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

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Presentation

Free Software: Scientific and Technological Innovation

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

In recent years we have seen how free software has evolved from being a software development model (with all its ethical and technical implications) to playing a key role in the development strategies of companies, institutions, regions, and even entire countries. Examples such as the Brazilian Government's support of Free Software [1][2] or the Andalusian Regional Government's adoption of free licensing for all its developments [3][4][5], have caused more and more institutions and associations to study the long term implications of adopting the free software model.

One of the most important milestones was the "*Study on the economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU*" [6] developed for the European Commission by UNU-MERIT. It concludes that Free Software offers one of the

best chances for the European ICT sector to become a worldwide player and promote RDI (Research, Development & Innovation) initiatives.

In the framework of this scenario we have published this special issue of *Novática* and *UPGRADE* on "Free Software: research and development", almost an annual event for the IT community. As usual, most of its content is published under a free license.

After a brief introductory article entitled "*The Need for Libre Software Research in Europe*" by the guest editors of the monograph, we kick off with the paper "*From the Cathedral to the Bazaar: an Empirical Study of the Life-cycle of Volunteer Community Projects*" which presents a comparison between the development communities of two prestigious free software projects, Wine and Arla. In particular the article compares the number of developers who have contributed to the project during its lifecycle.

The Guest Editors

Andrea Capiluppi obtained his Ph.D. from the *Politecnico di Torino*, Italy. In October 2003 he was a visiting researcher in the *Grupo de Sistemas y Comunicaciones* of the *Universidad Rey Juan Carlos*, Madrid, Spain. From January 2004 to the present he has been a visiting researcher in the Department of Maths and Computing at the Open University, UK, working in collaboration with Drs. Juan Ramil, Neil Smith, Helen Sharp, Alvaro Faria, and Sarah Beecham. This appointment has been renewed until December 2008. In January 2006, he joined the University of Lincoln as a Senior Lecturer. <acapiluppi@lincoln.ac.uk>.

José-Rafael Rodríguez-Galván works as a lecturer in the Department of Mathematics at the *Universidad de Cádiz*. Since 2004 he has chaired OSLUCA (Libre Software Office of the *Universidad de Cádiz*), organizing several projects including the 1st, 2nd, and 3rd Free Software Conferences at the *Universidad de Cádiz* and the 1st FLOSS International Conference (FLOSSIC 2007). He has been invited as a speaker to many meetings and symposiums relating to libre software and University. He is also member of UCA researching group FQM-315, where he develops his research in numerical simulation of equations for partial derivatives applied to fluid mechanics. <rafael.rodriguez@uca.es>.

Manuel Palomo-Duarte received his M.Sc. degree in Computer Science from the *Universidad de Sevilla* (2001). He works as a full-time lecturer in the Department of Computer Languages and Systems at the *Universidad de Cádiz* where he teaches subjects related to operating systems and videogame design using libre software. He is also an Erasmus Coordinator for the B.Sc degree in Computer Science "*Ingeniería Técnica*

en Informática de Sistemas" He is a member of the "Software Process Improvement and Formal Methods" research group and he is pursuing his Ph.D. on quality in BPEL web services compositions. Since he joined the *Universidad de Cádiz* he has collaborated with the Free Software Office, mainly in relation to the following conferences: 3rd Free Software Conference at the *Universidad de Cádiz* (JOSLUCA3) and the 1st FLOSS International Conference (FLOSSIC 2007). <manuel.palomo@uca.es>.

Israel Herraiz-Tabernero is a Ph.D. student at the *Universidad Rey Juan Carlos*, Madrid, Spain. His research is related to the evolution of libre software projects. In particular, he is using time series analysis and other statistical methods to characterize the evolution of software projects. He has participated in several research projects funded by the Framework Programme of the European Commission (QUALOSS, FLOSSMetrics, QUALIPSO, CALIBRE). He has also collaborated on other projects funded by companies such as Vodafone and Telefonica. He has participated in the writing of manuals about managing and starting libre software projects. For example, together with Juan José Amor and Gregorio Robles he wrote a manual for the *Universitat Oberta de Catalunya's* Master Programme in Free Software. He has been a reviewer for the IEEE Africon 2007 among other conferences and for the journal IEEE Transactions on Software Engineering. He is currently a research and teaching assistant at the *Universidad Rey Juan Carlos*, pursuing his PhD on the evolution of libre software. He also coordinates the programme of the Libre Software Master offered by the *Universidad Rey Juan Carlos*, in collaboration with Igalia and Caixa Nova. <www.herraiz@gsyc.escert.urjc.es>.

Based on these metrics and an analysis of information available from the project (such as ChangeLogs), the author concludes that the cathedral and bazaar models are not mutually exclusive during the lifecycle of a volunteer community project. While remaining in a cathedral phase does not necessarily imply failure (because the project may be meeting its goals), transition to a bazaar model would move the project on to a phase in which the development community would continue to grow. And it is the development community who can make this change happen.

