

**OPEN SOURCE SOFTWARE FOUNDATION:
COMPANY INVOLVEMENT, GOVERNANCE, AND
EFFECTIVENESS**

by

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in partial fulfillment of the requirements for the degree of
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ABSTRACT

This exploratory research compiles data from six foundations (i.e., Apache Software Foundation, Eclipse Foundation, GNOME Foundation, Plone Foundation, Python Software Foundation, and Software in the Public Interest) and uses it to examine the relationship among company involvement, governance, and effectiveness of open source software foundations (OSSFs). This research: (i) organizes OSSFs into three types: Merit, Merit-Dominated, and Sponsor-Dominated based on the rights of merit and sponsor members; (ii) uses the presence of open source celebrities on the OSSF's Board of Directors as a measure of prestige; (iii) identifies practices and compositions of OSSF's Board of Directors; (iv) develops a model on how company involvement and governance affect OSSF effectiveness; and (v) provides observations useful to executive directors of OSSFs, companies' top management teams who anchor business models around open source software projects, and academics who study nonprofit organizations.

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1 INTRODUCTION

Communities that develop open source software are virtual entities on the Internet and not legal entities. Open source software foundations (OSSF) are established as the legal entities of open source communities because the communities want to protect their intellectual property and carry out contractual arrangements. Foundations help communities attain their long-term goals, hold community assets, provide resources to communities, and balance the interests among different stakeholders (O'Mahony, 2003b; Balsler & McClusky, 2005).

Research on OSSF is inadequate (O'Mahony, 2003b). There is a need to assess OSSF effectiveness. Company involvement and governance are two factors deemed to affect the effectiveness of nonprofit organizations (Green & Griesinger, 1996; Smith & Shen, 1996; O'Mahony, 2003b).

For the purpose of this research, an OSSF must have at least one active software project. A software project is considered to be active if individuals are contributing to a new software release. OSSF effectiveness refers to the ability of a foundation to utilize resources to achieve its goals and missions (Forbes, 1998). Company involvement in an OSSF refers to when the company invests resources in an OSSF and influences the mission, primary organizational activities, and relationships of the OSSF.

A company may directly influence an OSSF by having its employees hold seats in the Board of Directors (BOD) and other governance groups of the OSSF. In this instance, the

company directly affects the decision making processes. A company indirectly influence decisions made by the members of an OSSF. In this instance, the company provides resources to affect a decision (Pfeffer and Salancik, 1978).

Governance refers to the overall processes and structures used to direct and manage an organization's operations and activities. Most of the OSSFs are membership based nonprofit organizations. They "serve a membership and give that membership democratic rights of governance" (Spear, 2004). The BOD of a membership based nonprofit is the major actor responsible for governance (Schnurbein, 2006). Individuals who sit on the BOD are elected by the members of an OSSF. A member can be a merit member or a sponsor member. An individual becomes a merit member after being recognized as making non-trivial contributions to the foundation. A sponsor member is a company which donates resources to an OSSF and in return is admitted as member of foundation because of the donation. Thus, individuals are merit members while organizations are sponsor members. Typically, employees of organizations represent sponsor members.

1.1 Objectives

The objective of this research is to examine the relationship among company involvement, governance, and OSSF effectiveness by answering the following four questions:

- (i) What are the different types of governance structures of OSSFs?
- (ii) What are the practices of the BOD of OSSFs?
- (iii) What is the composition of the BOD of OSSFs?
- (iv) How do company involvement and governance affect OSSF effectiveness?

1.2 Deliverables

The deliverables of this research are:

- (i) Types of OSSFs' governance structures
- (ii) Practices and compositions of BOD of OSSFs
- (iii) A model for the relationship among company involvement, governance, and OSSF effectiveness
- (iv) Observations on company involvement, governance, and OSSF effectiveness useful to executive directors of OSSFs, companies' top management teams, and academics.

1.3 Relevance

This research is relevant to executive directors of OSSFs, companies' top management teams, and academics.

Executive directors of OSSFs can use the model developed in this thesis as a guide to improve the effectiveness of their organizations.

This research will be useful to companies' top management teams who build business models around open source software (OSS) projects. They can incorporate the findings of this research into strategies that seek to align the communities' objectives with their own.

Academics will be interested in this research because it provides new examples of

governance structures of nonprofit organizations responsible for advancing open source software.

1.4 Contribution

This research makes at least three contributions. First, the researcher built a bottom up model using publicly available data on company involvement, governance, and effectiveness. This research discovered associations which were not reported in the literature previously.

Second, this research successfully identified different types of governance structures and the types of contributions each structure attracts. The result of this research can be used to segment contributors to OSSF.

Third, this research fills gaps in the open source and nonprofit literature stream. Little is known about OSSF governance, company involvement, and OSSF effectiveness.

1.5 Organization

The thesis is organized into six chapters. The first chapter is the introduction. The second chapter reviews the literature and identifies the lessons learned from reviewing it. The third chapter describes the research method. The fourth chapter presents the results. The fifth chapter discusses the results. The sixth chapter provides conclusions, describes the limitations of the research, and identifies opportunities for future research.

2 LITERATURE REVIEW

An OSSF is a non-profit organization (NPO). This thesis draws extensively on the large scholarly literature on NPO governance and effectiveness for constructs, relationships, and metrics. Very few researchers have examined OSSFs.

This chapter is organized into seven sections. Section 2.1 reviews the literature on OSSF. Section 2.2 reviews the literature on non-profit organization governance and governance models. Section 2.3 reviews the literature on non-profit organizational effectiveness. Section 2.4 reviews the literature on relationship between governance and effectiveness for non-profit organizations. Section 2.5 reviews the literature on open source software project and community governance. Section 2.6 reviews the literature on company involvement in OSSF. Section 2.7 presents the lessons learned from the literature review.

2.1 Open source foundations

The missions of open source projects and communities are to advance public interests. When they incorporate as OSSF they seek to gain financial advantages from donations and tax exemptions (O'Mahony, 2003a).

The primary objective of a NPO is to “support or to actively engage in activities of public or private interest without any commercial or monetary profit purposes” (Alvarado, 2000). Under the law, an NPO is a corporation that can handle business dealings, sign contracts, and own property as any other individual or for-profit corporation may do. NPOs differ from for-profits in terms of taxes and governance (Green & Griesinger, 1996).

NPOs' governance structures preclude private financial gain (Wolf, 1984). OSSFs in the United States are registered under tax-exempt 501(c)(3) or 501(c)(6). 501(c)(6) is reserved for "Business Leagues and groups such as Chambers of Commerce", which is a form of business network¹ in favor of pursuing members' own business interests. 501(c)(3) organizations provide public benefits². Most OSSFs registered in the United States are 501(c)(3) non-profit organizations (O'Mahony, 2003b).

Both 501(c)(3) and 501(c)(6) non-profit organizations are exempt from most federal income taxes. OSSFs registered outside of the United States may have similar benefits.

Open source software is a rather new phenomena relative to proprietary software. From a legal perspective, an OSSF is still a legacy NPO.

2.2 NPO governance and governance model

In nonprofit organizations, the executive is responsible for the effectiveness and performance of the organization. The NPO addresses the interests of its multiple stakeholders -- funders, internal and external groups, and the public (McClusky, 2002; Burlingame, 2004; Spear, 2004).

Various perspectives on governance exist throughout the literature. It is common to

¹ IRS Publication 557

² IRS Publication 557

consider governance to be tightly connected to the BOD (Dayton, 1987; Duca, 1996; Green & Griesinger, 1996).

Dayton (1987) and Carver (1996, 2001) define governance as the activities carried out by the BOD. McClusky (2002), however, claims that this definition is unsatisfactory, both in theory and practice

Hult and Walcott (1990) define four major aspects of governance: “mission, primary organizational activities, decision-making participants, and environmental relations”.

Interactions among different organizational actors and stakeholders are highlighted.

McClusky (2002) drew ideas from Parson (1991) and proposed that governance could be viewed as the function of NPO at the institutional level. He also argues that governance should not only include the traditional elements of governance, but also what might be considered combined governance and executive responsibilities. To McClusky (2002), governance should include rights and responsibilities such as fiduciary responsibility as stewards or trustees, BOD policy-making, and long-range goal/mission setting, strategic planning, formulating and directing strategy, environment and external relations management and directing financial resource development.

Houle (1989) and Carver (1996, 2001) proposed two of the most influential prescriptive governance models (Duca, 1996; McClusky, 2002). Houle (1989) listed eleven functions of the governing BOD and described the “shared responsibility” between the BOD and the executive staff. Organized staffs are assumed to have important governance,

management roles in these governance functions. Carver's (1996, 2001) "policy governance" model argues that the responsibilities of the BOD and the executive staff are distinct. The BOD should always do "governance and policy-making", while the staff should perform "administration and management".

Noticing the roles played by advisory groups in nonprofit governance, Bradshaw et al. (1998) propose a new governance model which highlights the functions of advisory groups in governance. In their model, the BOD, executive staff, and advisory groups are all participants in governance activities. There are no clear boundaries between each party, however. Each party shares governance roles defined by Hult and Walcott (1990). Advisory groups enhance organizational governance capacity by providing "additional programmatic, service delivery and accountability assistance" (Bradshaw et al., 1998).

Widmer and Houchin (1997) found that membership bodies and other entities have significant governance responsibilities in national federated organizations.

Alexander and Weiner (1988) examined the suitability of the corporate governance model for NPOs. Hodgkin (1993) argued against adopting the corporate governance model by noting it was "a dangerous error" for nonprofits.

Bradshaw et al. (1998) advanced a governance model as an emergent cellular model and hybrid model. The cellular model is "characterized by continuous, organic innovation. This model is evolving from the network form which allows for flexibility and

responsiveness to information. Cellular organizations are made up of cells (self-managing teams, autonomous business units, operational partners, etc.) that can operate alone but that can interact with other cells to produce a more potent and competent organizational mechanism as well". The hybrid model is a combination of four governance models: policy governance model, constituent/representative board model, corporate board model, and emergent cellular model.

Schnurbein (2006), one of the few researchers who has examined membership based non-profits, proposed that in membership based nonprofits (especially in trade associations and unions) the BOD plays a central role in governance. He argues that the roles of other actors are defined by their relations to the BOD. The roles and groups that dominate a governance structure include: BOD-member, BOD-executive, BOD-environment, and member-executive relations. Members of the BOD are elected by members of the nonprofits to ensure the interests of the members can be realized.

The academic literature defines governance in a variety of ways. This leads to confusion. The boundary between governance and management varies. However, throughout the literature the BOD is always the core actor in governance, and receives most of the interests from scholars and practitioners.

2.3 Nonprofit organizational effectiveness

Organizational effectiveness is a useful but problematic concept. Effectiveness is a tool for evaluating and enhancing the work of organizations (Forbes, 1998; Taylor &

Sumariwalla, 1993). However, this concept can mean different things to different people, and there are various ways to measure organizational effectiveness (Kanter & Summers, 1987; Herman 1990). At least three of approaches for assessing nonprofit effectiveness exist and there is little agreement on which measures best capture the nature of nonprofit effectiveness (Forbes, 1998).

Researchers have based their work on three major approaches: (i) goal attainment, (ii) system resource; and (iii) multiple constituency or social constructivism. The goal attainment approach focuses on the extent to which a NPO fulfils its goals and missions. The goal-attainment approach is based on the assumption that organizations' goals are identifiable and unambiguous. This approach defined effectiveness as the extent to which organizations successes in meeting their goals (Glisson & Martin, 1980; Forbes, 1998).

The system resource approach emphasizes organizational resource procurement. It defines effectiveness as viability or survival. It assesses the ability of organizations to exploit resources from their environments to sustain their goals. This approach is useful in a variety of studies of social services organizations because of the substantial dependence of these organizations on outside sources of funding, and voluntarism (Green & Griesinger, 1996; Forbes, 1998; Provan, 1980; Pfeffer, 1973; Glisson & Martin, 1980).

To assess NPO performance, approaches based on goal-attainment and system resource can utilize quantitative data such as that found in annul reports and operational statements (Forbes, 1998). However, this data is not easy to obtain (Cameron & Whetten, 1983),

especially when the research targets are the medium and small NPOs which typically lack accounts and records and whose goals often are semiformal and diversified (Smith & Shen, 1996).

The multiple constituency or social constructivism approach associates effectiveness with the reported opinions of key persons, such as clients, other constituents, or service professionals (Herman, 1990; Herman et al., 1991; Herman & Renz, 1997, 2000; Taylor et al., 1991; Smith & Shen, 1996; Forbes, 1998; Schmid, 2002). The social constructivist perspective views an organization as being more effective if it can better satisfy the interests of multiple constituencies within and around it (Schmid, 2002). Reputational assessments are often used in this approach to organizational effectiveness (Schmid, 2002). Effectiveness is assessed based on the survey or self-reports from stakeholders of the organization. The logic behind this approach is that an organization should satisfy individuals, groups and other entities supporting its survival and growth. This is especially critical for NPOs, which gain resources mainly from donation or supporting from their stakeholders (Schmid, 2002).

Cameron (1986), Bies and Cowles (2002) have expanded the number of approaches to conceptualize NPO performance. They have included models that focus on internal processes, legitimacy, fault-driven, and high-performing systems models.

Table 1 shows the dimensions for NPO effectiveness drawn from the literature review organized by approach.

Table 1: Dimensions for nonprofit effectiveness drawn from the literature review

Approach	Dimension
Goal attainment	Productivity (Glisson & Martin, 1980)
System resources	Financial resources (Provan, 1980; Pfeffer, 1973; Glisson & Martin, 1980; Green & Griesinger, 1996)
	Other resources (Bradshaw et al., 1992)
Multiple constituency or social constructivism	Stakeholders' assessment of effectiveness (Smith & Shen, 1996; Herman et al., 1991; Taylor et al., 1991; Herman, 1990; Schmid, 2002)

Researchers some times combined two or three approaches to assess nonprofit effectiveness. For example, Green and Griesinger (1996) combined the goal-attainment and system resource approaches to assess organizational effectiveness.

