An accurate understanding of users' needs is essential for the development of innovative products. This article presents an exploratory method of user centered research in the context of the design process of technological products, conceived from the demands of a large information technology company. The method is oriented - but not restricted - to the initial stages of the product development process, and uses low-resolution prototypes and simulations of interactions, allowing users to imagine themselves in a future context through fictitious environments and scenarios in the ambit of ideation. The method is effective in identifying the requirements of the experience related to the product’s usage and allows rapid iteration on existing assumptions and greater exploration of design concepts that emerge throughout the investigation.

Keywords: design research, user experience, low-resolution prototypes

Introduction

In contemporary society, the old method of judging products - comparing only its practical benefits - does not work anymore. People began to attach greater importance to the search for meaning and to phenomena that bring greater significance to their daily experiences (Semprini, 2010). Design, as a transforming agent and a factor of competitive advantage, extended its performance to the experiences that consumers have with products, services, spaces or set of these (Freire, 2009). Regarding the relationship between people and the products and services they consume, experience involves the emotions, beliefs, and expectations that occur before, during and after consumption (Chammas, Quaresma, & Alvão, 2015), and its development depends on a deep understanding of the user.

To Freire (2009), the experience is the result of the interaction between people, products and the context in which this interaction occurs - and must be functional, determined, engaging, attractive and memorable. It involves the senses, motor, and mental abilities, intentions, expectations, desires, concerns, values and previous experiences - and therefore people become more and more sensitive to the dimensions of the product, which go beyond the traditional aspects of usability and imply the need to understand emotions, experiences and their implications for product design.

Differentiation in the market is driven by the meaning of the products, which means that the differentiation happens much more for the reasons that make people want a product than for the necessity that this product supplies (Verganti, 2009). Once the evolution of production systems and market dynamics has transformed design, technology itself is no longer a differential: it is necessary to create value for users (Zurlo & Cautela, 2014). As a result, approaching the potential users within the intended target market should be a basic
premise for the entire design process. Along the design process, the user should be considered as an individual who possesses individual skills and unique needs, with the potential to represent the knowledge and limitations of the intended ultimate target audience.

One of the purposes of design, in the experience dimension, is to create the conditions that allow the experience to be created in a planned way. The understanding of the environment in which an emotional experience occurs, and the way objects become emotional triggers for people opens space for the discoveries of new opportunities for designing meaningful products (Forlizzi, Disalvo, & Hanington, 2003). In order to happen, it is necessary to involve the users along in the design process, not only by questioning them about their needs and desires but also by providing an environment where they can interact with the product or service under development and imagine themselves in future scenarios within this context of use. Furthermore, considering that design is an eminently projectual activity in which specific methodological procedures must be used to accomplish investigations, planning, projections, and analysis (Meurer, 2014).

This article aims to document an exploratory method of user-centered research, applicable in design processes that aims to create or investigate user experiences related to products/services. This method follows an action-research approach. Action-research consists of a cyclical process in which improvement is sought through a systematic oscillation between acting in practice and investigating it (Tripp, 2005). This type of research comes from the social psychology applications by Kurt Lewin, in the 1940’s USA, and have in its proposal and procedures an egalitarian need, considering participation and co-operation between the actors involved (Thiollent, 2011). Also, action-research uses less formal and prescriptive methods when conducted, because its goal is to address practical problems of a specific context, rather than produce independently validated and reproducible findings for others to use as guides for their future actions.

The method presented in this article arises in the context of projects under an agreement between HP Inc. Brazil R&D Center and Tecnopuc Crialab, the creativity laboratory of the Pontifical Catholic University of Rio Grande do Sul - Brazil. In this partnership, Tecnopuc Crialab is configured as an external design team, which co-creates with the company’s development teams in projects of products, services, and experiences. The method was applied 8 times in three different projects, and involved a total of 180 participants. The projects addressed research problems from 3 different contexts: home spaces, corporate meeting spaces, and home business working spaces, and were applied to investigate scenarios of interaction between users, ambient, and devices. All applications of the method were done in the initial stages of investigations to design technological products for these different contexts.

In this article, the first section explores the concept of experience design, followed by the conceptualization of user-centered design as a process by which experiences are conceived. In the second section, the method is presented, followed by a later discussion. Finally, we present conclusions that discuss the potential impact of the method in user centered experience design.

