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Open source usability and user experience

Abstract: The purpose of this article is to highlight the challenges of user-centered and usability processed and methods in open source software development context, as well as to provide some answers for these challenges.

Usability and User Experience

Usability has been addressed by especially the field of Human-Computer Interaction (HCI), which has also introduced lots of methods and processes aimed at improving usability. Usability is an important quality characteristic of software, systems, and services, and it is vital in facilitating the rich interaction between users and technology. Usability is defined as one of the main software product and system quality attributes in many international standards, such as in ISO 9126. In this standard, usability refers to the capability of the product to be understood, learned, used by, and attractive to the user, when used under specified conditions (ISO 9126). The second common definition for usability is in standard ISO 9241-11, where usability is defined as being the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (ISO 9241). The importance of usability has been acknowledged for example in information systems research, where the constructs of usefulness (the degree to which a person believes that using a particular system would enhance his or her performance) and ease of use (the degree to which a person believes that using a particular systems would be free of effort) have been identified as essential factors for successful technology adoption. As a result of changes in the socio-technical landscape, the concept of usability was further expanded with in early 2000s with user experience aspect, at first as a component of usability definition itself as satisfaction and later also as its own distinct domain of design and evaluation, to also cover the feelings and experiences of individual users (see e.g. Bevan et al., 2015). The relationships between user interface design, usability, user experience and service design are presented in Figure 1.

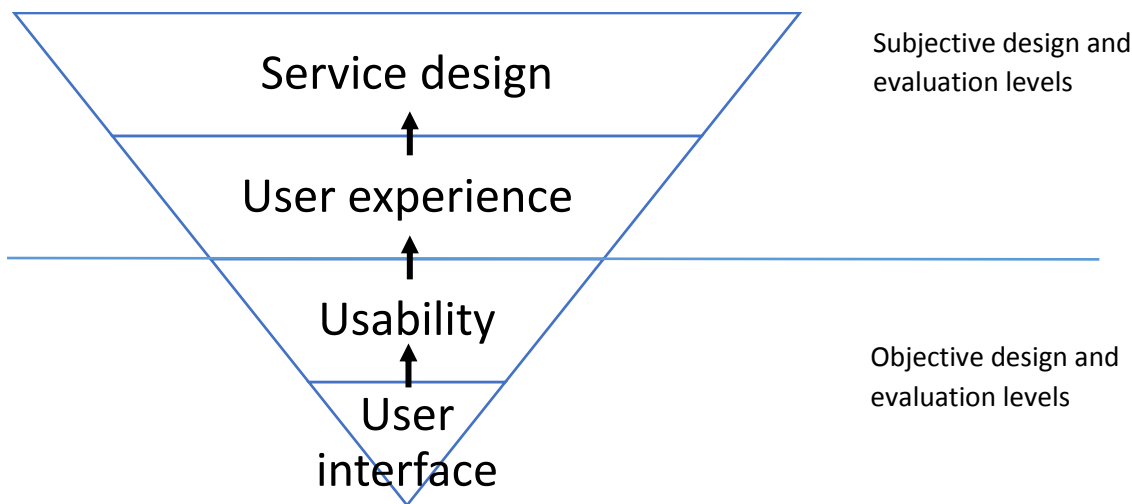


Figure 1. The relationships between user interface design, usability, user experience and service design (adapted from Rajanen 2021)

Usability evaluation is a crucial part of usability methods. Usability evaluation should be started very early in the design and development process, so that the results can truly be taken into account in the design and that the changes will not be too expensive to make, because design has not yet been developed too far. Finding issues only at the late part of the development process is problematic, because making changes into finished or almost finished system is too expensive and time consuming. At the early stage of design and development, the role of usability evaluation is to gather qualitative feedback and requirements, whereas at the later phases of the development the focus should be on if these requirements are met. Therefore, next we take a look at the benefits that better usability and user experience provide.

Benefits of Usability and User Experience

There are many benefits for all stakeholders from using user-centered design for the development process and aiming for better usability in both traditional software development context as well as in open source software development context (Rajanen, 2011). Users can benefit from better usability through higher productivity when the most frequent tasks take less time and users make fewer errors. The development organization can benefit from better usability through reduction in time and resources needed for product development due to reduced need for changes in later development phases, because the usability methods help to find needs for changes in requirements and design early on (Rajanen, 2006). In OSS development context, good usability can help OSS communities to get more non-technical users and happier users, because their software is easy to use and has a good reputation. Increased user satisfaction from good user interface and usability is an important factor for the image and a competitive factor also in company OSS development context. Furthermore, user-centered iterative and incremental development that aims at better usability gives the OSS projects also more time for redesign and facilitates also non-technical community members to involvement as active design participants in design and development providing feedback and providing redesign solutions in the project forums. This might also encourage the non-technical community members to provide peer support in the project forums, which would help both community-based OSS projects and company OSS projects. Furthermore, better usability would likely decrease the need for users to contact the peer support channels with usability-related issues and there is less pressure for redesign.

