

# Chapter 1

## An Empirical Study of Open Source Software Usability

### The Industrial Perspective

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#### **ABSTRACT**

*Recent years have seen a sharp increase in the use of open source projects by common novice users; Open Source Software (OSS) is thus no longer a reserved arena for software developers and computer gurus. Although user-centered designs are gaining popularity in OSS, usability is still not considered one of the prime objectives in many design scenarios. This paper analyzes industry users' perception of usability factors, including understandability, learnability, operability, and attractiveness on OSS usability. The research model of this empirical study establishes the relationship between the key usability factors and OSS usability from industrial perspective. In order to conduct the study, a data set of 105 industry users is included. The results of the empirical investigation indicate the significance of the key factors for OSS usability.*

#### **INTRODUCTION**

In the ISO 9241-11 (1998) standard, usability is defined as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” However, The International Organization for Standardization and The International Electro technical Commis-

sion ISO/IEC 9126-1 (International Organization for Standardization, 2001) categorizes software quality attributes into six categories: namely functionality, reliability, usability, efficiency, maintainability and portability. In the standard, usability is defined as “the capability of the software product to be understood, learned, used and attractive to the user, when used under specified conditions.” Here, usability is further subdivided into understandability, learnability, operability and attractiveness.

DOI: 10.4018/978-1-4666-2937-0.ch001

While studying GNOME project, Koch and Schneider (2002) observe that in general, the number of people involved in OSS development are more than in traditional organizations, “*but the data show the existence of a relatively small ‘inner circle’ of programmers responsible for most of the output.*” OSS users, however, come from every corner of the world having all sort of cultural, technical and non-technical backgrounds, requirements and expectations. They have free access as well as the ability to modify the source code (Aberdour, 2007). OSS is no longer reserved for computer developers alone, since a number of non-technical and novice computer users are growing at a fast pace, underscoring the need to understand and address their requirements and expectations (Iivari, 2009a). Although Laplante et al. (2007) believe that OSS has more potential to achieve higher software quality as compared to closed proprietary software; they observe the reluctance shown by many organizations in using OSS primarily due to “an inherent distrust of OSS quality.” Nichols and Twidale (2006) state, “it is unfair to compare imperfect but public OSS processes with imagined but concealed commercial processes.” They believe that due to the OSS environment, the software development process has become accessible that has been kept concealed in proprietary software. Referring much of the commercial software that failed to address usability issues properly, the authors do not consider usability a resolved issue in closed software projects either. They believe that research in the domain of OSS usability would be beneficial to both OSS as well as closed proprietary software products. Hedberg et al. (2007) observe that with the rapid increase in the non technical users of OSS, expectations related to higher software quality will grow as well. According to them, unlike the typical OSS approach, users will not be the co-developers who are competent enough to locate and fix the bugs; thus the quality assurance would need to be done before the software is delivered. They stress the need of having empirical research dealing with usability and quality assurance in OSS. de Groot

et al. (2006) maintain that “*many OSS projects, such as KDE, have established processes for the maintenance of software quality. However, these can only be of limited use when the actual quality of the product is still unknown.*” While carrying out a study on the evolution metrics of OSS, Wang et al. (2007) propose a new set of metrics. Furthermore, their case study on Ubuntu – a popular Linux distribution, confirms the essential role of open source community and its members in OSS evolution.

Winter et al. (2007) consider the improvement of “the usage of a system” to support user activities as the main aim of usability engineering. Bodker et al. (2007) highlight that OSS developers need to have a full understanding, motivation and determination to address users’ demands to avoid ending up with products that lack user friendliness, which could be a serious threat to its popularity and adoption. Ahmed (2008) refers to questionnaires that have long been used to gather users’ assessment regarding subjective matters such as interfaces. However he realizes the need of more resources for usability testing as its success relies upon the test quality and coverage. Zaharias and Poylymenakou (2009) also consider usability questionnaires as a fast, cost effective way to collect users’ feedback that can also be used to confirm target users.

We have already conducted three studies to empirically investigate the significance of certain key factors on OSS usability from OSS developers, users and contributors (that include users, developers, testers, systems analysts) points of view. This research work is the last of the series in which we analyze the industry users’ perception regarding impact of the sub-factors of usability (understandability, learnability, operability and attractiveness) upon OSS usability. This study contributes to understanding the effects of the stated key factors which play a vital role in OSS usability.

We present the literature review regarding software usability issues in the open source software industry, in general and related to the key

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