2.4 Relationship between governance and effectiveness

Most of the studies on effectiveness focus on the relationship between governance and effectiveness (Forbes, 1998). Normatively, governance is considered as the BOD's responsibility (Bradshaw et al., 1998; Saidel, 1998; Carver, 1996, 2001). A large portion of the governance-effectiveness literature stream focuses on associations between the characteristics of the BOD and organizational effectiveness and governance structure.

Three aspects of governance are examined in the literature: governance structure, BOD's practice, and BOD composition. Table 2 identifies the dimensions for governance drawn

from the literature review.

Table 2: Aspects and dimensions for governance drawn from the literature review

Aspect	Dimension
Governance structure	Centralization of authority (Carter et al., 1994; Glisson & Martin, 1980; Kushner & Poole, 1996; Schmid, 2002)
	Hierarchy of authority (Glisson & Martin, 1980; Kushner & Poole, 1996; Schmid, 2002)
	Structure formalization (Bradshaw et al., 1992; Glisson & Martin, 1980; Kushner & Poole, 1996; Smith & Shen, 1996)
	Power distribution pattern in and around BOD (Murray et al., 1992)
BOD's practices	Activity breakdown (Bradshaw et al., 1992; Green & Griesinger, 1996; Kushner & Poole, 1996)
BOD's composition	Occupation and skills of BOD members (Siciliano, 1990; Chait et al., 1996)
	Position in company (Siciliano, 1990)
	Prestige of BOD member (Provan, 1980)
	External linkages (Provan, 1980)

2.4.1 NPO governance structures

Scholars have researched NPO governance structures (Hult & Walcott, 1990; Kushner & Poole, 1996). Governance structure refers to “who participates in decision making” (Hult & Walcott, 1990).

The extent of centrality and hierarchy of governance structures are highlighted (Glisson & Martin, 1980; Kushner & Poole, 1996; Schmid, 2002). Carter et al. (1994) found that centralization of authority will improve effectiveness in terms of productivity and market

share. For human service NPOs, a highly centralized structure of authority is the most powerful, direct determinant of effectiveness in terms of productivity and efficiency (Glisson & Martin, 1980; Kushner & Poole, 1996).

Structure formalization is concerned about the existence of formalized rules, procedures, and guideline. Kushner and Poole (1996) and other scholars (Bradshaw et al., 1992; Glisson and Martin, 1980; Smith & Shen, 1996) reported that a high level of structure formalization generates large clientele and high revenues. Smith and Shen (1996) also found that formalization can improve reputational effectiveness.

The governance structure-effectiveness relationship is also studied from the perspective of the pattern of power distribution in and around the BOD (Murray et al., 1992). Murray et al. reported that BODs with fragmented power and powerless BODs are associated with subjective perceptions of poor performance of the nonprofit.

2.4.2 *BOD's practice*

Prescriptive responsibilities that BODs are expected to meet are based both in legal requirements and moral assumptions (Herman & Heimovics, 1991). BOD responsibilities have been linked to NPO effectiveness (Bradshaw et al., 1992; Kushner & Poole, 1996).

The practitioner literature has contributed best practices for the BOD. Houle (1989) listed eleven functions of the governing BOD. National Center for Nonprofit Boards' (NCNB) adopted this list of governance functions and slightly modified it into. The list of

governance functions includes: (i) determine the organization's mission and purpose, (ii) select and support the executive, and review her or his performance, (iii) approve and monitor the organization's programs and services, (iv) raise money, (v) ensure effective fiscal management, (vi) engage in strategic planning, (vii) enhance the organization's public image, (viii) develop itself as a BOD, from recruitment through assessing its own performance, (ix) understand the relationship between staff, BOD, and other volunteers, (x) organize itself so that the BOD operates effectively, and (xi) ensure sound risk management policies.

Carver's (1996, 2001) "policy governance" model defines "who should do what" in an NPO. The main idea of this model is that the BOD should always do "governance and policy-making" while the staff should perform "administration and management". He defines "policy" including both value and perspectives, which are "powerful, often invisible forces". He deems policy clarification as the central function of BOD leadership. Carver (1996, 2001) identifies four categories for BOD policy: (i) Ends, (ii) Executive Limitations, (iii) BOD-Executive Relationship, and (iv) BOD Process.

Crittenden et al. (1988) found that the presence of certain types of strategic planning activities was significantly associated with organizational effectiveness measured by stakeholder satisfaction. Activities, such as the analysis of strategic alternatives and the planning of implementation details contribute most to effectiveness. Siciliano (1997) reported similar results.

Bradshaw et al. (1992) found that BOD processes, especially the use of strategic planning techniques and the existence of a common vision on the BOD, contributes to organizational effectiveness measured by both financial and reputational factors.

Green and Griesinger (1996) used the goal-attainment approach to study the relationship between BOD performance and organizational effectiveness in human service organizations. Thirty-three activities in nine areas of BOD responsibility were examined. They found that BOD activities in policy formation, strategic planning, program review, BOD development, resource development, financial planning, control, and dispute resolution affected organizational effectiveness.

Kushner and Poole (1996) found that organizations which do not conform to the NCNB standards have low performance, while those that conform to NCNB standards have high performance.

“Self-Assessment for Nonprofit Boards” (Slesinger, 1991) and “Governance Self-assessment Checklist” (GSAC) (Gill et al., 2005) were developed to assist BOD of NPO and public sector organizations on BOD’s practice. Slesinger (1991) and Gill et al. (2005) reported the scores that the BODs achieve using these self-evaluation tools are positively related to overall organization effectiveness. Table 3 shows the GSAC subscales.

Table 3: GSAC subscales

BOD Effectiveness quick check		Fifteen items identified in the literature as successful governance
BOD Structure		Assess the extent to which the BOD has the clarity of structure necessary for effective governance, including bylaw, policies, and role descriptions
BOD Culture		Examine BOD dynamics, organizational values, communication styles, and degree of trust
BOD Responsibilities	Mission and planning	Measures the level of BOD engagement in planning, agreement on direction, and clarity of objectives
	Financial stewardship	Assess the degree to which the BOD scrutinizes finances and the existence of sound financial practices as well as the extent to which the BOD maintains a degree of objectivity and independence from management
	Human Resources Stewardship	Taps the level of BOD support for the executive director, its evaluation of his or her performance, and its oversight of other human resource practices such as BOD and senior management succession planning
	Performance Monitoring and Accountability	Evaluate the care with which the BOD monitors information and results, the adequacy of the BOD's accountability to stakeholders, and the extent to which it ensures fair dispute-resolution processes
	Community Representation and Advocacy	Assess communication practices, stakeholder input, and whether nomination processes generate BOD membership that adequately represents community diversity
	Risk Management	Evaluate the regularity of review of bylaws and policies, compliance with these and with relevant legislation, and safeguarding against financial and other risks
BOD Processes and Practices	BOD Development	Assess practices related to recruitment and orientation of BOD members, team building, and BOD self-assessment
	BOD Management	Evaluate conflict management, respect for roles, and distribution of work and power

2.4.3 BOD composition

Provan (1980) found that BOD member's prestige and linkages contribute to organizational effectiveness measured by absolute funding levels.

The relationship between BOD members' diversity and organizational effectiveness has been examined (Siciliano, 1990; Chait et al., 1996). Occupation diversity was found to significantly contribute to effectiveness.

Although governance covers aspects other than governance structure, BOD practice, and BOD members' composition, these three aspects are the major constructs of governance. Researchers have tested the relationship between these three constructs and organizational effectiveness. The selection of constructs, dimensions, and metrics is to large extent based on the researchers' judgments and perspectives. This is a weakness of the literature in the governance-effectiveness stream (Forbes, 1998).

2.5 Open source software foundation

2.5.1 Why open source software communities need foundations

Communities are not legal actors. The lack of legal rights of online communities creates dilemmas: they can not protect the concepts and trademarks or cooperate and contract with commercial firms (O'Mahony, 2003b).

2.5.2 OSSF governance and effectiveness

Fortune 500 firms were challenged for the idea of "collaborating with a web page". As a

result, Apache, Debian, Gnu, GNOME, FreeBSD, Jabber, Perl, Python, KDE, BIND, the Linux Standards Base and Chandler designed private non-profit foundations to “host” their projects (O’Mahony, 2003b).

Various researchers have examined OSS community governance (Lattemann & Stieglitz, 2005; Markus et al., 2000; West & O’Mahony, 2005; O’Mahony & Ferraro, 2007).

However, no researcher has examined the governance of OSSF. However the context and the forces which drive organizations to adopt governance structures are different at the community and foundation levels. The literature in this stream offers little insights on governance at the foundation level.

Occasionally, the open source software literature addresses some aspects of OSSF governance. For example, Dueñas et al. (2007) discussed the incubation process, which is one aspect of project governance in open source foundations.

The open source software literature has not examined governance in OSSF.

Most of the OSSFs are membership based organizations (O’Mahony, 2003b). However, the literature on nonprofits focuses on NPOs such as human service organizations, art museums, hospitals, and so on, which are not membership based. Few researchers (Spear, 2004; Schnurbein, 2006) examine membership oriented organizations. The literature in both of these streams agrees that the BOD is the core actor in governance.

DeLone and McLean (1992, 2002, 2003), Crowston et al. (2004, 2006) assess open source software project effectiveness and performance. Open source project effectiveness is one aspect of OSSF effectiveness. Other aspects of OSSF effectiveness have not been examined.

2.6 Company involvement in OSSF

Firms have various motives for becoming involved in open source projects and communities. These include: identifying opportunities for future collaboration (Rosenkopf et al, 2001), sharing the risk of developing innovations which might affect industry standards (Gabriel & Goldman, 2005; Koenig 2004; West & O'Mahony, 2005), increasing the demand for complementary products (Bonaccorsi & Rossi, 2004; Hawkins, 2004; Lerner & Tirole, 2004), using OSS as low cost components (Bonaccorsi & Rossi, 2004; Hawkins 2004), implementing strategies (Henkel, 2003, Koenig, 004), benefiting from external support (Bonaccorsi & Rossi, 2004; Gabriel & Goldman, 2005), gaining reputation (Henkel, 2003), and generating revenues on complementary services (Bonaccorsi & Rossi, 2004; Wichmann, 2002; West & O'Mahony, 2005).

New business models that allow companies to generate revenue from open source have been developed (Nissila, 2004). Researchers identified several open source business models (Hecker, 1999; Spiller & Wichmann, 2002). Generally, open source business models emphasise generating value by utilizing resources that lie outside of the firm's boundary (Hope 2003).

Firms which have business models related to OSS can become involved in the development of open source software by sponsoring and hiring developers (O'Mahony, 2003b). Also firms can directly initiate open source project-pooled research and development (R&D) and spinout projects (West & Gallagher, 2006). Pooled R&D begins as a community and spinout project. It begins with internal development and later external contributors join. Some firm initiated projects are a mix of both formats. Examples for pooled R&D would be Eclipse, while Mozilla and Jikes are examples of spinout projects (O'Mahony & West, 2004).

O'Mahony (2003) suggests that companies invest resources and manpower in open source foundations, and in return obtain advisory and sponsor roles that allow them to have a "voice in the foundation". This can be defined as influence. For a BOD member, influence is the relational treatment of power. According to the research by Pettigrew and McNulty (1995), a BOD member's power and influence is contingent on three sets of factors: context and structure, power sources, and will and skill. They used semi-structured interviews incorporated with BOD member background and career information to examine power and influence on corporation BODs.

Table 4 provides the constructs and dimensions for company involvement drawn from the literature review.

Table 4: Constructs and dimensions for company involvement drawn from the literature review

Construct	Dimension
Company investment	Resource investment
	Manpower investment
Company influence	Context and structure
	Source of power
	Will and skill

2.7 Lessons learned

- (i) Research on OSSF governance and effectiveness is scant. Not much has been published on this topic in the OSS and nonprofit literature streams
- (ii) The assessment of nonprofit effectiveness requires multiple dimensions
- (iii) BOD is the major actor in the governance of membership based nonprofits
- (iv) There are two types of OSS NPOs under the US tax exempt code: 501(c)(3) and 501(c)(6). 501(c)(3) NPOs are for public interests, while 501(c)(6) NPOs are for member business interests
- (v) Constructs, dimensions, and metrics for company involvement, governance, and effectiveness identified from the literature review

Table 5 identifies the constructs, dimensions and metrics for company involvement, governance and effectiveness drawn from the literature review. It synthesizes information provided in Tables 1, 2, and 4 in Chapter 2.