Repeated support requests related to usability issues in most frequent tasks can cause frustration to peer support members of the community.

Challenges of Bringing Usability and User Experience into Open Source Software Development Context

Open source software has become widely used in everyday life and the user base of open source software and systems has expanded from technology-oriented developers into non-technical users. This has caused more problems related to the level of usability of open source software, because a software that is developed by technically oriented developers for their own use is likely not that easy to use from the perspective of less technologically or development oriented user, who compares the OSS software to commercial software and expects similar levels of ease of learning and ease of use.

The status of usability and user experience is problematic in open source software development because most OSS projects do not know about the importance of usability and therefore there are no usability experts helping especially smaller OSS projects during their crucial first years when most of the design is made and after which it is more and more difficult to do radical changes into user interface, task flows and usability. Furthermore, as OSS development originates from the needs of the developers themselves, they do not typically consider other users, their characteristics, mental models and needs until the software has become popular among non-technical users. The quality of OSS system is mostly reliant on experience of the developers and their ability to collaborate and make compromises, because contrary to closed source software development the OSS development is more free-form and meritocratic.

The increased number of users due to successful OSS software solutions has lead the user base of OSS solutions growing in ways that were not imaginable couple of decades ago when OSS was more in the fringe and used by few very technology-oriented hackers. Now the developers do not any more design and develop the OSS software just for their own use, to scratch their own itch, but also for vast number of non-technical users with limited skills in technology use, and also this non-technical user base should be taken into account when developing OSS solutions, so that the OSS software will continue its increase in popularity and use. Non-technical users expect the OSS software to have the same level of ease of to learn, ease to use and intuitiveness as commercial software solutions and now most of the OSS software users are these kind of non-technical users who do not want to experience or report bugs or usability problems, but who just expect a certain level of usability and good user experience. As the popularity of OSS software solutions grows and the number of non-technical users increases, so does the requirements and expectations for better user interface design, good usability and good users experience. The non-technical users are not typically involved with the development of the OSS software, as they consider software as tool that should fulfill their need, and they are not interested in participating in the development of this software tool or they do not even know that it would be possible to do so and the OSS developers do not usually reach out to these non-technical users to gather their requirements or to test design solutions. However, the usability design and evaluation, and user centered design processes are rare among OSS projects. Often the OSS developers do not know the concept of usability, can mix it with graphical design, and can consider usability as an "add-on" that could be easily added mechanically to the next software version, if so desired.

In OSS development contributing something that the community views as valuable - usually software code - translates into prestige which makes it possible to influence the design and the future direction

of the OSS project. However, it has been shown to be difficult for usability and user experience experts to contribute and gain merit within OSS development context. As OSS developers and communities do not know about usability, it is very difficult for usability experts to gain enough merit in the development community to have an impact. Often any attempts by usability experts to provide their expertise for OSS projects and make the OSS software easier to use for non-technical users, is met with indifference or even hostility, the developers claiming for example that usability is just a matter of taste, that usability is not relevant for OSS software or that "this OSS software is not meant for girlfriends" (Rajanen, 2011). Contributions by usability experts have been ignored, they have been excluded outside of the community, and even when the usability experts have been successful in contributing, and their contributions have been reverted by an individual developer (Rajanen et al., 2015).

One issue that user interface designers and usability practitioners face, is that developers may consider usability and user interface design to be largely a matter of subjective taste. Because of this view, the developers might disregard even the absolutely objective usability measurements as merely opinions of the usability practitioners and users, and discard these measurements as not having objective validity in the reality, no matter how much objective usability measurement data and analysis is presented (Rajanen and Iivari, 2015). Therefore, there have been calls for replacing the subjective satisfaction component in the concept of usability with objective factors of harmony and symmetry of design, and to have the subjective user satisfaction component in the concept of user experience, which is by definition subjective and based on feelings and emotions of an individual users (Rajanen, 2021).

The decentralized and development-driven OSS context does not fit very well with user-centered usability processes. Building trust for usability experts and showing the merits of better usability are the key ways for usability experts to be able to effectively contribute to OSS projects and different strategies may be utilized, depending on the size and culture of the OSS project. Usability expert might try to establish their authority and trust by showing ones competence in usability with facts and data, or by trying to slowly integrate into the community through other means.