User centered design

The importance of design in innovation processes is a consensus in many different studies (Borja de Mozota, 2007). For Mitchell (1993) focusing on the needs and desires of users is central to the design, and therefore it is necessary to redirect design thinking to go beyond the product. Designers can design more than just products - and among the key qualities of these professionals are the skills to explore new tools and to create tangible versions of abstract ideas, representing different dimensions of the user experience (Suri, 2003).

Experience is a broad concept and it is related to how people interact with a product and what they learn in this process (Freire, 2009). An experience involves the relationship between the user and the product - therefore, the design is not limited to designing objects, but is also related to designing the contexts in which they are used, the systems in which they are organized, and the environment in which they operate. In addition to other factors, the potential commercial success of artifacts depends on the experiences they provide - and hence understanding consumer motivation is essential for designing significant experiences (Pine & Gilmore, 1998).

The term "user experience" is consolidated and widely diffused by the acronym "UX" (user experience), and especially in the business world has been used as an approach to understand how to give the consumers better experiences with their products in order to develop better products. According to ISO 9241-210, the term UX can be defined as the perception and response of people as to the use (or anticipation of use) of a
product, system or service. Therefore, it refers to the description of the totality of an individual's experience with the products and businesses with which he interacts.

When designing experiences for users, user-centered design approaches, methods, and tools should take place. To Krippendorff (2006) center design on human beings implicates in developing technology in human terms, guided by meaning. When designing by user-centered design recommendations, we should know that users are the ones who determinate products meanings, and it is the designer's role to take care of users and make sure that their concerns are being taken care of (Krippendorff, 2006).

For Keates and Clarkson (2003) user-centered design involves an approach that aims to create interfaces, artifacts, products, and services that are applicable, appropriate, and accessible to as many users as possible. In the creation process, which also includes research, users must be constructively oriented so that they can provide the information needed for product development (Lowdermilk, 2013). For that, the use of methods, techniques, tools, and approaches that actually help in understanding the project context and promote user participation in the design process is essential.

**User-centered research methods**

Observing the expansion of the concept of design and of the possible outcomes of the design process, we can clearly see changes in the designer's procedures in projects. The designer comes to be understood as a specialist in the relationship between people and things. Understanding interactions in the perspective of experiences, designers seek solutions to problems through processes that aim to develop products, services, and experiences. Considering the various roles that the designer can have and the types of projects that he can execute, choosing the most appropriate method for each project is of a contextual and subjective nature. High complexity projects require a high degree of structuring to be developed, and innovative projects face some level of uncertainty, being difficult to structure (van der Linden & Lacerda, 2009). The designer, which has multidisciplinary competencies, should be able to apply more than one approach to the same project (Chammas et al., 2015).

In traditional design methods, the designer is focused on the product/service being designed and looks for ways to ensure that it meets the user's needs. These methods include research phases, where the researcher collects primary data or uses secondary sources to learn about the user's needs, so the designer can interpret it through concept sketches or scenarios. However, in these cases the focus continues on the design development of the product/service, and the roles of the researcher, the designer, and the user are distinct, even they depend on each other. The user is not really a part of the team (Sanders, 2002), and a gap might exist in the communication between these actors.

In ideal participatory experiences, the roles of the designer, the researcher and the user are mixed, what enriches the results (Sanders, 2002). This new understanding calls for new studies. In this way, developing new methods to optimize processes focused on understanding and creating user experiences must become part of the designer's work. People want to express themselves and to participate directly and proactively in the design development process (Sanders, 2002). Users participation and co-creation in the product development process, demonstrating their behaviors and thoughts can lead to a more assertive result, since learning from users is very strategic (Schrage, 2015) so it must be strongly considered in new user-centered research methods.

In addition, it is relevant to establish an alignment between designers, engineers, and developers' perspectives from the beginning of the project, bringing dimensions of the user experience to the technological interactions that will be developed. This meets the need of applying flexible processes, with iterative phases, in order to be able to review previous decisions whenever needed. The lack of integration between design and other actors (or factors) in the product development process is a serious problem to be overcome in companies and in societies that wish to be successful in innovation processes (van der Linden & Lacerda, 2009). These subjects were considered throughout the projects under the agreement between HP Inc. Brazil R&D Center and Tecnopuc Crialab, and are addressed in the method presented in the following pages.

