Free/Libre and Open Source Software: Survey and Study

FLOSS

Deliverable D18: FINAL REPORT

Part 0: Table of Contents and Executive Summary

International Institute of Infonomics
University of Maastricht, The Netherlands

Berlecon Research GmbH
Berlin, Germany

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Overview of the FLOSS project

This project remedies the lack of information on Free/Libre/Open Source Software[1] starting at the very beginning: by conducting surveys to generate a unique base of primary data on Free/Open Source Software usage and development; identifying indicators to measure value creation and dissemination in the OS/FS arena; identifying business models based on these indicators; identifying the impact of and recommending changes in government policy and regulatory environments with regards to OS/FS; finally, the development of a base for extending these to the broader economic measurement of non-monetary and trans-monetary activity in the information society, beyond the domain of OS/FS.

The specific features of this project are:

1. The collation of a base of hard data (until now no such data exist) on the importance and role of OS/F software in today's economies and an impact assessment for policy and decision-making.

2. The development of indicators for the measurement of value creation within the OS/F software communities, especially in order to identify the distribution patterns of contribution within OS/F software communities and projects .

3. The measurement of contributions and identification of dependence on such contributions as are provided by user organisations OS/F software, including government/international institutions, on the developer community and on project development at large.

4. The evaluation and identification of business models and best practices in the OS/F software community, especially the transition to and from commercial software operations.

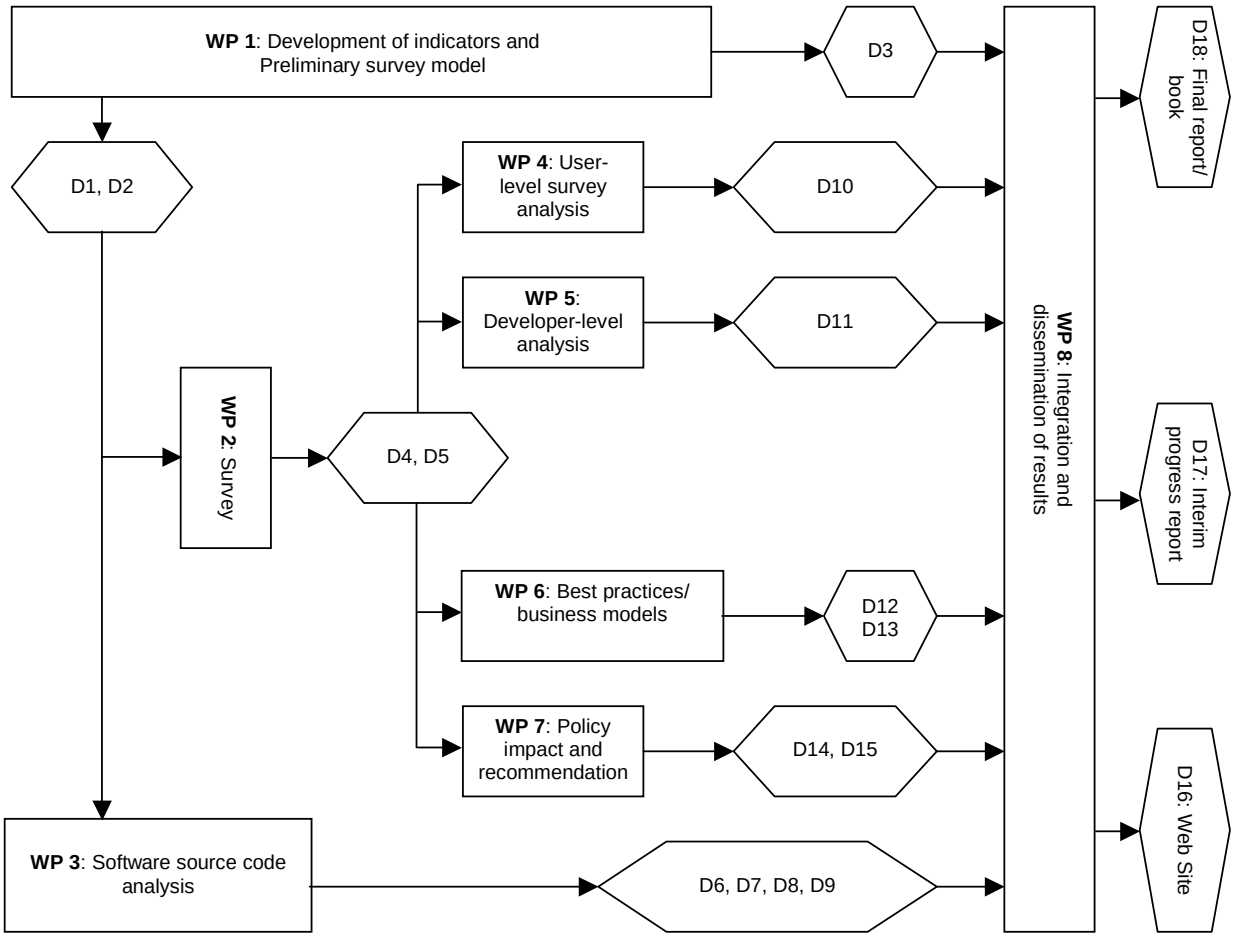
This document forms the final report for the FLOSS project. It is by no means a complete compendium of all the output of the project. The databases and source code resulting from this project are published as separate deliverables. Furthermore, various aspects of the project have been published in separate documents, the final versions of some of them being included in this final report. As a guide to the entire output of the FLOSS project, the list of publicly available deliverables is provided here, together with a Pert diagram showing their interdependencies.