While usability should be an integral part of the development process from the very beginning, often there is a lot of development already done before usability expert gets involved with OSS project. Task flows and functionalities have been set and user interface has been developed without design or testing with real users. Thus, it is very difficult for usability expert to jump into already moving train and to fix the problems in user interface, task flows and functionalities. However, the skills and expertise of usability experts is needed in open source software development projects to ensure the continued success of OSS software among non-technical users. Therefore, we should take a look at the possible solutions of integrating usability experts into OSS development context.

Solutions and Best Practices for Integrating Usability and User Experience into Open Source Software Development

While OSS projects are generally very different from each other with regards to their size, culture, ways of working, organizational structure and goals, there are some general solutions and best practices for integrating usability processes and methods into OSS projects. OSS projects could actively seek non-technical contributions from the very start of project creation. Finding experts that could do user interface design and development, usability design and evaluation, and graphical assets such as icons and visual design, would be very important for small and starting OSS development

projects. There could be a forum or social media platform where OSS projects could pitch their design visions and try to attract non-technical contributors, especially usability experts.

In order to improve the status of usability in OSS software, the OSS projects should actively seek for persons who have the skills and motivation to improve usability. Software developers do not typically have these required skills or motivation, as they have more technological outlook and they concentrate to improve the software behind the scenes. One of the most challenges to be solved is how the usability experts can gain merit and become recognized within OSS communities. The phases of usability expert contributing to OSS project is presented in Figure 2. Each of these phases presents a challenge for the usability expert, if there is no support from the OSS project community, for example in form of a usability champion among the developers (Rajanen et al., 2012). The OSS communities need to understand how usability experts can help to increase the popularity and reputation of their OSS software among non-technical users, how developers should learn about the importance of usability and how important it is to design and evaluate user interface designs and task flows, as well as get feedback from non-technical users. This is a challenge especially in small and medium-sized OSS projects, where developers might not have any idea what usability is. Also, OSS software is typically developed from small, separately developed modules, so it can be difficult to outline an overall uniform design between all modules.



Figure 2. The phases of usability expert contributing to OSS project

Furthermore, usability design and evaluation is relatively easy and straightforward to learn and do, and observing real end users interacting with the system is eye-opening experience which reveals problems in both user interface and task flow levels very fast. So OSS projects not having usability experts involved with their project would do well to organize even informal tests where they would observe non-technical typical users trying out the most common tasks with their OSS software. While ideally there would be usability experts available and welcomed to each OSS project, there are not enough usability experts to contribute to all numerous OSS projects. One solution would be for the more usability and user-oriented OSS developers to step in, become usability champions in the OSS projects they are already contributing to and to adapt the usability methods and processes to the context and ways of working of their particular OSS project they know very well. While usability expert would have to gain enough merit one way or another in an OSS project to actually have an impact, and to learn about the culture and customs of that OSS project and assess how usability methods and processes would have to be adapted to this context, the OSS developer likely already has merit and is recognized within the project community. Furthermore, this OSS developer becoming usability is already familiar with the culture and customs and therefore could adapt the usability methods and processes on the go. Figure 3 outlines the phases of OSS developer contributing usability to OSS project.

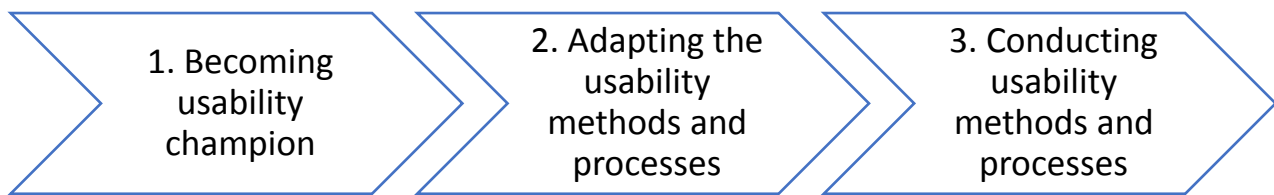


Figure 3. The phases of OSS developer contributing usability to OSS project

In distributed and collaborative environment such as OSS project good usability is enabled through five important factors: 1) collaborative environment and suitable tools to enhance communication between project stakeholders, including non-technical users and contributors; 2) established decision-making process that helps when communicating with non-technical users and contributors, such as usability experts; 3) a good and trust-based relationship between developers, users and usability experts; 4) usability expert who knows user-centered design process and can apply it from the very start of a new OSS project and 5) usability champions among the developers, who know the importance of good usability to the success of the OSS project from the very beginning.

Conclusions: Users expect similar levels of usability and user experience from open source software as they have experienced using commercial software and better usability and user experience is crucial for increasing the popularity of open source solutions, so open source developers and communities, as well as researchers and practitioners should find new ways of bringing better usability methods and practices into open source software development context.

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