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Monograph: Free Software: Research and Development (published jointly with Novática*)

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The Need for Libre Software Research in Europe

Israel Herraiz-Tabernero, José-Rafael Rodríguez-Galván, and Manuel Palomo-Duarte

The European Commission, by means of the Framework Programme, is funding several research projects on libre software. In the sixth edition of this programme, the sum of 25.13 million Euros has been dedicated to fund these research projects. Is this investment worthwhile? Can libre software help the development of Europe? In this editorial, we expose the reasons that justify this research, and how the research projects can foster the social and economic development of Europe. Finally, we include a summary of the main research projects funded in the scope of the Framework Programme.



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1 Libre Software in Europe

Libre software was born as a result of communities of volunteers, joining forces to develop software. The main motivations to work in the projects were personal. However, libre is now recognised as an important economic phenomenon causing the giants of software to adopt a strategy towards libre software: some regard it as a threat to their businesses, while others see it as an opportunity to open new markets and reinforce their competitiveness. Libre software respects standards, allows interoperability

among (and within) public and private institutions and avoids monopolies in the access to information. It also reinforces a neutral education, in some cases supplanting the commercial products used for educational purposes. Thus, universities and research centres, that were involved in the libre software movement since its beginning (in parallel with the development of the internet), are focusing on libre software, by promoting it for the daily tasks of these centres (research, education, management, etc), and by studying it as a matter of research. Its study is becoming more important because software is a fundamental agent in the economy. It is present everywhere: in offices, in mobile phones, in cars, in the public systems that manage our

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personal data, etc. However, there is not yet a true Engineering that provides the tools to build it. It is obvious that Software Engineering does exist, but the Brook's *Mythical Man Month* [1] is still present: *We cannot predict how long a software project will take, exactly what the final features will be, what defects will be present or how much money will finally have to be invested. Furthermore, the results of long projects are usually complex products, difficult to maintain. Sometimes, it is even better to start a new project from scratch rather than use a previous existing product as a base.* The software that is the main trunk of the current economic system is not made out in our economic frontiers: is not written by European engineers, neither it is sold by European companies. We could therefore say that a crucial industry for the European economy is not in the hands of Europe. It is also recognised that Software Engineering is not a truly scientific discipline. Many research paper authors have to sign non-disclosure agreements in order to gain access to data sources. In some cases, it is not even known which are the case studies included in the paper. These case studies are often labelled under obscure names such as A,BC or X,Y, etc. Thus, repetition and verification of the results is impossible. We will never achieve equality with the development stage of other scientific disciplines with all these obstacles. We will never overcome the software crisis using a scientific discipline that discourages innovation by means of obstacles (such as non-disclosure agreements). Libre software can help to overcome all these difficulties. First of all, regarding economic impact, libre software is controlled by no one (or, from other point of view, it is controlled by everyone). Currently, libre software has an important impact in the European economy. The recently published report *The impact of Free/Libre/Open Source Software on innovation and competitiveness of the European Union* [2] mentions that 20% of the European investment on software is made on libre software (this amount is similar for the USA), and that in 2010, the global impact of libre software will account for 4% of the GID. Because of its characteristics, from the research point of view libre software does not impose any obstacle to the advancement of science, because all the data sources are public. Furthermore, the report mentioned in the above paragraph also states that many libre products are market leaders in their niches. In other words, those products present a quality level that is good enough to overtake other solutions that have been developed in-house in industrial environments. This means that in spite of the lack of a scientific base on how we develop software, quality products are being produced. What is even better is that the development process in libre software leaves some trails (documentation, source code, change log records, e-mail communications, etc), and all those trails are publicly available. Therefore, libre software constitutes a true research laboratory in studying how to overcome the problems addressed by Brooks and which we are still facing. In this sense, in

the scope of the 6th Framework Programme (6FP), 11 research projects were launched, with a global budget of more than 25 million Euros (see Table 1). Within the 7th edition of the Framework Programme, some additional research projects on the same topic are being funded as well. Focusing on the 6FP, the description and goals of the projects vary:

■ Qualipso

This is the largest research project on libre software that has been funded by the European Commission. The first year of this project has resulted in the celebration of the Qualipso conference in January 2008 in Rome (Italy), with companies from all over Europe participating. The main goal of Qualipso is to define and implement the technologies, processes and policies to facilitate the development and use of libre software components, with the same level of trust traditionally offered by proprietary software.

