Linking firm-affiliation, network embeddedness, and technical contribution in open innovation communities

MARIO SCHAARSCHMIDT
CHRISTOPHER SCHNEIDER
HARALD F.O. VON KORZTFLEISCH

University of Koblenz-Landau
Institute for Management, Computer Science Faculty
Universitaetsstr. 1; D-56070 Koblenz, Germany
Phone: +49-(0) 261-287-2864
mario.schaarschmidt|cschneider|harald.von.kortzfleisch@uni-koblenz.de

Extended Abstract for 4th FLOSS Workshop 2010, Jena, Germany

Keywords:
Open Source Software, Social Network Analysis, Open Innovation, Network embeddedness
Introduction

In the past, firms mainly were following the predominant industrial logic of closed innovation strategies with the focus on internal aspects like the development of technological knowledge to be applied in own products or services (Chesbrough, 2003; Lichtenthaler, 2009b). In order to secure the ability of internal knowledge creation, firms consequently invested in own resources or hired the smartest people available. In recent years, firms started to rethink these strategies and began to rely on sources from inside and outside the boundaries of the firm. This trend is referred to as open innovation meaning that in contrast to a closed innovation paradigm, firms try to include customers, users, universities and even competitors in different stages of their new product development processes.

Among research activities on external technology acquisition (Laursen & Salter, 2006; Lichtenthaler, 2009b; Van de Vrande et al., 2006), absorptive capacity (Lichtenthaler, 2009a; Zahra & George, 2002) or R&D alliances (Ahuja, 2000; Vanhaverbeke et al. 2002) as incarnations of open innovation, especially the role of a community of users in the innovation process was shifted into the center of discussion (Dahlander et al., 2008; Van de Ven & Garud, 1993; Von Hippel, 2005; Von Krogh et al., 2003, West & Lakhani, 2008).

One extreme case of open innovation is the collective development of open source software (OSS). In contrast to software developed at research centers owned by software vendors, in the case of OSS, a community of usually unpaid developers, distributed over the globe interacts mainly through the usage of Email-communication to collectively work on a software project (Kogut & Metiu, 2001; Lakhani & Von Hippel, 2003; Von Hippel & Von Krogh, 2003). Based on an ideology of voluntary participation and free access, contributors – which are simultaneously the users of what they produce – seem to be driven mainly by intrinsic motivation like the perception of joy while they solve (technical) problems, but also
by extrinsic motivations like reputation in the community or career opportunities (Bitzer et al., 2007; Hertel et al., 2003; Shah, 2006; Stewart & Gosain, 2006). In addition to the most prominent feature, the fact that the software is available for free – *gratis*, the software code itself – as long as the code is published under a licence approved by the Open Source Initiative (OSI) – is delivered in a form which is human readable (Chen et al., 2007).

The engagement of software vendors like HP, IBM or even Microsoft in OSS shows that the community-based model of software development has become an expedient alternative to proven firm-based models (Bonaccorsi et al., 2006; Fitzgerald, 2006; Fosfuri et al., 2008). Recent research revealed a number of reasons for firms to actively participate or even start an OSS project like cost and risk reduction or the sale of complementary goods and services (Alexy, 2009; Dahlander, 2007; Dahlander & Magnusson, 2005; Dahlander & Magnusson, 2008; West & Gallagher, 2006). Depending on the strategy, firms can choose their level of engagement from simply sponsoring the project infrastructure, over assigning own programmers to work for an OSS project during their work time to paying external developers (Lakhani & Wolf, 2005; West & Gallagher, 2006; West & O’Mahony, 2008).

From a transaction cost perspective high investments are predicted to require a high level of control (Williamson, 1991; Van de Vrande et al., 2009). Therefore, firms which invest resources or money in OSS projects are likely to demand decision competence in return. However, in the case of OSS an (ostensible) precise separation of ownership and control is observable. Accordingly, as the product is a public good, firms with a business model dedicated to an OSS product therefore have to internalize the complementary asset – the OSS community – in order to exercise control, e.g. by paying committers (Dahlander & Wallin, 2006; Teece, 1986).
Since, on the other hand, natural tensions between control and collaboration exist (Gittel, 2000; Sundaramurthy & Lewis, 2003), it remains unclear how the presence of a firm with the aim to appropriate from an OSS product affects the established OSS ideology, the behavior of voluntary committers, or the project’s performance. In addition, still little is known about the distribution of managerial and technical tasks among firm-paid programmers and/or voluntary individuals. Recent research has started to investigate the role of network position and communication behavior as well as governance structures within OSS projects (cf. Dahlander & O’Mahony, 2008; De Laat, 2007; Fleming & Waguespack, 2007; Grewal et al., 2006; O’Mahony & Ferraro, 2007; Sparrow et al., 2001). Despite many new insights, e.g. on the development of authority in OSS communities, it is not entirely clear how network position and firm-affiliations influence the amount and quality of technical contributions to a project.

Building upon this line of literature, this paper contributes to the discussion on open innovation in the following way. Firstly, this paper investigates the role of firm-paid individuals within a network of programmers using social network analysis (Granovetter, 1983) and secondly, it aims to understand the influence of an individual’s network position on
the number of his technical contributions. The objective of our research is the Linux kernel developer community. Linux, an OSS operating system, exists in many derivatives, but the kernel is maintained by a designated group of developers including the founder of Linux, Linus Torvalds. Using publicly available Email-data and data from source code files, we ended up analyzing more than 1.33 million messages in a period of nine years and combined them with more than 11.400 source code files. With this unique data set we are able to predict an individual's performance based on his network embeddedness and whether or not he is sponsored by a firm.

Literature


