

An Analysis of Design Methodologies of Interactive System for Mobiles

Adriana Chammas, Manuela Quaresma, and Cláudia Renata Mont'Alvão

LEUI, Laboratory of Design and Usability of Interfaces PUC-Rio,
Pontifical Catholic University of Rio de Janeiro,
Marquês de São Vicente, 225, Gávea, Rio de Janeiro, Brazil
ttдри@yahoo.com.br, {mquaresma, cmontalvao}@puc-rio.br

Abstract. Companies subjected to pervasive need for "innovation" that reigns in the mobile market, to schedules and limited budgets; require more effective ways to adapt processes that excel the user experience (UX) to the corporate world pressure. Regardless of the design methodology and its suitability, the most important is to uncover how and where the user's voice takes place in this process, according to User-Centered Design approach. This study aims to compare antagonistic ways of considering the user's voice and asks to what extent the principles of ISO 924120/2010 are respected on behalf of the end user of the product in one of the most currently used methodologies, Scrum.

Keywords: Ergonomics, Usability, Design Methodologies, Human-centred Design, SCRUM.

1 Introduction

Mobile phones have evolved rapidly and became powerful smartphones, used by people of all kinds of ages, culture and backgrounds. These devices allow access to everything and everyone, anytime and anywhere, fascinating and proposing rewarding experiences to their users. According to Jordan (2002), the product with a useful and good usability is the one that inspires its user satisfaction, like smartphones do. The mobility, practicability and possibilities offered by them changed behaviors and became indispensable in users routine. Smartphones are used to shape relations, to consume entertainment, to filter what is wanted, and still offer a myriad of options of customizable features through dedicated applications (apps).

The apps are systems developed to run on mobile devices, suitable for the device manufacturer and operating system (OS) that propose improve the user productivity. The main four smartphones OSs in terms of market expressiveness are: *iOS*, *Android*, *Windows Phone* and *Blackberry*. The OSs differ from the structure navigation and the link to the distribution of their applications platform, the app stores – digital stores that offer immediate downloads, typically arranged by categories (entertainment, productivity, games etc.); and obey the rules of manufacturers marketing appliance and/or OS. The rules also cover content and quality of these applications.

Companies subjected to pervasive need for "innovation" that reigns in the market, to schedules and limited budgets; require more effective ways to adapt processes that excel the user experience (UX) to the corporate world pressure. Peter Drucker *apud* Tim Brown (2010) concludes that innovation should be inherent in the company's culture so that the gains can be realized in long and medium terms. Companies that resist to innovation will pave the way for competitors, eager for an opportunity. The market urgency sets the corporate strategy.

Among many design methodologies available to develop these products, SCRUM is the big star nowadays. The SCRUM is scalable, keeps close and constant contact between stakeholders and teams and quickly delivers the required features. This article asks whether the SCRUM involves the user in the project, whose active participation is inherent characteristic of good methodologies. It is believed that the dedicated UX side of the project (if any) has to fit to the constraints imposed by the market dynamics.

Most often it is needed skip stages in the project when using agile techniques, since the priority is limited by demand. It is considered that user participation in the process should be part of the culture of the developing company and researches on that subject should also be a concern.

This study aims to compare how the user's voice is considered and asks to what extent the principles of human-centred design (ISO 9241-210;2010) are respected on behalf of the end user of the product in one of the most currently used methodologies, SCRUM. Ultimately the results illustrate that the recommendations and principles of human-centred design can be translated into workable, cost-effective and appropriate projects to fit business demands, where the biggest beneficiary will always be the user, followed by the project viability.

1.1 Mobile Market

The scenario of substantial proportions of the smartphone market points to their relevance in the daily lives of users. The apps come with this growth and on the screens of smartphones proliferate exponentially. According to data from Flurry Analytics (2013) and Distimo Analytics (2013) the mobiles (smartphones and tablets) have assumed the role of personal computers and apps geared to productivity, like Evernote and Quip who gain more supporters. How you can check in the figure below (fig. 1), apps for mobile showed a significant increase in 2013 (115%). The most significant was the growth of apps for messaging and social networking (203%), included in this category apps for photo sharing. Can be taken as an example of these apps WhatsApp, the SnapChat, Instagram and Facebook Messenger, among others.

