

## Open source software, access to knowledge and software licensing

Marcella Furtado de Magalhães Gomes<sup>1</sup>

Roberto Vasconcelos Novaes<sup>2</sup>

Mariana Guimarães Becker<sup>3</sup>

*Abstract: The world depends more and more on computers. Open source and free software create the ideal conditions to access the fundamental digital tools, allowing the advance of knowledge, research and development in countries such as Brazil that would be otherwise deprived of these kinds of benefits.*

*In spite of the common terms, there are different ways to license and distribute open source software. The open source spectrum ranges from complete grant of commercial uses to those that demand that derivative works are distributed under the same license terms. These differences have important economical, legal and technical consequences. Those different structures affect software development, longevity of projects and software distribution.*

*In USA there is a better developed and structured legal precedent collection. In Brazil, however, the legal sphere is yet to study the precise rules and consequences of open source software, especially concerning intellectual property and patents.*

*Nevertheless, in the past decade Brazil government had supported the utilization of the open source software in its internal organizations. There is also a new legislation that illuminates the uses and advantages of those technologies. In this paper we present this Brazilian legislation regarding open source software licensing, and also analyses the gains of productivity or economic benefits*

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<sup>1</sup>Doutora e Mestre em Filosofia do Direito pela Universidade Federal de Minas Gerais. Profa. da Universidade Federal de Minas Gerais, Faculdade de Direito – Departamento de Direito do Trabalho e Introdução ao Estudo do Direito.

<sup>2</sup>Doutor e Mestre em Filosofia do Direito pela Universidade Federal de Minas Gerais. Prof. do IBMEC Minas Gerais, Curso de Direito.

<sup>3</sup>Graduanda em Direito pela Faculdade de Direito da Universidade Federal de Minas Gerais.

*derived from the adoption of those systems. This way, we intend to show that the availability of open source and free tools is a fundamental factor to promote development that could otherwise be halted due to high costs and private control of technology. The access and availability of open source software is a vital way to create better governments, public transparency and human rights enforcement.*

*Keywords: Free Software, Software Licensing, Access to knowledge*

## **1. Introduction**

In a world where our activities depend heavily on software performance, to create and disseminate free software, i.e., software that allows users to have access to its structural code, means to be able to provide meaningful technological access to many societies.

Despite its universal nomenclature, these tools have different kinds and levels of openness and use, which allows for various serious legal, economic and technological repercussions.

Campaigners of this technology argue that its use provides access to the most advanced digital tools, contributing to the progress of knowledge, research and development in countries, such as Brazil, in which the absence of these platforms would be more sharply felt, as a result of its technological gap, if compared to developed countries.

In this paper, we present what is free software, which open source legal arrangements there are and what are the ramifications of the different types of licensing, as well as the impact of its use, particularly in Brazil, which has adopted a government policy of encouraging the use of this tool.

## **2. Free Software and Open Source Software Concept**

In 1985 the *Free Software Foundation* was created, a non-profit organization, dedicated to eliminating restrictions on the use, copy, distribution, study and change of software. These actions are pillars of the free software definition; even though this definition is in constant improvement, due to the different social demands and constant technological developments in IT.

According to the *Free Software Foundation* (FSF), by free software we should understand software that respects the freedom and sense of

community of its users. It reaffirms, thus, the foundations that enabled the creation of the FSF, i.e., free software users have the freedom to run, to copy, to distribute, to study, to change and to improve software in order to control the program and what it would be able to do. (<http://www.gnu.org/philosophy/free-sw.html>)

This freedom regards both the software's use and implementation, as its ability to process and adapt data to new needs and applications, and it can only be exercised concretely by providing the source code that makes up the software for further analysis and modification by its user.

When the source code is available, it allows for a high degree of innovative technological production. A program can be disassembled and refurbished to generate several other programs which are different from their originals. It also allows certain social freedom, due to the occurrence of new partnerships between several programmers and users, which are not possible in software developed under proprietary license.<sup>4</sup>

The sheer amount of contributors can also lead to increase in software reliability by the simple fact that several developers, from all around the world and with all kinds of skills, work to improve them. Additionally, users who use these programs may report more fully the limitations and errors in its operation and are in a better position to deal with these failures, as they have access to the structure of the software they use.

