Inclusion, diversity and gender equality:
Gender Dimensions of the Free/Libre Open Source Software Development

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This is the draft version of the paper submitted for the encyclopedia "Gender and IT" (http://genderitencyclopedia.ist.psu.edu) to be published by IDEA Groups in 2006. This draft is released under the General Public License. The document itself has the potential to be improved in an open source culture. If you have comments or ideas on how it can be improved, please do not hesitate to contact me. Later on-line version will then be adjusted to take account of these points.

Abstract:

The FLOSS development is responding to the ICT development in various ways. This essay describes and analyses challenges (societal and organisational) and advantages (e.g. new models for mobile and collaborative work online), particularly regarding gender issues, encountered in the recent FLOSS development. The focus of the essay is not only on the claims made by women in the existed FLOSS community about the tensions between male and female developers' interests and ways of doings , but also on the current obstacles against bringing more women, who are not technically competent, to participate in the FLOSS development. This paper concludes with suggestions on how to create rules and resources and the creation of a common FLOSS space for both genders.

Keywords:

Free/Libre Open Source Software (FLOSS); Women-centred design; Women in a Knowledge-Based Society; gender inclusion; the gender digital divide; gender-biased languages in software documentaries

Introduction

Software is at the heart of the development of information communication technologies (ICTs). In an ICT-based society, it is increasingly important that software is designed to meet the requirements of diverse users. To do so, several software processes have been proposed to update the traditional ones. Methods such as Participatory Design (PD) (e.g. Schuler & Namioka 1993), agile computing (e.g. McBreen 2002), User-Centred Design

(UCD) (e.g. Norman & Draper 1986), and eXtreme Programming (XP[1]) (e.g. Beck 1999). These methodologies, though different, have a common goal of making software products more friendly and more diverse for various types of end users. The development mode of Free/Libre Open Source Software (FLOSS) is one of the most common and successful examples for this aim.

FLOSS has become a prominent phenomenon in ICT field and the wider public domain for the past years. Its

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[1] See http://www.extremeprogramming.org/ or http://www.xprogramming.com/.

success has also attracted researchers from different disciplines to analyse its unconventional innovation approach. But according to a FLOSS survey on FLOSS developers in 2002, "women do not play a role in the [FLOSS] development; only 1.1% of the FLOSS sample is female." (Ghosh *et al.* 2002). In the mainstream research on the FLOSS community, many researchers also overlook the diversity of the members, and presumes a stereotyped male-dominated "hacker communiy" (e.g. Levy, 1984; Raymond, 1999; Himanen *et al.* 2001). Moreover, the issue of gender inequality is often ignored and/or muted, in the pile of FLOSS studies. Not only are female programmers often rejected ex/implicitly from the software labour market (Levesque & Wilson 2004), but also female users' software requirements not respected and consulted ("Public report on the consultation meeting on European perspectives for open source software", 2001). This feature is opposite to the FLOSS ideal world where users should be equally treated and embraced (op. cit.). Compared with many literatures about the FLOSS development, the gender problem is marginalized. While many researchers endeavour to understand the process and structure of FLOSS-related organisations and management, few found a gender-biased situation problematic. In short, women are almost invisible in current FLOSS-related literatures and most policies targeting at advocating the FLOSS development are gender blind.

Thus, this essay highlights the need for increased action to address imbalances between women's and men's access to and participation in the FLOSS development in cultural (e.g. chauvinistic and/or gender-biased languages in discussions on mailing lists or in documentations), economic (e.g. unequal salary levels for women and men), political (e.g. male-dominated advocacy environment) and technical (e.g. unbalanced students gender in technical tutorials) spheres. But on the other hand, it also emphasises the powerful potential of FLOSS as a vehicle for advancing gender equality in software expertise. FLOSS helps transport knowledge and experience of software engineering through distributing source code together with the binary code almost without any limit. Many free software licences such as the General Public Licence (GPL) also facilitates the flow of information and knowledge. In other words, if appropriately harnessed, FLOSS stands to meaningfully contribute to and mutually reinforce the advancement of effective, more expeditious solutions to bridging the gender digital divide. In the end, this article also points out that while women in the advanced countries have a better chance of upgrading their ICT skills and knowledge through participating in the FLOSS development, the opportunity is less available for women in the developing world. It is worth noting that though the gender issues raised in this essay is widespread, it should not be considered as universal. Regional specificities in gender agenda in software industry should be addressed differently (UNDP/UNIFEM. 2004).