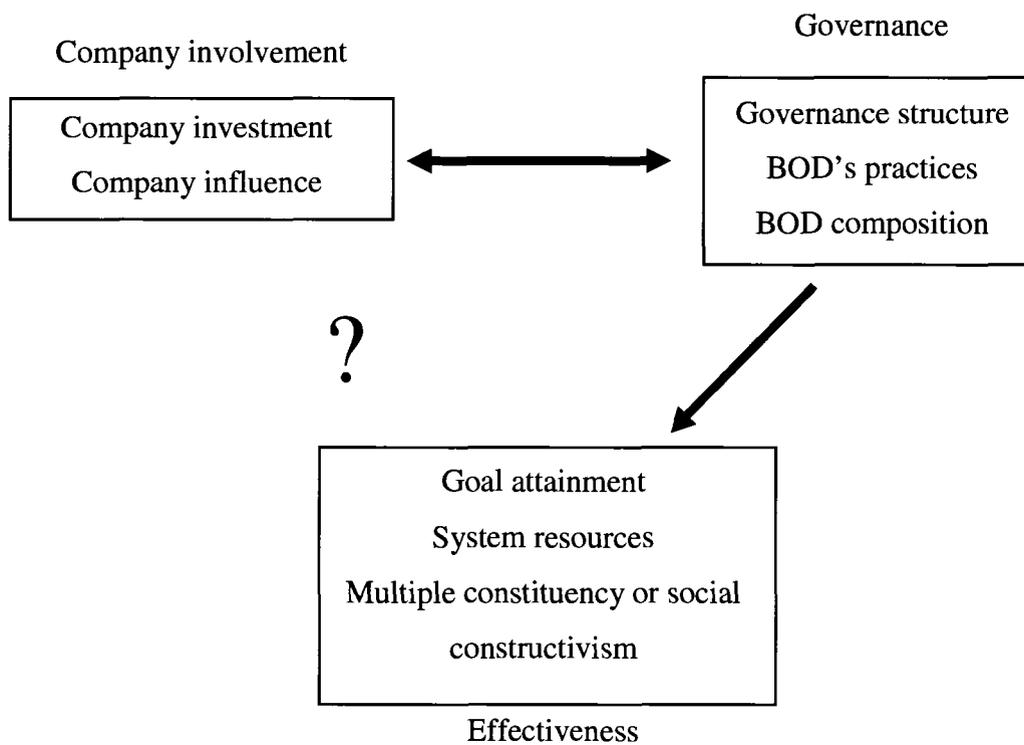
Table 5: Constructs, dimensions and metrics drawn from the literature review

Domain	Construct	Dimension
Company involvement	Company investment	Resource investment
		Manpower investment
	Company influence	Source of power over OSSF
		Will and skill
Governance	Governance structure	Centralization of authority
		Hierarchy of authority
		Structure formalization
		Power distribution pattern
	BOD's practices	Activity breakdown
	BOD composition	Occupation and skills of BOD members
		Position in company
		Prestige of BOD member
External linkages		
Effectiveness	Goal attainment	Productivity
	System resources	Financial resources
		Other resources
	Multiple constituency or social constructivism	Stakeholders' assessment of effectiveness

- (vi) The link between governance and foundation effectiveness is well established in the literature (e.g. Glisson & Martin, 1980; Provan, 1980; Siciliano, 1990; Bradshaw et al., 1992; Carter et al., 1994; Kushner & Poole, 1996; Forbes, 1998; Schmid, 2002). The literature suggested that there is link between company involvement and governance (O'Mahony, 2003b). It is unknown whether or not a link exists between company involvement and foundation effectiveness

Figure 1 illustrates the relationship among company involvement, governance, and OSSF effectiveness suggested by the literature review.

Figure 1: Relationship among company involvement, governance and effectiveness drawn from the literature review



3 RESEARCH METHOD

This chapter is organized into three sections. Section 3.1 describes the unit of analysis. Section 3.2 describes the study period. Section 3.3 describes the research method.

3.1 Unit of analysis

The unit of analysis is the open source foundation operating at least one active open source software project.

3.2 Study period

The study period is from January 1, 2003 to December 31, 2006.

The start and end date of the financial years of the foundations in the sample fall within January 1, 2003 and December 31, 2006.

3.3 Research method

Table 5 provides the ten steps of the method used in this research.

Table 5: Research method

Step No.	Dominant activity carried out	Outcome
1	Set criteria for sample selection	Criteria to select sample
2	Assemble list of open source software foundations and select sample	Sample
3	Identify constructs and dimensions for company involvement, governance and OSSF effectiveness from literature review	Version 1 of the constructs and dimensions for company involvement, governance and OSS effectiveness
4	Identify and collect information on constructs	Version 2 of the constructs, dimensions, and metrics of company involvement, governance and OSSF effectiveness
5	Collected data for metrics of the constructs	Electronic database
6	Identify categories for company involvement, governance and OSSF effectiveness and links between them	Categories and links across categories
7	Identify BOD activities, how they breakdown, and links to categories previous identified	Breakdown of BOD activities and links to other categories
8	Develop model and propositions anchored around the model	Model and propositions
9	Answer research questions	Answers to research questions
10	Link results to the literature and generate observations	Set of relevant links to the literature and list of observations

3.3.1 Set criteria for sample selection

Foundations in the sample should

- (i) Be registered in the United States, and have 501(C) tax exempt status in 2008

- (ii) Host at least one active open source software project
- (iii) Have public available financial data and records of governance activities for at least two consecutive years

Most of the OSSFs are registered in the United States. Thus, it is reasonable to limit the sample to OSSFs incorporated in the United States.

501(C) tax exempt status is evidence that an organization is a nonprofit. It must have at the very least formal financial records. This criterion excludes open source organizations which are not mature enough to be legal entities. This ensures that OSSFs in the sample have similar internal and external contexts.

Historical data is needed to compare OSSF. Thus, it was required that each foundation in the sample should have at least two years of publicly available information on its financial and governance activities. However, some important OSSFs (e.g., OpenBSD, FreeBSD, Perl, and etc.) were excluded because there was no public governance information available.

3.3.2 Assemble list of open source software foundations and select sample

To select the sample, a list of open source organizations was created first. Sources for these organizations were: Wikipedia's list of free and open source software

organizations³, Google's summer code mentoring organization list⁴, and the first ten pages of Google search results for the following keywords: "open source foundations OR nonprofit OR organization". The search was carried out on November 1, 2007.

Second, the researcher first searched the official website of each open source organization in the list and identified its status of incorporation. The researcher then removed the organizations that were not incorporated.

Third, the researcher first searched for the official incorporation and tax exempt documents of each organization left on the list. The researcher then removed organizations if they were incorporated outside of the United States or did not have 501(C) tax exempt status in 2008.

Fourth, the researcher first searched for the software projects of the organizations left on the list. The researcher then removed the organizations that did not host at least one open source software project that introduced a new software release in 2007.

Fifth, the researcher first searched for the financial reports, annual reports, and meeting records of the organizations left on the list. The researcher then removed the organizations which did not have at least two years of information on financial and governance activities.

³ http://en.wikipedia.org/wiki/Category:Free_and_open_source_software_organizations

⁴ <http://code.google.com/soc/2007/>

3.3.3 *Identify constructs and dimensions from the literature review*

Company involvement

The extant literature conceptualizes company involvement comprised of company investment and company influence. Companies are thought of influencing OSSFs by investing resources and hiring or sponsoring people in OSSFs (O'Mahony, 2003b).

O'Mahony (2003) suggests that company investment refers to resource investment and manpower investment.

In return for their investment, companies may receive roles as advisors, sponsors, or BOD members of the OSSF (O'Mahony, 2003b). This enables companies to directly influence OSSF governance.

The researcher decided not to consider indirect company influence. Company employees hold a significant proportion of seats on the BOD of the OSSFs. Thus, the indirect influence would be rather small compared to direct influence. For the purpose of this research, company influence means direct influence or "who participates in decision-making" (Hult & Walcott, 1990).

Governance

Because company involvement, governance, and effectiveness relation is the major concern in this research, aspects of governance which are not included in the governance-effectiveness literature stream are excluded from this research.

Table 2 in Chapter 2 identified three governance constructs drawn from the governance-effectiveness literature stream: governance structure, BOD's practices, and BOD's composition.

Governance structure is about who can make what decision (Hult & Walcott, 1990). For the purpose of this research, governance structure is comprised of governance instruments, the criteria on who can be part of the governance instruments, and the scope of rights for the members in governance instruments.

BOD's practices consider the existence of certain governance processes, formality of governance processes, and governance activities undertaken by the BOD.

BOD composition focuses on the background information of BOD members, such as occupation, position in company, prestige, and linkages. Background information indicates skill, power and will of BOD (Provan, 1980; Siciliano, 1996).

Effectiveness

Different dimensions can be used to evaluate effectiveness (Forbes, 1998). The researcher identified dimensions and measurable metrics for effectiveness found in records maintained by the OSSFs in the sample.

3.3.4 Identify and collect data on constructs

The researcher examined the records maintained by the OSSFs in the sample to better understand what dimensions and metrics were most suitable for each of the constructs being examined.

Most OSSFs are membership based nonprofits. Thus, the characteristics of membership based nonprofits need to be reflected in this step.

Company influence on the BOD of OSSF was examined in this research. Schnurbein (2006) argued that the BOD is the dominant group in the governance structure of a membership based nonprofit. To identify dimensions and metrics for company influence, background information on the BOD was collected (Pettigrew & McNulty, 1995; Siciliano, 1996). Special attention was paid to information on the employment of members of BOD.

Constructs for governance drawn from the governance-effectiveness literature stream were used in this research. Governance structure was examined following BOD-member relationship proposed by Schnurbein (2006). To identify dimensions and metrics for governance structure, information was collected on the bylaws and governance policies maintained by OSSFs in their official websites. This information included the descriptions of governance instruments, criteria for becoming a member in governance instruments, and scope of member rights, which reflects the extent to which the members of the OSSFs can shape the BOD's composition and decisions.

To identify dimensions and metrics for effectiveness, the researcher examined annual reports and BOD and member meeting records. Metrics which are used by members of the BOD or other officers to reflect performance were collected.

3.3.5 *Collect data for identified metrics*

Data for metrics drawn from the literature and public information was collected.

For each OSSF in the sample,

- (i) From the OSSFs' official websites, companies' websites, BOD and member meeting minutes, press release, personal web blog, third party interview, and third party reputation ranking, the following information was collected for each member of the BOD of the OSSF: profession, company association, position in companies, and reputation.
- (ii) From the bylaw, charter and other official governance documents on OSSF official websites, information on formal governance process and governance instruments was collected
- (iii) From OSSF websites, web blog, interview, presentations on OSS conference, annual reports, financial report, press releases, third party interview, and free statistics from information vendors, information on effectiveness metrics was collected

Sources of information

The sources of information included: OSSF websites, company websites, web blog, Wikipedia, interview, presentations on OSS conference, annual reports, financial report, bylaw, charter, official governance documents, press releases, third party interview, third party statistics, and free statistics from information vendors. Various data search tools are used, including Guidestar⁵ and Google⁶.

Table 6 provides the sources of information for company involvement, governance, and effectiveness.

⁵ <http://www.guidestar.org>. Nonprofits financial statement web search tool

⁶ <http://www.google.com>. General purpose web search tool

Table 6: Sources of information

	Sources of information
Company involvement	OSSF official website Company web site Annual report BOD meeting minutes Member meeting minutes Presentation on OSS conference Personal web blog
Governance	Bylaw Charter Other official governance documents Third party reputation ranking on members
Effectiveness	BOD meeting minutes Member meeting minutes Financial report Annual report Presentation for OS conference Web blog Wikipedia Interview Free statistics from information vendors

3.3.6 Identify categories and linkages

OSSFs were first categorized based on the metrics for which data could be obtained and then links between categories were identified.

3.3.7 Identify BOD activity breakdown, and links

For each OSSF in the sample, the researcher collected information on BOD governance practices by examining BOD meeting records. These records identify the activities

undertaken by the members of BOD or those that were undertaken by external organizations or staffs at the request of the BOD.

Published catalogs of governance activities for nonprofits (Houle, 1989; Slesinger, 1991; Gill et al., 2005) were referenced in the process of categorizing.

A count for each governance activity was identified. The unit counted is activity per month. Thus, if an activity is performed over two months, the count is two. OSSFs were compared based on whether activities were undertaken by (i) members of the BOD or (ii) staff in organizations outside of the BOD. For each OSSF in the sample, a breakdown of the BOD activities was obtained by calculating the ratio of the count of each catalog activity to the total count of activities.

OSSFs in the sample were also categorized based on the nature of their policies and guidelines. Links between categories of BOD's activity breakdown and the content of policies and guidelines were identified.

3.3.8 Develop model and propositions anchored around the model

A research model that explains the relationship among company investment, governance, and foundation effectiveness was developed. Propositions anchored around the model were developed.

3.3.9 *Answer research questions*

Results of the research were used to answer the four research questions.

3.3.10 *Link results to the literature and generate observations*

The results of this research were compared with the results of the studies reviewed in Chapter 2.

4 RESULTS

This chapter is organized into five sections. Section 4.1 describes the sample used in this research. Section 4.2 provides the dimension and metrics for company involvement, governance, and OSSF effectiveness drawn from publicly available information. Section 4.3 shows OSSFs categorized using the dimensions for which data exists. Section 4.4 provides the model generated, and the propositions anchored around it.

4.1 Sample

Appendix 1 provides a list of the thirty incorporated open source software foundations which were identified following the method described in section 3.3.2 on November 2007. For each foundation, Appendix 1 shows: (i) whether or not it holds 501(C) tax exempt status in the United States; (ii) whether or not it is responsible for at least one active open source project; and (iii) whether or not financial data and records of governance activities are publicly available for at least two consecutive years.

Six open source foundations listed in Appendix 1 met the sample selection criteria. Table 7 identifies the six OSSFs included in the sample used for this research. Five of the foundations hold 501(c) tax exempt status and one holds 501(c)(6) tax exempt status. SPI is the oldest foundation (almost 10 years old), while Plone is the youngest (three years old).

Table 7: OSSFs included in the sample

No	Foundation name	Legal type	Official website	Type of code of major project	Year founded
1	Apache Software Foundation	501(c)(3)	http://www.apache.org/	Networking/Internet server	2001
2	Eclipse Foundation	501(c)(6)	http://www.eclipse.org/org/foundation/	Development tool	2003
3	GNOME Foundation	501(c)(3)	http://foundation.gnome.org/	Desktop platform	2002
4	Plone Foundation ⁷	501(c)(3)	http://plone.org/foundation	Content management	2004
5	Python Software Foundation	501(c)(3)	http://python.org/psf/	Programming language	2001
6	Software in the Public Interest	501(c)(3)	http://spi-inc.org/	Operating system	1997

The Apache Software Foundation was incorporated in Delaware in 1999 by the members of the Apache group. Initially, the Apache Software Foundations was to support the Apache HTTP server project. In 2008, the Apache Software Foundation hosted 65 open source software projects, with 1765 committers⁸.