Involved in a frank and increasing ubiquity, industry designers and developers should make their apps are especially attractive in the App Stores. The interface design is the first step for turn the app an desirable product and attract subsequent downloads. The interface is one way to distinguish an app among many others offered, but what will make the real engagement happens, what will make the design promotes an optimal experience, will be the translation of the content of images, skills and user stories in an app.

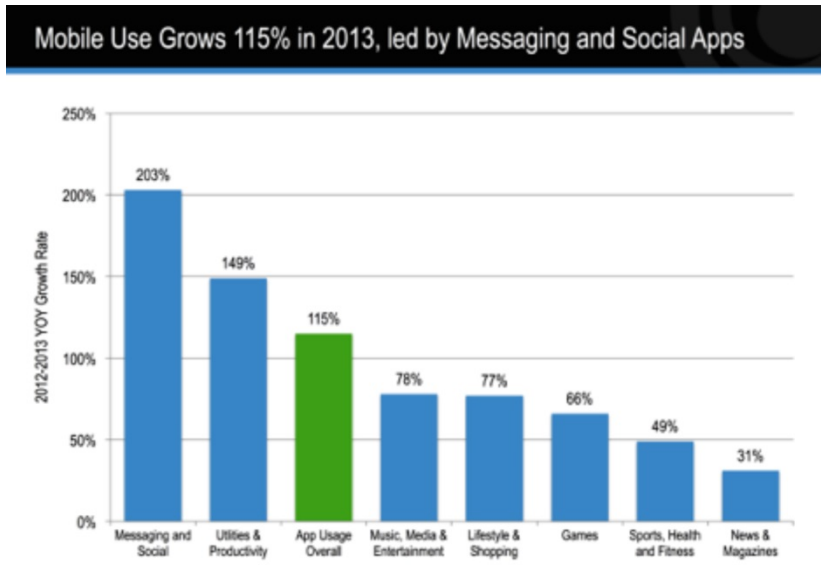


Fig. 1. Growth Graph use of mobile apps in 2013. Sources: Flurry analytics (<http://www.flurry.com/flurry-analytics.html>) and Distimo Analytics (<http://www.distimo.com/app-analytics>).

It is relevant to observe the user data analysis in Analytics tools statistics available to make sound decisions and prevent unfounded betting from the developer team. Therefore ergonomic design methods and tools should be merged in search of holistic product development. Consequently usability and the user experience will be the attributes that solidify the success of this app. Both one and the other will only be satisfactorily if the user is part of the app development process, i.e., the human-centered design.

2 Human-Centered Design

Digital interfaces are fascinating and should offer rewarding experiences for users, which makes good usability imperative in this case. The ISO 9241-210 (2010) approach translates the ideal human-centered design, explaining that usability will depend on the consideration of the user's goals and the context in which he is inserted. From this statement it is worth considering the UX on mobile devices and which features they offer. The ISO 9241-210 (2010) approach can be considered into various methodologies and be appropriated to particular contexts. These parameters benefit all parties, seeking the best interface design, the user-centered. The approach states the following principles:

- The design is based upon an explicit understanding of users, tasks and environments;
- Users are involved throughout design and development;

- The design is driven and refined by human-centred evaluation;
- The process is iterative;
- The design addresses the whole user experience;
- The design team includes multidisciplinary skills and perspectives.

This approach enhances the product effectiveness and efficiency improves well-being, user satisfaction, accessibility and sustainability and counteracts possible adverse effects of use on users.

2.1 The Users Role

ISO 9241-210 (2010) defines user experience as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service." According to this definition, the user experience includes all the emotions of users, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use. ISO 9241-210 (2010) also lists three factors that influence the user experience: an explicit understanding of users, tasks and environments.

Despite the importance of UX in the interaction with a product, developers often focus on their own skills and knowledge and ultimately underestimate the differences between their mental model and the user. Perhaps the biggest surprise of a developer team to participate directly in the research with the user is realizing how seemingly simple operations can be difficult, if not insurmountable, for the user. This point illuminates the need to, beyond hear the important views of experts, the team engages directly with the user.

The best information, the really useful, can not be extracted from the direct questions. Many users act differently of the speech, even if unconsciously. Proper conduct is, first of all, abstracting the indirect means of information about the user, not prioritize the encoding and use appropriate techniques, ie, techniques that provide optimal visibility of the user's mental model within the context.