**User centerd design**

As the user experience becomes central to the design process, the need to establish means by which designers and users can act as equal partners emerge, impacting not only the results but also the design goals and procedures. In the process of designing new products and services, the users' participation is essential to
contribute with their vision about what is being developed or planned. In this context, and based on the perspectives previously presented, we will present a research method directed - but not restricted - to the initial stages of a technological product and/or service development process, from a user-centered design perspective. The method brings in its structure, processes, and concepts from several design thinkers and other adjacent areas, which makes it ideal for projects of medium or high complexity.

The method presented in this article proposes not treating the users as objects of research, but rather as co-researchers. As previously mentioned, in classical research settings, the relationship between researchers and researched seems to be very clearly defined as a “non-relationship”, in which the researcher is, as far as possible, neutral or invisible. In this classical perspective, anything else is considered to lead to the distortion of the results or to threaten the internal validity (Bergold, J. & Thomas, S., 2012). This is different in participatory methods, as the perspectives of various stakeholders and their opinions are important for the process of discovery, so objectivity and neutrality are replaced by reflective subjectivity. In this sense, research with stakeholders to whom the proceedings of academic research are unfamiliar, calls for new methods of data collection that should, therefore, be developed appropriate to the concrete research situation and partners defined.

Because it can be difficult for people who have never had anything to do with research to understand methodological procedures, the knowledge created by the research is built on the participants’ everyday experiences by immersing the user in a fictitious environments that are similar to their real ones, where they can imagine new scenarios of interactions while they simulate known daily activities. This transforms research by providing a structure for new roles of researchers and researched ones. The researcher acquires new and unfamiliar roles, being an enabler to the users undertaking research, while the users involved bring their perspectives into the knowledge-production process.

The presented method uses the concepts of low-resolution prototyping and storytelling to construct a visibly fictitious and immersive environment with the intention to involve the user in a simulation of usage of a product and/or service in order to reveal the behavior of a population through participatory practices. Considering that technological innovation is one of the major sources of competitive advantage in the long term, but often requires costs and structure that few companies have the capacity to supply (Verganti, 2009) the method relies on the idea that it is possible to raise the maximum input of users in stages prior to technological development. Moreover, considering that people use emotional, psychological and sociocultural reasons when choosing a product, in addition to the practical and functional reasons, this method creates possibility for a greater interaction with the users, so that ones can think beyond functional characteristics, extending to the real value they attach to things (Krippendorff, 2006; Verganti, 2009) resulting in a big opportunity for designers to qualify their design process. Next, the four phases of the method are presented: context, plan, action and analysis.

**Phase 1 - CONTEXT**

The first phase of the method is related to the understanding of the project context (Figure 1). It defines the research goal and the directions to be followed in the experience application, in a joint decision between designers, managers, and development team. The circumstances of the research - which can be driven by the idea of a product to be developed, by the need to validate a product that is already under development, or to review a product already launched, for example - are also clarified.

In this phase, we also try to understand the user, and for that, we can use several techniques that help understand their profile, such as personas (Kalbach, 2009) and empathy map (Osterwalder & Pigneur, 2010), for example. It is important to emphasize that the user’s understanding at this moment is important to guide the definition of the hypotheses and the application of the experience - however, there are projects in which the experience is planned to explore behaviors and situations of use to later define the target audience of the product.

In order to better understand the delimited public and the context of the project, desk research - that is exploratory research in academic bases and websites on the Internet to investigate cultural, behavioral and market aspects related to the project - is done. This research aims to bring a theoretical foundation that will help in the definition of the protocols of the next phase, and that will base the elaboration of the hypotheses.

Next, we identify the behavior settings related to the experience, which configure patterns of behavior that occur in a given time and space. The behavior settings theory (Barker, 1968; Wicker, 1987) provides the
classification of behavioral patterns linked to a physical environment where they occur in a coordinated way. Based on these behavior settings, it is defined what technological interactions should occur in the experiment, and that are pertinent to the project scope - such as voice interactions, use of graphical interfaces, use of touch interfaces, passive user recognition, among others. Finally, we define the research hypotheses that will be validated with the application of the experiment.

It is important to emphasize that the method has an iterative character, and each phase or step can be revisited, whenever necessary. The CONTEXT phase creates the fundamental basis for the later phases of the method since it gathers all the information necessary for the effective design of the experiment, which follows.