The Apache Software Foundation has a meritocracy based membership structure, and has a large and mature open source community. Its organizational structures, processes, and policies served as examples for other OSSFs, such as the Plone Foundation⁹. The Apache Software Foundation has earned a reputation for incubating open source software project

⁷ Plone foundation is founded in late 2004. So data for Plone foundation only covered 2005 and 2006.

⁸ <http://involve.jisc.ac.uk/wpmu/oss-watch/2008/06/03/just-how-big-is-the-apache-software-foundation/>

⁹ <http://plone.org/foundation>

(Dueñas et al., 2007).

IBM released as open source the code of the Eclipse project and formed the Eclipse consortium in 2001. In 2004, the Eclipse consortium was reorganized into the Eclipse Foundation, a 501(c)(6) nonprofit. Unlike most other open source organizations, the Eclipse Foundation is for its members' business interests. In 2008, the Eclipse Foundation hosted 11 top level projects with 21 strategic members, 179 organizational members, and 942 committers in 2008¹⁰. Eclipse is dominant in the market for Java Integrated Development Environments (IDE)¹¹.

The Eclipse Foundation has a large and established community sponsored and controlled by companies (Helander et al., 2007; O'Mahony & West, 2004; West & Gallagher, 2006; Capek et al., 200). It is a known example of commercial open source phenomenon (also known as OSS 2.0) (Fitzgerald, 2006). The incubator process used by the Eclipse Foundation is very efficient (Dueñas et al., 2007).

GNOME is part of the GNU project and it was a subproject hosted by SPI¹². The GNOME Foundation was founded in 1997 by Miguel de Icaza and Federico Mena. The GNOME Foundation hosts the GNOME project which provides a desktop environment and development platform. It also hosts numerous other projects relevant to the GNOME

¹⁰ <http://www.eclipse.org/org/foundation/membersminutes/20080317MembersMeeting/2008-03-17-Jumpstart.pdf>

¹¹ <http://ieeexplore.ieee.org/iel5/2/31455/01463097.pdf?arnumber=1463097>

¹² <http://www.spi-inc.org/projects>

project. The GNOME desktop environment is one of the dominant desktop environments in the Linux desktop.

The GNOME Foundation has a large and established community (Helander et al., 2007).

The Plone Foundation was founded by Alexander Limi, Alan Runyan, and Vidar Andersen in 2004 to support the development of Plone, which is a free and open source content management system. Plone have a rather small market share in content management system, but it is deemed as one of the best in the market¹³.

The Plone Foundation has a meritocracy based membership structure. Many small open source consultant and service vendors are part of the Plone community (Michlmayr, 2007).

The Python Software Foundation was founded by Guido Van Rossum in 2001 as an organization devoted to the Python programming language, one of the leading script programming languages.

The Software in the Public Interest (SPI) was formed by members of Debian project in 1997. Its mission is to “help organizations develop and distribute open hardware and software”¹⁴. It hosts several open source projects, such as Debian, freedesktop.org, and

¹³ E.g. <http://www.openadvantage.org/articles/oadocument.2005-04-19.0329097790>

¹⁴ <http://www.spi-inc.org/>

openOffice.org. GNOME was a subproject hosted by SPI before the GNOME Foundation was founded. SPI seldom intervenes in the affairs of its member projects, but it does hold their common assets (O'Mahony, 2003b).

4.2 Dimensions and metrics identified from examining the data

Appendix 2 shows the dimensions and metrics identified by examining information about the six OSSFs included in the sample.

Table 8 shows the metrics for which data for the study period was available. Table 8 only includes the metrics in Appendix 2 for which data exists. Metrics without data for the study period were not included in this research.

Table 8: Metrics for which data exists

Domain	Construct	Dimension	Metric
Company involvement	Company investment and Company influence	Manpower investment and Employment	1-1. Number of members of BOD 1-2. Number of company employees in BOD 1-3. Number of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue 1-4. Number of BOD's members who work for major sponsor companies 1-5. Number of employees in BOD who are part of companies' top management teams 1-6. Number of employees in BOD who are part of top management teams of companies that do not depend on OSSF projects for significant portion of revenue
Governance	Governance structure	Participation in decision making	2-1. Member criteria 2-2. Majority member by number 2-3. Member constitution 2-4. Whether or not merit members have voting rights 2-5. Whether or not merit members can submit requirements 2-6. Whether or not merit members have the rights to approve policies and guidelines 2-7. Whether or not merit members have the rights to approve modifications to bylaw 2-8. Whether or not merit members have the rights to approve modifications to common visions 2-9. Whether or not merit members have the rights to approve primary human resource decisions 2-10. Whether or not sponsor members have voting rights

			<p>2-11. Whether or not sponsor members can submit requirements</p> <p>2-12. Whether or not sponsor members have the rights to approve policies and guidelines</p> <p>2-13. Whether or not sponsor members have the rights to approve modifications to bylaw</p> <p>2-14. Whether or not sponsor members have the rights to approve modifications to common visions</p> <p>2-15. Whether or not sponsor members have the rights to approve primary human resource decisions</p> <p>2-16. Institutionalized breakdown of merit vs sponsor members in BOD</p> <p>2-17. Institutionalized breakdown of merit vs sponsor members in advisory BOD</p>
Composition of BOD	Prestige of BOD member	2-18. Number of members of BOD who have a reputation in OSS community	
	Occupation	<p>2-19. Number of members of BOD who are engineers or scientists</p> <p>2-20. Number of members of BOD who are managers</p> <p>2-21. Number of members of BOD who provide business, public relation, legal, or strategy services</p> <p>2-22. Number of members of BOD who are part of companies' top management teams</p>	
BOD's practices	Activities	<p>Proportion of BOD effort dedicated to:</p> <p>2-23. Strategic planning and common vision development</p> <p>2-24. Establishing policies and guidelines</p> <p>2-25. Project governance</p> <p>2-26. Financial governance</p>	

			<p>2-27. Primary resources governance</p> <p>2-28. Human resource governance</p> <p>2-29. Fund raising</p> <p>2-30. External relations</p> <p>2-31. BOD self development</p> <p>2-32. Governance structure management</p> <p>2-33. Community development</p> <p>2-34. Conference planning and delivery</p> <p>Method to carry out governance activities</p> <p>2-35. Method to carry out governance activities</p> <p>Content of important policies</p> <p>2-36. Existence of umbrella policy</p> <p>2-37. Existence of incubation policy</p> <p>2-38. Extent to which committee of the BOD has power over roadmap</p> <p>2-39. Extent to which committee of the BOD has power over release schedule</p> <p>2-40. Restrictions on commercial usage</p>
Effectiveness	Goal attainment	Project effectiveness	3-1. Number of total projects operated by OSSF
		Community effectiveness	<p>3-2. Number of members</p> <p>3-3. Number of merit members</p> <p>3-4. Number of sponsor members</p>
	System resources	Resource acquisition effectiveness	<p>3-5. Revenue</p> <p>3-6. Major source of revenue</p>

4.3 Data and categories

4.3.1 *Company involvement*

This section provides the result on the employment of BOD members. The intent is to show the degree to which companies can exert direct influence on the governance of the OSSFs in the sample. Employers of the BOD members were categorized based on their potential relationship to the OSSFs in the sample, such as relevant company, major sponsor, and companies that do not depend on OSSF's projects for significant portion of revenue. The BOD members' positions in their employers were also considered.

Table 9 shows the number and proportion of BOD positions held by company employees. The identification numbers (IDN) on the left column correspond to those shown in the right column in Table 8.

In Table 9, the metrics which were calculated using the data collected include: 1-2-1 Proportion of company employees in BOD, 1-3-1 Proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue, and 1-4-1 Proportion of employees in BOD from companies that are major sponsors of OSSF. Company employees in BOD stand for the members of the BOD who are employed by companies which generate revenues from OSSF's projects (relevant companies). Companies that do not depend on OSSF's projects for significant portion of revenue are those which have multiple revenue resources and do not solely rely on providing services or selling products based on the OSSF's projects. This type of companies will continue to operate even without the OSSF's projects.

Table 9: Employees in BOD

IDN	Metrics	Apache	Python	SPI	Plone	Eclipse	GNOME
1-1	Number of members of BOD	27	21	29	16	31	33
1-2	Number of company employees in BOD	17	13	15	16	31	22
1-2-1	Proportion of company employees in BOD	63%	62%	52%	100%	100%	67%
1-3	Number of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue	10	11	7	5	27	18
1-3-1	Proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue	37%	52%	24%	31%	87%	55%
1-4	Number of employees in BOD from companies that are major sponsors of OSSF	10	6	4	8	26	20
1-4-1	Proportion of employees in BOD from companies that are major sponsors of OSSF	37%	29%	14%	50%	84%	61%

For Apache, Python, and GNOME, data on BOD members shown in Table 9 is for 2004, 2005, and 2006. For SPI, data on BOD members is for 2003, 2004, and 2005, for which is financial data is available. For Plone, data on BOD members is for 2005, and 2006, for which its financial data is available. For Eclipse, data on BOD members is for 2006. Data for 2004 and 2005 was not available. The bylaw, press releases, and announcements of

the Eclipse foundation, suggest that the constituents in its BOD are very stable¹⁵.

Companies appoint their employees to seat in the BOD for a relative long time. From official press releases, the researcher could not find a single re-appointment within the study period. Thus, the researcher deems the percentage calculated using the 2006 data as valid.

Figure 2 shows the proportion of company employees in the OSSF's BOD. Figure 2 shows that company employees comprise 100% of the members of the BOD of Eclipse and Plone. The corresponding proportions for the other four foundations (SPI, Python, Apache, and GNOME) range between 52% and 67%.

Figure 2: Proportion of company employees in BOD

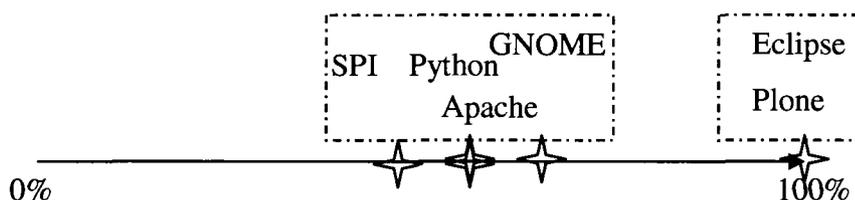


Figure 3 provides the proportion of employees from companies that do not depend on OSSF's projects for significant portion of revenue who are members of the BOD. This proportion can be used to cluster the six OSSFs into three groups. The first group has

¹⁵ The bylaw of Eclipse foundation states that the ratio of paid board members to meritocracy board members is around 6:1. Due to the nature of how BOD members are designated, its BOD members are very stable over the years.

three OSSFs, SPI, Plone, and Apache. The second group is comprised of Python and GNOME. The third group includes one OSSF, Eclipse.

Figure 3: Proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue

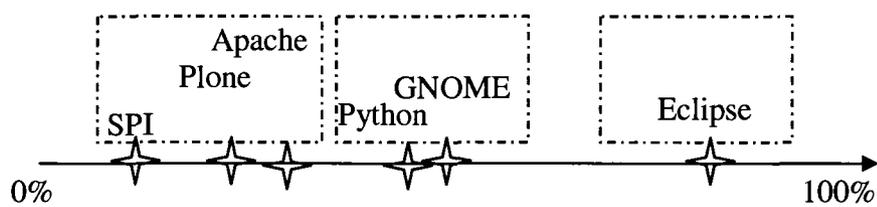


Table 10 shows the number and proportion of employees in the OSSF BOD who are part of companies' top management teams (TMT).

Table 10: Employees in BOD who are part of TMT*

IDN	Metrics	Apache	Python	SPI	Plone	Eclipse	GNOME
1-1	Number of members of BOD	27	21	29	16	31	33
1-5	Number of employees in BOD who are part of companies' TMT	10	5	3	10	17	7
1-5-1	Proportion of employees in BOD who are part of companies' TMT	37%	24%	11%	63%	55%	24%
1-6	Number of employees in BOD who are part of TMT of companies that do not depend on OSSF projects for significant portion of revenue	3	3	3	2	13	7
1-6-1	Proportion of employees in BOD who are part of TMT of companies that do not depend on OSSF projects for significant portion of revenue	11%	14%	10%	13%	42%	24%

* Apache, Python, and GNOME: 2004-2006; SPI: 2003-2005; Plone: 2005-2006; Eclipse:

2006

4.3.2 Governance

Governance structure

This section illustrates two aspects of the governance structure of OSSFs: (i) general information on membership structure of the OSSFs in the sample, and (ii) the dominate relation between BOD and members (Schnurbein, 2006). A nominal variable was developed to assess the degree to which a member can participate in decision making and influence the outcome.

Table 11 compares the OSSFs in the sample using the information identified in governance documents (i.e., bylaw and charter). General information on membership structure includes metrics 2-1 to 2-4. Metric 2-5 to 2-15 are members' decision making rights, which to some extent shape the primary decision making of the BOD in an OSSF. Metrics 2-16 and 2-17 describe the rights of the members to be elected as the members of BOD, which is the major governance actor in OSSFs.

