. *International Journal Information Theories and Applications*, 18(1), 50-55
- [2] Sánchez Marín, R. (2005). (Master thesis) Nuevos materiales para nuevas aplicaciones. In *Nuevas aplicaciones del hule de llanta reciclado, ecología y búsqueda en los objetos tradicionales mexicanos* (p. 45). Mexico City, Mexico: UNAM.
- [3] W. Strunk Jr., E.B. White, *The Elements of Style*, third ed., Macmillan, New York, 1979. pp. 81–84
- [4] Vredenburg, K., Mao, J., W Smith, P., & Carey, T. (2002). *CHI 2002, conference proceedings: Conference on Human Factors in Computing Systems : Changing the world, changing ourselves : Minneapolis, Minnesota, USA, 20-25 April, 2002* (1st ed., Vol. 4, pp. 471-478). Minnesota: Association for Computing Machinery.