'Social world' and 'system' are used as methodological concepts to help understand the dynamics of the composition and the character of the FLOSS development.

Gender problems in the software industry

To a degree, thegender problems in the FLOSS development can be seen as an extension of the ongoing gender issues in new-tech service industries and/or software industry (e.g. Mitter & Rowbotham 1995). These long-term problems mainly include low-level work content, unequal payment, emotional distress from discrimination and prejudice, physical ache from the long working hour in front of the computer, division of labour within the home (child-rearing), essentialist notions of women's roles, sexism, informal networks, prejudice, lack of role models and support, "glass ceilings". Generally speaking, women within the software industry have to work harder than men in order to get the same respect and conquer the glass-ceiling problem in this patriarchy world (DeBare, 1996).

Many studies have undermined the stereotyped presumption of a biological sex difference between men and women causing women to be less interested in scientific and technological fields (Bleier 1991; Frauenheim & Gilbert, 2005). Instead, evidences have shown that school curriculum and methods of teaching technology in school shall be adjusted to bridge the gender gap (UK Equal Opportunities Commission, 2004). Through

educational means, such as encourage women to pursue higher education in scientific and technological areas or join the job market in these areas, and/or governmental policies to support and promote women in ICT, it has been proved that there are no significant difference between men and women's abilities and qualities of work (ibid.).

For some reasons, the software industry has perceived these problems and tried to solve them. For instance, HP, Sun, Xerox and Compaq have sponsored the Institute for Women and Technology (IWT[2]) and other universities in a US-nationwide program to bridge the gender gap in technology, and support the development of technology products focused on women's interests and needs. Most of the software companies now also provides a series of women-friendly policies, including extended maternity and paternity leaves, accommodation for emergency leaves, and superior benefits, in order to cover childcare and family accommodation. Unfortunately, according to observers, motherhood is still seen as a liability for women's advancement, and the pay of women continues to suffer if they do have children (Walby & Olsen 2002). The software industry is socially constructed – men's superiority over women and an essentialist gender division of work are continuously reiterated (Walby 1988; Rubery *et al.* 1999; Miller *et al.* 2004; Panteli *et al.* 2001).

Towards a Feminist analytics[3] on the gender issues in the FLOSS development

Although FLOSS has dramatically changed the way software is produced, distributed, supported, and used, and has a visible social impact enabling a richer digital inclusion, most of the gender problems existing in the software industry have been duplicated in the FLOSS field.

A FLOSS *social world* (Lin 2004) is different from what Turkle (1984) argues that "computer systems [mainly proprietary] represent a closed, controllable microworld - which appeals to more men than women (Turkle1984). It requires a holistic perspective to capture the complexity and dynamics within and across the social world. While the heterogeneity and the contingency in the social world are not yet fully explored, analysis from a feminist perspective is almost absent. Little attention has been paid to the internal differences and to the private arena linked with the FLOSS innovation system. However, this methodological lack has not stopped us from observing the gender problems within the field. Instead, by means of the FLOSS development, some gender problems in ICT become even more apparent.

For example, most of the graphic interface of FLOSS appears to be less advanced. The mainly text-based feature of FLOSS is so predominant that women, who usually have few coding experiences, are less familiar with its operation. Instead of deducting from biological sex difference, the phenomenon suggests a lingering deficiency of women's IT education and women-unfriendly products and tools.

Additionally, in a world of volunteers, we clearly see that men and a competitive worldview are more present in all forms of media. Many women participating in the FLOSS development are invisible: their labour in fields such as NGOs that help implement and promote FLOSS, documentation translation, book editing, teaching and tutoring (e.g. E-Riders[4]) are less visible than men's dominated coding work.

Indeed, in light of Okin's argument (1999), I would like to argue that FLOSS advocates have not adequately

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2 http://www.iwt.org/systers.html

3 "By "feminism," I mean the belief that women should not be disadvantaged by their sex, that the moral equality of men and women should be endorsed, and that all forms of oppression should be demolished.