According to the developers interests, there is still the possibility that the user takes a participatory stance, when he can review, agree or disagree with the design solutions that the team has found before a single line of code has been written, saving time and allowances. Should be made as many design iterations as necessary until the UX is the ideal, but this step will have been in advance if the user's voice has been heard from the beginning.

Even though there is some concern about the noise or barriers that user participation can bring, it is important that the developer team realizes the gains of understanding those involved can bring the final design. Developers are largely responsible for the balance between the interests of the client and the user and if the developer team interact more with the actual users of the product, the research methods relationship will become increasingly clear - and objective.

Maybe that user interaction does not ensure all project requirements, but certainly many of design issues will be defined from it. The more premature his involvement is, the better UX results. Eventually the competitive market urgency can bring obstacles to the practice of direct interaction with the user, but the argument of solid gains in the medium and long term are indisputable. ISO 9241-210 (2010) exemplifies the human-centered design approach benefits when quotes "using appropriate human-centered methods can reduce the risk of the product failing to meet stakeholder requirements or being rejected by its users." In other words, its increase the likelihood of completing the project successfully, on time and within budget.

3 **Ágil Methodology - SCRUM**

Adopted by many companies to provide products with as quickly as necessary in nowadays technological world, the principles guiding the Ágil Manifesto are benchmark to the market.

Specialists in software development processes established the "Agile Manifesto" (Beck 2000 apud Rex Hartson; Pharda S. Pyla, 2012), from which emerged the following objectives: satisfy customers with quick and continuous deliverables; understand that time and budget constraints should be manageable and recognize that making changes in software development requirements are inexorable rule. The Agile methodology proposes:

- Prompt response to changes in accordance to the planning;
- Allow and encourage interactions between individuals and tools during the process;
- The comprehensive support documentation and continuous and necessary communication between customers and developers;
- The stakeholders flexibility with established points on the contract.

The Agile encompasses several different processes which share with the assumptions above. Among many methodology variations for interactive systems development and the pros and cons of each one, its clear that some keep their focus on the production / product, while others are concerned with the user and those that are others who focus on both, although the priority is limited by the demand. As an example we can cite SCRUM, Extreme Programming and Kanban. The SCRUM methodology briefly described below has been selected for this study because it is one of the most popular on the market.

The SCRUM is seen in the market as one of the best practices of agile development.

In general, the purpose of this development methodology is organized into a series of iterations limited by time spaces, which are called "cycles" (also called sprints). The following figure (Figure 2) illustrates the SCRUM methodology, detailed below.

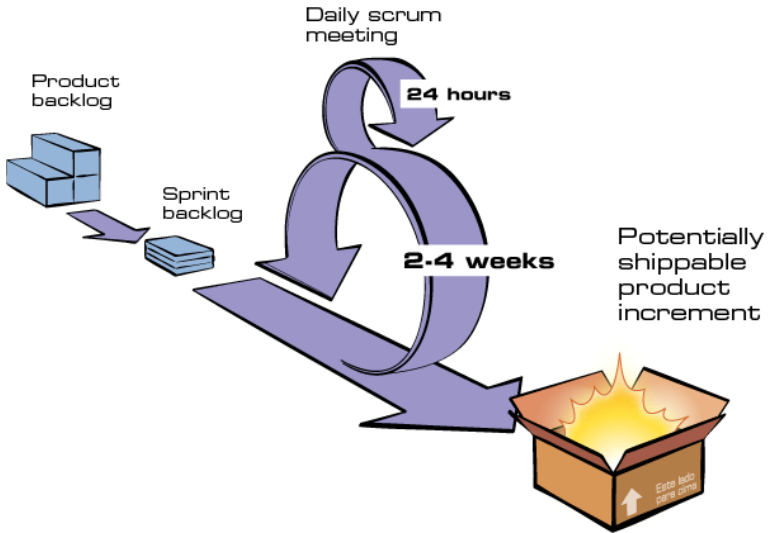


Fig. 2. Illustrated scheme of SCRUM Methodology. Source: Agile SCRUM (<http://desenvolvimentoagil.com.br/scrum>)

Brown (2013) divides SCRUM in two poles: the team members and the product backlog. Team members are SCRUM Master, the Product Owner (PO) and the development team. The SCRUM Master is the real project manager. He should remove any obstacle to be preferred goals and is responsible for the effective development of the project. Run it guarantees that the development team has conditions and tools necessary to fulfill their job with satisfaction. The Product Owner is the one who set work priorities, define the user stories with the development team and represents the users voice. The development team in turn, should provide consensual feedback over the work scope as an integral part of this process. Process changes can be made, since by consensus. Frequent communication between team members is imperative in SCRUM.