[1] Throughout this report and project documents the terms Free Software and Open Source Software are used interchangeably, except where a specific distinction between the terms is explicitly made.

List of Deliverables

Deliverable No.	Deliverable title	Dissemination level
D 1	Indicator definitions – working paper	Internal
D 2	Survey methodology & implementation plan	Internal
D 3	Indicator definitions/assessment – final	Public
D 4a	Developer survey – database format	Public
D 4c	User survey – database format	Public
D 5a/b	Survey findings/effectiveness - summary	Public
D 6	Data from source code analysis	Public
D 7	Analysis methodology/findings – summary	Public
D 8	Software tools developed for analysis	Public
D 9	Software analysis findings final paper	Public
D 10	User-level analysis – working paper	Internal
D 11	Developer-level analysis – working paper	Internal
D 12	OS/FS best practices – working paper	Internal
D 13	OS/FS Best practices and user-developer interaction – final paper	Public
D 14	OS/FS and policy impact – working paper	Internal
D 15	OS/FS and policy impact – final paper	Public
D 16	Implementation of project web-site	Public
D 17	Interim report	Internal
D 18	Final report/book (*this document)*	Public

Pert diagram for FLOSS project



WP : Work Package number
D: Deliverable number

Part I: Use of Open Source Software in Firms and Public Institutions

This report constitutes the first part of the final report from the FLOSS project, which was conducted from June 2001 – June 2002 by Berlecon Research and the International Institute of Infonomics at the University of Maastricht. The project was financed by the European Commission under the Information Society Technologies (IST) thematic programme.

Purpose of the FLOSS project was – among other things – the collation of a base of hard data on the importance and role of Open Source and free software in today's economies as well as an impact assessment for policy and decision-making. This report provides such data in the form of the results from a survey about the use of Open Source software (OSS) in European enterprises and public institutions, about their motivations for using OSS, and about the benefits they derive from its use.

From February to May 2002 the fieldwork for the FLOSS user survey was conducted. Altogether 1,452 companies and public institutions in Germany, Sweden and UK with at least 100 employees were asked by telephone whether they use Open Source software. 395 of these were indeed using Open Source software in some way or another or were at least planning to do so within the next year. These establishments were interviewed in detail.

There are two sorts of results from this survey. First of all, the number of companies in the different regions that use Open Source software provides some information about the actual poPularity of OSS within these establishments. As this survey was only conducted at the establishment level, the focus is on deliberate economically motivated usage decisions and not on the use of OSS for ideological or other personal reasons.

And secondly, the answers to several detailed questions posed to those establishments actually using OSS provides more insight into the motivations for and benefits from using Open Source.

As the survey has been conducted among enterprises as well as public sector institutions, we will call the survey units “establishments” to capture the for-profit as well as the non-profit entities. We will call both “professional users” to distinguish themfrom private users of Open Source software.

The report is organised as follows: the second chapter describes the survey’s methodology as well as its effectiveness. It also contains important information about how the survey results can be interpreted. The third chapter presents results about the spread of Open Source

Part II: Firms' Open Source Activities: Motivations and Policy Implications

The engagement in Open Source (OS) projects and the creation of Open Source software (OSS) is seen by most commentators and researchers as a private activity. Individual persons contribute to Open Source projects for private reasons, be it just for fun, in the hope of getting something in return, or because this activity yields private indirect returns on the labour market. Current emphasis on reciprocity and labour market motivations.