4 http://www.eriders.org

addressed this critique of gender equality. They tend to treat the FLOSS community as a monolithic culture--to pay more attention to differences between and among groups than to differences within them. They are so eager uniting the voices on freedom of information that they give little or no recognition to the fact that FLOSS groups, "like the societies in which they exist (though to a greater or lesser extent), are themselves *gendered*, with substantial differences of power and advantage between men and women" (ibid.). Apart from that, FLOSS advocates often do not take the private sphere into account when proposing an alternative agenda for a knowledge-based society, which is often identified as 'public domain' (Sophie Huoyer; Okin 1999). This emasculation of the private sphere is unwise in that they "neglect both the different roles that groups require of their members and the context in which persons' senses of themselves and their capacities are first formed *and* in which culture is first transmitted--the realm of domestic or family life." (Okin 1999). In other words, if a more liberal and democratised information society were to be established, as the FLOSS movement aspires, domestic arrangements need to be take into consideration. "Home is, after all, where much of culture is practiced, preserved, and transmitted to the young." (Okin 1999).

A number of key dilemmas that hinder women's participation in the FLOSS development can be summarised:

1) Strong long-hour coding culture

In terms of women's relation to and experience of FLOSS, it is observed that women are found mostly taking trainee positions that have a regular nine-to-five working hours, rather than a more unstable coding job. This often is owing to that women need to take care of the housework and require a more steady working time. Since a successful FLOSS project requires volunteers to commit on it progressively, women usually have less spare time and energy that can be donated to FLOSS compared with men. The way of working makes it very difficult for women to succeed in the business. It must be incredibly hard if a woman have children to navigate the hours. If men could share the child-rearing more equally, this will allow women more time to take on the consuming role of programming or leading a FLOSS project.

2) A lack of 'mentors' and role models

It is true that there is a very low percentage of female participants in the FLOSS social world. However, we should not overlook the importance and possible future of outstanding female figures in the FLOSS field such as Allison Randal[5], Amaya[6] (?), to name but a tiny few who are out already making a difference. It is difficult to make the majority of male peers respect these female figures. For instance, I have observed that when Allison spoke at the Italian Code Jam 2004 activity, she acted, and also was treated, rather as an assistant for Larry Wall than being an outstanding programmer whom would be granted as much respect as her male peers (fieldwork at Italian Code Jam 2004, Ferrara, Italy[7]). I am not suggesting that men all look down on women, but it is more difficult for women to be assertive in front of male-dominated audience. The whole way the world is constructed means there are just men at every level, which makes it really hard for women to get their feet in the door. A way of overcoming this is to establish more female figures in the world. While few in the computer world actually know that Ms. Ada Byron is the first programmer in the world, how could we expect people to recognise women's ability?

3) Discriminated languages online and/or offline (e.g. phrases in documentaries)

Still, there is a strong "chauvinistic mentality", extended from the society we live, in the FLOSS social world.

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5 She is the president of the Perl Foundation and part of thethe core developers in the Perl 6 project.

6   She is a Debian GNU/Linux developer and one of the founders of Debian-Women group.

7 http://www.codejam.org/index.en.html

As the barrier of accessing FLOSS references is relatively low compared with other proprietary software projects, there should be few problems for participants regardless of gender, class, ethnicity and religion, to participate in the FLOSS development. However, many female FLOSS developers have complained the highly unfriendly atmosphere within the social world, online (e.g. mailing lists, IRC) and/or offline (e.g. documentation). For instance, referred to prospective readers, existed FLOSS documentation usually use single sex term, he, rather than she or they. This kind of gender-biased words subtly exclude women from participating in the FLOSS development. While the online languages are in a direct way full of men's jargon, reading the documentation offline does not make a female developer/user feel more included in the field. If girls need to be encouraged to participate in FLOSS-related discussions, a sexist or discriminative surrounding is definitely not attractive.

4) A gendered text-based environment

A text-based coding environment somehow reinforces how users' ICT experiences are *gendered*. In saying so, I am not suggesting that women are less apt for coding in a text-based environment; instead, I would like to strengthen that such a coding environment symbolises a remote experience for most women that it is difficult for them to establish subjectivity in a men-led coding culture.

The difference between text-based and graphic environments is externalised memories that can recall the keystrokes and commands. Coding in a text-based environment is useful for those who use tools so often that they can remember the commands and keystrokes. And graphic environment helps present commands in visual forms for users who have to look up commands. Coding in a text-based environment is more useful for a frequent programmers. Consequently, it is said that coding environments is just a matter of taste, not to do with gender or other social factor. However, if this is only a matter of preference, why is there such an impression, if it is not a stereotype, that being able to code in a text-based environment shows more computer literacy than in computing than in graphic environment? Is there a social-constructed stereotype towards programming job, since most of the frequent programmers are male? Isn't this a gendered environment?

