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Views toward Usability in Open Source Software Projects: a Longitudinal Case Study

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Abstract

Open source software is gaining more users outside of their own developers. This change brings with it a need for better usability development as well. Introducing usability activities to OSS projects has turned out to be a difficult task for several reasons. To find better ways to achieve this several case studies on OSS projects have been conducted. The four first of these studies were done between years 2007 and 2009. This longitudinal case study seeks to make an update to the situation in these projects by finding out how these OSS projects saw usability back then, now, and in between. The findings from the original case studies are analysed to set a starting point. The situation after the case studies is mapped through analysing mailing lists and discussion forums. Finally a questionnaire is conducted to see what the current situation in the projects is.

Foreword

Completing this thesis required help from several different people so there are a lot of thank you's to give.

Thank you for all the people who participated in these four UKKOSS projects and gathered the data that I used as part of this study. Thank you also for the researchers who wrote down their findings into academic papers.

Thank you to all the OSS developers who helped me along the way. Especially thank you for everybody who answered the questionnaire and an extra warm thank you to those who helped getting the message about the questionnaire to other developers in their project.

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1. Introduction

In this thesis four open source software (OSS) projects are studied in order to find out how they see usability and do they consider it relevant or important in their project. The research is based on older research projects conducted in this same university and department. A longitudinal view is taken to analyse how the views have changed between the older research projects and time of writing this thesis.

1.1 Motivation and Research Question

In 2007 two HCI researchers from Department of Information Processing Science at University of Oulu started a series of studies on OSS projects. They wanted to find out how usability specialists could offer their help to OSS projects and get their voice heard. They had a team of students make usability evaluations on an OSS project. The results of these evaluations were then sent to the developers of that project. Depending on the project and on the way the developers were approached varied results were achieved.

These studies were named UKKOSS projects. The writer of this thesis was part of the student teams in three first UKKOSS projects. Back then many of these OSS projects didn't seem to care much about the idea of organized usability work or they didn't even know very well what it meant. This situation seemed to change a bit during the years after the first UKKOSS projects. At least one of the OSS projects got a lot more interested on usability during the UKKOSS project, and another OSS project ended up setting up an official usability team some years after the UKKOSS project.

As usability awareness in commercial software development has increased it is possible that the same has happened in OSS communities as well. This thesis aims to find out if this is true in these specific cases. The research question is: How usability was viewed in open source software projects in the past few years and how it is viewed now?

1.2 Research Methods

This study can be described as a longitudinal case study. Court (2010) describes longitudinal research as one that “is carried out over an extended period of time to enable in-depth exploration and analysis of social phenomena, in particular as these develop or change” (pp. 536-539). The goal of this study is to explore how a social phenomenon, that is social acceptance of usability in these cases, has changed over time. Longitudinal research can include many different approaches. This study can be considered a case study as it concentrates on four specific cases rather than taking a wider sample of the population.

Menard defines longitudinal research through three rules.

Longitudinal research is research in which (a) data are collected for each item or variable for two or more distinct time periods; (b) the subjects or cases analyzed are the same or at least comparable from one period to the next; and (c) the analysis involves some comparison of data between or among periods. (2002, p. 2)

This study fills these requirements, although it does include some challenges. Time period of several years is considered, situation between the starting point and this day is compared, and the cases remain the same.

However, the study hasn't been started as a longitudinal study several years ago, but instead the data from previous years is acquired through literature review and gathering some data about the cases from the years between. The questionnaire used to map the views toward usability today doesn't have a direct equivalent in the beginning of the time period and the data available from the literature review doesn't have a direct equivalent in this day. This is why the data itself is not compared from one time period to another. Instead the data is first analysed and the results of this analysis forms the basis for comparison.

For gathering data about the original situation in the OSS projects targeted in this study a literature review is made concentrating on published research about results of four first UKKOSS research projects. These include data analysis about the views and culture in these specific OSS projects. To see development between UKKOSS projects and present day a content analysis of mailing list archives and online discussion forums is made. Present day situation is mapped through a questionnaire that was answered by some of the OSS project developers.

1.3 Structure

The rest of the thesis is structured as follows: first the reader is introduced to usability and OSS development by going through some relevant research done on these subjects. Also the question about what makes OSS usability a special case is considered. The older UKKOSS research projects and the relevant cases are introduced.

Methods used for gathering data are introduced before the results of the analysis are shown. Discussion about the results and their analysis includes also the answer to the research question. Finally conclusions are made with limitations of this research discussed and some future research possibilities suggested.

2. Usability in Open Source Software Projects

Here we'll discuss about what is usability, what is OSS, and why usability in OSS is especially an interesting subject.

2.1 Overview of Usability

International standard ISO/IEC 25010 (2011) defines usability as “degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”. There are several other standards giving a similar definition to usability. Good usability of a product doesn't only mean that the user feels the workflow is nice or that the user interface looks good. Also effectiveness and efficiency are factors in usability, meaning that the user can also actually finish the task they are trying to accomplish and can do it effectively, without wasting time or other resources.

Nielsen (2012) defines usability as “a quality attribute that assesses how easy user interfaces are to use” (in section “What — Definition of Usability”). According to the article usability is defined by five quality components: learnability, efficiency, memorability, errors, and satisfaction. Nielsen separates usability from utility. According to the article utility refers to whether the product provides the needed features while usability refers to how easy and pleasant these features are to use.

To achieve good usability it needs to be considered in the design process of the product. For this several different approaches have been developed. One of the widely known is user-centred design or human-centred design. ISO 9241-210 (2010) defines human-centred design as an “approach to systems design and development that aims to make interactive systems more usable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques”. The same standard mentions, that terms user-centered design and human-centred design are often used synonymously.

2.2 Open Source Software

Open Source Initiative, a non-profit corporation that maintains Open Source Definition, summarises the meaning of open source software as “software that can be freely accessed, used, changed, and shared (in modified or unmodified form) by anyone. Open source software (abbreviated OSS) is made by many people, and distributed under licenses that comply with the The Open Source Definition.” (“Frequently Answered Questions”, n.d.) This development method can be contrasted with so-called closed source software development used especially in commercial settings where only a few people have access to the actual source code and the end user is given the binary form of the software.

The background of open source software goes back to 1980s when the Free Software Foundation was founded to protect and promote free software. Because of some disagreements the term open source was coined and Open Source Initiative was founded in 1998. Today both terms are used to refer to software where source code is released to public. Sometimes the terms are used together in term “free and open source software”, abbreviated FOSS or F/OSS, or with an added word “free libre open source software” (FLOSS).

Since the terms were taken to use the status of open source software has increased substantially. Today a popular website for sharing open source code, Sourceforge, says its users are from over 430 000 different projects (“About”, 2016). There are several very popular and widely known open source software projects. For example Linux operating system, Mozilla Firefox web browser, and Moodle course management system are all released under open source licenses. Android is an open source operating system for mobile platforms that had an over 80% market share in smartphone market in 2015 (“Smartphone OS Market Share, 2015 Q2”, 2016).

2.3 OSS Usability as a Special Case

As open source software becomes more popular and gets more non-technical users, also usability aspects become more important to the users. However, OSS software has a reputation of generally having trouble with usability. Nichols and Twidale (2003) list some features in OSS development that contribute to the problem of poor usability. The features are about the culture and development style, lack of resources, and the type of developers who participate in OSS projects.