As Brown (2013) the second pole is the product backlog. It is the user stories repository, which tasks will be needed to satisfy them and other project requirements. Product backlog focus on the requirements of those involved in the project: users, stakeholders and development team. The backlog is a compilation of all needs and desires of those involved in the project. Constructed from a "wish list" backlog becomes crucial for the app success, as it is what will make the product is really good for whom it is intended.

From the product backlog is initiated the planning phase, the release backlog, in which the specific requirements for the implementation of each of the desires of the list will be listed. Therein the developer team prioritizes requirements and estimated labor time required to complete them. At this stage it is possible to have a real dimension of work amount required to complete the entire release (and not only each requirement). Various techniques may be applied to estimate the time to finish the project, but the documentation of this practice developed by Ken Schwaber Scrum

and Jeff Sutherland (2011) recommends that at least two experts participate in this quantification. This step depends on the PO, responsible for deciding which requirements are really necessary and feasible in the backlog. The PO represents both the user role and stakeholders and who will drive the product.

Since the release backlog is properly prioritized, the Sprints should be started. Sprints are brief outlines of time that make it possible for several steps to be accomplished simultaneously and still allow an overview of the project. They are a realistic representation of the partial app development, where daily meetings of 15 minutes (daily standup) are done to share what was done the previous day and decide what should be done the same day. The idea is to facilitate the most effective communication between team members on behalf of the production progress of the project.

At the initial cycles, sprints last about 8 hours, to planning ahead sprints and specific deliverables in each subsequent sprint should be made. The largest Sprints should have a maximum duration of thirty days, which varies according to the product cycle and the PO assumptions. The shorter release cycle is, shorter the sprint will be. The only Sprint ends when all requirements are complete and tested. You should make a careful monitoring of Sprints, as the delay in one of them can be a strong indicator that the product deliver will be late.

A common factor that should not be overlooked in planning is the Defected Backlog, where bugs are placed, which can cause delays. Any bug related to a development requirement should be promptly treated, and the requirement can only be considered complete after the bug is fixed. Applicant's practice books a sprint or two in order to solve further bugs.

One of the major reasons of the SCRUM methodology popularity is provide a Burndown Chart, a visualization tool of the project progress quite satisfactory. This dynamic graph comes daily amount of work to be done to complete the sprint and is usually downward. It is based on the average productivity of the team during the stipulated period and allows them to be set completion dates and rate of progress, and help plan the necessary adjustments to keep product development on schedule.

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The progress of each member of the team are updated by item and hours of remaining work for each item. The total amount of time remaining in requirements group will dictate Sprint changes, if necessary. Burndown chart compiles the remaining data and allows view how many work hours will be needed for complete the Sprint.

4 Problem

The authors Pyla and Hartson (2012) points that agile software development methods are usually characterized by opting for a shared dynamic, so the feedback is continuous. However the authors state that the Agile process - including SCRUM,

practically does not mention the user involvement during project development. Also, representatives of users are not users and can not talk about the practice of others. User participation is deprecated on behalf of the faster process.

Eager customers, especially those seeking commercial products require expedited shipping. Often development teams need to skip steps in the project and use quick techniques to meet the demand, which illuminates the necessity of developing companies put the apps on the market and keep up with competition. This makes the schedules increasingly limited and substantially increase the number of versions, updates and paths instead of full deliverables. The part dedicated to the UX (user experience) in project must fit the constraints imposed by the software development team.

