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Open Source Software Community Inclusion Initiatives to Support Women Participation

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Abstract. This paper focuses on the inclusion initiatives of Open Source Software (OSS) Communities to support women who participate in their online communities. In recent years, media and research has highlighted the negative experiences of women in OSS and we believe that could be detrimental to the women of OSS. Therefore, in this research, we built upon the research that demonstrates the value of Codes of Conduct for minorities in an online community. Additionally, we focus on women only spaces in OSS, because past research on women and IT shows that women perform better when they can build connections and mentoring networks with other women. We investigated 355 OSS websites for presence of women only spaces and searched for, collected and analyzed the Codes of Conduct on the websites of these OSS. Qualitative content analysis of the websites show that only 12 out of 355 websites have women only sections. Less than ten percent (28) of the analyzed websites had a code of conduct.

Keywords: Open Source Software, Gender and IT, Women in Open Source, Code of Conduct, Women only spaces

1 Introduction

Open Source Software (OSS) communities depend on the participation and contribution of voluntary members to ensure sustainable growth and day-to-day management. In more than a decade, OSS communities have shown no growth in the percentages of women participating in these communities [5]. Women form more than half of the workforce in the United States, but the participation from women in Information Technology is not even thirty percent [13]. In addition, when we zoom in deeper into OSS communities; we find that the percentage of women in OSS communities is a measly three to five percent [15] or even one percent according to some sources [OS4W.org]. It behooves OSS communities to understand and address the issues related to the underrepresentation and mistreatment of women. In order to encourage more women to participate in OSS communities, it is important to take measures to demonstrate that the communities are inclusive, welcoming and supportive to the women who participate and contribute.

Anecdotal evidence about the negative experiences of women in the OSS communities has been in the spotlight via media and on the internet [6, 8 and 17] and highly controversial empirical research [18] that show that the contributions of women receive inferior treatment than the contributions of men. It is important for OSS communities to demonstrate that they take efforts to regulate the behavior of their community and that they are committed to providing an inclusive collaborative-shared environment where all the people and their views are welcome. The inclusion initiatives of OSS communities should be visible to the newcomers and should be available to community members who can use these to call out unwanted behavior.

Codes of conduct and women only spaces have shown to facilitate women engagement and retention in online communities. These safe spaces also allow women to be engaged and be creative [11]. In past research, we surveyed and interviewed women from across the globe to document their experiences of participating in OSS communities. Most of the surveyed and interviewed women indicated that along with mentoring, codes of conduct and women only spaces played an important role in their experiences within the open source communities. Other research had similar findings [2] regarding the value of Codes of conduct and therefore, this research aims to investigate the presence of Codes of Conduct in OSS communities and find out if any of these codes of conduct specially address issues or gender equality. We are also interested in finding out what types of women only spaces exist in OSS communities and the purpose and the scope of activities for these women only spaces. Cumulatively, these seem to create a visibly welcoming, inclusive and safe collaborative environment for women of OSS.

In the following sections of this paper, we will present the relevant past research on this topic, the research methods that we used to approach the aims of this study, the results from the research and a discussion of the results, limitations and future research areas.

2 Literature Review

Open source software communities are often seen as political communities, and the members are often viewed as ‘citizens.’ Carillo, Huff, and Chawner (2017) [1] address this aspect, noting how important the proper ‘socialization’ of new members is to both their performance of particular tasks and their participation in maintaining the community as a whole, the latter of which they refer to as ‘citizenship behaviors.’ When it comes to ‘socialization,’ the authors note that ‘codes of conduct’ are one important means of community maintenance (p. 338). Coelho and Valente (2017) [4] discuss whether lacking a ‘code of conduct’ is one of the reasons open source projects fail when they do. Although they do conclude that the adoption of a code of conduct is statistically negligible when it comes to differentiating the failed projects from the most popular ones in their sample set, they note that not one of the failed projects had a code of conduct. Neither did any included in the ‘least popular’ category. Thirteen percent of the most popular projects, on the other hand, implemented codes of conduct, and at least some of the developers of the failed projects considered cited ‘conflict among developers’ as a reason for failure.