Table 11: Participation in decision making

IDN	Metrics	Apache	Python	SPI	Plone	Eclipse ¹⁶	GNOME
2-1	Member criteria	Meritocracy	Meritocracy Sponsorship	Meritocracy	Meritocracy	Meritocracy Sponsorship	Meritocracy Sponsorship
2-2	Majority member by number	Merit	Merit	Merit	Merit	Merit	Merit
2-3	Member constitution	Individual	Individual Organization	Individual	Individual	Individual Organization	Individual Organization
2-4	Merit members have voting rights?	Yes	Yes	Yes	Yes	Yes	Yes
2-5	Merit members can submit requirements?	Yes	Yes	Yes	Yes	Yes	Yes
2-6	Merit members can reject policies and guidelines?	Yes	Yes	Yes	Yes	No	Yes
2-7	Merit members can reject modification to bylaw?	Yes	Yes	Yes	Yes	Yes	Yes
2-8	Merit members can reject modification to common vision?	Yes	Yes	Yes	Yes	Yes	Yes
2-9	Merit members can reject primary Human resource decision?	Yes	Yes	Yes	Yes	No	Yes
2-10	Sponsor members have voting rights?	N/A	Yes	N/A	N/A	Yes	No
2-11	Sponsor members can submit requirements?	N/A	Yes	N/A	N/A	Yes	Yes
2-12	Sponsor members can	N/A	Yes	N/A	N/A	Yes	No

¹⁶ Eclipse Rights by Membership Category

http://www.eclipse.org/membership/become_a_member/How2Join%20Eclipse%20Rights%20by%20Membership%20Category.pdf

	reject policies and guidelines?						
2-13	Sponsor members can reject modification to bylaw?	N/A	Yes	N/A	N/A	Yes	No
2-14	Sponsor members can reject modification to common vision?	N/A	Yes	N/A	N/A	Yes	No
2-15	Sponsor members can reject primary human resource decision?	No	No	No	No	Yes	No
2-16	Institutionalized breakdown of merit vs sponsor members in BOD	N/A	15%	N/A	N/A	>80%	0%
2-17	Institutionalized breakdown of merit vs sponsor members in advisory BOD	N/A	N/A	N/A	N/A	N/A	100% ¹⁷
2-16-1	Extent to which the sponsor members can participate in decision making in an OSSF	Merit	Merit Dominated	Merit	Merit	Sponsor Dominated	Merit Dominated

The six OSSFs in the sample are membership based nonprofits. There are two types of memberships, meritocracy based and sponsorship based. A sponsor member can only be an organization, and a merit member can only be an individual. In three foundations (Apache, SPI, and Plone), there are no sponsor members.

¹⁷ Nonprofits can be members of advisory board and exempt for membership fees.

A nominal variable was used to represent the extent to which OSSF's bylaws allowed sponsor members to participate in decision making. The variable was allowed one of three values: "Sponsor Dominated", "Merit Dominated" or "Merit". The variable is "Sponsor Dominated" if the bylaws of the OSSF allowed sponsor members to hold a majority in the BOD. The variable is "Merit Dominated" if the bylaws of the OSSF: (i) allowed sponsor members to hold a minority position in the BOD but not a majority position or (ii) allowed sponsor members to hold positions in one or more Advisory BODs, but not on the BOD. The variable is "Merit" if the bylaws allowed merit members but not sponsor members.

The last row in Table 11 indicates that Apache, Plone, and SPI are "Merit" OSSFs. Their bylaws only allow merit members. They do not recognize sponsor members.

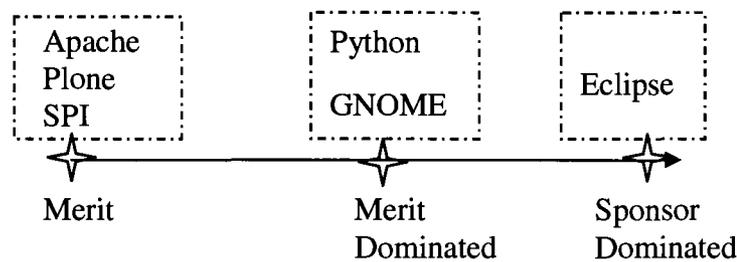
Python and GNOME are "Merit Dominated" OSSFs. The bylaws of Python provide sponsor and merit members with full voting rights. One organization that is a sponsor member has the same rights as an individual who is a merit member. Thus, the extent to which sponsor members can influence outcomes is low. The bylaws of GNOME do not allow sponsor members to be part of the BOD. They can only become members of the Advisory Board. Again, the extent to which sponsor members can influence outcomes is low.

Eclipse is a "Sponsor Dominated" OSSF. The Eclipse bylaws provide sponsor members with full voting rights and merit members with limited rights. Moreover, most merit

members in Eclipse are company employees. Thus, company employees have a high level of participation in decision making.

Figure 4 illustrates the OSSFs categorized into three groups based on the nominal variable that represents the extent to which the sponsor members can participate in OSSF decision making.

Figure 4: Extent to which a sponsor member can participate in OSSF decision making



BOD Composition

This section provides the results regarding BOD members' reputation and occupation.

Table 12 shows the number of members of the BOD of OSSF whose name appeared in the list of celebrities prepared by Abrahamsen (2007).

Table 12: Reputation in OSS community*

IDN	Metrics	Apache	Python	SPI	Plone	Eclipse	GNOME
1-1	Number of members of BOD	27	21	29	16	31	33
2-17	Number of members of BOD who have reputation in OSS community	5	2	6	0	0	1
2-17-1	Proportion of members of BOD who have reputation in OSS community	19%	10%	21%	0%	0%	3%

* Apache, Python, and GNOME: 2004-2006; SPI: 2003-2005; Plone: 2005-2006; Eclipse: 2006

Appendix 3 provides the rules for a name to be included in Abrahamsen's list as well as the list of celebrities assembled by Abrahamsen (2007).

Figure 5 illustrates the proportion of members of OSSFs' BOD who are celebrities in the OSS community.

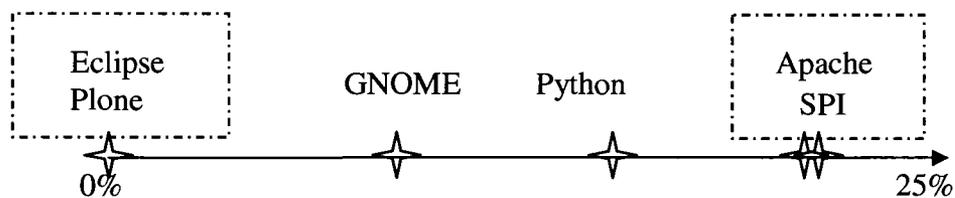
Figure 5: Proportion of members of BOD who are celebrities in the OSS community

Table 13 provides the number and proportion of members of the BOD with different occupation and position in companies. These companies may not have a direct relationship with the open source projects.

Table 13: Occupation of BOD members*

IDN	Metrics	Apache	Python	SPI	Plone	Eclipse	GNOME
1-1	Number of members of BOD	27	21	29	16	31	33
2-18	Number of members of BOD who are engineers or scientists	12	12	18	3	4	15
2-18-1	Proportion of members of BOD who are engineers or scientists	44%	57%	67%	19%	13%	52%
2-19	Number of members of BOD who are managers	3	1	0	2	2	2
2-19-1	Proportion of members of BOD who are managers	11%	5%	0%	13%	6%	7%
2-20	Number of members of BOD who provide business, public relation, legal, or strategy services	0	2	3	0	4	4
2-20-1	Proportion of members of BOD who provide business, public relation, legal, or strategy services	0%	10%	11%	0%	13%	14%
2-21	Number of members of BOD who are part of companies' TMT	10	5	3	10	17	7
2-21-1	Proportion of members of BOD who are part of companies' TMT	37%	24%	11%	63%	55%	24%

* Apache, Python, and GNOME: 2004-2006; SPI: 2003-2005; Plone: 2005-2006; Eclipse:

Potential skills can be deduced from BOD members' occupations and positions in their companies (Siciliano, 1990, 1996). Only the latest occupation and position of the members of the BOD during the research period was counted.

A BOD member was included in the engineer or scientist category if he/she was an engineer, senior engineer, researcher, senior researcher, or scientist. The manager category includes members of BOD with junior, intermediate, or senior level manager titles. The category for members of BOD who provide business, public relation, legal, or strategic service includes BOD members who are business developers, strategists, public relation developers, and lawyers. TMT includes BOD members who have top management team titles, such as VP, CEO, senior director, or president.

Figure 6: Proportion of members of BOD who are engineers/scientists

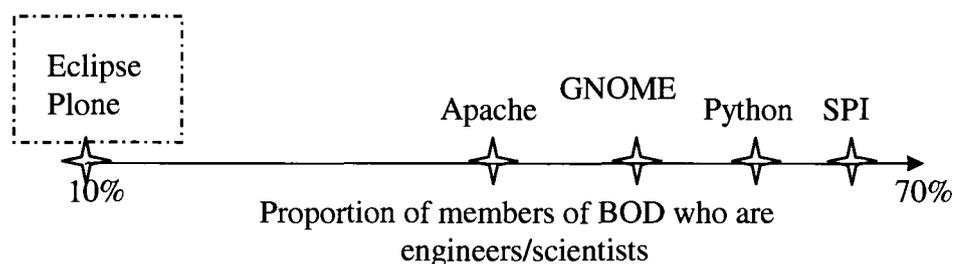


Figure 6 shows that the proportion of BOD members who are engineers and scientists between 13% and 67% and there are no natural clusters.

BOD's practice

This section shows the governance activities carried out by the BOD of the OSSFs in the sample. Methods to carry out governance activities are compared among OSSFs in the sample. Differences in important governance policies are identified.

Table 14 provides a breakdown of all governance activities of BOD.

Table 14: Activity breakdown of OSSF BOD*

IDN	Activities	Apache		Python		SPI		Plone		Eclipse		GNOME		All	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
2-22	Strategic planning & common vision	2	0%	1	0%	0	0%	1	1%	4	2%	9	3%	17	1%
2-23	Policy & guideline	50	8%	47	23%	21	34%	36	20%	39	23%	45	13%	238	15%
2-24	Project governance	475	72%	18	9%	0	0%	3	2%	24	14%	27	8%	547	34%
2-25	Financial governance	26	4%	24	12%	12	20%	14	8%	9	5%	29	9%	114	7%
2-26	Primary resources governance	13	2%	20	10%	9	15%	8	4%	8	5%	8	2%	66	4%
2-27	Human resource governance	6	1%	0	0%	0	0%	11	6%	5	3%	3	1%	25	2%
2-28	Fund-raising	25	4%	19	9%	2	3%	15	8%	0	0%	33	10%	94	6%
2-29	External relation	16	2%	30	15%	10	16%	43	24%	16	10%	80	24%	195	12%
2-30	BOD self development	1	0%	6	3%	3	5%	6	3%	1	1%	5	1%	22	1%
2-31	Governance structure management	22	3%	12	6%	4	7%	32	18%	26	15%	34	10%	130	8%
2-32	Community development	12	2%	5	2%	0	0%	10	6%	28	17%	8	2%	63	4%
2-33	Conference	16	2%	20	10%	0	0%	2	1%	8	5%	55	16%	101	6%
	Total activities	664	41%	202	13%	61	4%	181	11%	168	10%	336	21%	1612	100%

* Apache, Python, and GNOME: 2004-2006; SPI: 2003-2005; Plone: 2005-2006; Eclipse:

2006

Table 14 provides a count for each type of governance activity undertaken each month by the BOD.

The “Strategic planning & common vision” category includes BOD activities, such as long term planning, strategic planning, common vision development, goal clarification, strategy development, and mission reinstating. Activities in “Policies & guidelines” relate to policies or guides generating. Activities in “Project governance” include project status review, roadmap or release discussion, project coordination, bounty discussion. BOD activities in “Financial governance” include financial status and budget review, budgeting or granting. Financial governance activities do not include those related to fund-raising activities. “Primary resources” includes activities which are important for foundation and community day-to-day operations, such as server, broadband network access service, workflow software, and website maintenance and infrastructures related activities. Activities in “Human resource governance” include appointing officer, hiring staff, and so on. “Fund-raising” activities include activities such as funding plan, funding rising method development, funding status review, sponsor advocacy and communication. Activities in “External relation” include collaboration with companies, other open source foundation, officially attending open source conference, and press releases instructed by BOD, and etc. Activities in “BOD self development” include activities related to develop and improve BOD skill and performance in foundation governance. “Governance structure management” includes activities such as committee setup, membership review, and etc. Activities in “Community development” include fostering local communities, pushing and sponsoring community events. Since BODs in OSSFs spend much time and

efforts on open source “Conferences”, which have various effects on fund-raising, external collaboration, and community development. These activities are classified into one group.

The data in Table 14 is skewed because Apache has many top-level projects and it reviews its project status every three months. Since reviewing the status for each project counts as one activity, the percentage of total activities reported in Table 14 is skewed. Table 15 provides the same data as what is in Table 14 with the project governance category removed.

Table 15: Activity breakdown of OSSF BOD excluding the project governance category*

IDN	Activities	Apache		Python		SPI		Plone		Eclipse		GNOME		All	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
5-1	Strategic Planning & Common Vision	2	1%	1	1%	0	0%	1	1%	4	3%	9	3%	17	2%
5-2	Policy & Guideline	50	26%	47	26%	21	34%	36	20%	39	27%	45	15%	238	22%
2-25	Financial Governance	26	14%	24	13%	12	20%	14	8%	9	6%	29	9%	114	11%
2-26	Primary Resources Governance	13	7%	20	11%	9	15%	8	4%	8	6%	8	3%	66	6%
2-27	Human resource Governance	6	3%	0	0%	0	0%	11	6%	5	3%	3	1%	25	2%
2-28	Fund-Raising	25	13%	19	10%	2	3%	15	8%	0	0%	33	11%	94	9%
2-29	External Relation	16	8%	30	16%	10	16%	43	24%	16	11%	80	26%	195	18%
2-30	BOD Self Development	1	1%	6	3%	3	5%	6	3%	1	1%	5	2%	22	2%
2-31	Governance Structure Management	22	12%	12	7%	4	7%	32	18%	26	18%	34	11%	130	12%
2-32	Community Development	12	6%	5	3%	0	0%	10	6%	28	19%	8	3%	63	6%
2-33	Conference	16	8%	20	11%	0	0%	2	1%	8	6%	55	18%	101	9%
	Total Activities	189	18%	184	17%	61	6%	178	17%	144	14%	309	29%	1065	100%

* Apache, Python, and GNOME: 2004-2006; SPI: 2003-2005; Plone: 2005-2006; Eclipse:

2006

Figure 7 shows the OSSFs in the sample categorized by BOD's efforts dedicated to strategic planning and common vision development.