The question is: development environments are subjected to schedules and limited budgets and demand more effective ways to adapt processes UX to the pressures of the corporate world. From that, how to minimize risks, maximize flexibility and still create competitive products? In search of results that satisfy the target, companies that develop interactive systems for mobiles makes use of existing methodologies, but wonders to what extent the principles of human-centered design are respected on behalf of the end user of the product, ie, if these are considered in practice. The empirical perception raises the following questions:

- Is there a specific phase for user participation in the process?
- The methodology meets the requirements of the market (customers / developers), but does not consider the user needs according to the principles of human-centered design?
- The ISO 9241-210/2010 parameters are disregarded and / or unknown in practice?
- What are consequential damages such disregard / ignorance to users?
- What adjustments may be proposed in SCRUM to provide the best cost / benefit for both parties (the company - and all the agility of development expected by the market - and the user)?

From the suspicions listed above, the data will be thoroughly investigated and dealt with in search of answers and the resulting satisfaction of the entire supply chain involved in the project.

5 Methodologies Compared

Currently the methodologies that are closer to the human-centered design are the Usability Engineering Cycle (apud Cybis Mayhew, 2007) and Design Thinking (Brown, 2010). Both increase user participation as imperative. Besides Usability Engineering Cycle (apud Cybis Mayhew, 2007) is grounded by a multidisciplinary team, not only provides the active participation of the actual user, in some cases, it can promote him to co-author of the project. The Design Thinking (Brown, 2010) has a well-qualified staff and user participation as priority for to validate their projects: observe, analyze, transform ideas into products and concludes with the user

feedback. This methodology adds design innovation and user experience. These methodologies prioritize user involvement since the beginning of the project.

SCRUM as an Agile methodology (Hartson and Pyla, 2012), is fully in line with the market, which makes cost / benefit relation the beacon prioritization mechanism, has delivery by priority and impersonates the user through their representatives, or words, this method replaces the actual user of the product by team members.

SCRUM fosters collaborative environments and multidisciplinary teams and understand that conflicting perspectives are necessary to find creative solutions.

Resulting from this environment, the decisions taken by the team are flexible and interactive and implemented in real time. The challenge of the process is dealing with the project limiting factors and at the same time basing it on the perception of the user who demands a strategic approach to developing software - and the inclusion of the time and costs required to put it into practice.

The UX professional team that uses agile methodology (if any) usually has little time to work on the material before it is encoded. Although for Brown (2013) the best option is include the user's voice in the process from the beginning and weekly, the author states that devote a sprint or two for usability testing sessions can be a feasible option. The proposed Pyla and Hartson (2012) is to insert an analyst at SUFA UX (Small Up Front Analysis) to work with the client in the context of step and support in making and prioritizing stories. The greatest chance of success is based on culture, team dynamics and project and how this team is prepared for iterative cycles involved on this approach.

6 Final Thoughts

According SOMMERVILLE (2007) apud MELCHER (2012) there is not an ideal process, organizations leads appropriate development approaches for their projects according to their own style and the structure degree varies depending on the criticality of the system.

Regardless of the design methodology and its appropriateness, the most important is to reveal where the user's voice enters in this process, ie, how and in what steps he is involvement. Nothing more consistent with the assumptions of Ergonomics and HCI to translate the language man / machine and increasingly tailor systems to users' needs, making the support and interaction transparent to his eyes, the most natural and intuitive as possible. The philosophy and practice of human-centered design must be inherent in the process of developing these apps, and user-focused on his needs.

This reality needs to be adapted to UX processes, weighing up the agility of agile methods, cost benefit relation and especially the ISO 9241-210 (2010), which should be complementary to the production methodology chosen, so that all concerned can be benefited. The project managers have an important role because they are the ones who should predict the time required for the best user experience explicated on schedule, so that investment will pay for itself with generous dividends, is to the stakeholders, the developer company or the user itself.

Mobiles manufacturers (smartphones, tablets), apps developers and their customers, ergonomics and HCI professionals, and the project party involved directly or indirectly will be rewarded by bringing the user to the scene . Even if the schedule has to be revised, this adjustment will be offset in the long terms, with better results and less updates, that end up increasing costs . The great beneficiary will be the protagonist, the end user of interactive systems for mobiles, the apps. From this statement it is worth putting the user experience of interactive systems, especially mobiles - and all the features they offer - as relevant in a modern setting in which the major chunk of the population is inserted, since the concept of usability deals with the relation between product and the user, within the context of use. The active user involvement is characteristic of good methodologies, should be part of the culture of the developer company and be worry inherent in researches of this type.

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