While the assumption of altruistic behaviour dominated the Open Source discussion in earlier years, the current work emphasises more reciprocity or individual labour market considerations. E.g., Lerner and Tirole (2002) argue that a programmer can signal his coding abilities by participating in Open Source projects. This should raise his expected future wage or give him access to programming jobs, as already Raymond (2000, Chapter 5) has pointed out, although he considers the latter as rare and marginal motivation for most hackers.

Although important for explaining the Open Source phenomenon, this focus on the individual programmer neglects an important Open Source driver: firms. Part of the Open Source community consists of individuals employed explicitly for developing Open Source software. Ghosh et al. (2002) point out that about a third of the surveyed developers are being paid directly for developing Open Source software. Thus, their contribution to Open Source projects is the result of firms' deliberate decisions to finance the development of Open Source software. In addition there are several examples of companies that have made available formerly proprietary software as Open Source software.

The sheer amount of resources devoted by companies to OS development can be large. IBM alone claims to have spent $1 billion on Linux alone and is also active in several other Open Source projects (Wilcox, 2000). Other companies also devote considerable resources to the development of OS software. Due to their size these initiatives are important contributions to the development of OS software in total.

Despite this size the companies' motivation behind their OS engagement is not as well understood as the motivation of individual developers. Although discussed in passing by some authors like Lerner and Tirole (2002) or Schmidt and Schnitzer (2002), much less attention has been devoted to firms' Open Source activity than to Open Source activity of individuals.

Also in the context of public policy the firms' Open Source activities are of importance. If commercial firms produce Open Source software alongside their proprietary software, a strict distinction between the "commercial world" and the "free world", as it can sometimes be seen in the public policy debate, might not be sensible. Rather one would have to ask, whether commercial firms produce the socially optimal amount of Open Source software, just like economics asks whether firms engage in a socially optimal amount of basic research. Even if one comes to the conclusion that this amount is sub-optimal, one has to take firms' behaviour into account when designing policy measures intended to foster the use of Open Source software.

In the remainder of this paper, we will proceed as follows. Section two discusses the engagement of the world's 25 largest software companies in OS activities. Section three groups these activities. This analysis forms the basis for the subsequent work. Section four discusses the motivation(s) behind the companies' engagement in OS development using analogies for similar activities from economic theory. This framework is also used to discuss

which policy and regulation activities influence the companies‘ behaviour and which conclusions can be drawn for government bodies and regulatory authorities. Section five concludes.

Part II B: Open Source Software in the Public Sector: Implementation and Policy Directives within the European Union

This paper describes the current practices, policies, and implementation strategies of governmental organizations within the European Union. We will thereby concentrate on the different incentives, pros and cont, as well as on possible and actual stumbling blocks for the replacement of proprietary software. We describe the current situation concerning open source software within the European Union. Towards the end of the paper recommendations are elaborated for a better realization of political aims in the context of open source software.

The paper concentrates on the direct impact of government policies and regulatory environments on the use and development of OS/F software, as well as the implications of the growing OS/FS phenomenon on policy and regulation. In the following we will summarize and update reviewed literature, as well as analyze the findings relating to policy and regulatory issues in the survey, interviews and interaction with OS/FS and commercial software developers as well as government, regulatory and other policy-making bodies.

This paper is structured in three parts: The first part will analyze why open source is content of the political discussion: What is the societal benefit of open source? Are there reasons for governments to support the dissemination of open source software and why should this not be left over to market forces? We will analyze to what extend governmental institutions should or should not use open source software to fulfill their public functions and responsibilities.

In a next step we will look at the European Union to learn more about the state of the art. Are there main countries for open source software development? How is the open source developers’ scene distributed within Europe? In this context, findings from the open source software developers’ survey of the FLOSS project will be scrutinized. We will also point towards the degree of dissemination of open source software in the public sector within the European countries. Thereby we will look at both, the fields of implementation within public sector organizations and institutions, as well as actual policy directives towards open source software. This will also include a perspective onto future trends.

In the last part we will define possible goals governments in general should follow in the forthcoming years to develop a common European direction towards the topic. Concrete steps will be described to reach these goals.

Part III: Basics of Open Source Software Markets and Business Models

This part of the FLOSS final report contributes to the theoretical background of the FLOSS project by analysing the Open Source phenomenon, the market for Open Source software as well as business models for companies based on Open Source software. It also analyses best practices for the latter. The work is based on comprehensive literature and online research as well as on several expert talks and presentations on various conferences and trade fairs (such as the Wizards of OS 2 in Berlin, October 11-13, 2001 or the LinuxWorld in Frankfurt, October 30-November 1, 2001).