As OSS projects get a larger user base that grows beyond software developers also usability has become more of an interest to OSS projects. First attempts at increasing OSS usability were driven by corporations who had business in OSS field. Later on other methods have been invented to get around the problems that OSS development style and culture make for usability development. Developers are using various tools to reach the users via Internet and coming up with creative ways to communicate their thoughts on this subject. Also UX designers are slowly introduced to OSS projects. (Terry, Kay & Lafreniere, 2010)

Bringing usability activities into a commercial, closed source software development process has been known to be difficult since the beginning of usability activities several decades ago. One of the reasons for this is that the benefits of good usability are not as easily calculated as other aspects of software engineering where cost-benefit analysis data is available. (Rajanen & Iivari, 2007) It can be expected that introducing usability activities to OSS projects is difficult as well partially for the same reasons. The limited resources in an OSS project compete with each other and usability might not be seen as something that is worthwhile to use resources to.

One of the ways to bring more usability activities to OSS projects is to introduce usability experts into them. Getting into an empowered position in an OSS project requires acceptance from the rest of the community, which usually happens by the developer showing good enough merits of their skills. Merits are often shown as pieces of code which means that usability specialists can have a hard time showing their merits and getting accepted in the OSS project as part of the core developer group. (Rajanen, Iivari & Lanamäki, 2015)

3. Starting Point: UKKOSS Research Projects

Researchers Mikko Rajanen and Netta Iivari, together with their colleagues and several student teams, have been doing research on bringing usability help into OSS projects for several years. The research style in these projects has been design science research and they are based on specific cases. These projects have been named “UKKOSS” and a number according to the order they have been conducted in. The first project, UKKOSS 1, was done in 2007. By the time of writing this thesis there has been 17 UKKOSS projects.

The first four cases looked at in UKKOSS projects are the basis for this study. These are introduced in an article by Rajanen, Iivari and Anttila (2011). Enough time has passed since their execution that longitudinal observations are possible to make. They are also the most extensively analysed cases in regard of the material gathered during the studies (e.g. online chat discussions, e-mails and online forum discussions between the researchers and developers as well as among the developers themselves). In this section each of these cases is shortly introduced and then any findings from them relevant to this study are gone through.

3.1 UKKOSS Projects

The first UKKOSS project case targeted a media centre OSS project called MediaPortal. At the time of the UKKOSS study the project had around 30 core developers and about 16000 users. A student team under supervision of HCI researchers Rajanen and Iivari made usability evaluations on the application. Then they offered the results of these evaluations to the developers. This approach was seen as a consultative approach. The evaluation results were quite completely ignored by the developers.

For the second case researchers took a different approach. Here the target project was a relatively small OSS project developing a game called Freedroid. The project had about 15 developers and around 1000 users. This time a team of students contacted the developers from the very beginning of the research project and tried to get as close to the development team as possible. Again evaluations and also concrete suggestions for user interface improvement was done, but this time the developers got a saying in what they wanted the team to do. Results from this approach were significantly more promising. The usability team’s suggestions were taken seriously and awareness about the importance of usability rose among the developers.

In the third case a similar approach to Freedroid case was tried but this time with a large and complex OSS project developing 3D modelling software Blender. This OSS project had at the time of the study about 40 active developers and a very large user base of over 800000 users. In the third UKKOSS project the student team made an effort to get close to the core developers but didn’t succeed in this. Their usability evaluation reports didn’t gain much interest within the OSS project and the results were quickly buried among other developer discussion topics.

The fourth case was trying to replicate the results of the first case. Again a media center software project was chosen, this time one called XBMC (the project has since changed its name into Kodi). The project had at the time of the study about 20 developers and a very large user base of over 800000 users. Again a consultive approach was tried with

very similar results to the first case. The usability evaluation reports were apparently ignored by the developers.

3.2 Previous Findings

The four UKKOSS cases described in previous section gathered plenty of other data than just that which was directly related to the object of their study. There was discussions between the student researchers and OSS project developers that were executed through IRC (online chat protocol), e-mail and online discussion forums. The projects and their internal cultures were observed through their own discussions. This data has already been used to analyse for example the power structure in OSS projects (Rajanen & Iivari, 2015) and gatekeeping tactics in the same projects (Rajanen, Iivari & Lanamäki, 2015). This study is using the previous research to see what the analysis of this extensive data has found about the views toward usability in the target OSS projects.

3.2.1 Case 1: MediaPortal

MediaPortal project developed a media centre software. The project identified its target users as ordinary people. (Rajanen et al., 2011) Still there was some hostility towards usability expressed among the project members on the project's forums. Usability improvement suggestions were disregarded by the developers. The project was said to be "not meant to be for girlfriends". (Rajanen & Iivari, 2015, p. 5)

The UKKOSS team's efforts were ignored by the developers, and the issues were silenced down. (Rajanen et al., 2015)

3.2.2 Case 2: Freedroid

In the second case the OSS project was developing a game called Freedroid. This project welcomed the UKKOSS team's usability help even though the lead developer admitted not understanding very well even what usability means. During the UKKOSS project "the help seemed to be appreciated and the awareness of the importance of usability rose in the community". In the end of the UKKOSS project the developers were interested in further collaboration with usability experts. (Rajanen et al., 2011, p. 14) The lead developer at the time even "expressed a wish that the usability team would become a close-knit part of the development team" (Rajanen & Iivari, 2015, p. 7).

Even though usability work was appreciated in the project, the usability team's suggestions weren't accepted as they were. The developers "considered only those suggestions that they saw as fixing issues they saw as problems". (Rajanen et al., 2015, p. 10)

3.2.3 Case 3: Blender

Blender project was the largest of the four cases. Its 3D content creation software had a vast number of features. The project had a goal of expanding the user base.

The software had a background in commercial software that was released into open source. Over the years the software was further developed by adding new features but "very few usability activities or user interface design were carried out". Still usability and

user interface were the subject of substantial amount of discussions among the project developers and users. (Rajanen et al., 2011, p. 15)

The UKKOSS team found that the core developers had very strong but varying opinions regarding the user interface.

Some of the long-time core developers had very firm opinions regarding how the user interface should compare with competitive commercial alternatives, meaning that the user interface must not be anything like the others. One of the core developers commented that usability was not something that would apply to this type of professional and complex system. However, another core developer noted that one of the goals of the project was to attract talented experts to use this open source system rather than similar commercial systems they were currently using at their work and in their free time. (Rajanen et al., 2011, p. 15)

Soon after the UKKOSS project had ended Blender rolled out a new software version where some substantial changes were made to the user interface. (Rajanen et al., 2011)

3.2.4 Case 4: XBMC / Kodi

The fourth case had a similar starting point to the first case. Also this project was developing a media center software, called XBMC. The project's target users were ordinary people. (Rajanen et al., 2011)

4. Data Gathering Methods

There were a couple of different ways that material was gathered in this study. This material aimed to help in finding out about the views toward usability in the open source projects during the years between previous research and this day and to see how the projects consider usability now.

Present situation was mapped through conducting a questionnaire among the active project developers. Past views were estimated by going through the discussion forums and mailing lists the developers use for project communication.

4.1 Questionnaire

The questionnaire was modelled after previous questionnaires used for charting views toward usability in different contexts from game usability to ICT companies (Nissinen, 2014; Toivanen, 2015; Rajanen & Nissinen 2015). These questionnaires were considered as tried and tested, and therefore seen as good ones for this purpose. Questionnaire was made shorter and the questions adapted to suit OSS projects. The final questionnaire can be found in appendix A.

The questions were evaluated by three people before sending the questionnaire to developers. These people commented on the language and question wording. The questions were adapted considering this feedback.