Online communities including OSS groups often rely on ‘codes of conduct’ to regulate behavior among members. Many scholars have addressed codes of conduct in passing as they explored various aspects of OSS and other online communities such as how they develop [9, 10 and 2], how these ‘collaborative’ projects work in general (e.g. Scacchi, Grundy, Hoek, & Whitehead, 2010) and the role of a ‘leader’ or ‘manager’ in such a community [2, 12 and 16]. Others studied, the values that these communities embody [20], what other types of organizations can learn from them e.g. Müller-Seitz & Reger 2010 [14], and how integrating women in software development leads to a more balanced “community smell” [3]. Recently, however, scholars have become interested in the code of conduct as an object of study in its own right. What kinds of things does it include? Tourani, Adams, & Serebrenik (2017) [19] offer a sustained discussion of online communities’ ‘codes of conduct’ in the literature to date. The authors investigate a number of different codes of conduct through both web searches for the codes themselves and interviews with some members of the communities who adopt them. The questions they attempt to answer with this empirical research concern the kinds and number of codes there are, what they say, and how they are used (pp. 24-25). In this research, we built upon the research on Codes of Conduct by Tourani, et al. [19] and started a new inquiry into the women only spaces of OSS to explore the OSS communities and their inclusion initiatives for women.

3 Research Methods

Research Objective: The main objective of this research is to investigate the inclusion initiatives of OSS communities in the form of women only spaces and codes of conduct that are available on the websites of OSS.

Research Questions

1. How many OSS communities have women only spaces on their website?
2. What is the nature and scope of these women only spaces?
3. How many OSS communities have Codes of Conduct on their website? What are the common and differentiating elements in these codes of conduct?
4. How do the Codes of Conduct demonstrate support for women in OSS communities?

3.1 Data Collection and Analysis

For this exploratory qualitative research, we used the list of OSS available from Wikipedia at https://en.wikipedia.org/wiki/List_of_free_and_open-source_software_packages. The list was collected on March 1, 2018. On that date, there were 355 OSS listed on that Wikipedia entry and included 22 categories of open source software. The list is a good starting point of representative open source software and provided a functional sample of popular and not so popular OSS.

A spreadsheet was created with the 355 software and the corresponding website for each of the software. Each website was searched for women only spaces and Codes of Conduct. We use the following keywords to search the websites with a search feature: Women, Female, Codes of Conduct, Guidelines and Values. The websites that did not

have a search feature for the overall website were examined by reviewing all the individual sections of the website, these sections included, Blogs, Forums, Mailing Lists, IRC, Community FAQs, About Us, News, Announcements, Wiki, GitHub Link and Support section. Very few websites had women only spaces and/or Codes of Conduct. All the Codes of Conduct that were available on these sites were collected and stored in the spreadsheet for further analysis. Notes were created for women only spaces and a URL of the women only space was recorded in the spreadsheet.

For examining the women only spaces on the OSS websites, we investigated the types and the purpose of these spaces. We reviewed the content on these spaces to understand their objectives and activities.

For analyzing the codes of conduct, we built upon the five components developed by Tourani et.al [18] by adding three new components specific to our research objectives. The three new components that we added are, name used to refer to the code of conduct; the intended audience of the code of conduct and the explicit mention of specific groups (women). The five components from the Tourani study are purpose; honorable behavior; unacceptable behavior; enforcement and scope.

We used these collective eight categories to analyze the elements of all the codes of conducts for presence of these elements. Then we qualitatively analyzed the text for the eight elements using NVIVO software to develop common themes across the elements of the Codes of Conduct. This gave us a deeper understanding of the focus and intent of each of the eight elements of the Codes of Conduct.

4 Results

In this section, we present results starting with the inquiry into the women only spaces, the purpose of these spaces and the activities of these spaces. In the next sub-section, we discuss the results about the Codes of Conduct. We present results about the number of codes found, the names of these codes and an analysis of the key elements of these codes.

4.1 Women Only Spaces in Open Source Software Communities

Out of the 355 OSS websites listed on the Wikipedia page (https://en.wikipedia.org/wiki/List_of_free_and_open-source_software_packages), only twelve websites had women only spaces or they provided a link to an external website that was for women using that software. Some examples of the external websites are Facebook groups and local chapters of meet up groups. Table 1 presents a list of the websites that have women only spaces and the names and URL of these spaces.

Table 1. OSS websites with women only spaces.