All these contribute to the programs greater longevity. Proprietary software may go out of line, preventing their recycling into programs that are more modern or with new applications. Free software, although they are also liable to fall into disuse, are easily accessible to be reused.

The various licenses governing free software use<sup>5</sup>, first of all, revolve around preventing commercial exploitation of exclusive nature of its source codes. This does not mean that it cannot occur any kind of economic exploitation using free software or its source code; but only that the user must have access to the source code and thus, enabling, further than economic gain, that the user may relish the software intellectual value and have control over the program.

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<sup>4</sup>The term proprietary is used to refer to programs and licenses that cannot be considered free according to the given definition.

<sup>5</sup>To be considered truly free these licenses cannot restrict the freedoms mentioned, having as its purpose to guarantee them.

Therefore, free software bears this name because its user is free to learn and use the structure on which that system was build:

“Thus, “free software” is a matter of liberty, not price. To understand the concept, you should think of “free” as in “free speech,” not as in “free beer.” (<http://www.gnu.org/philosophy/free-sw.html>)

The FSF has identified four essential freedoms that must be present in software so that it can be called free:

- “The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbour (freedom 2).

The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.” (<http://www.gnu.org/philosophy/free-sw.html>)

The only limitation to these freedoms, particularly to freedom 3, is what is known as Copyleft, i.e., the possibility of imposition by the free software license that the distributed copies must be licensed in the same way as the original software is, not allowing for the addition of restrictions contrary to the central freedoms. This rule has the ability to prevent free software from losing, in its process of modification by the community, the qualities that characterize them as such.

Open Source Software is another term commonly used to refer to free software, and, in fact, basically define the same type of programs. Nevertheless, the use of these two terms as synonyms can be regarded as mistaken. Open source software is not necessarily focused on user’s freedom, one of the main issues of free software. Here, what really matters is the practical aspects of making the source code available, i.e., the way it was developed, its benefits, its great capacity for innovation and reliability. Free software movements have a more politically and socially engaged view, and therefore care about access to knowledge and freedom to use that knowledge.

### 3. Law and Software Licenses

In Brazil, Law No. 9.609/98 - Software Law and Law No. 9.610/98 - Copyright Law governs computer programs, both free and proprietary software. Regarding free software, it is necessary to emphasize that the application of copyright must first be recognized so that, later, it may be waived in favour of other users and programmers. However, free software regulation depends heavily on its licenses, specially developed for this type of program, as they stipulate, in large part, the legal consequences of using this type of software.

Through our study of Software Law, we verified that users can do close to nothing with a purchased program beyond using it on their own computers and making one copy for safekeeping. It is the author's prerogative to authorize less restrictive uses of the programs. These permissions are usually granted through licenses that, in turn, ensure the freedoms that underlie the concept of free software.

The permissive character of free software licenses is not absolute. There are certain licenses, such as the original BSD License (Berkeley Software Distribution), that require mentions to the program's authorship, and others like the GNU GPL (General Public License from GNU Project), which endorse Copyleft.

Free software licenses can be classified in two groups, permissive licenses and licenses that apply Copyleft. Permissive licenses such as the MIT License and the Apache License, only refer to the use, redistribution and modification of software. They do not require that in redistribution the software keeps itself free and do not require that open source versions be distributed, which allows free software to become proprietary. These licenses, however, are interesting to be used when the purpose of the project focuses on its wide dissemination.

In a certain way, permissive licenses are the maximum guarantee of freedom of speech and users have autonomy to use free software in the way they wish. On the other hand, it might also end up restricting this freedom to the extent that it might omit freedom of third parties that would come in the chain of redistribution. This leads to the big problem that the code of programs distributed under this type of license, be they modified or not, can go closed. Permissive license admits that redistributors combine open source with material based on closed source, which allows developments latter added to the code to end up being made under a proprietary license. Now, softwares are dynamic structures that

are only useful if they follow the constant changes and new realities and needs of users. Therefore, even if the original code remains free, if their subsequent developments become proprietary, in the long run, this can derail their use without purchasing the subsequent modifications, which ultimately force the user to acquire later developments.

