
Requirements for design participation in Open Source Software communities

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Abstract

On the basis of our research on forms of participation in an Open Source Software Design (OSSD) community (Python), we investigate requirements to participate in OSSD, which is seen as a form of distributed participatory design. We outline that design participation is supported by socio-organizational roles, such as boundary-spanners. We assume that design participation, especially for end-users, can be improved by tools enhancing development of common ground,

situation and social awareness within OSSD communities.

Keywords

Open Source Software design, distributed participatory design, requirements

ACM Classification Keywords

C4. Design Studies. H.5.2 User Interface. ergonomics

Introduction

OSS design (OSSD) can be considered as a distributed form of participatory design. In principle, various stakeholders can participate in all the phases of the design process (elicitation of needs and requirements, design and implementation) [5]. Stakeholders can participate to OSSD by posting and answering on online mailing-lists, eliciting some needs, proposing and evaluating design solutions; by reporting bugs; by contributing to the design by proposing new code to implement a new design idea or to correct a bug. This broad participation is usually seen as one of the most important factor explaining the success and the quality of the Open Source Software (OSS).

In this paper, our point is to outline that effective participation in OSSD requires stakeholders to overcome various barriers. It is based on results of a case on forms of participation in one of the major OSS project, the Python project.

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CHI 2008, May 05 – May 10, 2008, Florence, Italy

ACM 1-xxxxxx

The Case Study: forms of participation in an OSS community

The central issue of our research is to investigate emerging roles and forms of participation fostering design-use mediation during the Open Source Software design process. We focus on the Python community - dedicated to the design and the usage of the Python programming language-, and some of its application domain communities – that use Python to develop application in web, financial or biological domains for instance. Our study investigates participation to the proper design process of the Python language (proposition, evaluation and implementation of new design ideas) that occurs mainly through online discussions. It compares participation in online interactions for a successful “pushed-by-users” design process with unsuccessful previous proposals. This process involves:

- Participants evolving in the Python core community, which are developers as well as users of the Python language, called the *developers*;
- Participants evolving in application domain communities, which are users of the Python language and developers of application based on Python, called the *users* (in reference to the Python language).

The developed methodology, articulates structural analyses of online discussions (organization of discussions, number of posted messages, etc.), and content analyses of messages (activities and knowledge sharing), to actions to the code and documentation made by participants in the OSS project. Our data concern: on one hand, discussions occurring in two mailing lists: one, usage-oriented (dedicated to general and usage questions about Python) and the other development-oriented (dedicated to design issues of

the Python programming language); on the other hand revisions of code and document online archived on a platform. To complement these analyses, we performed interviews with various stakeholders of Python in Europe and in the US.

Lessons Learned

Requirements to OSSD participation

To characterize some conditions to successful participation in OSSD, we use the framework developed in [4] which outlined various factors leading to success in distant collaborations. Indeed, distributed participatory design can be seen as a form of remote collaboration.

COMMON GROUND, SITUATION AWARENESS, SOCIAL AWARENESS

Participants in OSS communities may share a common ground related to technical knowledge and skills (most of participants know the C programming language and work in Information Technology area for instance [3]). They may also share some methodological skills, such as Agile methodologies (www.agilemanifesto.org) These skills lead to enhance the efficacy of the collaboration.

They may also share norms and values. For instance, a participant has to be aware of the history of the design process and not to ask a question that has already being answered: conforming to this rule requires to have constructed situation awareness.

Indeed, our research reveals that participants may also construct situation awareness, i.e. a representation of “*what is going on*” in the community, the ongoing discussions, developments and issues for instance.

This is complemented by social awareness of the community, related to social knowledge:

- Who gets which expertise in the project.
- Who gets which status in the project, e.g. who gets the right to modify directly the source code.
- What effective roles are performed by participants in the community. For instance, some participants are called the 'Bot (abbreviation of Robot) because they answer to questions in online discussions very quickly and accurately.

COLLABORATION READINESS AND TRUST

Collaboration readiness refers to the culture to collaborate, shared by participants, their motivation to work together, their trust in each other and their sense of collective efficacy.

This trust may be actively constructed into the community through the quality of ones participation:

- Technically related quality (technical solutions, code);
- Perceived discursive quality (relevance of question and answer in online discussions for instance);
- Perceived social quality (recognition of other's work, reliability in helping others, thanks for the gift of the community).

TECHNOLOGY READINESS

The technology readiness deals with the comfort of participants using collaboration technologies and their adaptation and ease of use.

Participants in OSS communities mainly use two kinds of tools: communication tools (such as mailing-lists) and project management tools (such as the sourceforge platform (www.sourceforge.net) or the Bugzilla bug report system). Globally these tools have poor features to support the development of situation and social awareness of the community [2] which then requires participants to have developed some strategical

knowledge, to reconstruct coherence of online discussions for instance.

TIME AND CULTURAL ISSUES

Time and cultural issues deal with the various locations of participants all over the world: culture, time zones of participants and the time that participants can take to participate.

In OSSD, time issues refer to the duration of time that ones need to take to participate – to develop a piece of software for instance-, but also to availability to participate in the community, reading or posting on online discussions for instance. Our research reveals that some of these discussions are quasi-synchronous and participants in different time-zone are more than often put off discussions [2].

These differences of time-zones may be increased by cultural differences as OSSD grown mainly in the US and in Europe, as far as norms and values embedded in these communities may reveal these cultures.

Barriers to design participation

The outlined requirements enforce various barriers for users to participate in design in OSS communities.

Barriers are from different natures:

- Insufficient skills and competences, in particular poor sharing of technical and methodological common ground with others, and specifically with the development community; poor social and discursive skills;
- Insufficient construction and updating of situation and social awareness, in particular based on the difficulty and time to construct it;
- Time cost required to participate.

Stakeholders who cannot overcome these barriers might fail in establishing a trust relationship with other participants, which decreases the efficacy of their participation.

Overcoming barriers to design participation

Our research outlined that some key participants can help in overcoming some of these barriers [1]. In the successful design process we studied, we outlined that the presence of boundary spanners [6] between the development and the usage communities, fosters the design-use mediation process.

Requirements to participate were less costly for them as they already developed common ground, situation and social awareness and trust within the communities. They helped in maintaining situation awareness between these communities by active cross participation in the two mailing lists and by transferring knowledge from one community to the others. They also helped the user championing the design idea.

This participant had the social skills to coordinate the process and enhance harmonious relationships within the community. However boundary spanners supported him in establishing a trust relationship within the community. They also support him with technical and discursive help.

Conclusions

Assuming the highlighted barriers, a challenge to perform distributed participatory design in OSS context, is to associate end-users to the design process. Indeed, they have to cope with a complex socio-organizational and technical chain to participate to OSSD.

Another challenge is to support the development of common ground, situation and social awareness. In a previous paper we propose such a tool mining online discussions to propose social and thematic visualizations [2]. However, it remains essential that these tools be a complement of the socio-organizational support observed, helping members of OSS community in developing social and situation awareness, such as mutual trust. It has already been shown that socio-organizational support enhances development of knowledge and competences in OSS communities.

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