Software Package	Name of the Space	URL
ArchLinux	Arch Linux for Women	http://archwomen.org
Bitcoin	Women in Bitcoin Madchenabend in Berlin	https://www.facebook.com/women-inbitcoin/
BonitaSoft	Blog Post about Community efforts for encouraging women	https://community.bonitasoft.com/behind-scenes-bonita-21-27-feb-2011

Debian	Debian Women	https://www.debian.org/women
Drupal	Women in Drupal	http://www.womenindrupal.org/
Fedora	Fedora Women	http://fedoraproject.org/wiki/Women
FreeNX	IRC Channel for Women	ircs://chat.freenode.net/archlinux-women
GNOME	GNOME Women	https://wiki.gnome.org/GnomeWomen http://gnome.org/opw/
KDE	IRC Channel for Women	https://userbase.kde.org/IRC_Channels
Mozilla	WoMoz	http://www.womoz.org/blog/
PHP	PHP Women	http://phpwomen.org/
Ubuntu	Ubuntu Women Project	https://wiki.ubuntu-women.org/

4.2 Purposes of women only spaces on OSS communities

The different types of women only spaces that we found on OSS communities to support women in participating in the community range from completely dedicated websites for women, to women only IRC Channels, dedicated blogs, collection of resources for women in a blog post, dedicated Facebook pages and local meet-up groups. The purposes explicitly reported on each of these spaces are presented in Table 2.

Table 2. Purposes of the women only spaces on OSS websites

Name of the Space	Purpose of the Space
Arch Linux for Women	Helping more women become involved*
Women in Bitcoin	Networking and promoting women in bitcoin
Madchenabend in Berlin	
Bonita Soft	Recruiting more women developers
Debian Women	Engaging and promoting women*
Women in Drupal	To offer women only space, promote women*
Fedora Women	Foster involvement of women
IRC Channel for Women	Talk about women issues, etc.
GNOME Women	Female only space, encouraging women of GNOME
KDE IRC Channel	Women only chatting space
WoMoz Blog	Dedicated to women
PHP Women	Online community, events and mentoring for women
Ubuntu Women Project	Fostering women contributions through mentoring and inspiration

Some of the women only spaces include blog posts and describe the initiatives that the community is taking to support women. This type of posts are good minimal investment ways to make the community efforts visible to newcomers. Bonita Soft, for example, presented the statistics related to women participating in their community and the growth in that participation. The Debian women community explains the roles in which women can start contributing and offer a safe place to ask questions. Drupal women site expresses a sense of community by creating a place for sponsoring women, solving issues that women face in Drupal or outside and have fun and celebrate life together.

Fedora women page was very clear in being inclusive for women, trans and gender-queer people. Fedora Women also does a great job at highlighting the existing women in the community. The IRC channels support women by having technical channel and an off topic channel, so that women can feel free to connect with other women about “off topic” concerns. The Arch Linux IRC channel for women was interesting for multiple things, including explicit messages about the unacceptable behavior including “If you make us feel uneasy or “creeped out”. This is both not quantifiable and not negotiable. It is a judgment call and entirely at the discretion of the Op requesting your exit.” In addition “Looking for dating advice. This is not a dating service. This is also not a lonely hearts channel. We like sex and relationships fine. But that's not what we're here for.” And “Discussion of self harm.” This channel also listed resources for people feeling depressed and/or suicidal.

4.3 Codes of Conduct

Out of the 355 OSS packages listed on the Wikipedia page, only 28 websites had Codes of Conduct or other similar guidelines for regulating the behavior of participants in the communities. After this observation, we refer to the general name as “community rules” and reserve the use of “Code of Conduct” for the community rules that are called “Codes of Conduct”. We collected these community rules by searching each of the website using the keywords “Code of Conduct”, “Values” and “Guidelines” or by browsing all the sections of the website. Interestingly, not all the communities used the specific term “Code of Conduct” even when they had some rules for the community. The different names under which community rules were found varied significantly and included terminology such as guidelines, principles, rules, netiquette, etc.

Out of the 28 websites, 14 websites used the term Code of Conduct, three websites used Guidelines and two websites used Principles to refer to their community rules. The rest of the communities used the following one time occurring terms when referring to their community rules - Community guidelines, forum guidelines, fundamental freedoms and values, ListEtiquette, Netiquette guidelines, Rules, Values, Values and Goals. Within the code of conducts, there were sections such as Board rules, Chatiquette, common code, common etiquette rules, core values, event policy, forum code, mailing list code, Policy (Welcoming Policy, Anti-harassment policy, and complaint procedure), Statutes, Values and Goals, IRC rules and “Principles, guidelines and actions”.

Community rules were collected from the following 28 websites: 3DSlicer, Apache, Apereo, Asterisk, Chromium, CiviCRM, Compiere ElasticSearch, ERPNext, Evergreen, IRC, Fiji, FreeNX, FreePBX, GIMP, HandBrake, Inkscape, ITK, KitenKMyMoney, LedgerSMB, Moodle, Natron, OpenAFS, OpenBravo, Opencog, OpenSSL, Pencil2D, PM and Tryton.

