Implications of FLOSS for Public Organizations

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INTRODUCTION

In the last years, free and open source software (also sometimes termed libre software) has gathered increasing interest, both from the business and academic worlds. As some projects in different application domains like most notably the operating system Linux together with the suite of GNU utilities, the office suites GNOME and KDE, Apache, sendmail, bind, and several programming languages have achieved huge success in their respective markets, both the adoption by commercial companies, and also the development of new business models by corporations both small and large like Netscape or IBM have increased. Given this situation, it did not take a long time for the discussion surrounding this new phenomenon to reach public organizations. Especially the most prominent example, the choice between a free operating system like GNU/Linux or a commercial system like Microsoft Windows has sparked interest in this new form of software, its legal and economic implications, and its new model of software development.

In this article, these implications will be explored, explicitly not focusing solely on the Linux vs. Microsoft debate. To this end, an introduction to free/libre/open source software (FLOSS) and its concepts will be given, then different aspects of the relationship between FLOSS and public organizations, especially e-government, together with future trends will be discussed.

BACKGROUND

History of FLOSS

The history of FLOSS (Gonzalez-Barahona, de las Heras Quiros, & Bollinger, 1999; Raymond, 1999; Working Group on Libre Software, 2000) in fact started very early, as in the 1950s and 1960s the first large-scale computers from IBM and others came with software that was distributed with source code, could be modified, improved, and shared.

The history of the current free and open source movement is closely interconnected with the history of the Unix operating system, which after having been largely free, was commercialized following the AT&T divestiture in 1984. This led to the foundation of the Free Software Foundation and the GNU Project by Richard Stallman in 1983 (Stallman, 2002). The aim was to produce a free Unix-like operating system, but for the time being, mostly tools and compilers were produced. Besides this, Unix was also improved at the University of California at Berkeley, mainly funded by DARPA contracts, spawning both Sun Microsystems and the later BSD (Berkeley Software Distribution) family of free operating systems.

Another milestone in the FLOSS movement was the announcement by Finnish graduate student Linus Torvalds that he has been working on a Unix-like kernel for x386-microprocessors (Torvalds & Diamond, 2001), whose source he released and which was to be known as Linux. After this, the movement became known to a wider public, leading to other memorable events like Netscape releasing the source code of the Navigator browser in 1998 (Hamerly, Paquin, & Walton, 1999) thus founding the Mozilla project, the continuing support by corporations like IBM and the rise of new firms like RedHat or VALinux.

Definition of FLOSS and Licenses

The area of FLOSS is surrounded by several terms, most notably open source software and free software (Dixon, 2003; Laurent, 2004; Rosen, 2004). The term open source as used by the Open Source Initiative (OSI) is defined using the open source definition (Perens, 1999), which lists a number of rights which a license has to grant in order to constitute an open source license. These include most notably free redistribution, inclusion of source code, to allow for derived works which can be redistributed under the same license, integrity of author's source code, absence of discrimination against persons, groups or fields of endeavor, and some clauses for the license itself, its distribution, and that it must neither be specific to a product nor contaminate other software.

The Free Software Foundation (FSF) advocates the term free software, explicitly alluding to "free" as in "free speech", not as in "free beer" (Stallman, 2002). A software is defined as free if the user has the freedom to run the program, for any purpose, to study how the program works, and adapt it to his needs, to redistribute copies and to improve the program, and release these improvements to the public. Access to the source code is a necessary precondition. In this definition, open source and free

software are largely interchangeable. Libre Software is the European term for free software and is used as a way of referring both to free and open source software. The GNU project itself prefers copylefted software, which is free software whose distribution terms do not let redistributors add any additional restrictions when they redistribute or modify the software. This means that every copy of the software, even if it has been modified, must be free software. This is a more stringent proposition than found in the Open Source Definition, which just allows this.

The most well-known and important free and open source license, the GNU General Public License (GPL), is an example for such a copyleft license, with the associated viral characteristics, as any program using or built upon GPLed software must itself be under GPL. To ease these limitations, the GNU project also advocates under special circumstances the use of the GNU Lesser (formerly Library) General Public License (GNU LGPL), which permits linking with non-free modules. There are a number of other licenses, some of which can be considered copyleft, like the X11 license or clarified versions of the original, vague Artistic License, and others which can be considered free or open source, like BSD, Apache or the Mozilla Public License and Sun Public License. Other licenses not considered free or open are for example the Sun Community Source License or Microsoft's Shared Source License.

FLOSS Development Process

Not only is FLOSS unique in its licenses and legal implications, but also in its development process. The main ideas of this development model are described in the seminal work of Raymond (1999), "The Cathedral and the Bazaar," first published in 1997, in which he contrasts the traditional type of software development of a few people planning a cathedral in splendid isolation with the new collaborative bazaar form of open source software development. In this, a large number of developer-turned users come together without monetary compensation (Hertel, Niedner, & Hermann, 2003; Raymond, 1999) to cooperate under a model of rigorous peer-review and take advantage of parallel debugging that leads to innovation and rapid advancement in developing and evolving software products. In order to allow for this to happen and to minimize duplicated work, the source code of the software needs to be accessible which necessitates suitable licenses, and new versions need to be released often.

Possible advantages and disadvantages of this new development model have been hotly debated (Bollinger, Nelson, Self, & Turnbull, 1999; McConnell, 1999; Vixie, 1999). Critics admonish that the largely missing requirements engineering and design, together with the trend to search for bugs late in the life-cycle in the source code

lead to high effort, which is just hidden by spreading it throughout the world, but this is countered with arguments of very high modularity, fast release cycles and efficient communication and coordination using the internet. Today, agile methods like eXtreme programming or the strict release processes in place in several open source projects (Holck & Jorgensen, 2004) give evidence to mixed forms of development. Currently, empirical research on similarities and dissimilarities between FLOSS development and other development models is still proceeding (Koch, 2004; Mockus, Fielding, & Herbsleb, 2002).

IMPLICATIONS OF FLOSS FOR E-GOVERNMENT AND PUBLIC ORGANIZATIONS

Overview

In this article, the possible implications of and interactions with FLOSS will be detailed from the viewpoint of public organizations. There are several main areas which are to be distinguished. The first case is a public organization adopting FLOSS, the most prominent example certainly being the choice between GNU/Linux and Microsoft Windows. It is to be analyzed what influences this decision in the general case of any organization, and what special considerations affect this decision for public organizations. In the second area to be considered, public organizations leave the role of passive users and become co-developers. Besides feeding back their own improvements to any project, public organizations might also act as sponsors of FLOSS projects or ideas out of various reasons. In the third and last area to be considered, public organizations interact with FLOSS as regulatory authorities (e.g., regarding software patents).

Public Organizations as Adopters of FLOSS

The public sector needs to change over to communicating digitally, which is posing great demands on the IT systems on which e-government is based and on work processes in the public sector. This change, especially in the current situation of tight budgets, needs to be made as cost-effectively as possible. As the most obvious characteristic of FLOSS when selecting software is the price, or more correctly the absence of price in the form of license fees, many public organization facing a decision regarding procurement of software consider it. Most prominently this is embodied in the decision between a Microsoft

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