

Exploring health within OSS ecosystems

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Abstract. Open Source Software (OSS) is software which can be freely used, modified and redistributed, generally produced in a collaborative fashion by global communities of firms and individuals. In this paper we consider OSS ecosystems using an analytical device which we refer to as the OSS Stakeholder triangle. We believe that the OSS Stakeholder triangle constitutes a useful means for analysing many aspects of Open Source ecosystems, including interaction between stakeholder roles and the overall health of an ecosystem.

1 Introduction

Many of the major examples of business innovation in the software sector in recent years have been in the area of OSS (Ghosh, 2005, 2006). Companies and public sector organisations are increasingly using OSS in their daily business (e.g. Lundell et al., 2006), and a significant number of companies are specialised in supplying Open Source products and services (e.g. Open Source Sweden, 2009). Further, an increasing number of companies are actually contributing to Open Source projects¹, paying employees to participate or even initiating projects by releasing their software as OSS². In such cases, building and maintaining OSS communities becomes an important issue (Senyard and Michlmayr, 2004).

A number of studies have analysed the Open Source phenomenon and presented a basis for an increased understanding of aspects of it, including: motivations for developers' involvement in Open Source projects, policy aspects, and economic implications of Open Source. Researchers have more recently turned their attention to the dynamics of OSS ecosystems. For example, Feller et al. (2008) investigated how Zea Partners formed a network ('ecosystem') of small open source companies with complementary capabilities, to deliver a 'whole product'. Crowston and Howison (2006) analyse how Open Source projects are typically organised, noting that whilst "code is easy to access, understanding the communities that build and support the software can be difficult." (p. 89)

¹ See, for example, <http://oss.sgi.com/projects/>

² For example, SSAB's process control system Proview, <http://www.proview.se/>

In this paper we present and discuss the use of an analytical device, the OSS stakeholder triangle, aimed to support analysis of roles and interactions within OSS ecosystems.

2 Exploring relationships in the OSS stakeholder triangle

The different roles taken by stakeholders in OSS can be viewed in terms of a stakeholder triangle (an analytical device introduced in Lundell and Lings, 2004). The triangle identifies the mutualism necessary between the different stakeholders to avoid missed opportunities, which can often be attributable to a lack of shared knowledge. The OSS stakeholder triangle (Figure 1) identifies roles, and influences between roles, in OSS ecosystems. It conceptualises three distinct roles and the symbiotic relationships between these roles. In a healthy OSS ecosystem, as depicted in Figure 1, these relationships are mutualistic.

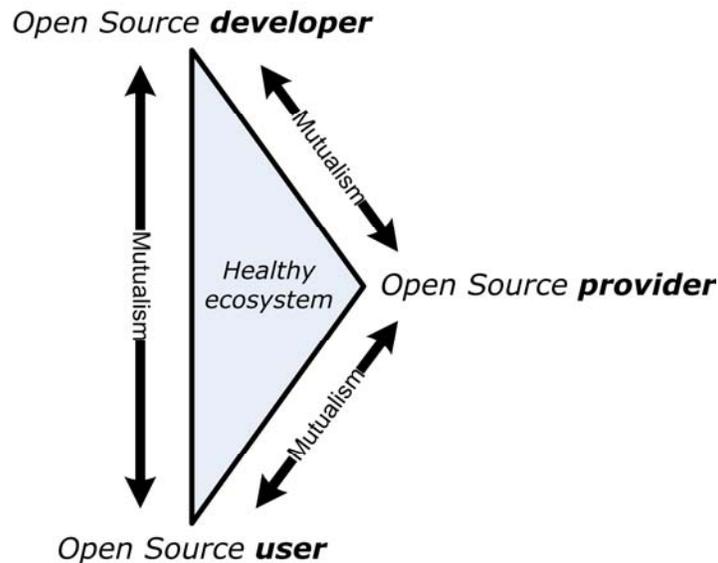


Figure 1: The OSS stakeholder triangle, depicting a healthy ecosystem.

In practice, the relationships are frequently commensalistic (for example, when an Open Source user benefits from Open Source development but neither helps nor harms that development). Any relationship of an individual or organisation with an OS ecosystem which does not lead to mutual benefit can be considered to be a missed opportunity, reducing the potential health of the ecosystem and, ultimately, lowering its potential benefit to all involved.

The *user/developer relationship* relates to (but is inherently different from) the classical relationship between those that develop and offer a solution, and those that use it. For example, developers in an open project often participate because of their own interests and motivations (with no obligation to provide support to those that use it). In particular, the provider has no commercial stake in the user adopting the product, but does have an interest in receiving input from a community of users.

