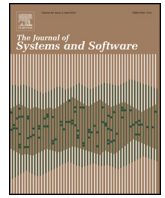




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Sustainability of Open Source software communities beyond a fork: How and why has the LibreOffice project evolved?☆



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ABSTRACT

Many organisations are dependent upon long-term sustainable software systems and associated communities. In this paper we consider long-term sustainability of Open Source software communities in Open Source software projects involving a fork. There is currently a lack of studies in the literature that address how specific Open Source software communities are affected by a fork. We report from a study aiming to investigate the developer community around the LibreOffice project, which is a fork from the OpenOffice.org project. In so doing, our analysis also covers the OpenOffice.org project and the related Apache OpenOffice project. The results strongly suggest a long-term sustainable LibreOffice community and that there are no signs of stagnation in the LibreOffice project 33 months after the fork. Our analysis provides details on developer communities for the LibreOffice and Apache OpenOffice projects and specifically concerning how they have evolved from the OpenOffice.org community with respect to project activity, developer commitment, and retention of committers over time. Further, we present results from an analysis of first hand experiences from contributors in the LibreOffice community. Findings from our analysis show that Open Source software communities can outlive Open Source software projects and that LibreOffice is perceived by its community as supportive, diversified, and independent. The study contributes new insights concerning challenges related to long-term sustainability of Open Source software communities.

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1. Introduction

Many organisations have requirements for long-term sustainable software systems and associated digital assets. Open Source software (OSS) has been identified as a strategy for implementing long-term sustainable software systems (Blondelle et al., 2012a; Lundell et al., 2011; Müller, 2008). For any OSS project, the sustainability of its communities is fundamental to its long-term success. In this study we consider long-term sustainability of communities in OSS projects involving a fork. Our overarching goal was to establish rich insights concerning how and why the LibreOffice project and associated communities have evolved. More specifically, we report on commitment with the LibreOffice project, retention of committers, and insights and experiences from participants in the LibreOffice community. Overall, the study has revealed several key findings. First, the LibreOffice project, which was forked from the

OpenOffice.org project, shows no sign of long-term decline. Second, the LibreOffice project has attracted the long-term and most active committers in the OpenOffice.org project. Third, our analysis shows that Open Source software communities can outlive Open Source software projects. Fourth, LibreOffice is perceived by its community as supportive, diversified, and independent.

The issue of forking OSS projects has been an ongoing issue of debate amongst practitioners and researchers. It has been claimed that “Indeed, the cardinal sin of OSS, that of project forking (whereby a project is divided in two or more streams, each evolving the product in a different direction), is a strong community norm that acts against developer turnover on projects” (Ågerfalk and Fitzgerald, 2008). Further, it has been claimed that few forks are successful (Ven and Mannaert, 2008). Therefore, it is perhaps not surprising to see claims for that “there must be a strong reason for developers to consider switching to a competing project” (Wheeler, 2007). However, it has also been argued that “forking has the capability of serving as an invisible hand of sustainability that helps open source projects to survive extreme events such as commercial acquisitions, as well as ensures that users and developers have the necessary tools to enable change rather than decay” (Nyman et al., 2012). Similarly, Brian Behlendorf, co-founder of Apache Software Foundation, states that the “right to fork means that you don’t have to have any tolerance for dictators, you don’t have to deal with

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people who make bad technical decisions – you can put the future into your own hands, and if you find a group of other people who agree with you, you can create a new project around it” (Severance, 2012). Another argument is that code forking can positively impact on both governance and sustainability of OSS projects at the levels of the software, its community and business ecosystem (Nyman and Lindman, 2013). From this, there is clearly a need for increased knowledge about how OSS communities are affected by a fork.

There are two specific objectives. For the *first objective*, we characterise community evolution over time for the LibreOffice project and the related OpenOffice.org and Apache OpenOffice projects. For the *second objective*, we report on insights and experiences from participants in a community of the branched project LibreOffice in order to explain how and why the project has evolved after the fork from its base project OpenOffice.org.

The paper makes four novel contributions. First, we establish a characterisation of the LibreOffice project and the related OpenOffice.org, and Apache OpenOffice projects with respect to history, governance, and activity. Second, we present findings regarding developer commitment with the projects under different governance regimes. Third, we present findings regarding retention of committers in the projects under different governance regimes. Fourth, we report on rich insights and experiences from participants in the LibreOffice project with a view to characterise its community and its way of working. In addition, we demonstrate approaches involving metrics for analysing long-term sustainability of communities (with or without forks) in OSS projects, and illustrate their use on different OSS projects.