4.4 Key elements of the Community Rules

In order to identify the common and differentiating elements in the 28 community rules, we conducted content analysis and coded each one for common elements. We used the five common elements as outlined by Tourani et al. [19] they derived these elements

from an analysis of seven Codes of Conduct, which they found were basis of a large number of codes of conduct in OSS communities. We used these five elements as an initial starting point, added more element categories, and customized the definition of the eight elements according to our data set. We analyzed the 28 community rules for the following eight elements.

1. Terms Used –We added this new category because our searches on the website were not limited to “Codes of Conduct” keyword, but included any initiatives that were about community regulation and laid guidelines for the behavior of members of the community. This category allowed us to see the diverse range of terminology that the communities use to refer to their rules. It is important to know about the different ways in which communities express their approach and acknowledging this allows us to do a more comprehensive inquiry into inclusion initiatives.
2. Length of the rule – This was also a new element category that we added in order to record the varying lengths of the rules. The length of the rule can be an influencing factor in the usage of the rule. If it is too long, if it is ever read completely and if it is not read, then does it serve any purpose? The purpose for this category element is to guide understanding what would be good length for a code of conduct.
3. Purpose of the community rule – This element category is defined as the reason for the community rule to exist and the intent of this code for the community. What is it that the community wants to achieve and what do they focus on in order to achieve that goal or intent.
4. Honorable Behavior Examples – This element category is defined as the section of community rules that expresses what type of behavior is expected from the community members. These are positive examples of how the community expects members to behave.
5. Unacceptable Behavior Examples – This element category is defined as the section of the community rules that describes the behavior that is negative, discouraged and is to be avoided in the community
6. Enforcement – this elements category is defined as the section of the community rules that outlines consequences of not following the community rules, the actions that the community will take if the community rules are violated and it includes clear articulation of what a member of the community should do if they witness violation of community rules.
7. Scope of the code – this element category is to record the applicability of the code of conduct – if it is application to a section of the website (such as forums), or if it is for the entire community or if it is for online and offline community interactions and if it included the intended audience for the community rules.
8. Specific mention of minority groups/gender –Since we are specifically interested in the inclusion activities of the communities per their community rules, we added an element category to record the community rules that specifically include gender and generally any minority groups.

Table 4. The Elements of Community Rules

CoC Element	No. of Instances out of 28
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Terms Used	28/28 – 11 different terms were used in 28 examples
Length of the Code	Range of Length – 146 words to 7080 words
Purpose	28/28
Honorable Behavior Examples	27/28
Unacceptable Behavior Examples	25/28
Enforcement	28/28
Scope	28/28
Gender / Minority	13/28

As presented in Table 4, all the 28 community rules that were analyzed had a term for the rules, a purpose of the rules, an articulation of the scope of the rules and enforcement of the rules, in case of a violation. Most of the codes also included examples of honorable and unacceptable behavior, though not all. Only 13 (less than half) of the community rules that were analyzed had an explicit mention of gender and/or minority. Even though, the purpose of all the communities reflected the goal of an inclusive community, they all do not address gender or minorities in the language of the code.

4.5 Main Themes for Each Key Element of Community Rules

In depth, qualitative analysis of each of the element category gave insights into the approach of the respective OSS community.

The *length of the rules of the community* also varied greatly, with OpenSSL code being the shortest in length with 146 words and the ITK code with more than 7000 words.

The explicit *purpose* of most of these codes of conduct can be summarized as that of creating a shared collaborative environment, ensuring good community health, creating a positive community vibe, sharing and ensuring a good safe community environment. They express their goal to achieve their purpose by focusing on activities such as conversations, collaboration, welcoming, getting involved, leveraging diverse perspectives, willingness to learn and having a good time. Interestingly, many communities specifically outline the goal to be happy, stress free, friendly and helpful in this productive learning environment.

The *honorable behavior examples* include two types of behavior; one is about how each community member should behave with others in the community e.g. being open, considerate, polite, friendly, respectful, kind, empathetic and taking responsibility of their own actions and speech. In addition, the second type of examples include the responsibility of each community member to support other community members by flagging bad behavior and engaging when others are being disrespected. One code of conduct specifically discussed resolving disagreements constructively and asking for help when unsure what to do.