Licenses that apply Copyleft, on the other hand, require, in case of redistribution, conditions that ensure the software will keep its original freedoms, acting to prevent that a later version will become closed. This limitation on the maximum expression of freedom imposed by Copyleft can be regarded as a precaution so that the freedom of others may remain assured.

The GNU GPL license was the first one to apply the concept of Copyleft, developed by Richard Stallman, original author of the GPL. Copyleft uses Copyright laws to ensure that the code will remain freely available:

“To copyleft a program, we first state that it is copyrighted; then we add distribution terms, which are a legal instrument that gives everyone the rights to use, modify, and redistribute the program’s code or any program derived from it but only if the distribution terms are unchanged. Thus, the code and the freedoms become legally inseparable. Proprietary software developers use copyright to take away the users’ freedom; we use copyright to guarantee their freedom. That’s why we reverse the name, changing “copyright” into “copyleft.”” (Stallman, 2002, p.91)

By requiring that the source code be available, GPL propitiates modifications on the software and, if they occur and the modified program is redistributed, the new version’s source code should also be available, enabling new subsequent modifications.

In theory, the combination of open source code with proprietary code would cause any software that includes material derived from a combination of codes to be regarded as free. Therefore, theoretically, to combine free licenses that apply copyleft with proprietary licenses or other permissive licenses would be impossible.

However, that does not mean that it is not possible to simultaneously use programs with both licenses, or even combines them. Each free software license applies its precepts in different ways and to different degrees, and there are several ways to combine programs.

#### 4) Development and economic exploitation

To refer to software as free alludes to its ideology of respect for its essential freedoms that are crucial to society, especially considering that our daily activities are increasingly digitized and depend on the performance of the software that structure them. In this context creating and disseminating free software has the power to give relevant technological access to several nations, promoting economic development and freedom in general.

The anti-free software speech often argues that for the production of software to be possible is necessary to pay many people, especially programmers. The debate on the economic issue in free software, i.e., how to generate income and profits from its production is, in fact, an argument about this model's durability, because there will always be a need for resources, whether economic or workforce.

Programmers need indeed to be paid in some way and companies that develop it must work with profits. However, various models have already shown that it is possible to combine free software with forms of exploitation so that its production can still occur.

Free software sales may seem, at first, somewhat contradictory, but a deeper analysis shows that it is exactly the opposite. As already discussed, free software are free and not for free, thereby, whoever acquires free software is free to share them, which includes selling, enhancing its natural tendency to spread. This does not occur with proprietary software, whose distribution without previous permission is illegal.

Furthermore, a major source of income from these programs is work for hire, providing classes on the use of software, technical assistance, specific adaptations that interested parties may request. As they say in the free software community: software are free, people aren't - "software are free to be reproduced and distributed, but for people's knowledge you must pay."

Generally, the original developers can best offer these improvements. It is also pointed out that free software are often used as sub-systems and applications for electronic devices, i.e., as by-products of another main business that provides the income.

Free software market provides people and businesses capable of offering maintenance and technical support for programs and products that work based on free software. In theory, anyone can become an expert in a given program, and, therefore, capable of offering this kind of

service, mainly because there is not, necessarily, a dependence on the support of the software's producer and its authorized service providers. The user, thus, is free to choose who they want to hire.

Free software have been providing a new vision on how to deal with computer programs, which cease to be something static, dependent on its original developers to originate new improvements and applicability. They have started to have a dynamic nature, on which the user has control to use them however they want in any given circumstances, being able to adapt them, improve them and make them more useful. Such dynamism leads to the emergence of several new updates and software derived from their original with such a speed that cannot be verified in proprietary software. The dissemination of new or upgraded technologies has a potential benefit to society as a whole.

Moreover, one of the great merits of free software is exactly to demonstrate, through successful practical examples, that production models based on non-proprietary structures actually work. It is possible to extrapolate these models to other economic areas and verify their productive, financial, technological and social impacts. With the internet it is possible to transmit knowledge and culture at levels never before dreamed.