■ TOSSAD

TOSSAD is a coordinated activity with the purpose of diffusing libre software in the public and private sectors, and hopes to create a consortium for this purpose. It will try to identify synergies in order to foster innovation by adopting libre software.

■ SELF

This project is similar to TOSSAD, but it is more focused on educational resources. The main idea is to take advantage of libre software features (availability of resources, provider independence, low cost of licenses, etc) in the educational sector.

■ FLOSSWorld

This project studied the situation of libre software in the different world regions: Europe, Asia, Africa, North America and Latin America. The main goal was to make sure that Europe leads research on open source in the world, as well as determine the current situation regarding libre software development, industry, standards, interoperability and e-government in the different world regions.

■ FLOSSMetrics

This project is collecting metrics and information about a large set of libre software projects (in the order of thousands). The goal is to create a database that could be used by third parties such as researchers, companies and even libre software projects themselves. This project is trying to coordinate with other projects from the 6FP, that need to collect metrics for their particular purposes (for instance, there is a close collaboration with the QUALOSS project).

■ TEAM

This project is developing a knowledge sharing environment, based on libre software. The final system will be released as libre software as well.

■ EDOS

Libre software distributions (such as Red Hat, Debian, Ubuntu, Suse, etc) face many common problems. Most of the problems are related to dependencies among the different packages of the distribution. Even today it is common to crash a running system by installing an upgrade of

the packages, because of this dependencies issue. Furthermore, the development and maintenance of those distributions is becoming more and more complex because of the growing interactions among packages (these interactions grow with the square of the number of packages). In order to address these problems, this project tried to provide tools to manage packages installation and distributions maintenance.

■ CALIBRE

Project	Start date	Duration (months)	EC budget (m€)	Total budget (m€)
Qualipso	Nov-06	48	10.42	17.29
TOSSAD	Feb-05	25	0.78	0.79
SELF	July-06	24	0.98	0.98
FLOSSWorld	May-05	26	0.66	0.67
FLOSSMetrics	Sept-06	30	0.58	0.58
TEAM	Sept-06	30	2.95	4.16
EDOS	Oct-04	33	2.22	3.45
CALIBRE	June-04	28	1.50	1.65
SQO-OSS	Sept-06	24	1.64	2.47
PYPY	Dec-04	28	1.35	2.29
QUALOSS	Sept-06	30	2.05	2.95
		Total:	25.13	37.28

Table 1: Research Projects on Libre Software Funded under the Scope of the 6th Framework Programme (source: <<http://cordis.europa.eu/ist/st/projects.htm>>).

This project tried to be a meeting point between secondary sector companies i.e. those companies that do not develop software but whose businesses crucially depend on software. As a result of this project, an industrial forum was created, called CALIBRATION, which many European companies belong to (Philips, Telefónica and Vodafone among others).

■ SQO-OSS

This project is trying to develop a model for the evaluation of the quality of libre software, by means of empirical methods. It uses the public data sources of some libre software projects. Among these sources, we may find source code version control repositories, mailing list archives, bug tracking systems, source code, etc. Its main aim is very close to QUALOSS.

■ PYPY

With the goal of porting Python (a well known programming language) to more platforms, thereby making it more flexible for adaptation to new systems, this project is creating a new implementation of Python. An interesting point of this project is that it is using agile methods in the software development tasks, and the consortium is organized following the schemes of a libre software community. All the development process is being monitored, with the goal of making research the impact of agile software development in the development process.

■ QUALOSS

The main goal of QUALOSS is to create an evaluation model for the quality of libre software projects. For this purpose, several publicly available data sources are being used. This project will study 50 different software projects, and will try, wherever possible, to reuse the information and databases provided by FLOSSMetrics.

In summary, libre software has an important impact on the economy of Europe. This impact will grow in the following years. Furthermore, libre software offers a very good opportunity to gain more knowledge on the software development process, with the final goal of getting the scientific base for a true Software Engineering. Currently there exist many research projects that are trying to address and overcome these problems, with the financial aid of the European Commission through the 6th and 7th editions of the Framework Programme. We think that the European Commission should keep this aid in subsequent editions.

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