Additionally, It is observed that women usually obtain their programming expertise through the formal education system. Unfortunately, formal education institutes rarely have text-based coding included in their curriculums. Instead, it is more common to see learn windows-oriented graphic-based coding environemnts such as Microsoft visual basic, visual C++ or Java. While coding for proprietary software is continuously reinforced, it is difficult for female programmers to be involved in the FLOSS development which requires the skill of coding in a text based environment.

5) A lack of women-centred view in the FLOSS development

The consequence of the lack of female FLOSS developers is that there is a greater amount of female-unfriendly software in the FLOSS system. Some scholars in science and technology studies (STS) have pointed out that technologies are gendered both in their design and use (e.g. Edwards 1993; Wajcman 2004).The social relations of gender within and across the FLOSS social world are reflected in and shaped by the design of FLOSS. And such a lack of women's perspective on software design and use restricts women's participation in the FLOSS development and, in turn, forms the stereotyped fact that women are almost absent in the FLOSS development because they are less adequate in programming or less likely to be advanced computer users. This absence of female developers would also be a loss of the FLOSS development, and results in inequalities in an ICT-based society as a threat to social cohesion and social order.

6) A male-dominated competitive worldview

"[The OSS market] is literally a war for the best and brightest. If we don't get there, somebody else will."

- by Andrew Clark, Director of strategy and market intelligence for the venture capital group at IBM

(interviewed with C|Net.com on February 14, 2005)

As Arun and Arun (2001) point out, "The project-based, competitive nature of software development reproduces a masculine culture, which further interacts with the different career patterns of women and social norms and tends to disadvantage women". While languages in a similar tone with Clark's above repeatedly turn up in the mass media such as advertisements from big computer companies, the male-led competitive worldview is continuously represented and reinforced in the society. Since there are fairly clear disparities of power between the sexes within the FLOSS social world, a gender-imbalanced world is ensued. The more powerful, male members are those who are generally in a position to determine and articulate the group's beliefs, practices, and interests. Although not all proposals associated with FLOSS are potentially antifeminist under such conditions, but they somehow duplicate and forward the view that might limit the capacities of women and girls to freely choose lives that they would like to live. It is very alarming that a large amout of perspectives and purposes regarding the FLOSS development is determined by white men. This imbalance might give a distorted world view; it is much better to have views from everybody, from all around the world.

7) No sympathy from women peers

There are many more spoken or unspoken problems for women to take part in the FLOSS development (e.g. Spertus 1991; Henson 2002). However, facing these gender inequalities, many women remain remote and feel no need of tackling these problems. While some women-centred online groups have networked together to address the gender issue in the FLOSS movement, many female programmers still do not share the same view on an ongoing and enlarging gap between men and women software developers. As happened in other fields in the society, sometimes women are more gender blind than men. While gender issue in FLOSS is not addressed in most of the literature and also not recognised by female peers, it is difficult to network women to tackle the coherent patriarchal hegemony in the computer world.

How can FLOSS Empower Women?

Hitherto, this essay has depicted the gender problems in the FLOSS social world and highlighted the need for increased action to address imbalances between women's and men's access to and participation in FLOSS. However, like many other ICTs, FLOSS carries the powerful potential as a vehicle for advancing social equality. The FLOSS-based environment, online or offline, provides opportunities to bridge the gender divide.

Along with the transformation of ICTs and their penetration into the home, workplace and education means, the type and meaning of gender digital divide is changing as well. Since the gap is narrowing between men and women in their levels of use of computers, the Internet, mobile phones and other systems, the problem is less about increasing the number of female ICT users, but that of female ICT developersICTs. In terms of FLOSS, it opens up an opportunity for women to learn how to communicate and interact with software designers and speak out what kind of software they want (e.g. file bug report, join the user group and online forum etc.), to have access to source code and fork the software (e.g. to have a female-friendly version of the software), if they are interested and competent.

There are three main ends in current "women movement in the FLOSS community": 1) providing women-friendly software and services; 2) creating a women-friendly environment for developing and using FLOSS; and 3) fostering a gender-balanced ICT innovation system for both competition and collaboration. These three points have close connections with one another – in order to create technology-based products that engage and

build on women's ideas and vision, we need to create a more women-friendly environment in order to attract more women to participate in the FLOSS development. Encompassing such a women-centred view of design, which usually resembles a more sympathetic and inclusive way of doing, will possibly foster a gender-balanced ICT innovation system that is not only friendly to women but also to various minotirites in our society. This system, unlike the current one based on a highly competition-oriented approach, will draw on aptitudes and competences of diverse actors in the FLOSS social world so as to develop a holistic environment which is based on a collaboration-oriented approach.