For example, the approach to commercial exploit the music industry is changing. The easiness of downloading music illegally has reduced physical album's sales making music sales over the Internet at a diminished price possible. There are artists who offer their works on the internet to be purchased at the price the consumer wants to pay. It applies here, too, the model of work for hire, in which the main source of income is no longer selling products but profits from the concerts.

*"In a way, free software is a cutting edge that is experiencing, from many points of view, new models of production of intellectual works. Models that do not restrict the user's freedom to protect the author's. Models in which anyone can improve the work of others. Models in which, in the end, we are rediscovering how to cooperate." (González-Barahona et al., 2012, p.29)*

## **5. The Brazilian government experience**

Brazilian government has been encouraging free software development in the country with various motives, such as saving public



money by not paying for expensive proprietary licenses and developing local IT industry. Free software is seen as an excellent alternative for sharing information to meet specific government needs.

Expenses on software and IT in general have increased in all sectors, including in the government. Free software offer the possibility of reducing costs, saving public funds by not payment for proprietary licenses. There is independence from suppliers, which avoids the usual proprietary lock-in, for there is no obligation to acquire new licenses from a single manufacturer with the release of new versions. With free software, there is no dependency since there is a wide range of companies that could be hired to upgrading them. This would even encourage domestic market with the increase in demand for IT professionals. Furthermore, using free software also aims to universalize services for citizens through Brazilian population's digital inclusion, taking into account communication and education rights through access to technology.

Seeking to enable this project Brazilian government has adopted favourable laws and measures. In 2005 the "Free Guide: Migration Reference to Free Software by the Federal Government" was created, having "The IDA Open Source Migration Guidelines" of the European Community, in its second version, as a basic reference. This document establishes a strategy for free software implementation, aiming to sever technological dependence on large groups:

"Over the past three years, we have implemented a strong policy of technological independence, strengthening high performance computing research, digital inclusion and adoption of free software." (Reference Guide for Migration to Free Software by the Federal Government - Organized by Working Group Migration to Free Software - Taken from the Introduction text by President Lula)

This independence also avoids a problem that has occurred in some countries, where old files can no longer be accessed due to the change of the default code in which they were developed. Proprietary software does not allow that these files source code be updated so they become obsolete and the information they contain inaccessible.

Arising out of the free software implementation initiative, the concept of Public Software emerged as a way to share software developed by the government. The GPL License was adopted by government

in its search for ways to make the sharing of solutions between public institutions feasible. To this end, in 2004, the National Institute of Information Technology, responsible for the Technical Committee for the Implementation of Free Software in the Brazilian Electronic Government, commissioned a study on the constitutionality of the GPL License. It resulted in the “Study on Free Software” by the Getúlio Vargas Foundation, which concluded that the GPL is consistent with the Brazilian legal system. The study generated the book “Free Software Law and Public Administration”.

Public Software is developed by the government and as such is a public good. The availability of software by the public sector goes beyond the world of open source, so the basis of Public Software concept was established as a manifestation of public interest for a given solution. In this respect, the study mentioned above says that “the note that allows the administration to assign, as its discretion, the particular use is compatible with the public interest [...]” (Falcon et al., 2007, p. 161).

In 2005, it was licensed the first federal free software, whose guidelines was based on what was available in the country at that time, the Copyright Law, the Software Law and the Resolution No. 58 of the National Institute of Industrial Property. This program, initially developed to meet the demands of government, exceeded the federal public sector.

The availability of software in a public environment of collaboration enabled the intensification of its use and the speed of its adoption meant that a network of service providers arose rapidly throughout the country. Society assumed a dynamic role in software development process.

In 2007, the Brazilian Public Software Website was created, whose goal revolves around its effectuation as a public good, promoting a collaborative environment for users, developers and service providers. The available services are accessed by other countries, such as Uruguay, Argentina, Portugal, Venezuela, Chile and Paraguay and the software that are available on the website follows the guidelines of Instruction No. 1/2011 of the Secretary of Logistics and Information Technology in the Ministry of Planning, Budget and Management:

“Article 2nd –The Brazilian Public Software is a specific type of software that adopts a free license model for its source code, protection of its original identity which includes its name, brand, source code, documentation and other related artefacts through

the Trademark Public License model and is available on the Internet in a public virtual environment, being treated as a benefit to society, market and citizen [...].”