4.2 Conducting Questionnaire

To find developers who the questionnaire would be sent to the project forums and mailing lists were looked into as well as project bug trackers where committed changes could be seen. From people actively discussing through these channels and committing code to the project five to eight people per project were chosen. They represented a sample of core developers and other active contributors in the projects. For the smallest OSS project in this study the names weren't specifically chosen. There was too few active developers for getting any reasonable sample other than trying to reach the whole developer base.

The developers were reached in several different ways. Sending an e-mail to the developers without any previous contact attempt was not seen as the best way. A similar approach in early UKKOSS projects ended up being ignored by the developers (Rajanen et al., 2011; Rajanen et al., 2015). In one project's website sending e-mail to developers about subjects concerning the project was specifically prohibited ("Team Kodi/Members", 2015).

All the projects had an official IRC channel for discussing the project development or for user support. To contact both the community in general and targeting specific developers a message was written to these IRC channels. Specific developers were mentioned by nickname if they could be recognised among the channel participants. For the smallest OSS project just a general message was sent to the IRC channel asking volunteers to answer the survey.

However, most of the developers weren't reachable through the IRC channel. For the smallest project a champion was gained who told other developers in the project about the questionnaire. Three answers was gained from this project.

In another project one developer was reached through IRC and another happened to already know the researcher. Rest of the targeted developers were sent an e-mail referencing these developers who had already answered the questionnaire to encourage them and make the message seem a little less spammy. One of the lead developers of the project answered directly to this e-mail giving a negative reaction to both the message and the questionnaire questions. Three answers were received from this project prior to the negative reaction but no further answers were received from the project developers after the developer's message.

Developers from two other projects were approached through their more active communication channel, the online discussion forums. A general message to the forum was sent and further communication was done through private messages on the same forum. Three answers was received from both of the projects.

4.3 Discussion and Mailing List Analysis

To see how the views toward usability have shown and possibly changed during the years between previous UKKOSS research projects and present day OSS projects' discussion forums and mailing lists were looked into and discussions analysed. For two of the projects public mailing list archives were available. In two other projects the developers' discussions weren't publicly available but a support forum for users was publicly readable. In one of these projects a publically readable forum specifically for developers had existed since 2012. This forum was opened to increase transparency ("Explaining the Team Member Feature Thread", 2012). However not all developers used this forum.

To find out how usability has been discussed on these forums and lists a sample of the discussions was read through and analysed. The approach where these discussions would be searched for relevant keywords and only relevant discussions would be analysed didn't work because people don't always use the official terms when discussing usability subjects. A few searches using keywords such as "usability" "user friendly" and "easy to use" were tried but it soon became clear that there was a lot of results that weren't relevant and on the other hand many relevant results weren't found this way.

Going through all the material wasn't an option either because of resource considerations. During the years studied in this research there has been hundreds or thousands of discussions in each project. Because finding the relevant discussions required going manually through the discussions and single messages in them some sort of sampling was required.

Sampling technique used for mailing lists can be described as stratified random sampling (Cochran, 1977, p. 89). The whole body of e-mails from each mailing list was divided according to time. From each of these divisions a certain number of discussions was sampled by simple random sampling. This way the material could be obtained from each time period but the danger of getting too similar results by looking into only for example each January's discussions was avoided.

For the discussion forums sampling was done using systematic sampling (Cochran, 1977, p. 205). Because forums are not divided by time frames or other ways meaningful for this

study the stratified sampling wasn't purposeful. The forums were divided into pages. For the sampling every n pages were taken and from these pages every m discussions were chosen. Number varied according to the forum as different forums had a different amount of discussions.

4.4 Conducting Analysis

MediaPortal had only general discussion forums available publicly. The developers have internal ways of communication that were not publicly available for analysing. The general discussion forums had several sections. From these several sections were selected to be sampled. A sample was taken from each of these sections through random sampling. Sample was taken from discussions that were written between the years 2008 and 2015.

Freedroid is the smallest of the projects examined in this study and had only one mailing list for all the discussions about subjects related to the project. The mailing list archives included a few hundred messages per year for the first few years within the scope of this study, reducing to only eleven messages on 2014. Thus the number of discussions analysed was different from year to year so that on some years most of the discussions could be gone through while for some years only a portion of the discussions were analysed.

Blender is a big and complicated OSS project which means that there are several mailing lists meant for different types of issues. The main focus for this analysis was on the most popular list meant for project committers and development discussion. A variety of topics were discussed on this list. The archives include hundreds of messages per month. From each year four months were randomly chosen and about 10% of the discussion threads for each of the chosen months were analysed.

Additionally two other mailing lists were looked into. One of these was meant for feature requests. This list was much less active than the main list including only a few messages per month for most of the period analysed. About 10% of discussion threads per chosen year was analysed from this list. Since July 2014 there has been a separate list for Blender's UI team. This list hadn't yet gained much momentum for the time period of this study so all the messages from 2014 and some of the messages from 2015 were analysed.

XBMC/Kodi had a similar situation as MediaPortal. A public discussion forum was available and the internal developer discussions were not available for analysis. The forum had a section for developers only discussions that was opened in 2012 and was used by only part of the developers. This developers only section of the forum was analysed along with a couple of other sections. Samples were with random sampling technique. They were taken from discussions written between the years 2011 and 2015.

One major challenge in data gathering was determining when a discussion was usability related and when it could be counted as some other topic. There were several border cases where the category of the discussion wasn't clear. For example some feature requests could be on topics that would affect usability, but that was not the point of view in the request or the following discussion. Because the goal of this study was to look into the developers' views toward usability, only those discussions were marked as usability related where the needs of the end user were considered from usability point of view. Also those usability discussions that were about other issues than strictly the developed software were abandoned. For example discussions about website usability or how the

bug tracker could be more intuitive were not considered to belong to the scope of this study.

5. Results

The results from analysing the discussion forums and mailing lists as well as the questionnaire results are written out in this section. Results are organized by project.

5.1 Discussion Forum and Mailing List Analysis Results

The discussion forums and mailing lists the projects use for their internal communication gave an interesting look into each project's internal culture. Although there was a lot of data that could be analysed there was also several limitations to what can be deduced from this data.

The projects have also other methods of communication that are used alongside the forums and mailing lists. Some of these are not archived and thus cannot be analysed afterwards. For example discussions that happen on IRC channels are not available for analysis afterwards unless there has been a conscious effort to save the chat logs. In some samples it was specifically mentioned that the discussion will continue on IRC or through private messages making it clear that the discussion forum or mailing list messages did not represent the whole extent of the discussion.

Some of the discussion channels are not publicly available. The developers have internal ways of communicating that are not shared with the general public. The discussions on the forum or the public mailing lists might show a one-sided view to the project's culture. This could be clearly seen in XBMC / Kodi case where both developer discussions and user discussions were analysed from the same forum. The developer discussions included a lot more usability related topics and a much stronger user centered view than the user discussions did.

Another challenge is the amount of data that is available. Each of the bigger projects include several mailing lists or discussion forum sections and only part of them could be sampled and analysed in the scope of this study. It is possible that there could have been interesting usability related discussions on mailing lists and forum sections that were not sampled in this study.

In this section findings from the discussion forum or mailing list analysis is introduced for each of the target projects. Each section includes a summary of the scope of the analysis and the findings in form of a table. The sampled discussions are organised by the year, telling the number of discussions that were read for each year, and how many of these discussions included subjects related to usability. A summary of the important observations from each year's discussions is given.

5.1.1 MediaPortal

MediaPortal was the target of the first UKKOSS project done on 2007. The developers' discussions are not publicly available so the discussion forum meant primarily for users was analysed. Both developers and other users answered the questions or comments that users made on that forum. There were several subforums that were analysed for this study. The discussions that were analysed were chosen randomly. The samples were taken from years between 2008 and 2015.