The *developer/provider relationship* relates to (but is inherently different from) a relationship between a sub-contractor (in this case the Open Source developer) and the company that guarantees the contract to its customer (in this case the Open Source provider). The provider is offering a service based on the OSS product. The way in which an Open Source company influences an Open Source project is fundamentally different from the scenario in a traditional sub-contractor scenario.

The *user/provider relationship* relates to (but is inherently different from) a relationship between a company that offers a solution (in this case the Open Source provider) and its customers (in this case a company or public sector organisation that uses an Open Source product). For example, the user has an additional option to interact directly with those that produce the product (as it is an open project). Further, there is likely to be more open competition amongst companies willing to support any given Open Source product.

Organisations with a role as *Open Source developer* feel a need to raise their level of awareness about the conditions necessary for a thriving OSS ecosystem. Organisations wishing to participate in open source development want to improve their working knowledge of how to seed, grow and maintain a community around their OSS product(s), avoiding such real problems as project stagnation and project forking. Some companies aim to develop Open Source communities around novel products which they see as important but non-core business for them.

Organisations with a role as *Open Source user* feel a need to increase their understanding of health of OSS ecosystems, a pre-requisite for wider adoption of OSS in organisations. There are many challenges facing a company wanting to become active in using Open Source in their organisation. In such companies, it is essential to raise awareness of how the OSS ecosystem and the software market works in practice amongst key stakeholders influencing that market. In particular, the many new business models around the role of Open Source provider are not well understood in practice. Such awareness includes improved knowledge of and processes around Open Source adoption, paying attention both to direct adoption and third party provision.

Organisations with a role as *Open Source provider* are better placed than most to understand the Open Source market place, requiring detailed knowledge both of potential user organisations and the Open Source projects the products of which they specialise in. Their main assets include an understanding of legal and technical implications of OSS adoption. However, the market place is in a state of flux, and such companies need continually to update their knowledge and learn from the wider experience of others. When operating in a competitive market, they also need to be

aware of the particular aspects affecting the conditions for doing business in their national and global marketplace.

Only with greater shared knowledge can greater understanding be built between the various participants in the OSS stakeholder triangle, opening the way to leveraging the advantages which OSS can offer.

3 Using the stakeholder triangle

Exploration of different aspects of the OSS Stakeholder triangle (its three roles and different interactions between roles) is important for establishing a comprehensive understanding of the business models emerging from open strategies within organisations, and will provide immediate practical benefits for business decision makers. Specifically, such exploration will establish an increased awareness about opportunities and threats related to OSS.

For *Open Source providers*, such exploration will raise awareness of how the OSS ecosystem and software markets work in practice amongst key stakeholders influencing that market (i.e. key stakeholders in user organisations, Open Source projects and policy makers). This is a pre-requisite for a competitive and healthy software market.

For *Open Source users*, such exploration will increase trust and confidence in the OSS ecosystem, which is a pre-requisite for a wider adoption of OSS in organisations. It will also open up the many models for OSS participation, and for the use of OSS-inspired working practices.

For *Open Source developers*, such exploration will raise an awareness amongst user organisations and policy makers about how Open Source projects work, which is important for promoting policy decisions that positively improve (or at least avoid worsening) the conditions for a thriving OSS ecosystem.

Establishing the health of an OSS ecosystem is a complex task and will require multidisciplinary tools. For example, there are a range of quantitative tools under development, investigating activity within an ecosystem and presenting such things as social interaction diagrams. However, this is only one of many dimensions, and it is likely that new tools will be developed. It is important to be able to monitor ecosystem health, primarily because those considered to be healthy are more likely to attract new, active members – further increasing health. However, it is also important to understand and develop intervention mechanisms, for example when seeding a new community around a newly Open Sourced project.

In an ongoing collaborative research project (OSA³), led by the University of Skövde (Sweden), such exploration is currently being undertaken in collaboration with Swedish companies. Open Source is hugely important for the social sector in Sweden (see, for example, Odell, 2008). However, there is an apparent lack of understanding of OSS business models and their implications for OSS adoption,

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leading to what may be considered as a lack of trust in OSS and a consequential lack of involvement with OSS at all levels. As the need for competitiveness increases in all aspects of business and government, there is a strong need to increase knowledge of OSS ecosystems in order to engender increased trust and thereby increased utilisation of the potential of OSS for Swedish organisations.

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