The Trademark Public License, launched in 2010, has as its main legal objective to protect software trademarks offered in the Brazilian Public Software Website. Its graphical representation was an idea copied from Copyleft, being the letter “R” inside a circle used to indicate trademark, only reversed. It is in its first version and is based on models developed in the various versions of the GPL and the Creative Commons License, especially the License for Trademarks:

“Article 3rd V - Trademark Public License: type of trademark license that preserves its original identity which includes its name, brand, source code, documentation and other artefacts related to the Brazilian Public Software and in which the registration holder allows generically, without any kind of prior and / or specific approval, that others use it for free for the purposes of copy, distribution, sharing and transmission in any physical or virtual appliance, including commercial purposes [...] “. (Instruction No. 1/2011 of the Secretary of Logistics and Information Technology in the Ministry of Planning, Budget and Management)

Considering the Brazilian legislation on trademarks and patents the Trademark Public License ensures the mark’s original structure and recognizes its authorship, so the author can just waive its exclusivity on the developed program. It allows the user some free software basic principles, its copying, distribution, sharing, transmission and marketing in a permissive way, not requiring prior permission, provided that the brand continues unchanged and there is respect to its definition and proportionality.

## **6. Political interferences on free software use: Paraná’s case.**

Even before the creation of the Federal Government Guide for migration to Free Software in 2005, the State of Paraná was already establishing itself as a national reference in independence and sustainable technological innovation being indicated as one of the biggest free software user and developer in the country. The Information Technology and Communication Company of Paraná (CELEPAR), organization that

centralizes the activities of information technology in Paraná, conducted this strategic policy.

The State Government aimed to raise public informatics and intensify the democratic process, knowing that public investment in this area should be done in a responsible and sustainable manner.

In 2003 were sanctioned state laws 14.058/2003 and 14.195/2003 on the preferential use of free technologies and of open source by the State Government. These laws state that, when purchasing software, Paraná's administration should opt for free software, operating systems and word processors of open source and, in case of proprietary software acquisition<sup>6</sup>; preference should be given to those that operate in multi-platform environment, enabling implementation without restrictions on free software operating systems. With this measure, public coffers saved U.S. \$ 127.3 million<sup>7</sup> in just the first three years of its implementation.

Thus, public administration bodies' softwares were available to society by editing a General Public License (GPL) based on international copyright laws. Paraná's public informatics had been progressing through a more participatory management, with the support of technology to government decisions.

However, in April 2013, Carlos Alberto, who was Governor of Paraná at the time, signed a memorandum of understanding with Microsoft whose proposal was to provide free technology solutions for training people in IT and the use of a virtual learning platform for a period of two years. Software options to be implemented by the government in the areas of education, skills, innovation and entrepreneurship will be provided. A similar agreement was signed with the State of São Paulo stating that domestic and international investors trust was rescued with the government new guidelines.

This bland disregard of Law 14.058/2003, about the acquisition of proprietary software platform, demonstrates a common problem of Brazilian public administration: public policies instability because of the different political inclinations that are in power. Moreover, this situation also reflects a serious problem that the free software movement faces, pressure from large companies to bar initiatives of adopting them.

When the State of Paraná started treating software as a means of

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<sup>6</sup> Law 14.058/03 - Article 3 - It is understood by software with a proprietary license one whose usage license implies license payment for the intellectual property of their creation, and offers manufacturer's warranty regarding its effectiveness and exact use.

<sup>7</sup>[http://www.softwarelivre.gov.br/noticias/News\\_Item.2006-06-23.3734/](http://www.softwarelivre.gov.br/noticias/News_Item.2006-06-23.3734/)

production and not only as a product, enabled the development of technologies that, in turn, drove the emergence of new economic enterprises, thus contributing to socioeconomic development of the state and the country. A clear example is the software developed by the Paraná called *Expresso*, which functions as an agenda, calendar, email, whose community; *Expresso Livre* is constantly improving the program. With over half a million users spread across 167 institutions, *Expresso Livre* shows that developing technological solutions of high quality and in a collaborative way in Brazil is possible.

