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Open Source Software Governance: Towards a Link to The Business World

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Abstract

In this article, we argue that the lack of theoretical definition in the literature related to open-source governance opens the floor for multiple possibilities to define it. Therefore, the existence of a baseline to refer to a robust governance solution is deemed crucial. We posit that defining vertical product domains as a benchmark to measure governance solutions robustness helps in theory advancement in governance literature. The creation of vertical product domains is the output of successful open-source projects due to the transformation of open sourcing. We develop a conceptual understanding to precisely define the vertical domains in open-source projects and future agenda for open source governance theory advancement.

Keywords: Open-source Software, Vertical domains, Governance.

1 Introduction

Since the early years of the twenty-first century, Open-source software (OSS) supporters have called to liberate developers by allowing them to run, copy, distribute, study, and improve software codes (Stallman, 2002). Open-source software (OSS) is the source code used and distributed under open source licenses (Raymond, 1998; O'Mahony, 2003; de Laat, 2007). These licenses are restrictive and permissive ones.

For the restrictive licensing, the software shall remain open sourced. All decentralized collaborations (technical and non-technical) between the heterogenous software developers inside and outside the organization's boundaries are combined to create and reshare software codes. Researchers found that such software is a general software such as an operating system that can be implemented across the different industries (Fitzgerald,2006). Therefore, governance in this case works as an input to trigger participants' motivations to participate (Crowston et al., 2012); not only do the intrinsic and extrinsic motivations for participants determine their participation attitude, but also the governance solution used (in terms of license type for example) (Lerner & Tirole, 2005b) will also determine if such a project is an "itch worth scratching" (Raymond, 1999a).

However, for the permissive licensing, the license of the modified software can be changed and the software may be privatized. Accordingly, companies that participate in the development of the OSS under permissive licensing may be negatively affected ; their contributions may be privatized by other competitors. As a result, governance is becoming even more critical than before to protect participants' intellectual property whom are unwilling to forfeit their intellectual property for nothing (O'Mahony, 2003). Therefore, Governance should take a new theoretical direction with the introduction of permissive licenses because interested individual customers or commercial firms (simply, the market) can consequently interfere with changing the project license and the technical future. This means that Governance is currently affected by market variables.

Literature reviews have focused on Governance as a solution to sustain motivations rather than paying attention to the market effect on these solutions. In this paper, we are redirecting the theoretical attention from the process of developing a general OSS software that can be used across the different industries and governing its participants motivations and collaboration styles toward the process of developing a software that is directed by a market and is implemented across a niche or a specific market; this is referred to as a vertical domain software (Fitzgerald,2006). The long-term implication of accomplishing the article aims to move the open-source theory from enriching the literature about different governance solutions to providing practical solutions supported by theory and implemented in an open-source environment.

The finding of this theoretical paper will help in suggesting aspects for OSS vertical domain as well as providing a governance research agenda for each aspect.

2 Literature review

Open-source software (OSS) is the source code used and distributed under OSS licenses (Raymond, 1998; O'Mahony, 2003; de Laat, 2007). It confirms the central role played by the decentralized collaboration between the heterogeneous software developers inside and outside the organization's boundaries while keeping the same spirit of intellectual rights that immensely differs from the proprietary software property rights.

Studying OSS governance is challenging for researchers because governance definition in the literature is divergent. Researchers neither agreed upon a robust definition nor common characteristics to deal with Governance. This divergence makes it hard for researchers to identify variables for governance measurement. It is believed in this article that we need to shift our focus from traditional Governance to a robust governance solution, solutions that are effective in fulfilling the projects' output. This is true as "Link to the business world" is the core inner value for OSS. OSS is valued only when linked to business regardless of profits being generated or not.

Traditional governance concepts focus on discussing social values, for example (Kassen, M., 2022). Trust and reputation are the fundamental social values governing OSS communities (Lerner & Tirole, 2002a). Moreover, authority and control are discussed in leadership and decision-making necessary to ensure effective participation from contributors (Di Tullio & Staples, 2013, Ferraz, I. & Santos, C., 2022). In addition, ownership and licensing are another crucial discussion for OSS governance under which the shifting from restrictive to permissive licensing was explored and discussed (Hmoud H. et al., 2016, O'Mahony, S. & Karp, R., 2022).

However, the robust governance solutions, as suggested by Fitzgerald (2006), need to stimulate OSS projects in vertical domains either by the creation of OSS with complex business requirements that goes beyond the conventional wisdom of the participants and find their way through the different industry sectors or through the engagement in OSS projects that require more specialized knowledge in a specific industry sector.

3 Research agenda

3.1 Vertical domains in terms of domain-specific applications

Vertical domains include domain-specific applications (Riepula, 2011). Those applications can be described according to Yoo et al. (2010) where a novel product software can be developed and gains its power from the heterogeneity of its actors. Instead of developing a general software, it is argued to build a comprehensive vertical domain software that can serve the heterogenous needs of a certain industry or market. This can be implemented by sharing the core software that can be general enough to attract different customers and satisfy their incremental and customizable needs. These needs are transferred into different software requirements and features that are developed as layers of software complementarities. And the final project is undoubtedly

complex! It is complex in its requirements, features, compatibility, development, and maintenance.

To do so, heterogenous actors need to be shaped into networks that appraise the role of exchanging resources out of the boundaries of the common hierarchies and markets (Malone et al., 1994). Organizations need to attract actors to design and develop a novel product outside the closed premises where the organization is placed. Moreover, knowledge shared between the heterogenous actors needs to be related to design hierarchies that produce an unexpected product with brilliant components that all fit together in different layers of software technologies. It is believed that governing a complex novel software needs to focus on :

- How the different contributions in OSS projects can be combined to produce one complex project that is effective than creating different projects solely?
- What processes can be used to mine the information generated by the different contributors to produce the needed knowledge? How conflicts over different knowledge and systems development processes can be managed?
- What are the challenges of finding the robust social arrangements that could be addressed by the participants? And how the productivity of the open source project would affect their incentives to collaborate?
- How to measure the effect of the market (contributors that are individual customers or employees in commercial firms) on the open source governance?

3.2 Vertical domains in terms of Sector oriented projects.

Vertical domains include mission-critical applications (Poba-Nzaou et al., 2014). The emphasis of this article is on the vertical domains that are more oriented toward a specific mission, such as ERP in higher education and healthcare sectors. The OSS projects aim to pool the contributors' resources to reduce the cost and increase the performance and control (Dolphin, 2014), as well as share risks, which are achieved through appropriate governance mechanisms. Reducing the cost refers to investing through capacity building, knowledge sharing, and human resources development. Increasing the performance results from sharing resources, skills, and experiences. In terms of control, mission critical OSS projects are considered a solution for the build-buy dilemma when adopting information technology by providing the organization more control over the software in terms of maintenance, customizations, and support.

As their requirements are specific, vertical OSS products are designed and maintained by knowledgeable and experienced developers in that area. This also may require developers to be paid to contribute to the OSS project.

Based on the above discussion, the following governance questions are suggested:

- What are the formal and defined coordination mechanisms used?
- How OSS communities govern the public and private tensions between contributors?
- What are the rules governing the collaboration between contributors?

- How are monitoring and sanction going to be practiced I these new settings?

4 Conclusion

This paper suggested the vertical domains perspective of OSS projects would fit as a benchmark to measure governance robustness for OSS projects. Such perspective is argued to contribute to theory advancement for OSS governance literature as new direction for governance research questions are suggested.

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