Figure 7: Proportion of BOD's efforts dedicated to strategic planning and common vision development

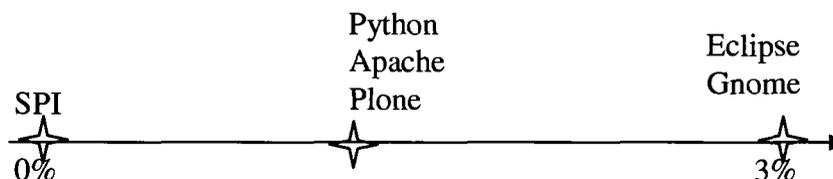


Table 16 shows the method used to carry out governance activities for the six OSSFs in the sample. In Eclipse, almost all the governance activities initiated by the BOD are carried out by externals. For the other five OSSFs in the sample, BOD members themselves undertake most of the activities related to management and operation.

Table 16: Method used to carry out governance activities

IDN	Metrics	Apache	Python	SPI	Plone	GNOME	Eclipse
2-34	Method to carry out governance activities	By members of BOD or BOD committees					By authorizing organizations or staffs outside of BOD

Table 17 identifies differences in the primary policies and guidelines of the six OSSFs in the sample.

Table 17: Difference in OSSF's primary policies and guidelines

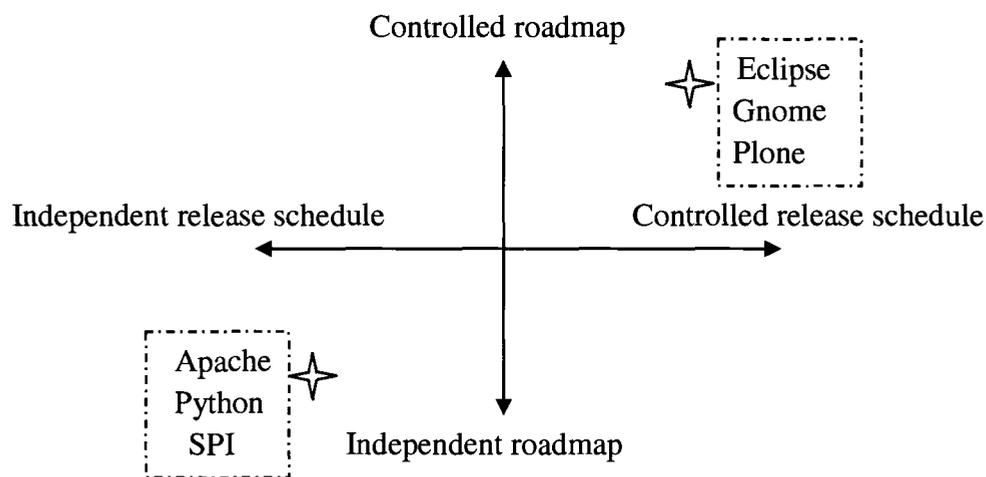
IDN	Metrics	Apache	Python	SPI	Plone	Eclipse	GNOME
2-35	Existence of umbrella policy	Yes	No	Yes	No	Yes	Yes
2-36	Existence of incubation policy	Yes	No	No	No	Yes	No
2-37	Extent to which committee of the BOD has power over roadmap	Independent	Independent	Independent	Strong	Strong	Strong
2-38	Extent to which committee of the BOD has power over release schedule	Independent	Independent	Independent	Strong	Strong	Strong
2-39	Restrictions on commercial usage	Can resale No need to contribute back No need to open source code	Can resale No need to contribute back No need to open source code	Need to contribute back Need to open source code	Need to contribute back Need to open source code	Can resale No need to contribute back No need to open source code	Need to contribute back Need to open source code

An OSSF is considered to be an umbrella foundation if its policy regulates it to host more than one major foundation project. Apache and Eclipse are foundations which have incubation policies to help new OSS projects grow.

A roadmap and release control policy is deemed to be controlled if: (i) final decisions are made by a committee of the BOD, rather by consensus or (ii) it is time based (Michlmayr, 2007).

Figure 8 illustrates that the six foundations can be organized into two groups according to the extent to which a committee of the BOD has power over the timing and content of software roadmaps and releases. BOD committees in the Eclipse, GNOME and Plone foundations have strong control over software releases. This is not the case for the other three foundations.

Figure 8: Extent to which a committee of the BOD has power over the timing and content of software releases



4.3.3 *Foundation effectiveness*

This section provides the result on OSSF effectiveness. Effectiveness metrics identified from official governance documents with data available are categorized into project effectiveness, community effectiveness, and resource effectiveness. OSSFs in the sample are compared based on their major sources of revenue.

Continuous data on OSSF effectiveness is not readily available. Tables 19 to 21 extract data from Appendixes 4 to 6. Revenue is the only metric with sufficient data to be included in this research as a measure of performance.

Table 18: Project effectiveness: number of projects in OSSFs

IDN	Metrics	Apache			SPI		
		2006	2005	2004	2005	2004	2003
3-1	Number of total projects in foundation	37	27	19	9	6	4
		GNOME			Eclipse		
		2006	2005	2004	2006	2005	2004
3-1	Number of total projects in foundation	28	182	122	66	50	33

Table 19: Community effectiveness: number of foundation members (merit and sponsor)

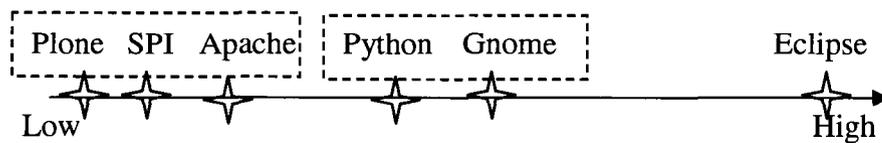
IDN	Metrics	Apache			SPI			Plone		
		2006	2005	2004	2005	2004	2003	2006	2005	2004
3-2	Number of members	202	176	117	595	551	403	101	95	N/A
3-3	Merit member	202	176	117	595	551	403	101	95	N/A
		Python			GNOME			Eclipse		
		2006	2005	2004	2006	2005	2004	2006	2005	2004
3-2	Total member	595	551	403	375	368	335	914	590	397
3-3	Merit member	102	92	83	360	354	324	765	470	316
3-4	Sponsor member	21	17	10	15	14	11	131	104	68

Table 20: Resource effectiveness: financial effectiveness

IDN	Metrics	Apache			Python			SPI		
		2006	2005	2004	2006	2005	2004	2006	2005	2004
3-5	Over all revenue	149121	49212	17045	217138	147582	37119	38545	<25000	<25000
		Plone			Eclipse			GNOME		
		2006	2005	2004	2006	2005	2004	2006	2005	2004
3-5	Over all revenue	3118	3390	100600	5.5M	3.9M	1.5M	157565	12000	164253

Table 18 shows the number of projects which can be used to evaluate project effectiveness for umbrella OSSFs. Table 19 shows the numbers of merit and sponsor members which can be used to evaluate community effectiveness. Table 20 shows the financial data which can be used to evaluate resource effectiveness. Since Eclipse is not required to make its tax filing public, its financial data comes from its BOD meeting minutes. Data for the other five foundations come from tax documents filed annually.

Figure 9 shows that the six OSSFs in the sample can be categorized into three groups based on revenue.

Figure 9: Revenue of OSSFs

OSSFs can be categorized into three groups based on the main source of revenue. Table 21 shows that public donations were the major source of funding for Apache, SPI, and Plone. Python's major source of revenue is the Python conference. GNOME and Eclipse's major source of revenue is sponsor membership fees.

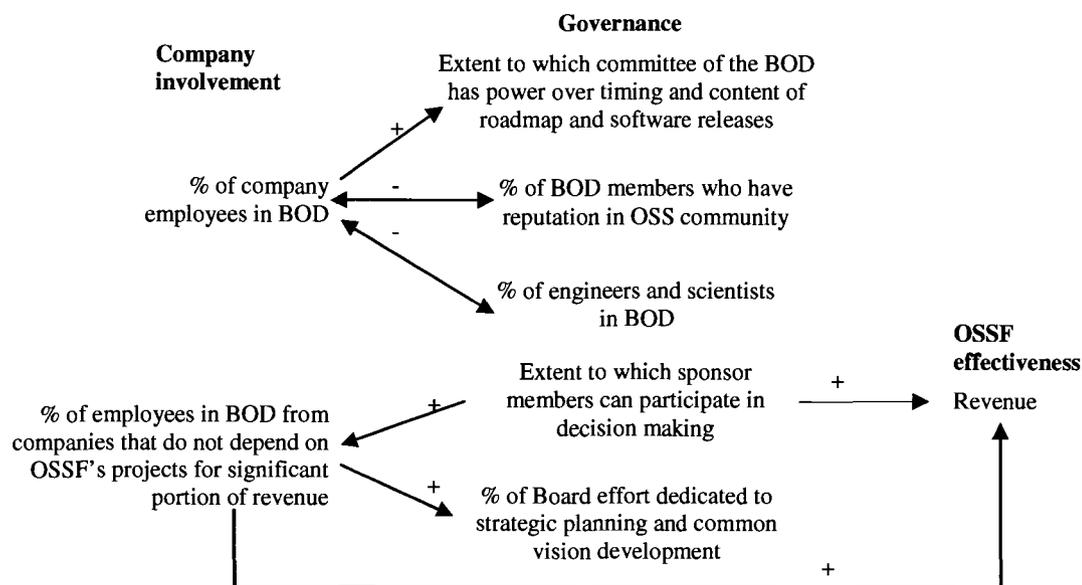
Table 21: Major revenue resources

Apache	SPI	Plone	Python	GNOME	Eclipse
Public donation			Conference	Sponsor membership fees	

4.4 Model and propositions

Figure 10 provides the model proposed by the researcher after examining the data and linking the categories founded earlier in this chapter. The model advances a relationship among company involvement, governance, and OSSF effectiveness.

Figure 10: Model for how company involvement and governance affect OSSF effectiveness



The model in Figure 10 indicates that the extent to which sponsor members can participate in decision making increases OSSF revenue. The model suggests that two metrics related to company involvement (the proportion of company employees in BOD and the proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue) are related to five metrics representing governance.

The Eclipse and Plone BOD are comprised exclusively of company employees (Figure 2), and have tight control over the software roadmap and releases (Figure 8). SPI, Apache, and Python BOD have the lowest proportion of BOD members who are company employees. These three BODs do not have high control over their roadmaps and software releases. For the Apache, SPI, member projects have independent roadmaps and software

releases. Python's roadmap and release is controlled by a "benevolent dictator for life" (BDFL).

Based on the observations from Figures 2 and 8, the researcher proposed a causal relationship:

Proposition 1: Proportion of company employees in BOD positively affects the power of a committee of the BOD has over timing and content of roadmap software releases

Michlmayr (2007) reputed that one of the reasons that Plone has strict control over roadmap and software releases is that "many Plone developers work as consultants building web sites. Because of the unpredictability of Plone, it was difficult for them to decide which version to use for future projects". Generally, the business of companies generating revenues from open source software can benefit from predictable software release features. Thus, it is reasonable that companies will try to use their influence to make the development of open source software as predictable as possible. So, the researcher proposed that the proportion of company employees in BOD is a major contingent factor of extent to which committee of the BOD has power over timing and content of software releases and the relationship is a causal relationship.

Based on observations from Figures 2 and 5, the researcher proposed:

Proposition 2: The proportion of company employees in BOD is negatively related to the proportion of BOD members who have reputation in OSS community.

For the two foundations which have the highest proportion of company employees in their BOD, Eclipse and Plone, there are no BOD members who have reputation in the OSS community. In contrast, SPI has the lowest proportion of company employees in BOD and the highest proportion of BOD members who have reputation in the OSS community. One possible explanation for this is that for those who have high reputation in OSS community, these kinds of people generally are traditional hackers, and are more likely to accept hacker ethos. Since the OSSFs with more company employees in BOD tends to have more control over roadmap and release schedule, people with high reputation in OSS community may deem it as a violation of hacker's ethos. It may be easier for individuals with a high reputation in the OSS community to obtain seats in BOD that is not dominated by company employees. Another possible explanation is that newly founded OSSFs are less likely to have prestigious celebrities, because there is less time for people in these foundations to develop a reputation. And since open source has attracted more businesses in recent years, newly founded OSSFs are more business driven and will tend to have more company employees in their BODs.

Based on observations from Figures 2 and 6, and Table 13, the researcher proposed:

Proposition 3: The proportion of company employees in BOD is negatively related to the proportion of engineers and scientists in BOD.

Company involvement in an OSSF BOD brings in business interests and decreases the extent that the OSSF is technology driven. The proportion of engineers and scientists in a

BOD may reflect the extent to which the BOD is technology driven. Figures 2 and 6 show that the two foundations with the highest proportion of company employees in their BOD have the least proportion of engineers and scientists as members.

Based on observations from Figures 3 and 4, the researcher proposed a causal relationship:

Proposition 4: Extent to which sponsor members can participate in decision making positively affects the proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue.

When OSSFs provide mechanisms for company employees to participate in decision making as sponsor members, they attract a great number of individuals as members of BOD who are employed by companies that do not depend on OSSF's projects for significant portion of their revenue.