As it is, this agreement with Microsoft may mean a setback in digital inclusion and independence, including those regarding the economic factor, given that the offered software has its gratuity restricted to two years. In addition, Microsoft's software is not multiplatform, which renders the use of concurrent programs impossible.

In the public sector, the adoption of free software seems imperative. Not only aimed at saving resources, but also because the government stimulus leads to the emergence and strengthening of communities of IT and software alternatives that benefit society as a whole.

## 7. Conclusion

Since the beginning of its development, software has always been associated with cooperation and with sharing being generally developed in academic environments and in enterprise collaboration. Software was not seen as something separated from hardware and its source code used to be provided so that potential failures could be corrected and further improvements could be made. Software was free at least for those who had access to the technology available at the time.

The concept of free software as we know today emerged during the 1980s as an alternative to the trend that grew stronger to block the user's ability to access the source code in order to prevent its study and modification. Software industry was changing; the constraints were increasingly more common. Richard Stallman, then a member of MIT, attempted to gain access to a Xerox printer so he could fix a code error, but access was denied. From this experience, Stallman devised the free software movement, starting the GNU Project and subsequently creating the Free Software Foundation.

Since then, the free software community have been growing, its programs become increasingly known and used by the average user,

allowing anyone access to free software. However, this expansion is still somewhat shy especially in regard to its freedom and cooperation philosophy. There are misconceptions, vague ideas, and a large lack of knowledge that hinders the understanding of its advantages.

The free software concept was developed in certain a way that, as it primarily considers the set of freedoms that are guaranteed in their licenses, makes it a legal concept. The licences that generally govern non-free software, as well as the laws about copyright that govern software rights, impose the conditions under which they can be used, distributed and modified, and always in a very restraining manner. Users have no right to exercise freedom of use over acquired software unless explicitly authorized by the license holder.

Our society is used to prohibition, not permission. Free software licenses act in a permissive way, guaranteeing freedom of use, distribution and modification.

Software has an amazing ability to adapt, and may be reproduced in different contexts and easily adapted to perform numerous tasks. Current legislation prohibits exploring this capability, which can obstruct economic development of poorer nations. These limitations make them extremely rigid and immutable, even if the user has the technical expertise to adapt it according to their interests or those of their community. Interestingly, adherence to free software also provides technological independence from suppliers.

It is argued that a capitalist society cannot be based on products that do not comprise property concepts, but when dealing with income generation and profit from free software, many examples have shown that it is possible to combine them to various forms of economic exploitation. In addition, the experience with free mode of production and software distribution has been overcoming the technological field, being noticed in various intellectual fields. Internet has had a major role in enabling this expansion, increasing the transmission of knowledge and culture.

As another interesting example of free software applicability, we can point out Brazilian government's successful experience, whose encouragement of free software has generated tremendous savings in public spending with proprietary licenses and development of the local IT industry.

From this initiative the Public Software arose. It was considered a manifestation of public interest for a particular solution for sharing software developed by the government. In order to protect it, the Trade-

mark Public License was developed based on the GPL License and the Creative Commons License. It ensures the mark's original structure and recognizes its authorship, so the author can waive its exclusivity on the program. To assist Public Software implementation, the Brazilian government has developed a guideline to free software migration.

Despite all these efforts for its introduction in government sectors and expansion in society, large corporations' particular interests and political disagreements act as a barrier to free software establishment. The change of political groups in power reflects often in a change in government policy, in order to benefit different interests that often do not coincide with those of the population.

The State of Paraná was in the forefront of sustainable technology in Brazil by the enactment of two state laws that give preference to the use of free technologies, or at least that operate in multiplatform environment.

However, changes in the state's political power led to the signing of a memorandum of understanding with Microsoft, which marks not only a setback for the free software community, but also for Brazilian society which is back to its technological dependence from a single vendor prison. Microsoft's choice to offer this technology for free (for a period of two years) for essential areas of development to the country as education, innovation and professional qualification can be seen as a strategy to investigate this dependence.

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