The report is organised as follows: Section 2.1 gives an introduction into the Open Source (OS) software phenomenon. The term OS software (OSS) is defined and compared to several other software distribution concepts. Various OSS license policies are compared and the major OSS products and development projects are introduced. Section 2.2 provides the theoretical background for a strategic market analysis of the software market in general. The software value chain for Open Source products is derived on the basis of traditional software production. For each part of the value chain, proprietary or commercial software is compared to OS software and free software.

Chapter 3 provides an overview of the software market and its relation to the IT (information and technology) market. It also segments the software market. Business dynamics for the software products market, for the software services market, and for the embedded products market are discussed. A basic understanding of market structures of the software market is necessary to evaluate the business models in Chapter 4. It is also needed to analyse the impact of OSS on the traditional software market.

Chapter 4 outlines the different OSS business models referring to the market analysis in Chapter 3. For each business model identified the basic business principle, the market and the critical success factors will be evaluated.

This report formed the basic foundation for other elements within the FLOSS project. For example, the analysis of different software characteristics went into the construction of the user survey and the business models for companies that wanted to establish a business based on Open Source went into the analysis of firms' Open Source activities and the resulting policy implications.

Part IV: Survey of Developers

Although Open Source and Free Software are no new phenomenon, they have shown a considerable increase of their importance just in recent years. However, many aspects of this domain still appear unknown or even strange. Economic exchange relations, as they occur within the community of OS/FS developers as well as in the traditional parts of capitalist economies, are usually based on the fundamental principles of private property and monetary payments. However, these principles seem not to be applicable to OS/FS, and still this domains functions very well and gains more and more importance in the leading software markets.

Based on an online survey on 2784 Open Source/Free Software developers, this report provides insights in fundamental features of the OS/FS community and its economic principles. It sheds a light on personal features of OS/FS developers, of their work and project organization, their motivations, expectations, and orientations. Finally, it illustrates the fundamental dividing lines that characterise mainly the OS/FS community and cause its outstanding position, which are the distinction between monetary and non-monetary rewards, the distinction between OS/FS and proprietary software, but also the internal distinction between Open Source Software and Free Software.

The results of the study have shown that the OS/FS community is a rather young and predominantly male community with a strong professional background in the IT sector and a high educational level. The developers are mostly singles or only loosely associated with their partners. They feature a high degree of mobility, whereby the European Union appears as attractive only for developers from its member states, but not for developers from the United States of America or other world regions.

Overall, developing OS/FS still resembles rather a hobby than salaried work. Besides (software) engineers and programmers, students play also a significant role in the community, but project performance and leadership is primarily a matter of professionals. Most of the developers feature networks that consist of rather few people. Nevertheless, we found a considerable large group of OS/FS developers that showed regular contacts to more than 50 other developers and that provided undoubtedly the “professional elite” within the community.

Comparing the motives to start with the development of OS/FS and the motives to continue with it, we found an initial motivation for participation in the OS/FS community that rather aims at individual skills and the exchange of information and knowledge with other developers, but over time a maturing of the whole community with regard to both, commercial (material) and political aspects. To learn and to share knowledge have also been the most important issues of OS/FS developers’ expectations from other developers.

Finally, regarding the main dividing lines we found the sample clearly one-sided with respect to the differences between Open Source/Free Software and proprietary software. Positive features are generally associated with OS/FS, and negative features with proprietary software. The difference between monetary and non-monetary rewards does not play a major role within the OS/FS community.

The internal differentiation of the community by self-assignments to either the Open Source or to the Free Software community does not provoke a polarization of the community into two different parties. Rather, we found six distinguishable types of orientations in this respect, ranging from those who clearly assign themselves to one of the two domains and claiming fundamental differences between them to those who do not care to which domain they belong.

Part V: Source Code Survey

In the past two years there have been some surveys conducted, of users as well as developers, though usually on fairly small samples and far from comprehensive. No survey actually looks at what is perhaps the best source of information on free software – the source code itself. This was attempted first as an experiment in late 1998 and then published after more work as the Orbiten Free Software Survey in May 20002. Although there have since been other surveys of authorship and many of the relatively recent web sites that provide an environment for open source development such as SourceForge provide some statistics, none of these adopt the approach of looking at the free software community from the bottom up. With the result that simple facts, such as the number of individual developers contributing to free software projects, an indicative number of such projects and their size were unknown.

Under the FLOSS project, the methodology of extracting empirical data from the source code is further developed and applied as a survey of a large base of free/open source software source code. Results from this survey are summarised and analysed in Part V of this report.

[2] Ghosh & Ved Prakash, 2000