**Figure 1: Context Phase. Source: the authors.**

**Phase 2 - PLAN**

There are many possible strategies to be applied for user participation in the design process. In this method, the application of an experience in which the user will immerse and interact with the product is prioritized. The PLAN phase consists of the design of the experience to be applied and simulated. This phase begins with the elaboration of the narrative (storytelling), which is written based on the hypotheses, behavioral patterns, and technologies defined in the previous phase, and that is consolidated as a text or storyboard. The narrative aims to tell stories that will be experienced by users in a relevant way to assist them in their immersion on the simulated experience, involving the interaction with the product being tested and sharing ideas and knowledge in a persuasive way in a script (Denning, 2005). For that, researchers can use specific methodologies for the construction of narratives, such as Smith and Wintrob’s narrative framework (2013), Denning’s template (2005) or Smith’s storytelling model (2012).

The next step is to elaborate on the research protocols. The scripts for simulation are elaborated, which cover from the user’s arrival to the research site until their exit. Also, the interview scripts are defined - which, in this method, will be semi-structured scripts with questions pertinent to the project context, and that will be done before, during and/or after the experiment.

The physical construction of the ambient for the experience simulation then begins, through the use of prototyping techniques, which aims at the conceptual or analogical representation of a product, service and its environment of use, in order to turn tangible an imaginary future for idea validation. Prototyping is a common step of any product innovation process and is an activity and tool that has received considerable attention in the product development process (Zomerdijk & Voss, 2010). By broadening the understanding of the design process in business and development domains, early-stage prototypes in the design process have become an important practice. Unlike the traditional role of the prototypes in the engineering process, in which they are more used for product testing, prototypes in the design process - especially in product design - has an exploratory role (Elverum, Welo, & Tronvoll, 2016). At this stage of the method, low-resolution prototypes of the artifacts that compose the experience to be simulated are constructed, considering the products involved and the scenario where the interaction takes place (Figure 2).
The low-resolution prototyping of the scenario is done considering the narratives that were previously created - the space to be constructed will be the scenario in which the experience will occur, and will assist the user to immerse himself, imagining in fact in the situation in which he would perform the requested actions. It may be risky to make decisions based solely on the users' interaction with the product prototype without an understanding of the context of use of the product - hence the prototyping of the scenario is essential for the completeness of the experience and the identification of the contextual factors that drive the use of the product. Finally, the low-resolution prototyping of the product with which the user will interact in the experiment inserts the product into its context of use and serves not only to test functionalities, ergonomic issues, and other aspects of the product itself, but also to investigate the meaning that this product has for the user. All prototypes must be constructed in order to stimulate imagination, explore ideas and validate hypotheses, as a tool to build to think (Seidel & Fixson, 2013). It is interesting to emphasize that low-resolution prototyping also has the advantage of bringing a playful aspect to the experience so that the user feels more comfortable doing simulations.

![Figure 2: Example of low-resolution prototyping of scenario and product, as part of a project between Tecnopuc Crialab and HP Inc. Brazil R&D Center. Source: the authors.](image)

Still, in the planning phase (Figure 3) it is defined the recording media - which can be video, audio, and photography, for example - and tools of support - that will be used in specific parts of the interaction. These support tools are used jointly by the user and the researcher, and help the user to imagine hypothetical scenarios and to more fully demonstrate their thoughts, opinions, and feelings. Some examples of support tools are cards to help scenario creation, image sorting (Kumar, 2013) the emotional response test (Memória, 2006; Meurer, 2014), among others.

Finally, we recruit the participants to take part in the experiment and schedule them with enough intervals to reorganize the experience space, if this is the case. Recruited users must be within the profile traced in the context step, in the first phase. Recruitment does not necessarily need to be started at this stage but must be finished before the beginning of the next phase - again, it is emphasized that the phases have an iterative character, for better application of the method.
Phase 3 - ACTION

The third phase of the method (Figure 4) is focused on the effective simulation of the experience that is being designed. In this phase, a pilot application of the experience with a few users is done to verify the operation of the scenario and the research protocols. Once this verification is done, the experiment will be applied according to the scheduled participants. This research procedure provides the testing, evaluation, and analysis of hypotheses, exploration of ideas, generation of insights or confirmation of facts already known (Hevner, March, Park, & Ram, 2004), so it is advantageous to perform this application in short rounds, interspersed with pauses for a reassessment of the protocols. Possible adjustments may occur in these reevaluation intervals, and these adjustments should be recorded for consideration in the final analysis. Throughout the application rounds, it is also essential to make sure all recording media are working so that the experiences simulated by each participant are registered so that they can be analyzed at the end of the research.