Next up is one of the most interesting articles published in the “Workshop on Emerging Trends in FLOSS Research and Development 2007” (FLOSS 2007) [7], “*The Commons as New Economy and what this Means for Research*”. This paper looks at how the ICT world would change if companies were to adopt and develop free software en masse. It analyses some of the consequences, such as a drastic drop in the cost of licenses or the reduction of the risk and cost of software experimentation. This would lead to a really interesting scenario and would open up new avenues in ICT teaching since the latest source code would be available to be studied and improved on by students. Programming would change radically, and it would become a matter of finding and integrating code rather than a creating new code from scratch. Also the monetary and human resources needed to develop and deploy Ultra-Large Scale Systems would be reduced.

The paper “*Libre Software for Research*” by the Systems and Communications Group, *Universidad Rey Juan Carlos* (Spain), demonstrates how research groups can benefit from the adoption of a free software methodology. This methodology and its associated protocols can improve communication between globally distributed members and increase the visibility of reports, products, and internal information. All, naturally, in a free software environment.

The next paper is focused on telecommunications: “*Technological Innovation in Mobile Communications Developed with Free Software: Campus Ubicuo*”. It describes the results of a collaboration between the GITACA research group and a company supported by the Extremadura regional government (Spain). This project has developed a solution (Campus Ubicuo) for the increasing demand for services and the need for mobility that has changed the traditional model of Internet connectivity based solely on access via fixed networks. Campus Ubicuo has been developed using free/libre software and aims to offer user ubiquity through advanced communications services over wireless networks.

Another paper showing the results of an investment in free software by a public institution is “*The Case of the University of Cádiz’s Free Software Office among Spanish Universities*”. The paper describes the work done by the Free Software Office of the University of Cadiz (Spain) since it was set up in 2004. One of the most important features of an institution attached to a university is its broad scope of action. Several kinds of initiatives have been developed in the fields of teaching, research, management, support of the

development and dissemination of free software, and collaborations with external institutions.

The next paper, also related to RDI and free software, is “*On Understanding how to Introduce an Innovation to an Open Source Project*”. Like one of the earlier articles, this paper was first published in FLOSS 2007. It describes a methodology for incorporating software engineering inventions into free software projects. This not only benefits researchers by allowing them to test their tools, methods, and process designs in real-life settings, but it also benefits the free software community by allowing them to apply the latest academic innovations to their projects. But introducing a new artefact into a community which has been working without it for a long time is no simple task. The steps to be taken to ensure successful adoption differ widely depending on the kind of innovation and on the structure and size of the community.

From another Free Software Conference, FLOSSIC 2007 we have selected the paper, “*3D Distributed Rendering and Optimization using Free Software*”. This paper received an award as the best paper of the conference. It is the result of a research effort by two European institutions: the *Universidad de Castilla La Mancha* (Spain) and the Software Competence Center at Hagenberg (Austria). The paper deals with a classical computing problem, image generation: in particular how 2D photorealistic images can be obtained from the abstract definition of a 3D scene. The use of free software tools and state-of-the-art distributed techniques and algorithms reduces the computational cost of the process. The free software tools used for distributed rendering optimization in this particular case were Yafrid and MagArRo, both developed at the *Universidad de Castilla-La Mancha*.

For our final article we have taken another interesting paper from FLOSS 2007, “*Identifying Success and Tragedy of FLOSS Commons: a Preliminary Classification of Sourceforge.net Projects*”. It researches why some free software projects succeed or fail (a tragedy). Although success or failure is very difficult to measure, the authors use collective action (CVS changes, stable versions released in the past year, downloads, etc) as criteria for classifying projects. They develop a different kind of classification of success or tragedy in projects, based on their number of developers, project size, and other metrics.

We would like to conclude our presentation by thanking the staff of *Novática* and *UPGRADE* for entrusting us with this special issue. And, of course, we would like to thank everyone whose work has contributed to the publication of this issue: authors, reviewers, translators and, in general, the whole community that makes Free Software and Knowledge a reality.

Useful References on Free Software

The following references, along with those included in the articles this monograph consists of, will help our readers to dig deeper into this field.

- [1] <<http://www.nytimes.com/2005/03/29/technology/29computer.html>>.
- [2] <<http://news.bbc.co.uk/1/hi/business/4602325.stm>>.
- [3] Decree 72/2003 on Measures for Advancing the Knowledge Society in Andalusia, of March 18, 2003 (BOJA 55, March 21, 2003)
- [4] <<http://www.20minutos.es/noticia/91463/0/programas/ordenador/pueden/>>.
- [5] <<http://www.juntadeandalucia.es/repositorio/>>.
- [6] <<http://ec.europa.eu/enterprise/ict/policy/doc/2006-11-20-flossimpact.pdf>>.
- [7] <<http://cross.lincoln.ac.uk/floss2007/>>.

Institutions Supporting Free Software

- Free Software Foundation <<http://fsf.org>>.
- Open Source Initiative <<http://opensource.org>>.
- Cenatic <<http://www.cenatic.es>>.
- OSLUCA <<http://www.uca.es/softwarelibre>>.

News Sites

- **Slashdot** <<http://slashdot.org>>.
- **Digg** <<http://digg.com>>.
- **Blog de Ricardo Galli** (in Spanish) <<http://ricardogalli.com>>.
- **Meneame** (in Spanish) <<http://meneame.net>>.
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Other Interesting Links

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- FLOSSIC 2007 Free documentation compilation. <<http://flossic.loba.es/>>.
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