In the years between the original UKKOSS project and this study the MediaPortal project has forked into two versions. The original project was named MediaPortal 1 and an attempt to rewrite the program was named MediaPortal 2. At the time of writing both projects are still maintained but MediaPortal 2 is said to be the main focus of development. The discussion forum had a specified discussion area for both versions. Discussions from MediaPortal 1 subforum's "MediaPortal 1 talk" section were analysed for the whole timeframe. MediaPortal 2 moved on from alpha state on 2014 so discussions on MediaPortal 2 subforum's "General" section were analysed for years 2014 and 2015.

MediaPortal 1 subforum has a section for improvement suggestions with the ability to filter topics tagged as usability related. MediaPortal 2 subforum's section called Skins and Design was also sampled. Both of these sections included much less discussions but the discussions were more closely related to usability topics.

All in all usability was not a common subject among the discussions that were analysed. Discussions tended to be very technical and the users seem to understand a lot about the technical side of the topics. Although users who had less expertise in the topics were not treated in directly unfriendly manner, several questions started with an apology for the upcoming "newbie" question. Some level of technical expertise seemed to also be expected. For several questions the suggested solution was very technical, for example that the user can make their own plugin to fix the issue.

Questions related to usability didn't receive any kind of answer in several cases. In one discussion the first message specified several issues the user wished to get fixed, including a few usability issues. Only the more technical problems were acknowledged by the developers.

In few discussions the less expert users were considered. Some requests were justified by saying that for example a girlfriend or children are struggling with some feature, suggesting that the said girlfriend or children are not as comfortable with finding their way around small problems as the writer might be. One feature, and indicator to show how a list of items could be scrolled to see the rest of the list, was being implemented because new users were having problems without it. There was some resistance to do this because the indicator was seen as not fitting to the theme and the assumption was that the new users would get used to scrolling without indicators pretty soon.

When solutions to usability issues were discussed in more detail the comments were typically based on each person's own preference. Commentators might guess on how other people would react to the suggested solution for example saying that probably half of the users feel this way and the other half that way. No attempts to ask from a larger user base about the issue was found in this sample.

Table 1. Summary of MediaPortal discussion forum analysis

Forum section	Year	Discussions read	Usability related	Observations
MediaPortal 1 talk	2008	48	9	Questions that stem from problems in usability are often ignored. If the question is answered, it's usually for the user to fix something themselves. No discussion on how something usability-related could be changed to make it easier for users.
MediaPortal 1 talk	2009	24	4	Two of the discussions are about how ways to navigate in the program are unclear. Two others are about problems with installation. Specific help given. No plans to make things easier mentioned.
MediaPortal 1 talk	2010	12	0	No clearly usability-related discussions in discussions observed for this year.
MediaPortal 1 talk	2012	4	1	About turning off a feature. Help given.
MediaPortal 2 general	2014	4	1	Non-technical user got sound settings messed up. Specific help given.
MediaPortal 1 talk	2015	4	1	Help with specific setup, including a usability point of view. Specific help given.
MediaPortal 2 general	2015	8	3	Some feedback on MP2, including usability-related thoughts. These not really addressed in the other discussion than in the original post.
MediaPortal 1 feature requests	2009-2014	20	8	Many discussions didn't have any answers, including usability related topics. Writing plugins as a solution. Technical difficulties make it hard to fix some problems.
MediaPortal 2 skins and design	2010-2015	19	4	Usability-related features bring up several comments in the discussions. Very heavy bias on what each of the commenters thinks would work best for them. In one discussion the motivation for changing the situation was that new users are having troubles.

5.1.2 Freedroid

The original UKKOSS project where Freedroid was the target OSS project was done on 2008. The mailing list analysis was conducted for years 2009, 2010, 2012, and 2014.

The mailing list was open for both Freedroid developers and users. Most of the discussions were about development, bug reports and technical issues. Some clearly usability related discussions turned up as well.

There was hardly any negative comments when someone raised a usability issue on the mailing list. The comments were usually received with interest. Often the issue was already acknowledged by the developers and either was already worked on or was at the time ignored because there wasn't enough resources to fix the problem. Most of the discussions about solving usability issues was based on developers' opinions. Even if the existence of the usability issue was not denied, the solution to it was chosen on the basis of what the developers felt was a good way to solve it.

Some interesting conflicts were raised during the discussions. On 2010 a long discussion on level editor user interface included a suggestion to bring in a larger audience to discuss the issue and bring forth their ideas. This suggestion was compatible with user friendly design as hearing users is an integral part of user friendly design. Moreover, this is in parallel with the Scandinavian tradition of IS research, which has emphasis on the users, and which advocates designing for the users, with the users and by the users (Oinas-Kukkonen et al. 2015). Also a more solid basis for UI development was suggested. These suggestions were shot down by another developer, who felt that it would be too difficult to find that larger audience, and that the issues in current UI were clear enough that there's no need to discuss them further. Even though the general idea of improving the usability of UI was encouraged, some developers clearly felt that there was no need to put resources into finding out the larger audience's point of view.

In the year 2009 the mailing list was clearly the main channel for developer discussions. On 2010 a discussion forum was opened and it seemed that a big portion of the discussions was transferred there. Unfortunately the forum was no longer available at the time of this study. Many of the discussions on 2010 were concentrated on Google Summer of Code projects as Freedroid was one of the OSS projects who got student workers through that year's Summer of Code. There was still a few that dealt with usability issues. In one discussion a user said that "I suck in editing level by hand". The developer answered by asking, what the problem was, and if there was a problem with the user interface or missing features the developers would be happy to know. Seems that the first assumption was not that the user is just not skilled enough to perform the task, but instead the guilt was assumed to be in the usability of the tool.

In the years 2012 and 2014 the mailing list was very quiet. It seems that the project was going through a quiet phase at that time. There was only three clearly usability-related messages during these years. Two of them went completely unanswered, which could mean that the user's questions were ignored, or that he or she was contacted in other means. The issue in the third message was apparently a known problem which wasn't yet fixed because of a lack of resources. Still the feedback was received with a positive and helping attitude.

Table 2. Summary of Freedroid mailing list analysis

Year	Discussions read	Usability related	Observations
2009	63	12	Raising a usability issue gets generally a positive response from the developers. Often it is noted that there's not enough resources to attend these right now. Discussions are on heavily personal basis ("I think this works well"). One discussion included a suggestion to involve end users, was shot down ("Are there such people who use this feature" and "But I think this is a good way to do this")
2010	90	8	Usability issues are taken seriously and any help with improving UI especially in certain parts of the application is warmly welcomed. Developers seem to be aware of the possible usability issues and are working on some of them. The best way to increase usability is chosen through the developers' personal opinions.
2012	14	2	Usability issues were gameplay related (player not knowing what he or she can and cannot do in the game). There was no answer to these questions. Could be that the discussion was done somewhere else than the mailing list.
2014	5	1	Player complained about difficult controls. The problem was acknowledged, a fix promised, and work around suggested.

5.1.3 Blender

The UKKOSS project that targeted Blender was done on early 2009. The mailing list analysis for the main developer mailing list, the committers list, was done for years 2010, 2012, and 2014. For the feature request list only years 2012 and 2014 were analysed because there weren't any longer discussions on the list in 2010.

The discussions on committers list was mostly concentrated on technical and development issues. Still usability also came up every once in a while. There were some important milestones in the OSS project during the period of this study that are worth mentioning. In 2010 the developers were working on a major new version where one of the big changes was a new UI. In 2014 a UI team was founded and a mailing list was opened for them. These milestones clearly affected the discussions. Usability was a much hotter topic among the developers on 2010 than on later years. The launching of a new UI team seemed to move some of the usability related discussions away from the committers list.