In the *unacceptable behavior examples* elements category, we found a range of approaches being used by the OSS communities, including not mentioning any unacceptable behavior to giving very specific definitions and examples of unacceptable behavior. Some common themes that most of these examples included are harassment, verbal abuse, sharing private information about others, spamming, being rude or offensive, exclusionary behavior, trolling and personal attacks. Some Codes of conduct use this

section of the code to condemn any acts of harassment related to gender or otherwise. A standard template language was often used to explain these unacceptable behaviors; this language is from a standard template and was found across multiple websites. E.g. "Examples of harassment: Verbal taunting, racial and ethnic slurs, comments that are degrading or unwelcome regarding a person's nationality, origin, race, color, religion, gender, sexual orientation, age, body disability or appearance". Specific examples against sexual harassment were also found such as; "sexual harassment of any kind, defined as unwelcome sexual advances, verbal sexual innuendos, suggestive comments, jokes of a sexual nature, requests for sexual favors, distribution or display of sexually suggestive graphic materials, and other verbal or physical conduct of an unwanted sexual or intimidating nature and contributing to an unwelcoming environment."

In the *enforcement* category, we found examples that describe how the community will enforce its code, how the community members can ensure that the code is followed and who should be contacted to inform about the violation of the code. Some of the consequences of violation outlined in the code of conducts are removal of content, verbal warning, public censure of the member and expulsion from the community. Removal of offensive content or illegal content is often the first act after a report is made. In most codes, this section also explains the process of registering a complaint and the steps taken by the community. Only one community mentions legal actions against community members if they post illegal content. Community moderators contact information is provided in most of the codes and specific names were provided in some instances.

In the *scope* element category, all the codes of conduct defined their community and distinguished the spaces based on being online or offline. Online included forum, mailing list, wiki, web site, code repository, IRC channels, and private correspondence and public meetings. In offline events, it included meetups, hackathons, events, conferences and public meetings.

The *intended audience* for all the community was specified as the users of the spaces and members who belonged to the community.

In the *specific mention of gender and/or minority* category, we found examples of template-based language that was repeated in less than half of the total codes of conduct. A common excerpt for this category is, "We are committed to making participation in this project a harassment-free experience for everyone, regardless of level of experience, gender, gender identity and expression, sexual orientation, disability, personal appearance, body size, race, ethnicity, age, religion, or nationality."

5 Discussions and Future Research

The results show that different types of women only spaces are present in very few OSS communities. These spaces are considered “safe” spaces for women and are focused on mentoring, supporting, helping, guiding, advancing women in these communities. The objectives of these spaces are very much in line with the research that shows that when women feel safe, they are able to participate, engage and create better [11]. Some of the spaces we studied also had very specific information about sexual harassment, self-harm issues and “no defined topic” areas. These “no defined topic” areas are for any discussion that the women would like to have with other women and was not restricted to OSS or technology. We believe the concept of peer parity (when an individual can identify with at least one other member when interacting in a community) [7] would be valuable in OSS communities to improve the participation and retention of women. Fedora Women does that by identifying and posting profiles of other women who are successful in the Fedora community.

More OSS communities should consider creating women only spaces in order to become more inclusive for women and to provide resources to women who participate. The expenses for creating these women only spaces would be mitigated by the larger number of women who will participate and the improved sense of safety and equality that the women will experience. The impact of these safe spaces for women has been studied in other areas [10], but not specifically in OSS communities. The authors of this study will continue this research by studying a larger number of such women only spaces in OSS communities and by interviewing the members of these communities to assess the perceived impact. Codes of Conduct investigation revealed very few OSS communities have a Code of Conduct. Recent research has shown an increasing trend [20], but there needs to be more awareness about the value of Codes of Conduct for fair treatment of all participants of a community. Specially, since there are several existing templates for Codes of conduct, we urge the creators of the OSS communities to adopt one of the existing ones, if they are not able to revise the existing ones for their own community. The codes of conduct that are present also do not always highlight women and or minority equality and inclusion. This might be due to a number of reasons, but having these explicit gives an opportunity to the community members to cite these whenever they have to address a conflict or have to flag out a violation of the code. A combination of women only spaces and community rules that explicitly include women will create a positive and welcoming environment for newcomers and veteran women members of the community. The results from the women only spaces show a variety of positive ways in which OSS communities are supporting women. The code of conduct can benefit from adopting some of the same language and activities. The authors of this study acknowledge that codes are conduct are often time added to communities, when they are already successful. We believe that adopting a Code of Conduct early on in the life of a project, will be a contributing factor for the success of a project. Presence of a code of conduct will demonstrate an interest in building a fair and collaborative space. We note that this exploratory study is limited in its sample selection and the sample size is not representative of the entire OSS environment. In future research, we will expand our sample size to include trending projects on GitHub and continue to evaluate

the role of community rules and women only spaces in an OSS community. As a next step to this research, we are analyzing the women only spaces for membership, longevity and topics. We believe that women only spaces and inclusive community rules will provide a strong foundation for OSS communities to attract more women and retain the existing women contributors.

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