The proportion of employees in the OSSF BOD from companies that do not depend on OSSF's projects for significant portion of revenue is much larger than the proportion of sponsor members in the BOD (refer to Figure 3). Although companies are prescribed in the governance documents to become a sponsor member to hold their "voice" in OSSFs, they actually get more "voice" through their merit committers in OSSFs. For OSSFs which does not have sponsor members, the only way that companies can get involved in OSSFs is through merit members.

Based on observations from Figures 3 and 7, the researcher proposed a causal relationship:

Proposition 5: Proportion of members of BOD from companies that do not depend on OSSF's projects for significant portion of revenue positively affect the proportion of BOD effort dedicated to strategic planning and common vision development.

Strategic planning and common vision development provide occasions for OSSFs to attain consensus on important issues. Company employees voice their companies' interests and try to align the interests of others with their own. For SPI, the researcher didn't find any sign of strategic planning and common vision development in the official BOD meeting minutes. For Apache, such activities are triggered by an external event, such as a license issue. Eclipse and GNOME are very active in activities related to strategic planning and common vision development.

The data suggests that OSSFs which have sponsor members are much more active than OSSFs which do not have sponsor members, in strategic planning and common vision development. Compared to Eclipses and GNOME, Python is not very active in strategic planning and share vision development. This may be explained by the fact that Python is engaged in programming language development.

Based on observations from Figures 6 and 9, and Table 21, the researcher proposes a causal relationship:

Proposition 6-a: Extent to which sponsor members can participate in decision making positively affects revenue of OSSFs.

Proposition 6-b: The proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue positively affects revenue of OSSFs.

The researcher observed two positive associations: (i) association between the extent to which sponsor members can participate in decision making and revenue of OSSFs and (ii) association between the proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue and revenue of OSSFs. OSSFs with no sponsor members heavily rely on public donations, while OSSFs with sponsor members benefit from steady income from membership fees. Eclipse's revenue from membership fees are over 20 times greater than the revenue of the other OSSFs'. GNOME's membership fees are its major source of revenue. For Python, although its membership fees are not the major source of revenue, its revenue from its conference makes it the second richest OSSF. The extent to which sponsor members can participate in decision making attracts potential sponsors. Thus, it can positively affect revenue of OSSFs. The proportion of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue reflects the degree of involvement of companies which have abundant resources, especially financial resource, to contribute to OSSFs. These companies have more will and ability to make monetary contribution to OSSFs. Thus, the researcher deemed that it can positively affect revenue of OSSFs.

5 DISCUSSION OF RESULTS

This chapter is organized into three sections. Section 5.1 answers the four research questions. Section 5.2 provides observations on the relationship among company involvement, governance, and OSSF effectiveness deemed useful to executive directors of OSSFs, companies' top management teams, and academics. Section 5.3 links the results of this research with the literature reviewed in Chapter 2.

5.1 Answers to research questions

The first deliverable of this research was to answer the following four research questions:

- (i) What are the different types of governance structures of OSSFs?
- (ii) What are the practices of the BOD of OSSFs?
- (iii) What is the composition of the BOD of OSSFs?
- (iv) How do company involvement and governance affect OSSF effectiveness?

5.1.1 Governance structure types

Sponsor members join OSSFs as organizations while merit members join them as individuals. A sponsor member has one vote just as a merit member does. Bylaws clearly describe the rights of sponsor and merit members.

In this research, governance structure refers to “who participates in the decision-making”.

The data on the nominal variable: the extent to which the sponsor members can participate in the decision making of OSSFs in Table 12 and Figure 4, suggests that three

governance types exist. The researcher has named the three types: (i) Merit; (ii) Merit Dominated; and (iii) Sponsor Dominated.

In foundations with a Merit type of governance structure, all members are merit members with full voting rights. In Merit Dominated governance structures, merit members are in a majority and it is difficult for sponsor members as a group to affect outcomes. In Sponsor Dominated governance structures sponsor members are in a majority. Sponsor members can be classified into tiers. Size of the payment determines tier membership. Merit members in Sponsor Dominated structures typically work for a company or research centre.

5.1.2 BOD's practices

Table 14 shows that twelve categories of governance activities are carried out by BODs of OSSFs. The twelve activity categories are: (i) strategic planning and common vision development; (ii) policy and guideline; (iii) project governance; (iv) financial governance; (v) primary resources governance; (vi) human resource governance; (vii) fund-raising; (viii) external relation management, (ix) BOD self development, (x) governance structure management, (xi) community development, and (xii) conference governance.

Table 14 indicates that all six BOD of the OSSFs in the sample allocate more than 60% of their effort carrying out activities that fall into the following four categories: (i) project governance (ii) policy and guidelines; (iii) external relations; and (iv) governance structure management.

Table 14 also indicates that all six BOD of the OSSFs allocate the least amount of effort to carrying out activities that fall into the following three categories: (i) strategic planning and common vision development; (ii) human resource governance; and (iii) BOD self development.

That the BOD of the six OSSFs in the sample did not spend more effort raising funds was a surprise. The BOD of one foundation did not undertake activities to raise funds, and another only 3% of its activities were carried out to raise funds. Perhaps the reason for this is that OSSFs are mostly virtual organizations and large budgets are not required to operate them. Thus, the BODs of OSSFs do not carry out a large number of activities to raise funds.

The data in Table 14 suggests that the GNOME BOD is the most active (309 activities carried out), while that for SPI is the least active (61 activities carried out).

5.1.3 BOD composition

The occupation and status of BOD members affects the BOD's ability to carry out tasks as well as its behaviour and performance (Siciliano, 1990; Zald 1967; Pfeffer 1972; Baysinger & Butler, 1985).

Table 13 shows the breakdown of BOD by occupation. It shows that Eclipse and Plone have a greater proportion of their BOD members with a background in management,

business development, and strategic management. The proportion of engineers and scientists in their BOD are small. Table 13 shows that more than 50% of the BOD of the Plone and Eclipse foundations are also part of companies' TMT.

SPI has the largest proportion of BOD members with engineer/scientist background (67%) and a small proportion of BOD members with background in management, business development, and strategic management (11%).

Table 12 indicates that the SPI and Apache foundations have the largest proportion of OSS celebrities in their BODs. Plone and Eclipse do not have a single OSS celebrity on their BOD.

5.2 Model on how company involvement and governance affect OSSF effectiveness

The model in Figure 10 is new. The inductive approach to model building was used. The model was developed from reasoning and observing information on the six foundations in the sample.

Figure 10 shows that company involvement is comprised of two dimensions: (i) company employees on the BOD and (ii) employees of companies that do not depend on OSSF's projects for significant portion of their revenue on the BOD. The latter dimension is a subset of the first.

In the model shown in Figure 10, OSSF governance is comprised of five dimensions. One

dimension focuses on how much effort the BOD spends on strategic planning and common vision development. Two dimensions relate to the composition of the BOD: (i) BOD members who have a reputation in the OSS community and (ii) BOD members with a background in engineering and science. One dimension deals with power, specifically the power the BOD has over timing and content of roadmap and software releases and (ii) power of sponsor members. Finally, one dimension focuses on sponsor members' ability to participate in decision making.

The model in Figure 10 identifies revenue as the only variable that could be used to assess OSSF effectiveness in this research. Data for other variables were not available. It also shows that two dimensions, one that relates to company involvement and one that relates to governance, positively affect revenue.

The model highlights the importance of including on the BOD of OSSF employees of companies that do not depend on the OSSF's projects for significant portion of their revenue. The presence of these employees in the BOD increases the effort that BOD members will dedicate to strategic planning and common vision development as well as the OSSF's revenue.

Governance structure concurrently affects company involvement and OSSF revenue. This discovery is important for designing OSSFs. The greater the number of sponsor members in a BOD, the greater the number of employees of companies that do not depend on OSSF's projects for significant portion of their revenues and the greater the revenue.

The model suggests that the number of company employees in a BOD is negatively correlated to the two BOD composition dimensions: (i) BOD members who have a reputation in the OSS community and (ii) BOD members with a background in engineering and science.

5.3 Observations

This section provides two observations on the relationship among company involvement, governance, and OSSF effectiveness deemed to be useful to executive directors of OSSFs, companies' top management teams, and academics.

The first observation is that OSSF with Sponsor Dominated governance structures register as 501(c)(6) nonprofits, while OSSFs with Merit and Merit Dominated structures register as 501(c)(3) nonprofits. Donations to 501(C)(6) OSSFs are not tax deductible to the donors. Thus, the public will not be interested in making donations to OSSFs registered as 501(c)(6). The 501(C)(6) OSSFs must attract revenue from membership fees to survive. OSSFs registered as 501(c)(3) OSSFs can receive at least one third of their support from the general public. Membership fees and revenues from OSS conferences are not deemed as support from the general public. Large donations from founders or BOD members, or going back year after year to the same foundations or corporations for income, may not count as "public" support¹⁸. From all the financial statement of sampled 501(c)(3) OSSFs, long term public support is generally below US \$500,000. This means,

¹⁸ 501(c)3 Fact Sheet: <http://www.rurdev.usda.gov/rbs/ezec/Toolbox/501c3factsheet.html>

that revenue for a 501(c)(3) OSSFs can not be much more than \$150,000 a year over the long run.

The second observation is on BOD's working styles. A BOD may delegate most of the managerial and operational activities to a full-time Executive Director or Chief Executive Officer and specific councils. This working style is consistent with that described by Carver (1996, 2001) as a "policy governing" BOD. A full-time management organization in the OSSF is the enabler for a "policy governing" BOD. For example, the BOD of the Eclipse Foundation can be referred to as a "policy governing" BOD.

The second working style refers to where BOD members, volunteers and staff members carry out the work of the BOD. This working style can be denoted "working" BOD.

5.4 Links with the literature

Weiss and Birnbaum (1989) examined technological infrastructures. These infrastructures were conceptualized as being comprised of a network of producers and users of technology anchored around a process and a dominant design. The characteristics of the technological infrastructures described by Weiss and Birnbaum (1989) seem to describe the infrastructures that Sponsor Dominated OSSFs provide companies to collaborate. It is less clear whether or not these characteristics describe the technological infrastructures established by Merit and Merit Dominated governance structures.

The extant literature focuses on financial resources to assess the effectiveness of nonprofits (Provan, 1980; Pfeffer, 1973; Glisson & Martin, 1980). Green and Griesinger (1996) argue that dimensions other than financial dimensions (e.g., revenue) should be used when measuring the effectiveness of nonprofits. While revenue data is the only data available (hence it was used as the only measure of effectiveness in this study), it may not be the best measure to assess OSSF's effectiveness. The reason for this may be that OSSFs are virtual organizations with less need for large budgets.

O'Mahony (2003) raises the concern of company involvement in OSSFs. The researcher, however, did not observe instances where company involvement negatively affected OSSF effectiveness.

Crowston et al. (2007) develop metrics, based on the features of SourceForge, to evaluate the effectiveness of open source software projects. Metrics identified to assess the effectiveness of the projects of OSSFs in this research are consistent with those used by Cowston et al. (2007), except for bug fixing time, which is not a concern of effectiveness in the official governance documents of the OSSFs in the sample.

While OSSFs are new phenomena, they share many characteristics with nonprofit organizations. This suggests that BOD members in OSSF can benefit from the literature on governance written for nonprofits (e.g. Houle, 1989; Slesinger, 1991; Carver, 1996, 2001; Gill et al., 2005).

6 CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

This chapter is organized into three sections. Section 6.1 provides the main conclusions of this research. Section 6.2 describes the limitations of this research. Section 6.3 provides suggestions for future research.

6.1 Conclusions

The first conclusion is that OSSFs use at least three types of governance structures: Merit, Merit Dominated, and Sponsor Dominated.

The second conclusion is that we have inductively constructed a model of the relationship among company involvement, governance and OSSF performance. The model in Figure 10 illustrates how company involvement improves OSSF governance and increases OSSF revenue and how governance also improves company involvement and affects revenue.

The third conclusion is that OSSF many not identify revenue as their most important measure of effectiveness. There is not enough data on OSSF effectiveness that is publicly available to carry out empirical research.

6.2 Limitations

This research has several limitations. First, as expected to be the case in exploratory studies of a new subject matter, the selection of constructs, dimensions, and metrics depends on the perspective of the researcher. Thus, this study inherits the limitations of

inductive research.

Second, this research is limited because it did not examine indirect influence. Companies may exert their influence on OSSFs in indirect ways (i.e., ways other than assigning their employees to be part of OSSFs BOD).

Third, dimensions on OSSF effectiveness were identified by observing information on OSSF's official websites and governance documents. This approach does not provide insights that represent all of OSSF's stakeholders. Important effectiveness measures may not be discovered in this way. Surveys on effectiveness of OSSFs for GNOME and Eclipse foundations¹⁹ do exist. However, this data is not large enough to carry out research at this stage.

Fourth, the sample selection criteria led to the inclusion in the sample of well known, mature, US-based foundations. The selection criteria led to the elimination of important OSSFs such as Free Software Foundation, Perl foundation, FreeBSD foundation, OpenBSD foundation, and Gentoo foundation.

6.3 Future research

The following suggestions are made for future research:

The first suggestion is to empirically test the relationships identified in the model

¹⁹ Eclipse started to do annual community since the end of 2006

included as Figure 10.

The second suggestion for future research is to collect data from various OSSF stakeholders. Use a survey to examine how the various stakeholders assess OSSF effectiveness as the social constructivist approach suggests.

The third suggestion is to examine how company indirect influence affects the relationship among company direct influence, foundation governance, and foundation performance.