Suggestions and requests related to usability were not received with hostility but weren't especially warmly welcomed either. Many of the suggestions were simply ignored or at least the discussion about them wasn't done on the list. Sometimes a suggestion might get some encouraging comments from other users who had hoped for a similar change. However, when the discussion did turn to usability different types of end users and their

needs were often considered and discussed. For example in one case different workflows for character modelling and architectural modelling were given as a justification for a solution.

Most often the comments were based on commentator's own experiences. Views could differ depending on what type of modelling or animation the commentator was doing or what kind of experiences his or her friends and work acquaintances had had with Blender. The developers include many different types of users so that several different points of view could come out even though they weren't acquired through a formal study. The developers seem to be very aware of the fact that Blender can have many different types of users. Balancing between the new users, those switching from another 3D software, those who have gotten used to the old way of working with Blender, and people with varying technical skill levels, is seen as a challenging task that needs to be carefully taken into account.

In some cases there were suggestions that comments from a larger audience should be gathered. One developer mentioned that they had constantly seen users giving a similar opinion on the topic in question on online discussion forums targeted toward Blender users. In another discussion using testers and prototypes was suggested to "find out what works best".

When discussing on UI change suggestions commenters often referred to how other applications have constructed their UI. The applications included commercial 3D software such as 3ds max and Maya, but also several other software such as GIMP image editing program or Visual Studio integrated development environment. These suggestions were not necessarily shot down. The idea that Blender should not resemble other software from its UI did not show strongly on this time period.

The dedicated UI team that was founded in 2014 provides an interesting viewpoint to the way usability development is seen in the project. Even though the issue was seen as important enough that an official team was founded, the group weren't immediately empowered in the project. One of the lead developers wrote to the UI mailing list a couple of times during the time period studied here. In one of these messages written in 2015 the team was instructed into what is expected of them.

The message stated: "The UI team is new still, it has to be empowered, but also still has prove [sic] itself." The message then continues to explain what type of help is expected from the team. It is clearly stated that the UI team is not seen as experts and that the writer feels that the team doesn't currently understand the underlying system well enough. The team is essentially seen as a group novices who need to work their way up the ladders like other developers do before they will be listened in any other subjects than those appointed to them.

Table 3. Summary of Blender mailing list analysis: Committers list

Year	Discussions read	Usability related	Observations
2010	38	9	Most of the usability improvement suggestions did not invoke comments. More comments on threads where the topic was a new or recently changed feature. On the threads where there was more discussion different types of end-users and their differing needs were well considered.
2012	28	5	Topics related to usability usually brought up discussions where user friendliness, ease of use, and different user groups were considered.
2014	24	2	Very few usability related topics. The other discussion analyzed was a UI change proposal, which didn't get any responses on list. The second was a feature request with discussion on what is best for the end user.

Table 4. Summary of Blender mailing list analysis: Feature Request list

Year	Discussions read	Usability related	Observations
2012	12	4	The hot topic related to usability was possible keymap changes, which was the topic for three of the discussions. This generated a lot of discussion, mostly from each writer's personal point of view. Still also different types of end users were mentioned as well.
2014	9	4	Mostly usability-related feature requests. When the request generated discussion it included both usability and user experience considerations. Problems and issues were taken seriously.

5.1.4 XBMC / Kodi

UKKOSS project that targeted XBMC was done in late 2009. In 2014 the project changed its name to Kodi. The random sample of discussions from the project's online discussion forum included discussions from years between 2011 and 2015. The discussion forum is mostly meant for users. There is a dedicated section for developer discussions called Feature Discussions that was opened in 2013 and is used by some of the developers but not all of them. This section was sampled as well as two public sections: Feature Requests and Kodi Related Discussions.

The public sections included very little usability related topics. The sample taken from Kodi Related Discussions section didn't include any clearly usability related topics. Feature Requests section included some requests that were related to usability but most

of them received very little attention from the developers on the forum. It is possible that some of these requests were talked about elsewhere.

In contrast the developers only Feature Discussions section included several usability topics. In 2013 a majority of the sample discussions was about usability related topics. Even several of the more technical topics include discussions on how the different types of end users should be taken into consideration. For example when different technical solutions are discussed an important factor seems to be how they will affect the user experience on slower or more powerful hardware.

In one of the sampled discussions from the developers' forum a poll from the community was suggested and also executed. The suggestions from the users are seriously considered and discussed. The discussion revolves strongly around each developer's own preferences or what they think would look good or be confusing. A good design is seen as something that is clear for the end users and works "out-of-the-box". Even though many developers give their own opinions, they are not justified by the individual preferences as much as by what is thought to be easy for the regular user by each of the participants.

In several discussions especially on the general forums meant for users the issue of consistency is raised. This feature, which is included in the definition of usability, is most often taken seriously by the developers. In one discussion the developers felt that the complaint was justified but also admitted that there were no developers currently interested in taking charge of this part of the software. This is an interesting example of how the developers in OSS projects are volunteers "scratching their own itch" and focusing on features that are relevant to themselves, even when they can see that there might be other issues that could need their attention.

Table 5. Summary of XBMC / Kodi discussion forum analysis: Feature Discussions

Year	Discussions read	Usability related	Observations
2013	17	13	A lot of usability related topics. Number of messages starts growing during this time period. End users considered in a very usability-oriented way on several occasions.
2014	2	1	Discussion on menu solutions based on personal opinions.
2015	6	2	End users are a common consideration in several topics, including some not directly usability related topics.

Table 6. Summary of XBMC / Kodi discussion forum analysis: Feature Requests

Year	Discussions read	Usability related	Observations
2011	5	1	Usability related feature request that was taken seriously once the way of making the request was considered appropriate.
2012	10	1	Usability related feature request with no answers.
2013	10	6	Several usability related feature requests that are not answered in any way. Some requests are discussed from mostly technical point of view.
2015	10	1	Usability related feature request with some discussion but no developers commenting.

5.2 Questionnaire Results

The questionnaire received three valid responses from each of the OSS projects. One answer was discarded. There seemed to be some confusion about what the questions meant and some feedback was given about the difficult language of the questionnaire. It was notified that the developers answering the survey might not be native English speakers and could have trouble understanding the questions completely. It seemed from the answers that for example the term “usability activities” wasn’t very clear and that needs to be taken into consideration when analyzing the results. In this section answers are gone through for each project.

5.2.1 MediaPortal

All three answers agreed that usability is important in their software. All three also said that they do usability activities in their project. Only one of the three tried to elaborate what kind of usability activities they had, mentioning barrier-free user interface (skin). Two of three said that coding project developers were responsible for the usability activities, while one claimed that it was non-coding contributors. Answers to future usability activities differed. One mentioned that GUI will be developed further, other mentioned MediaPortal 2, and third said this was unknown.

Understanding of what usability means also differed slightly. Two mentioned a clear user interface, other said that it meant being bug free. The importance of usability in both general and in their software was ranked high. One of the answers was very happy at the level of usability activities in their project, while the other two gave 3 to this question signaling a more unsure position. All of them felt that the previous usability activities have been useful.

The developers who answered the survey had been involved in the project for 3-10 years. Their thought on whether the level of usability activities has changed during the time of

their participation differed. One said that it has stayed the same as a clear user interface has always been their goal. Other said the level of usability activities has changed without specifying further, and third explained that they are not involved with user interface development and thus do not know the answer.