Phase 4 - ANALYSIS

The last step of the method refers to the analysis of the evidence generated with the application of the simulation of the experience (Figure 5). The analysis of the data obtained is done qualitatively since this approach allows to describe the complexity of the phenomena related to the objects of the study. For that, it is important to first make transcriptions of all the audios and select important parts and images from the videos.
recorded - this is important to help to cross images and texts of the transcription later. Ideally, more than one video camera is used for recording the user in different angles. After that, evidence from each recording media (data from interviews and observation) are crossed and categorized and, finally, analyzed. The analyzed results are compiled, and design principles are generated. Design principles propose to transform the insights collected and generated into project recommendations and indicators for the development of a future solution related to the desired experience (Kumar, 2013).

Figure 5: Analysis Phase. Source: the authors.

This method allows constant iterations throughout its application and predicts and suggests them especially in its central phases - plan and action. This means that the experience plan can be reviewed at any time, which will impact the application of the simulation with the users, resulting in a new version of the experience. This new version can take place whenever a change in the research process is defined, whether it is a new premise to be explored or the reformulation of an old one (Figure 6).

Figure 6: The four phases of the method. Source: the authors.

Discussion

After applying this method in several projects within the partnership between Tecnopuc Crialab and HP Inc. Brazil R&D Center, there are two relevant points that can be discussed. One refers to the participatory characteristic of this method, that is entirely based on the involvement of the users as co-creators of the product/service that is being tested or validated. Other refers to the contribution of its exploratory aspect to the design process.

According to Sanders (2002), there are many ways we can learn from people using research methods: we can listen to what people say, we can watch what people do, we can observe what people use, and we can interpret what people express and make inferences about what they think. Each method can reveal different
stories and peculiar aspects of the user’s perceptions. But, seeing the whole picture is only possible putting these perspectives all together. As an example, listening to what people say in an interview can tell us just what they are able to express in words, as well as observing them while using a product can provide us just observable information. So special tools are needed to access the deeper levels of user expression, such as non-verbal ways of communicating. For that, bringing the user to create together is essential to understand what is truly meaningful to them (Sanders, 2002; Preece, Rogers, & Sharp, 2002).

This method was built and repeatedly tested to enable a scenario in which the users can simulate specific situations, interacting with product and environment prototypes, interacting with the researcher to freely talk about their perceptions, physically interfering in the prototypes in order to demonstrate new ideas, and, from that, using their imagination to immerse themselves in hypothetical situations. In this way, the designers and researchers not only interview and/or observe the users, but create with them, having as results a deep understanding of what people say (their thoughts), what people do (their actions), and what people make (their feelings and dreams), to create innovative and significant products/services (Sanders, 2002).

Another valuable point of this method is its exploratory aspect. The purpose of this method is not only to validate certain hypotheses related to the design problem but also to make new discoveries that will influence the design experience - and therefore it is considered to be explorative. As the simulations are applied with flexible scripts and protocols, the results obtained with this method can bring ideas to new projects, and start new research cycles.

Some advantages are perceived specifically in each method’s phase. In the first phase, called “context”, the stages of “behavior settings” and “technological interactions” stand out. It is suggested that these steps be carried out in sequence, as presented in the text, so that existing contracts between people and products already available in their contexts are not disrespected. That is, interaction with a known product has a clear purpose for the user, and this purpose must be considered when casting the eye of the technological interactions on the product or context in which it is inserted. The contract that a person has with a mirror, for example, is the reflection of his image, so it is not possible to conceive an experience in which the primary use of the mirror is no longer a place where the person sees his reflection for beauty and/or health purposes.

In the "plan" phase, the formulation of scripts and protocols associated with prototyping of products and scenarios gives a systemic perspective for the research under development. This clarifies and relates "what you want to know" with "how it will be asked to the user" and "what kind of experience it will simulate" in order to get the most out of this participatory interaction.

The presented method allows constant iterations throughout its application between all phases, and predicts and suggests them especially in its central stages ("plan" and "action"). This means that the planning can be reviewed at any time, which will impact the application of the experience with the users, resulting in a new version of the research experience. This iterative structure corroborates its characteristic of being open to the influence from the users’ imaginative participation in its results. This influence might result in a new version of the under development experience and can take place whenever a change in the research process is defined, whether it is a new premise to be explored, the reformulation of an old, a new identified behavior setting, or new technological interaction that is considered.

