

# User and developer mediation in an Open Source Software community: Boundary spanning through cross participation in online discussions

Flore Barcellini<sup>a,b,\*</sup>, Françoise Détienne<sup>a</sup>, Jean-Marie Burkhardt<sup>a,c</sup>

<sup>a</sup>*INRIA Eiffel Group, Domaine de Voluceau, 78153 Le Chesnay Cedex, France*

<sup>b</sup>*Cnam, Laboratoire d'Ergonomie, Centre de Recherche sur le Travail et le Développement, 41 rue Gay-Lussac, 75005 Paris, France*

<sup>c</sup>*Laboratoire Ergonomie-Comportement-Interactions, Université Paris 5, 45 rue des Saints-Pères, 75270 Paris, France*

Available online 25 October 2007

## Abstract

The aim of this research is to analyse how design and use are mediated in Open Source Software (OSS) design. Focusing on the Python community, our study examines a “pushed-by-users” design proposal through the discussions occurring in two mailing-lists: one, user-oriented and the other, developer-oriented. To characterize the links between users and developers, we investigate the activities and references (knowledge sharing) performed by the contributors to these two mailing-lists. We found that the participation of users remains local to their community. However, several key participants act as boundary spanners between the user and the developer communities. This emerging role is characterized by cross-participation in parallel same-topic discussions in both mailing-lists, cohesion between cross-participants, the occupation of a central position in the social network linking users and developers, as well as active, distinctive and adapted contributions. The user championing the proposal acts as a key boundary spanner coordinating the process and using explicit linking strategies. We argue that OSS design may be considered as a form of “role emerging design”, i.e. design organized and pushed through emerging roles and through a balance between these roles. The OSS communities seem to provide a suitable socio-technical environment to enable such role emergence.

© 2007 Elsevier Ltd. All rights reserved.

*Keywords:* Open Source Software Community; Cross-participants; Boundary spanners; Distributed design; Role emerging design

## 1. Introduction

Open Source Software (OSS) design is characterized by a communitarian and a distant, asynchronous and mediated design process. This new way of designing is becoming increasingly widespread in the computer science world: there are thousands of OSS, some of which are highly successful, like Mozilla ([www.mozilla.org](http://www.mozilla.org)) or Apache ([www.apache.org](http://www.apache.org)), and they are supported by communities of tens to hundreds of developers and millions of users (Gacek and Arief, 2004).

Mainly mediated by Internet tools (Mockus et al., 2002; Sack et al., 2006), OSS design is a paradigmatic case of distant and asynchronous collaborative design, which has

thus far been less investigated than distant and synchronous, or co-located collaborative design (e.g. Olson et al., 1992; Stempfle and Badke-Schaub, 2002; Détienne et al., 2004, 2005). Studying OSS is also of particular interest to gain insights into supporting the changing nature of the software industry, which is increasingly making use of OSS design's tools and methods as it becomes more and more distributed and global (Gutwin et al., 2004).

OSS design can also be considered as a continuous form of distributed participatory design: new functionalities can always be proposed and discussed at any step in the project (Gasser et al., 2003), forms of participation in OSS projects are supposed to be “open” in time and for different kinds of participants whatever their stake in the project (developers or users of the OSS). Thus, users of OSS can potentially be involved in all the phases of the design process (elicitation of needs and requirements, design and implementation), at least if they have the skills to do so. This is often the case as, in OSS, users can be highly skilled

\*Corresponding author. Tel.: +33 1 39 635552; fax: +33 1 39 635995.

E-mail addresses: [flore.barcellini@inria.fr](mailto:flore.barcellini@inria.fr) (F. Barcellini),

[Francoise.Detienne@inria.fr](mailto:Francoise.Detienne@inria.fr) (F. Détienne),

[Jean-Marie.Burkhardt@univ-paris5.fr](mailto:Jean-Marie.Burkhardt@univ-paris5.fr) (J.-M. Burkhardt).

in computer science (Ducheneaut, 2005), as well as in particular application domains (e.g., education, biology, scientific computing, etc.). Moreover, the participation of users is considered to be the major strength of the OSS design process compared to proprietary ones: most bugs are detected and fixed because “there are many eyeballs looking at the problem” (Raymond, 1999).