From these answers it seems that usability as ease of use is appreciated by the developers of the project. There doesn't seem to be any formal usability activities and no designated usability developers in the project. The understanding of the term is pretty good though somewhat narrow.

5.2.2 Freedroid

All of the answers stated that usability is important in their software. Two of three said answered that there are usability activities in the project and one said there are not. The usability activities are said to be informal play testing, meaning that the game is tested to make sure it is playable. Other answer refers to UKKOSS project from year 2008 and states that the user feedback is listened to closely. One developer stated that they look at online videos to see how people play their game to spot any problems or difficulties. Both coding developers and non-coding contributors were credited as being responsible for the usability activities in the project.

The answer that said the project does not include any usability activities stated the reason for this is a lack of resources. The same problem was mentioned in one answer to question if the project is planning any usability activities in the future.

Good usability is seen as the same thing as a clear user interface that is intuitive to use and consistent. One of the answers gave several examples of good and bad usability, including references to consistency with common practices, informative error messages, and efficient controls. Usability in general is consistently seen as important but the importance of usability in their product was valued between 3 and 5. This is consistent with the statements that usability is seen as important but the scarce resources are rather used for other parts of the project. Two of the three answers felt that the level of usability activities in the project and their effect was insufficient while third answer rated these to a good level.

The developers answering the questionnaire had been involved in the project for 6-8 years. The view of how level of usability activities during this time has changed varied between the answers. One said no, another said yes, and the third answer stated that the level fluctuates depending on the contributors available to the project.

These answers give the impression that usability is thought to be important. The project includes developers who have a good understanding of what usability means but resources are considered to be too scarce to use them for formal usability activities. The situation is expected to remain the same in the future.

5.2.3 Blender

All three answers stated that usability is important for the project. Two out of three answered that the project conducted usability activities, while the third stated that it does not. The answer that said there are no usability activities in the project stated that it is because of lack of resources and knowledge. In the positive answers the UI team was

referenced when asked about what type of usability activities the project has. Possibly the same was meant with a mention of “usability discussion groups”. Also open movie projects were mentioned.

Internal contributors were said to be in charge of usability activities. Also artists were mentioned in one answer. For future one answer expected the open movie projects to continue as well as involvement of users in GUI development. Some new efforts by the contributors were mentioned. Another answer stated that the UI team will continue and increase its work. Some changes in a future version of the software were mentioned.

When asked to define usability one answer mentioned that the tools should be easy to discover and both new and experienced users should be catered for. Another answer said that usability is a vague term and referenced to the ease and speed of human-computer interaction. An interface that supports the work instead of getting in the way is given as an example of good usability. The third answer emphasized consistency with both other tools and the software itself. Also a learning path was mentioned as good usability.

All of the answers rated usability as very important both in general and in their product. The answers to whether the project has enough usability activities and whether they have been useful varied widely. The level of usability activities was rated between 1 and 5, and their usefulness between 3 and 5. The developers who answered this questionnaire had been involved in the project between two and fourteen years. The change in usability activities has changed during this time by both the developer who had been in the project the longest and the one who had been for the shortest time. The third developer felt that there had not been any change.

From these answers it seems that usability is appreciated and attention is given in the project to increase the product’s usability. The UI team is seen as an important factor in this development. The developers seemed to be well informed about what usability means and several different aspects of usability were understood by developers. Still further efforts in usability development are hoped for.

5.2.4 XBMC/Kodi

All the answers stated that usability is important for their software and that their project does conduct usability activities. Two out of three answers to the question about what type of usability activities the project has included a list of aspects that are considered from usability point of view in the project. These included different aspects of GUI, general ease of use, UX design and customization. One answer stated that the project gathers feedback from the users and has UI/UX developers. Both coding project developers and non-coding developers were said to be in charge of the usability activities. The future of the usability activities in the project was said to be unplanned and current customs were expected to continue.

In the question about the definition of usability ease of use, simplicity, and clear user interface were referenced. User experience was mentioned in two answers and accessibility in one. In all of the answers the importance of usability in general was rated as high and importance of usability in their project as very high. The answers to level of usability activities and their effectiveness varied. The level of usability activities was rated between 2 and 4. The usefulness was rated between 3 and 5.

The developers answering the survey had been involved in the project between one and seven years. Two of the answers stated that the level of usability activities has changed during this time frame and one said that it hadn't. One answer specified that over the years the project has tried to get users more involved and that the developers have become more open to users' suggestions than before.

These answers suggests that usability is seen as a very important aspect of the project development. There are no designated usability experts in the project but it seems that several developers are concentrating on usability and user experience in their work. The understanding of usability is quite accurate and rather wide. It seems that the project could be interested in more usability activities as no one rated the level of usability activities as very high but their usefulness was rated between moderate and very high.

5.3 Summary of the results

This section includes a table to summarize all the data that was gathered from four different projects using three different data gathering methods.

Table 7. Summary of the data gathered

	MediaPortal	Freedroid	Blender	XBMC/Kodi
UKKOSS literature analysis	Targeted to ordinary people. Hostility towards usability seen on the forums.	Poor understanding of what usability means. Usability help was welcomed and appreciated. Only the suggestions that the developers liked were accepted.	The project had a goal of expanding the user base. Very few usability activities. Usability and user interface a talked topic. Developers had strong but varying opinions regarding UI.	Very limited amount of data. Target users were ordinary people. UKKOSS project's approach was ignored by the developers.
Forum or mailing list analysis	Only user forums available for analysis. Technical focus on discussions. Usability suggestions often ignored. Sometimes less expert users considered. Usability discussions typically based on personal opinions.	Developer mailing list. Usability discussions were taken seriously. Solutions based on developers' personal opinions. Some developers don't want to use small resources to usability development. User's inability to complete a task seen as a usability issue.	Several mailing lists for developers. UI team launched during the analysed timeframe. UI team expected to prove itself before it will be empowered. Usability suggestions apparently often ignored. Comments based on personal experiences. Different types of users acknowledged. Users sometimes involved in UI design. UI solutions from other software considered as a choice.	User forums and a developer forum. Developer forum included a lot of usability discussions. Different types of end users considered. Users included in UI design. Comments based on personal opinions but justified by what is thought to be easy for users. Consistency seen as an important feature. Concrete changes not done if none of the developers have personal interest in making it.
Questionnaire	Usability appreciated. No formal usability activities. No designated usability developers. Understanding of the term usability is a little narrow but good.	Usability thought to be important. Scarce resources not used for usability development. A good understanding of the term usability.	Usability is appreciated. Attention is given to usability development. UI team seen as an important factor in this. Good and wide understanding of the term usability. Further efforts in usability development hoped for.	Usability seen as very important. Several developers consider usability in their work. Good and wide understanding of the term usability.

6. Discussion

Literature suggested that there are several hurdles to bringing usability activities into OSS development. Experiences from UKKOSS projects confirmed this. In all of the UKKOSS cases some type of difficulties or resistance was encountered when the efforts of the usability experts were offered to the OSS projects.

The research question in this thesis is: How usability was viewed in open source software projects in the past few years and how it is viewed now? Based on the analysis in this thesis the research question can be answered in three parts. What the situation was in the beginning of the time period, how it was in between, and what is the situation right now?

In the beginning it seemed that none of the projects were especially interested in using resources to usability development. There didn't seem to be a very clear concept of what usability means and why it would be relevant to the projects.

Through the mailing list and discussion forum analysis a slightly different picture could be seen. Especially in Blender the change during the time period could be clearly seen. Usability efforts gained an official status in the project during the examined time period and also seemed to get more attention in the general discussions. For XBMC/Kodi project the level of user centered discussions came into view when the forum section meant for the developers was opened for general public to see. Each of the projects showed at least some interest in usability subjects and considered their end users in some way in the forum and mailing list discussions.