There are five reasons which motivate a study on the LibreOffice project. Firstly, LibreOffice is one of few OSS projects which have had an active community for more than 10 years (when including the development in OpenOffice.org), with significant commercial interest. Secondly, there have been tensions within the OpenOffice.org project which finally led to the creation of the Document Foundation and the LibreOffice project (Byfield, 2010; Documentfoundation, 2013a). Thirdly, the project has reached a certain quality in that it has been adopted for professional use in a variety of private and public sector organisations (Lundell, 2011; Lundell and Gamalielsson, 2011). Therefore, its community is likely to attract a certain level of attention from organisations and individuals. Fourthly, previous studies of the base project OpenOffice.org (Ven et al., 2007) and more recent studies of LibreOffice (Gamalielsson and Lundell, 2011) show that there is widespread deployment in many organisations in a number of countries. This in turn imposes significant challenges for a geographically distributed user community. Fifthly, previous results (Gamalielsson and Lundell, 2011, 2012) and anecdotal evidence from an official spokesperson for the LibreOffice project (Nouws, 2011) suggest significant activity in the LibreOffice community. This motivates a more in-depth investigation of how and why the LibreOffice project evolved.

Hence, there is a need to extend previous studies on the LibreOffice project and in so doing include investigation of the project which LibreOffice was forked from (the OpenOffice.org project) and also alternative branches (the Apache OpenOffice project). An investigation of the OpenOffice.org project is interesting since it has been widely deployed. Further, the project is a natural source for recruitment to the LibreOffice project. Similarly, Apache OpenOffice is also interesting to investigate since it is the project that succeeded the OpenOffice.org project after Oracle abandoned it. Further, the investigation of Apache OpenOffice enables a more comprehensive study of community dynamics since the OpenOffice.org project is a potential source for recruitment to the Apache OpenOffice project as well.

For the rest of this paper we position our exploration of sustainability of OSS communities in the broader context of previous

research on OSS communities (Section 2). We then clarify our research approach (Section 3), and report on our results (Sections 4 and 5). Thereafter, we analyse our results (Section 6) followed by discussion and conclusions (Section 7).

2. On sustainable Open Source software communities

Many companies need to preserve their systems and associated digital assets for more than 30 years (Lundell et al., 2011), and in some industrial sectors (such as avionics) even more than 70 years (Blondelle et al., 2012b; Robert, 2006). In such usage scenarios “there will be problems if the commercial vendor of adopted proprietary software leaves the market” with increased risks for long-term availability of both software and digital assets (Lundell et al., 2011). Similarly, for organisations in the public sector, many systems and digital assets need to be maintained for several decades. This causes organisations to vary concerning different types of lock-in and inability to provide long-term maintenance of critical systems and digital assets (Lundell, 2011). For this reason, sustainability of communities has been identified as essential for long-term sustainability of OSS.

There are many different aspects of an OSS project that can affect community sustainability. Good project management practice includes to consider different incentives for contributing to OSS communities. This in turn may affect the future sustainability of communities (Bonaccorsi and Rossi, 2006). Previous research has shown that there are a number of different kinds of motivations for individuals and firms that have impact on any decision concerning participation in OSS projects. Such motivations are sometimes categorised into economic, social, and technological types of incentives (Bonaccorsi and Rossi, 2006). Earlier research also suggests that an effective structure of governance is a basis for healthy and sustainable OSS communities (de Laat, 2007). In particular, aspects such as clear leadership, congruence in terms of project goals, and good team spirit are of fundamental importance. Moreover, the community manager in an OSS project plays a key role for achieving an effective structure of governance (Michlmayr, 2009). Further, the licensing of OSS may affect the community. It has been claimed that “fair licensing of all contributions adds a strong sense of confidence to the security of the community” (Bacon, 2009). It has also been claimed that the choice of OSS license type “can positively or negatively influence the growth of your community.” (Engelfriet, 2010) To successfully master the art of establishing a long-term sustainable OSS community is a huge challenge. As in all organisations, there are “times in every community when repetition, housekeeping, and conflict play a role in an otherwise enjoyable merry-go-round. When the community begins to see more bureaucracy and repetition than useful and enjoyable contributions, something is wrong.” (Bacon, 2009)

A fork is often a consequence of inadequate OSS project governance. It has been claimed that forks “are generally started when a number of developers do not agree with the general direction in which the project is heading” (Ven and Mannaert, 2008). In particular, conflicts within communities can arise due to inadequate working processes, lack of congruence concerning project goals, and unclear (or in other ways inadequate) leadership. There are different views on what is considered an OSS project fork. It has been claimed that in order to be considered a fork, a project should (Robles and Gonzalez-Barahona, 2012): (1) have a new project name, (2) be a branch of the original OSS project, (3) have an infrastructure that is separated from the infrastructure of the original project, e.g. web site, mailing lists/forums, and SCM (Software Configuration Management system), (4) have a new developer community that is disjoint from the community of the original project, and (5) have a different structure of governance. There are

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