The "action" phase, in which simulations of interactions with artifacts occur in visibly fictitious built environments, has shown to be efficient to verify user behaviors in interaction scenarios unknown by them. Still, this phase transcends verification, as it also encourages and supports imagination so that participants in the experiment can in fact project the future and imagine themselves in the simulated situation. As opposed to answers collected from interviews (or another traditional method of inquiry), for example, the comments of the participants become more spontaneous, without much prior elaboration before their speech, and therefore more reliable to their feelings and real opinions.

In the "analysis" phase, audio and video recordings make possible to observe behaviors that are not verbalized, from speeches, gestures, body and facial expressions that neither the user perceives himself to be doing or speaking. Interestingly, sometimes these gestures and expressions even contradict speech, which reaffirms the importance of a method that considers data triangulation. This triangulation give space for the manifestation of the paradoxes and idiosyncrasies of users, so the researcher can truly understand their needs and intentions. Thus, the phase called 'analysis' is qualified by the crossing of what the user consciously speaks, automatically does and unconsciously expresses while simulating the research experience.
It can be stated that the presented method is directed to research steps inserted in design processes, but it is not restricted to them. As a flexible method, it can be used for designing products and services, and also for validating existing products and services. When used for validation purposes, the 'context' phase may not be entirely applied, since hypothesis, behavior settings and technological interactions might have already been defined by the product in case. The method, when applied for conceptual purposes, adds value by its “build to think” characteristic, in which prototyping is used in moments of ideation for generating ideas and exploring unforeseen possibilities. When applied for validation purposes, its focus may be directed to the confirmation of product or service requirements.

Stands out the importance of the involvement and alignment of designers, engineers and developers in the conception of the design research focused on the user, strongly acting together in the phases “context” and “plan” so that the defined hypotheses at the beginning of the process are of common interest and cover questions related to the various areas involved in the design of the technological product or service. Structuring work in teams, joining skills, knowledge, attitudes and other personal characteristics is paramount for achieving the company's goals (Peeters-Baars, 2006). With this in mind, aspects of the experience simulation have a direct impact on its development (technological or not), leading to a review of priorities and adjustments in the requirements. The simplicity of the method allows the dimensions of the experiment to be rebuilt whenever necessary throughout the research process and works with the bias towards failing early and iterating fast. This way the process can be repeated several times, with low costs in terms of material and technological resources, which helps to deepen the design of the experience.

**Final considerations**

This article aimed to present a method that brings the approach of experience design applied to user centered design research, focusing on using low-resolution prototyping to create interactive meaningful experiences. With the repeated applications of this method in different project contexts, it is verified that the carefully planned simulations provide a deep immersion of the participants in the context of the project, which allows more significant contributions from the respondents, far from those resulting from traditional methods of inquiry such as interviews or focus groups.

Simulations help users visualize and understand the new technologies represented in the experience, and also to relate them to their daily lives, so they can assess their relevance and meaning in the midst of their routines. In addition, the application and registration of simulations with low-resolution prototypes are advantageous for the observation of small subtleties of user behavior, such as facial and body expressions that support or contradict speech, and which enrich the analysis of the research evidences.

Just as personas and scenarios help the imaginative process of designers, prototypes and simulations have the potential to do the same for users who are immersed in the co-creation process. The use of low-resolution prototypes proved to be efficient in stimulating the imagination of users, since it allows a higher level of abstraction, surpassing their previous experiences with related product or services and opening room for ideating new scenarios of usage. Also, low-resolution prototypes represent low costs in terms of material and technological resources, which enables new applications of the experience whenever necessary.

The method also transcends the idea of the designer as the only definer of the subject-object relationship within a system, since it has as fundamental the participation of the user. It is believed that the researcher is able to identify and report the tangible and intangible aspects assessed by the participant user from the simulations and interactions that he / she performs.

Finally, the usefulness of the method in several stages of technological product design processes is emphasized, since its iterative structure considers inputs of the users. We highlight the impact of the use of the method for the subsequent technological development, which then has as a starting point an experience (its artifacts and contexts of use) that is significant for the user of the solution under development.

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“This work was achieved in cooperation with HP Brazil R&D, with incentives of Brazilian Informatics Law (Law no 8.248 of 1991).”