The questionnaire results show that in 2016 the examined OSS projects consider usability an important aspect and understand the term moderately well. These findings correspond very well with the findings of Terry et al. (2010). From the answers it also became clear that even though the projects understood what usability is felt that it is important, usability development is not integrated into the development process in any clearly defined way. Developers from some projects gave different answers to questions asking about the project's usability activities or who is responsible for usability activities in the project. There didn't seem to be any clear plans for future usability development in any of the projects either.

6.1 Implications

Some changes in the views about usability has happened. It seems that understanding of the term has increased and that the developers now appreciate the need for usability development.

However, the concrete changes are still rather small in most projects. In MediaPortal project the biggest change has been the introduction of MediaPortal 2. This change in development efforts has also prompted some discussions on usability. Still there are no clear signs that the project would be including any specific usability design activities into their development process or that the subject of usability would be a topic that would be discussed with a variety of end users in mind. Freedroid seems to have gained more thorough understanding of what usability is, but it still has the same problem with the lack of resources as it had before. Blender has introduced a special UI group to its development team, but the group doesn't have an empowered position in the project yet. For XBMC/Kodi there was a lack of data to properly analyse the starting point of this analysis.

In the discussion forum messages a slight development towards more user oriented viewpoint could be seen, but there does not seem to be any changes to the actual product development cycle.

7. Conclusions

The focus of this study was on how usability is seen in OSS projects and is it considered as being a relevant subject for them. The longitudinal case study in this thesis started by analysing what is known of the target OSS projects based on earlier UKKOSS papers. The development from this starting point was mapped through mailing list and discussion forum analysis. Finally the situation at the time of writing was found through a questionnaire that developers from each of the targeted OSS projects answered. The goal of the study was to see, if there had been changes in how the OSS projects see usability.

The results showed that there has been some increased awareness of what usability is and why it is important, but there was very little concrete steps to bring usability activities into the project development. The findings were in line with earlier research about usability in OSS projects.

The increased awareness is a promising starting point. It could be possible that as the awareness grows also the possibility of introducing usability experts and usability activities into the projects increases. The developers seem to care for the end user and some of the comments reflect a user-centered approach to software development. These aspects suggest that there could be an increasingly fertile ground for any usability experts who are interested in giving their time and effort to OSS projects.

7.1 Limitations

This is a qualitative study for these few projects only. They might or might not represent well the whole OSS community. There is a vast number of different types of OSS projects and they might or might not have a completely different viewpoint. The sample size from these specific OSS projects wasn't big. Even the different developers of the same project might have a different viewpoint to the subject. It is possible that the developers who are interested in usability related subjects are the ones who are willing to answer a questionnaire related to the subject while those with differing thoughts on the topic will ignore the request to fill out the survey.

The study concentrated on a specific time span. This was not a long enough time period or big enough sample size to safely extrapolate the results to the future. Even though the trend seen in the results of the study is promising there is no way to know if it will continue or if the blossoming interest in usability development will disappear in the upcoming years.

7.2 Future Research

There are several different ways how this study could be expanded in the future. A longitudinal study could be continued so that the questionnaire would be repeated some years in the future to see if there really was a lasting change in the projects. Another direction where the study could be expanded would be horizontally to other OSS projects. A bigger sample of case studies could be analysed to see if similar signs of change can be found from other OSS projects. To get a smaller glimpse from a larger variety of OSS projects the questionnaire could be repeated to several more OSS projects without a closer inspection to the history of these projects.

The analysis raised several questions that would be interesting to explore further. The reasons behind the way the developers approach usability would be interesting to find out. Why usability is not a big priority in the development process even though it is seen as an important aspect? How does the culture around the OSS projects mirror into how users and usability are viewed by developers? Does the background of developers affect how usability is seen in the project? For example, does having non-coding contributors in an empowered position have any effect on how usability is approached by the project?

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Appendix A. Questionnaire

Views About Usability in Open Source Software Projects

The goal of this survey is to learn about how open source software projects think about usability. Taking the survey should take about five minutes. The survey is part of a research done for a master's thesis in University of Oulu Department of Information Processing Science. You may contact the researcher through email: kaisa.anttila@student oulu.fi.

1. Do you think good usability is important in your software?
 - Yes
 - No

[If answer is No, go to question 2. If answer is Yes, go to question 3.]

2. Why do you not see usability as important in your software?
 - Open answer

[Continue to question 3.]

3. Does your project conduct usability activities?
 - Yes
 - No

[If answer is Yes, go to section “Your project’s practices”. If answer is No, go to question 6.]

Your project's practices

4. What kind of usability activities are conducted in your project?
 - Open answer
5. Who is responsible for usability activities in your project?
 - Coding project developers
 - Non-coding contributors
 - External experts
 - Other
 - Open answer to specify

[After questions 4 and 5 continue to question 7.]

6. Why your project doesn't conduct usability activities?
 - Open answer

[Always continue to question 7.]

7. Is your project planning to conduct usability activities in future? If yes, what kind of activities are you planning?
 - Open answer

8. Please define usability: what do you think it means? What makes usability good or bad?
- Open answer
9. How strongly do you agree or disagree with following statements?
- Usability is important in most software.
Strongly disagree 1 2 3 4 5 Strongly agree
 - Usability is important in our product.
Strongly disagree 1 2 3 4 5 Strongly agree
 - Our project has enough usability activities.
Strongly disagree 1 2 3 4 5 Strongly agree
 - Our project's usability activities have been useful.
Strongly disagree 1 2 3 4 5 Strongly agree

Information about you

10. Which open source project are you involved in?
- Open answer
11. How many years have you been involved with this open source project?
- Open answer
12. Has the level of usability activities in your project changed during the time you have been involved in it?
- Open answer
13. Are you involved in any other open source software projects?
- Open answer
14. Additional comments and feedback about this questionnaire:
- Open answer
15. If you wish me to get back to you about the results of this study, please leave your e-mail address:
- Open answer

Appendix B. Cover Letter for the Questionnaire

When the developers were approached through an e-mail or a private message through a discussion forum they received this letter. In some cases the letter was slightly modified for example to include the specific project name or to add references to other developers who had recommended that these specific developers should be contacted.

Hello!

I'm a student writing my master's thesis for Department of Information Processing Science at University of Oulu. The subject of my research is views about usability in open source software projects. I am hoping that you could answer a short questionnaire about this subject. It shouldn't take more than a few minutes to fill out the survey and I would be very grateful for your answers. I'm hoping to get answers within one week.

The research is a follow-up study on UKKOSS research projects conducted several years ago. In those projects we tried to introduce usability activities in specific open source projects, including your project. Now I'm hoping to find out if there has been any changes in how usability is seen in these specific projects since the UKKOSS research projects. That is why I'm asking from you specifically to fill the questionnaire. I hope to get insights to your project's thoughts and practices from your answers.

If you wish to hear about the results of my research, you may leave your e-mail address at the end of the questionnaire.

The questionnaire is reachable behind this link:

<https://docs.google.com/forms/d/1EDqpLCWyZxbSA8cNxcBdP4HCLe5QWJq4xaajkYFVwxg/viewform>

Thank you for your help!