As mentioned above, the continuing production of *gendered* software and ICT products would make the gender gap in ICT grow. As such, it has been recommended that women need to be brought into today's knowledge-based economy, not only in order to balance the gender bias, but also in order to build a more vigorous innovation system based on a diverse range of creativity and productivity from different biological and cultural groups (WIGSAT recommendation; Faulkner *et al.*; C|Net "Opening doors for women in computing" 2005). Although female user' experiences can be focused in this account, it often treats female labour as an asset and claims that gender inclusion would help draw on the human being's entire talent pool. That said, this view seems to downplay the importance of social justice and put the economic value of female's participation in a higher priority. This perplexing situation requires alternative interpretations.

Networking is important in "democratising the access and dissemination of knowledge and establishing a base for a citizenship defined by gender equity. In order to encourage women's participation and also to explain the operation of FLOSS to women, some female developers/users have started to network and form online groups such as , LinuxChix[8], KDE Women[9], Gnurias[10], GenderChangers[11], and Debian-women[12]. They act to dispel the unfriendly wording in documents and in online peer groups, to report this kind of sexist bug reports to other developers, to give online tutorials. These networking and gathering, online or offline, would serve as a base for gender inclusion (see "The Gathering experience of Computer parties as means for gender inclusion").

Conclusion and future research

The essay aims to identify the current challenges of gender politics and help formulate strategies and recommendations in order to advance and to empower women in FLOSS. It is anticipated that through conceptualising and documenting the current gender issues in the FLOSS development, it will help enlarge the knowledge base for gender-sensitive policies on ICTs, and propose a women-centred policy towards developing and implementing FLOSS. While FLOSS denotes a new milestone for software development and knowledge-making in a broad sense that might alter the social relations of gender (Lin 2004: the concluding chapter), "in this technoscientific advanced era, feminist politics make wider differences in women-machine relationship than the technologies themselves" (Wajcman, 2004). As such, a gender-sensitive agenda for developing FLOSS is urgently needed.

In terms of future research, in order to get a comprehensive overview of the current gender digital divide in the FLOSS social world, more research, both qualitative and quantitative, needs to be conducted. The former would allow us to understand women's experiences and needs better through ethnographical observation, interviews, and focus groups, while the latter would give a more full picture of the general gender problem. Researchers across disciplines are encouraged to analyse FLOSS activities more gender critically, and to develop a

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8 http://www.linuxchix.org/

9 http://women.kde.org/

10 http://www.gnurias.org.br/

11 http://www.genderchangers.org/

12 http://women.alioth.debian.org/

conceptual frameworks and methodologies for better understanding and analysing the relationship between FLOSS and gender. Additionally, in encouraging the FLOSS development, governments and organisations should pay extra attention to gender-related issues as well, and take initiatives to include women in the FLOSS development. Holding training workshops for female developers might be a feasible way of bridging the gender digital divide in the FLOSS social world. Other efforts such as design of products and websites for women and girls, support networks for female professions in FLOSS shall be encouraged (see Sophia Huyer).

However, in speaking of implementing and developing FLOSS, most of the cases are centralised or situated in the developed countries. One should bear in mind that there are many undocumented activities happened in the developing world. When strengthening the advantages of FLOSS, we should not overlook many problems emerging from implementing FLOSS in developing countries, such as a lack of sufficient training and support (e.g. Guardian. February 17, 2005). The digital divide shall be considered as a symptom of inequality, not the cause of it. There is a need of understanding what local people really need: water, food, jobs, decent healthcare and sanitation, or software and ICT infrastructure. The gender issue of ICT might be more complex than we thought as well. Female participants very often suffer from hybrid discriminations, both from the male-dominated FLOSS world and the socio-cultural patriarchy in the society. Although virtual groups such

Linuxchix Brazil[13] and Linuxchix Africa[14] have started providing women with help on solving problems in implementing Linux, more efforts need to be spent on documenting, analysing and deconstructing the patriarchal hegemony embedded in the whole ICT infrastructure. As such, like many other fields concerned with gendering, this essay is a mere beginning of a feminist accounts about the FLOSS development – an analytic stage on which "we need to place the details contributed by ethnographic research, cultural critiques, sociological surveys, legal scholarship on men and women in their many specific conditions and subjectivities." (Sassen 1999: 2).

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13 http://www.linuxchix.org.br

14 http://www.africalinuxchix.org

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