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LIST OF APPENDICES

Appendix 1: Sample selection

No	Foundation Name	US 501(c)?	Active software project?	Financial and governance records for two years?	Include in the sample?
1	Apache Software Foundation	Yes	Yes	Yes	Yes
2	Eclipse Foundation	Yes	Yes	Yes	Yes
3	Free Software Foundation	Yes	No	No	No
4	FreeBSD Foundation	Yes	Yes	No	No
5	GNOME Foundation	Yes	Yes	Yes	Yes
6	Jabber Software Foundation	Yes	Yes	No	No
7	Krysalis Foundation	No	-	-	No
8	The Linux Foundation	Yes	No	-	No
9	Mambo Foundation	No	-	-	No
10	Mozdev Community Organization	Yes	Yes	No	No
11	Mozilla Foundation	Yes	Yes	No	No
12	NetBSD Foundation	Yes	Yes	No	No
13	Open Bioinformatics Foundation	No	-	-	No
14	Open Channel Foundation	No	-	-	No
15	Open Security Foundation	No	-	-	No
16	Open Source Applications Foundation	Yes	Yes	No	No
17	Open Source Geospatial Foundation	No	-	-	No
18	Open Source Initiative	Yes	No	-	No
19	Perl Foundation/Yet Another Society	Yes	Yes	No	No
20	Plone Foundation	Yes	Yes	Yes	Yes
21	Python Software Foundation	Yes	Yes	Yes	Yes
22	Radioactive Foundation	No	-	-	No
23	Sakai Foundation	Yes	Yes	No	No
24	Software In The Public Interest	Yes	Yes	Yes	Yes
25	Wikimedia Foundation	Yes	No	-	No
26	X.Org Foundation	Yes	Yes	No	No
27	Xiph.Org	Yes	Yes	No	No
28	Zope Foundation	No	-	-	No

29	Blender	No	-	-	No
30	Worldvista	Yes	Yes	No	No

Appendix 2: Dimensions and metrics drawn from the data

Domain	Construct	Dimension	Metric
Company involvement	Company investment	Resource investment	<ul style="list-style-type: none"> • Money invested • Value of software contributed • Value of hardware contributed • Value of other resources contributed
		Manpower investment	<ul style="list-style-type: none"> • Number of company employees in committers • Number of company employees in OSSF members • Number of company employees in committees and councils • Number of company employees in BOD • Number of employees in BOD who are part of companies' top management teams
	Company influence	BOD member's prestige	<ul style="list-style-type: none"> • Number of members of BOD who have reputation in OSS community
		Employment	<ul style="list-style-type: none"> • Number of company employees in BOD • Number of employees in BOD from companies that do not depend on OSSF's projects for significant portion of revenue • Number of employees in BOD who are part of top management teams of companies that do not depend on OSSF projects for significant portion of revenue • Number of employees in BOD who are part of companies' top management teams • Number of BOD's members who work for major sponsor companies
Governance	Governance structure	Participation in decision making	<ul style="list-style-type: none"> • Member criteria • Majority member by number • Member constitution • Whether or not merit members have voting rights • Whether or not merit members can submit requirements • Whether or not merit members can reject policies

			<p>and guidelines</p> <ul style="list-style-type: none">• Whether or not merit members can reject modification to bylaw• Whether or not merit members can reject modification to common vision• Whether or not merit members can reject primary human resource decision• Whether or not sponsor members have voting right• Whether or not sponsor members can submit requirements• Whether or not sponsor members can reject policies and guidelines• Whether or not sponsor members can reject modification to bylaw• Whether or not sponsor it members can reject modification to common vision• Whether or not sponsor members can reject primary human resource decisions• Institutionalized breakdown of merit vs sponsor members in BOD• Institutionalized breakdown of merit vs sponsor members in Advisory Board
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	BOD's practices	Activities	<p>Proportion of BOD effort dedicated to:</p> <ul style="list-style-type: none"> • strategic planning and common vision development • establishing policies and guidelines • project governance • financial governance • primary resources governance • human resource governance • fund raising • external relations • BOD self development • governance structure management • community development • conference planning and delivery <p>Method to carry out governance activities</p> <ul style="list-style-type: none"> • Method to carry out governance activities <p>Content of important policies</p> <ul style="list-style-type: none"> • Existence of umbrella policy • Existence of incubation policy • Extent to which committee of the BOD has power over roadmap • Extent to which committee of the BOD has power over release schedule • Restrictions on commercial usage
	Composition of BOD	Prestige of BOD member	<ul style="list-style-type: none"> • Number of members of BOD who have a reputation in OSS community
		Occupation	<ul style="list-style-type: none"> • Number of members of BOD • Number of members of BOD who are engineers/scientists • Number of members of BOD who are managers • Number of members of BOD who provide business, public relation, legal, or strategy services • Number of members of BOD who are part of companies' top management teams
Effectiveness	Goal	Project effectiveness	<ul style="list-style-type: none"> • Number of total projects operated by OSSF

	attainment		<ul style="list-style-type: none"> • Number of popular projects • Number of software releases • Number of new features • Number of bugs resolved • Number of lines of code added • Total number of installations in user sites • Number of downloads • Market share
		Community effectiveness	<ul style="list-style-type: none"> • Number of committers in core and non-core projects • Number of user groups • Number of suppliers of products and services that use OSSF's projects • Number of OSSF members • Number of people in mailing-list • Number of sponsor and merit members
	System resources	Resource acquisition effectiveness	<ul style="list-style-type: none"> • Revenue (includes contributions and donations received, service revenue, membership fees) • Major source of revenue • Expenses
	Multiple constituency	Stakeholders' assessments	<ul style="list-style-type: none"> • Overall satisfaction with membership <p>Satisfaction with:</p> <ul style="list-style-type: none"> - OSSF - return on membership investment - ecosystem as means to support business - ecosystem growth - marketing events and programs - IP services - IT infrastructure - Governance

Appendix 3: Prestige and reputation

Abrahamsen (2007) generated a list of open source/free software celebrities using the number of Google hits.

The rules for a name to be included on the list are:

- (i) The number of hits you obtain when searching for the name with Google must be higher than the currently lowest placed name. The name should be surrounded in double quotes when entered into the search utility
- (ii) The hits should be dominated by a single person
- (iii) The hits should be dominated by free software references
- (iv) Name variations are handled with the OR operator in Google
- (v) Any questionable cases are decided by the list maintainer

The list of celebrities is:

Rank	Name	Google hits	Project
1	Linus Torvalds	1600000	Linux
2	Richard M. Stallman	1140000	GNU
3	Alan Cox	1010000	Linux
4	Larry Wall	975000	Perl
5	Ask Bjørn Hansen	716000	Perl
6	Guido van Rossum	574000	Python
7	Mark Shuttleworth	486000	Ubuntu
8	Rasmus Lerdorf	365000	PHP
9	Miguel de Icaza	348000	GNOME
10	Jens Axboe	323000	Linux
11	Wietse Venema	293000	Postfix
12	Eric S. Raymond	287000	Open Source
13	Tom Christiansen	285000	Perl

14	Bruce Perens	270000	Debian
15	Donald E. Knuth	252000	TeX
16	Randal L. Schwartz	252000	Perl
17	Jeremy Allison	247000	Samba
18	David Heinemeier Hansson	244000	Ruby
19	Alex Martelli	231000	Python
20	Theo de Raadt	213000	OpenBSD
21	Ian Murdock	209000	Debian
22	Frank Damgaard	206000	Linux
23	Ian Jackson	202000	Debian
24	Peter Toft	180000	Linux
25	Werner Koch	179000	GnuPG
26	Matt Welsh	168000	Linux
27	Brian Behlendorf	168000	Apache
28	Michael K. Johnson	158000	Linux
29	Paul Mackerras	153000	Linux
30	Andrew Tridgell	144000	Samba
31	Eric Allman	143000	Sendmail
32	Jason R. Thorpe	138000	NetBSD
33	Mads Bondo Dydensborg	132000	Linux
34	Roland Mcgrath	122000	Glibc
35	David Axmark	108000	MySQL
36	Dean Gaudet	106000	Apache
37	Jes Sørensen	105000	Linux
38	Hubert Feyrer	99400	NetBSD
39	Poul Henning Kamp	98800	FreeBSD
40	Leslie Lamport	98200	LaTeX
41	Matthias Ettrich	94000	KDE
42	Manuel Bouyer	91900	NetBSD
43	Henrik Størner	89900	Linux

44	Ryan Bloom	89500	Apache
45	Lars Wirzenius	85200	Linux
46	Anton Blanchard	82900	Linux
47	Marc Slemko	77400	Apache
48	Johan Vromans	74900	Perl
49	Bill Stoddard	74900	Apache
50	Jordan K. Hubbard	73500	FreeBSD
51	Jörg Schilling	68800	cdrecord
52	Robin Dunn	68300	wxPython
53	John Ousterhout	67100	TCL
54	Rob Pike	66300	Plan 9
55	Mitch Kapor	62900	Mozilla
56	Greg Lehey	62600	FreeBSD
57	Roy T. Fielding	60900	User
58	Bob Young	60800	Red Hat
59	Paul Vixie	60400	bind
60	David Brownlee	59700	NetBSD
61	Andrew Eddie	54400	Mambo
62	der Mouse	53500	NetBSD
63	Matthew Green	51700	NetBSD
64	Julian Smart	51700	wxWidgets
65	Charles M. Hannum	49300	NetBSD
66	Ignatios Souvatzis	48900	NetBSD
67	Roy Fielding	48800	Apache
68	Michael Monty Widenius	46800	MySQL
69	Chris G. Demetriou	46600	NetBSD
70	Todd Vierling	45700	NetBSD
71	Bill Studenmund	44900	NetBSD
72	Luke Mewburn	43000	NetBSD
73	Simon Burge	42800	NetBSD

74	Perry E. Metzger	39700	NetBSD
75	Daniel J. Bernstein	39400	Qmail
76	Jim Blandy	39000	Guile
77	Wes Hardaker	32900	SNMP
78	Alistair Crooks	31300	NetBSD
79	Daniel Laliberte	30900	Hypernews
80	Jim Winstead	29400	Apache
81	David Kastrup	29400	Emacs
82	Stephen Rothwell	27800	APM
83	Lars Magne Ingebrigtsen	25200	Gnus
84	Dennis Ritchie	22800	Plan 9
85	Per Abrahamsen	21000	Emacs
86	Jamie Zawinski	16200	XEmacs
87	Michael Elkins	11400	Mutt
88	Hrvoje Niksic	11100	Emacs
89	Jens M Andreasen	10700	Linux
90	Kim F. Storm	9610	Emacs
91	Paul Kinnucan	894	JDE
92	Julian Seward	609	Ghc
93	Steven L. Baur	595	XEmacs

Appendix 4: Project effectiveness

Appendix 4-a: Project Effectiveness for Apache, Python, and SPI

Foundation	Apache			Python			SPI		
	2006	2005	2004	2006	2005	2004	2005	2004	2003
Time									
Foundation projects	Number of total projects operated by OSSF	37	27	19	1	1	9	6	4
	Number of core projects	37	27	19	1	1	9	6	4
	Number of other popular related projects	? ²⁰	?	?	27	?	?	?	?
Core project market performance	Total install number	26.2M ²¹	20.6M	16.3M	?	?	1.2M	0.75M	0.44M
	Download times	?	?	?	?	1.1M	?	?	?
	Market share	64.3%	70%	68.1%	2.60%	2.25%	1.40%	25%	19%
Project measures on core projects	7	10	8	4	3	4	1	0	0

²⁰ Data unknown

²¹ Million

Appendix 4-b: Project Effectiveness for Plone, Eclipse, and GNOME

Foundation Time	Plone			Eclipse			GNOME		
	2006	2005	2004	2006	2005	2004	2006	2005	2004
Foundation projects	Number of total projects in foundation								
	1	1	1	66	50	33	286	182	122
	Number of core projects								
Core project market performance	Number of other popular related projects								
	?	?	?	?	?	?	?	800+	?
	By total install number								
Project measures on core projects	?	?	?	?	?	?	?	?	?
	Download times								
	400K ²²	100K	?	?	?	?	60K	?	?
By percentage of total market									
?	<0.01%	<0.01%	<0.01%	?	65.1%	56.2%	0.38%	0.31%	0.29%
Release number per year									
5	2	1	2	3	1	1	2	2	1

²² Thousand

Appendix 6: Resources effectiveness

Appendix 6-a: Resources effectiveness for Apache, Python, and SPI²³

Foundation	Apache			Python			SPI		
	2006	2005	2004	2006	2005	2004	2005	2004	2003
Time									
Contributions, gifts, grants, and similar amounts received	94723	31134	16069	66692	118572	9160	38124	?	?
Program service revenue including government fees and contracts	51651	17193	0	141125	0	0	0	?	?
Membership fees and assessments	0	0	0	?	29000	18000	0	?	?
Interest on savings and temporary cash investments	2704	885	976	2224	0	0	421	?	?
Over all revenue	149121	49212	17045	217138	147582	37119	38545	?	<25000
Expense	33312	25409	25002	103958	53944	2567	21359	?	?
Net assets	243842	128033	104230	267338	154158	45642	108645	91459	?

²³ Unit: US dollar

Appendix 6-b: Resources effectiveness for Plone, Eclipse, and GNOME

Foundation	Plone			Eclipse			GNOME		
	2006	2005	2004	2006	2005	2004	2006	2005	2004
Time									
Contributions, gifts, grants, and similar amounts received	2400	3390	100600	?	?	?	59418	?	124753
Program service revenue including government fees and contracts	598	0	0	?	?	?	98147	?	39500
Membership fees and assessments	0	0	0	?	?	?	0	?	0
Interest on savings and temporary cash investments	120	0	0	?	?	?	0	?	0
Over all revenue	3118	3390	100600	5.5M	3.9M	1.5M	157565	12000 ²⁴	164253
Expense	13040	?	?	5.4M	3.4M	1.1M	121745	12000	138663
Net assets	36749	46671	?	?	?	?	115933	80540	85013

²⁴ Approximate number