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Appendix C. Questionnaire Results

MediaPortal

Question	Answer 1	Answer 2	Answer 3
Do you think good usability is important in your software?	Yes	Yes	Yes
Why do you not see usability as important in your software?			
Does your project conduct usability activities?	Yes	Yes	Yes
What kind of usability activities are conducted in your project?	Barrier-free user interface (skin)		
Who is responsible for usability activities in your project?	Coding project developers	Non-coding contributors	Coding project developers
Why your project doesn't conduct usability activities?			
Is your project planning to conduct usability activities in future? If yes, what kind of activities are you planning?	Skins (GUI) will always be developed further	MP2	Unknown
Please define usability: what do you think it means? What makes usability good or bad?	The GUI must be barrier-free and, easy-to-use without doubts what a specific button will do	Trying to be free bug	Simple, clear user interfaces (can you use it without reading the manual?)
How strongly do you agree or disagree with following statements?			
Usability is important in most software.	5	5	5
Usability is important in our product.	5	4	5
Our project has enough usability activities.	5	3	3

Our project's usability activities have been useful.	5	4	4
Information about you			
How many years have you been involved with this open source project?	10 years up to now	5	3
Has the level of usability activities in your project changed during the time you have been involved in it?	No, my goal was always to have a barrier-free and easy-to-use GUI	Yes i think	I don't know - I'm mainly involved in very low-level software, not at the user interface level

Freedroid

Question	Answer 1	Answer 2	Answer 3
Do you think good usability is important in your software?	Yes	Yes	Yes
Why do you not see usability as important in your software?			
Does your project conduct usability activities?	Yes	Yes	No
What kind of usability activities are conducted in your project?	We play-test the game regularly, and every change of code or data that could imply a change on the player side is play-tested before to be introduced. However, we do not have any 'academic' process, nor any rules on usability. It just has to be "playable", whatever it can mean for the tester...	There was a study done once :). Besides that I try to listen to irc when people complain about UI, sometimes I watch people play the game on youtube to get an idea of what they do wrong/ what parts of the game are difficult to understand and what could be improved.	
Who is responsible for usability activities in your project?	Non-coding contributors	Coding project developers	
Why your project doesn't conduct usability activities?			not enough resources
Is your project planning to conduct usability activities in future? If yes, what kind of activities are you planning?	No. We are a too small team to be able to dedicate time on such activity. We have some higher priorities. But we know that usability could be improved (and even drastically improved on some part of our user interface).	No idea, unfortunately, I am not that active any more.	No
Please define usability: what do you think it means? What makes usability good or bad?	Usability is about how a user can easily or not achieve his goal, his intent, using the 'tools' (in a generic sense) provided by the interface. A bad interface is an interface with which the user is always looking at what tool (button, menu...) to	Form follows function. Usability is good when no manual is needed to understand a program and the user can jump right in. In terms of software, things (menu items for instance) might benefit from	usability is ease of end user to get output that they want (information, or side effects) from interactive program examples that make usability bad

	<p>use to do something. A bad interface has no consistency: some actions use buttons, some others use keyboard keys only, no consistency in the use of shift/control modifiers...</p>	<p>being ordered semantically.</p>	<p>relevant information that is hidden (example have to navigate through many menus to get to information, or information never displayed)</p> <p>inefficient input method (pressing and holding mouse button on a counter does not increment it faster)</p> <p>common actions not supported (copy paste, repeat last)</p> <p>default settings get in the way of doing common actions</p> <p>error messages do not describe error well</p> <p>examples for good usability</p> <p>similar actions grouped together in graphical interface</p> <p>customizeable interface (to a limit)</p> <p>simple repetitive action can be done with few actions by user (select text to end of file, draw line of wall units in game level editor)</p> <p>in command line, smart autocomplete</p>
How strongly do you agree or disagree with following statements?			
Usability is important in most software.	4	4	5
Usability is important in our product.	3	5	4
Our project has enough usability activities.	2	4	1

Our project's usability activities have been useful.	2	5	1
Information about you			
How many years have you been involved with this open source project?	8	6-8	6
Has the level of usability activities in your project changed during the time you have been involved in it?	Not so much	I think so, usability is important to me so I like to file related bugs or hand in related patches.	level of usability changes fluctuated as result of contributor availability

Blender

Question	Answer 1	Answer 2	Answer 3
Do you think good usability is important in your software?	Yes	Yes	Yes
Why do you not see usability as important in your software?			
Does your project conduct usability activities?	Yes	Yes	No
What kind of usability activities are conducted in your project?	Open Movie projects, usability discussion groups	We have a UI team that follows the goal of continuously improving the interface and it's usability.	
Who is responsible for usability activities in your project?	Internal contributors	Both, artists and developers (UI Team)	
Why your project doesn't conduct usability activities?			Not enough resources, not enough knowledge about the subject.
Is your project planning to conduct usability activities in future? If yes, what kind of activities are you planning?	Continued open movie projects. Continued involvement of users in the GUI development process. There is a new effort from users at rightclickselect.com to gather proposals for usability improvements (among others)	UI team work is going to be continued and increased; the Blender 2.8 project aims to turn the interface into a more user workflow supportive direction.	No idea.
Please define usability: what do you think it means? What makes usability good or bad?	Tools should be discoverable. Both new users and power users should be catered for. New users are important, but in the end I think it is the power users who really make the product what it is.	Usability is a vague term which is usually used to describe the ease and speed of interaction with software or physical devices through an interface. A good usability is given if the interface doesn't get in the way of the user's actions, it should rather support him. Bad usability is given if the user is required to move his attention to the interface, pulling it	Consistent with other software in artist's toolkit, consistent with itself, providing a learning path.

		away from the goal he tries to accomplish.	
How strongly do you agree or disagree with following statements?			
Usability is important in most software.	5	5	5
Usability is important in our product.	5	5	5
Our project has enough usability activities.	4	2	1
Our project's usability activities have been useful.	5	3	5
Information about you			
How many years have you been involved with this open source project?	14	2	5
Has the level of usability activities in your project changed during the time you have been involved in it?	Yes, quite dramatically improved.	Yes	No

XBMC/Kodi

Question	Answer 1	Answer 2	Answer 3
Do you think good usability is important in your software?	Yes	Yes	Yes
Why do you not see usability as important in your software?			
Does your project conduct usability activities?	Yes	Yes	Yes
What kind of usability activities are conducted in your project?	initial setup/configuration of the program, general ease of use, layout of items in the gui, unified representation of data in the gui	UX Design, Customization.	Feedback from users, UX/UI developers
Who is responsible for usability activities in your project?	both coding and non-coding developers/contributors	Coding project developers	Coding project developers
Why your project doesn't conduct usability activities?			
Is your project planning to conduct usability activities in future? If yes, what kind of activities are you planning?	nothing planned. activities are usually initiated by developers working on a new future. they can also be brought up by users on our forum.		Continue to seek feedback and implement ideas to improve usability.
Please define usability: what do you think it means? What makes usability good or bad?	defenition: ease of use mainly. good: - it should be straightforward to use the software without having to consult a manual. - everything that's represented in the gui should be self-explanatory. - configuration options should be easy to find	Simplicity. Clear UX design. Predict when a user wants to see data and show it.	I define usability as the experience a user faces when opening the software. This includes the interface and how clear it is to use, including for people with disabilities.

	and again, be self-explanatory.		
	bad: - non-logical layout of items in the gui. - having to ask yourself "what does this button do?"		
How strongly do you agree or disagree with following statements?			
Usability is important in most software.	4	4	4
Usability is important in our product.	5	5	5
Our project has enough usability activities.	3	2	4
Our project's usability activities have been useful.	4	3	5
Information about you			
How many years have you been involved with this open source project?	7	1	1+
Has the level of usability activities in your project changed during the time you have been involved in it?	yes, we've tried to get our users more involved over the years. and developers are more open to their ideas and suggestions compared to years ago.	Not really, I guess.	Yes