As far as we know, there has been no research that aims at obtaining a global understanding of the OSS design process, and of the position actually occupied by users proposing new functionalities. Mediating design and use in this distant and asynchronous design setting can be of particular interest given the usability problems of OSS software, which are mainly due to the lack of human–computer interaction methods in OSS communities (Twidale and Nichols, 2005).

The aim of this research is thus to understand the ways in which members of OSS communities, and especially users, participate in the design process and to identify whether or not some key participants may act as boundary spanners to link the user and the developer communities. This research is focused on a major OSS project, Python, which is an object-oriented programming language ([www.python.org](http://www.python.org)).

In the following sections, after a review of our theoretical framework, we set out our research questions and strategy. Then, we present the results and discuss the perspectives of this research.

## 2. Theoretical framework

To build our theoretical framework, we need to refer to OSS studies that establish which statuses and roles can emerge in OSS communities. We refer to the cognitive ergonomics of collaborative design to understand what activities participants perform during a design process. Finally, we also refer to organizational science and design studies which point out that some key participants, boundary spanners, act as mediators between users and designers.

### 2.1. Roles, statuses and user participation in OSS communities

OSS projects are seen as online epistemic communities (Cohendet et al., 2000; Preece, 2000). Their members form a group of people connected together on the Internet with a common goal—to develop software—with the “meta”—objective of producing and constructing knowledge about the artefact they develop for the benefit of all the community. Their activities are framed by implicit and explicit rules: volunteer participation or evaluation of work by a peer-review mechanism for instance (e.g. Raymond, 1999).

Major OSS projects are highly hierarchical and meritocratic communities (Mahendran, 2002; Gacek and Arief, 2004). Five different statuses are generally distinguished in these projects, according to the distinctive rights and power of the participants. Some participants can modify the

source code and participate directly in the design process and in decisions regarding the software:

- The *project leader* (generally the creator of the project such as Guido Van Rossum for Python, or Linus Torvalds for Linux).
- The core team or *administrators*, who have to maintain the code base, the documentation.
- The *developers* or contributors who participate in the evolution of the OSS and maintain some of its parts.

Other participants are called *users*. In an OSS context, users may be highly skilled in computer science, and thus far from the classical notion of “end-users”.

- They are called *active users* if they participate in mailing-list discussions as informants for newcomers, by reporting or correcting bugs with patches, and by proposing new modules. These *active users* in a particular OSS project may be developers in another project.
- Other users are called *passive users* as they only use the software or lurk on the discussion and documentation spaces of the project (Preece et al., 2004).

It is possible to evolve between these statuses by acquiring and proving one’s technical skills and ability to engage and maintain online discussions: that is to say that roles emerge and are actively constructed within the community (Mahendran, 2002; Ducheneaut, 2005). This notion of role reflects the effective and emerging behaviour of participants. In some cases, these activities may correspond to what is expected from a particular status.

The literature on OSS clearly identifies that active users take part in the evaluation phase of design (bug reporting and patching, e.g. Ripoché and Sansonnet, 2006) and that the project leader, administrators and developers participate in the design process itself, i.e. generating and evaluating solutions and taking decisions (Barcellini et al., 2005). Open issues are still to characterize the role of users regarding the design process itself and the role of all the active participants (project leader, administrators, developers and active users) during the elicitation of the needs and requirements phase. Despite the idealistic picture that users may intervene freely in the process, we will question whether users who are neither administrators nor developers in the core Python community can really have an impact on the design choices and decisions. In particular, we will focus on the design-use mediation process: how to use and design are articulated when new functionalities are proposed, solutions are generated and evaluated; and what are the links between users and developers in OSS communities.

### 2.2. Collaborative design activities in OSS

Studies of face-to-face design meetings, especially in software design meetings (e.g. Olson et al., 1992; Herbsleb et al., 1995; d’Astous et al., 2004) or on mediated,

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات