RECOMMENDATIONS FOR THE ADOPTION OF LIBRE SOFTWARE IN THE PUBLIC SECTOR IN SOUTH AMERICA

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This work is dedicated to the libre software community and specially to those who believe that libre knowledge is a tool for social change, for a better world!

'If you want to accomplish something in the world, idealism is not enough - you need to choose a method that works to achieve the goal'

Richard Stallman

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1. INTRODUCTION

'If you or I lose control over our computing, that is a misfortune. If a government loses control over its computing, then that is much worse than a misfortune; that is a dereliction'[1] Richard Stallman

The presence of modern technologies in almost every aspect of society is a trend that we have seen consolidate in the last few years and it is foreseeable that it will continue to do so in the near future. The public sector has not escaped this development. In fact, the government is one of the main consumers of information technology (IT) services and products.[2]

The use of technology in this sector may represent a significant improvement in the products and services provided to the citizens and more state efficiency, among other benefits. However, what type of technology is used and how it is technically and legally implemented, represent an important difference not just to the citizens but to the government itself.

1.1 LIBRE SOFTWARE

A key component in the technological structure of any organization is software. In relation to the licenses, software can be categorized in proprietary software and free software. The latter is, according to the Free Software Foundation (FSF), the one that allows the user to 'run, copy, distribute, study, change and improve the software'. In consequence, the source code must be available. The FSF states that in order to consider a program free software, it has to give to the user the following four freedoms:

-The freedom to run the program as you wish, 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 neighbor (freedom 2).

-The freedom to distribute copies of your modified versions to others (freedom 3). By doing

1 Tim Lohman, 'Governments Must Abandon Proprietary Software: Stallman' (*Computerworld Australia*, 6 October 2010) <www.computerworld.com.au/article/363417/governments_must_abandon_proprietary_software_stallman/> accessed 6 February 2015.

2 The Software Alliance, 'Powering the Digital Economy, A TRADE AGENDA TO DRIVE GROWTH' 6 <http://digitaltrade.bsa.org/pdfs/DTA_study_en.pdf> accessed 6 February 2015.

this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this[3].

As it is clear from the previous definition, the point is liberty, not price. However, in the English language the word 'free' is ambiguous, and in this context could be understood as software available without monetary cost, i.e. gratis, which is not necessarily the case. In order to clarify the ambiguity of the word 'free', it will be replaced by the word 'libre', a word of Latin origin which only implies liberty and not zero cost.[4] Consequently, and continuing a trend followed by many, including organizations such as the European Commission,[5] in this text the term 'libre software' will be used to refer to free software and open source software.[6] Although the concept of open source is not exactly the same,[7] it is commonly used interchangeably. Another clarification that should be made is that in some quotes employed through the text, the expressions FOSS or FLOSS are mentioned, acronyms that also refer to libre software.

On the other hand, proprietary software is basically non-libre software. This software is under a license that does not give the user the four freedoms mentioned above, imposes restrictions regarding the use, distribution and modification of it and usually does not release its source code.[8] It is important to clarify that proprietary software is not equivalent to commercial software, a common misuse of the term, and that libre software can be commercialized.[9]

Because of their relevance, it is necessary to define other concepts. First of all, copyleft. This is 'a general method for making a program (or other work) free, and requiring all modified and extended versions of the program to be free as well.'[10] Consequently, copyleft software is libre software:

[W]hose distribution terms ensure that all copies of all versions carry more or less the same distribution terms. This means, for instance, that copyleft licenses generally disallow others to

3 Free Software Foundation, 'What is Free software?' <www.gnu.org/philosophy/free-sw.html> accessed 7 February 2015.
4 Wikipedia, 'Gratis versus libre' <https://en.wikipedia.org/wiki/Gratis_versus_libre> accessed 7 February 2015
5 Free Software Foundation Europe, 'What is Free Software?' <http://fsfe.org/about/basics/freesoftware.en.html> accessed 7 February 2015.
6 Open Source Initiative, 'The Open Source Definition' <http://opensource.org/osd> accessed 7 February 2015.
7 Richard Stallman, 'Why Open Source misses the point of Free Software' (Free Software Foundation) <www.gnu.org/philosophy/open-source-misses-the-point.html> accessed 7 February 2015.
8 Techopedia, 'What is Proprietary Software?' <www.techopedia.com/definition/4333/proprietary-software> accessed 7 February 2015.
9 Stefano De Paoli and others, 'Why Free Software Is Not The Antonym Of Commercial Software: Two Case Studies From Corporate And Volunteer Based Projects' (2012) 1 Journal of Peer Production <http://peerproduction.net/issues/issue-1/peer-reviewed-papers/why-free-software-is-not-the-antonym-of-commercial-software/> accessed 8 February 2015.
10 Free Software Foundation, 'What is Copyleft?' <https://www.gnu.org/copyleft/> accessed 28 June 2015.

add additional requirements to the software (though a limited set of safe added requirements can be allowed) and require making source code available.[11]

In contrast, non-copyleft libre software 'comes from the author **with permission** to redistribute and modify, and **also to add additional restrictions to it**. If a program is free [libre] but not copylefted, then some copies or modified versions may not be free at all'.[12] The most known example of a copyleft license is the GNU GPL, while Apache and BSD licenses are well-known non-copyleft licenses.

1.2 LIBRE SOFTWARE AND THE PUBLIC SECTOR

The government is among the largest software users, especially in developing countries.[13] Traditionally, governments have used proprietary software.[14] The acquisition of these software licenses usually represents an important amount of the budget for technology in the public sector. However, different factors such as the economic crisis, security concerns, political changes, and the growing activism of libre software movements, have brought to the public debate the necessity of rethinking the traditional approach that governments have had regarding technologies and software in particular.

Despite the traditional prevalence of proprietary software, the public sector has become one of the main adopters of libre software.[15] Governments on all the continents, arguing a range of reasons, have taken steps towards the adoption of libre software in the public sector. Among the measures there are legislation, administrative rules, guidelines, procurements, subsidies, etc.[16] This situation has resulted in a heated debate regarding whether or not the government should adopt it and which measures it may legitimately take to pursue that aim.

Despite the fact that the libre software movement started in the 80's, up to the late 90's and early 2000's the use of libre software in the public sector remained significantly limited, even in

11 Free Software Foundation, 'Categories of free and nonfree software' <www.gnu.org/philosophy/categories.en.html> accessed 7 June 2015.
12 ibid (emphasis added).
13 Henry Haglund and others, 'Open Source and Proprietary Software in Latin America and the Caribbean: An Exploratory Study' (Inter-American Development Bank 2006) 21.
14 ibid.
15 Brian Buffett, 'Meeting on the Management of Statistical Information Systems' (MSIS 2014) (17 February 2014) 10 'Factors influencing open source software adoption in public sector national and international statistical organisations' <www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.50/2014/Topic_1_UNESCO.pdf> accessed 8 June 2015.
16 Jyh-An Lee, 'New Perspectives on Public Goods Production: Policy Implications of Open Source Software', (2006) 9(1) Vanderbilt Journal of Entertainment and Technology Law 45, 57 <http://ssrn.com/abstract=963491/> accessed 24 May 2015.

some of the most technologically advanced countries and in countries with a significant proportion of the libre software developers,[17] such as Europe[18].

At that time, Latin America, and the developing world in general, was far behind the United States and Europe regarding libre software development.[19] This situation started to change during the 2000's as the region experienced sustained economic growth, the information technologies started to disseminate among the population and a wave of left-wing leaders were elected in numerous countries of the region. Through different measures and with different degrees of success, these new governments have boosted the libre software in the public sector.

1.3 THE RESEARCH

Considering this reality in the world and in the region, the central research question of this thesis is: what legal and policy measures can be taken for a better adoption of libre software in the public sector in South America? The relevant sub-questions are: what are the advantages, the possible objections and potential answers to them, of using libre software in the public sector of the region; what common measures have already been taken by South American governments for migrating to libre software; and finally, which aspects, from a legal and policy perspective, should be taken into consideration in order to migrate to libre software in the public sector.

The thesis will consider measures and experiences in countries around the world, when relevant to the research, but the emphasis will be on South America. However, due to the length of this work, it is beyond the scope of this thesis to conduct a detailed assessment of the measures adopted in every country in South America. It is advisable that at the national level thorough assessment be conducted in every country to determine in detail the reasons for the failures and successes. It is hoped that this thesis can serve as a general tool in those national and local analysis.

Although this thesis is aimed to contribute to the implementation of libre software in the public sector in South America, it can also be useful to the rest of Latin America, owing to their common characteristics. Moreover, it is also expected that it might serve as an element of analysis for discussions in this field in the rest of the developing world and even in the developed countries. In conclusion, this work is expected to be a contribution to the libre software movement and a tool for

17 Gregorio Robles and others, 'Who Is Doing It? A research on Libre Software developers' (August 2001) Fachgebiet für Informatik und Gesellschaft, Technische Universität Berlin <http://ig.cs.tu-berlin.de/oldstatic/s2001/ir2/ergebnisse/OSE-study.pdf/> accessed 26 April 2015.

18 Patrice-Emmanuel Schmitz, Unisys Belgium, 'Study into the use of Open Source Software in the Public Sector, Part 2: Use of Open Source in Europe' (June 2001) <http://ec.europa.eu/idabc/servlets/Doc2c72.pdf?id=837/> accessed 26 April 2015.

19 See for instance the lack of developers in this field at that time' “Debian, as the whole Libre Software community, also lacks from developers that come from the Third World countries'. Robles, (n 17).

policy makers seeking to implement libre software in the public sector.

1.4 SIGNIFICANCE

The importance of this research is given in the first place by the mentioned vigorous debate that has been taking place in an ever-growing number of countries regarding the adoption of libre software in the public sector and the appropriate measures to achieve that. This debate is particularly relevant in South America owing to the boost that libre software has received from governments of the region and their ongoing efforts to deepen the advancement achieved so far. In fact, in South America libre software enjoys significant support from many governments, a tendency that has been seen since the first half of the 2000s.[20]

On the other hand, it is possible to find literature showing the advantages of libre software over proprietary software in various areas. In the same sense, there has been some research on the subject of libre software and the public sector around the world. However, in relation to this latter topic and South America in particular, there is a gap not much covered in the academic field, especially taking in consideration political and legal aspects. On account of that fact, this work aims to advance in covering that gap.

The political motivations, for instance, are sometimes neglected or deemed as negative when analyzing regulations or public policies in the field of technology. However, they can be indeed a positive factor. After all, it should not be forgotten that the law, in its different manifestations (constitution, legislation, etc), is the expression of a political will, that ideally should be the will of the majority of the people if a country aspires to be considered a democracy.

This thesis attempts to contribute to the fields of information technology law and public policy regarding libre software. This will be done considering a region in the world that, as it was already mentioned and will be further explained through the text, presents some particular characteristics that make the analysis relevant not just to the countries involved but to others as well.

1.5 METHODOLOGY

In order to conduct the research, various sources were employed, mainly in English, but also in Spanish and Portuguese, since those are the main languages of South America. Academic sources such as books, papers and articles were analyzed. Additionally, news from the media were

20 Matthias Sax, 'Economic efficiency of free and open source software in the public sector: the example of Chile' (United Nations - ECLAC October 2006) 33 <www.cepal.org/en/publications/3535-economic-efficiency-free-and-open-source-software-public-sector-example-chile> accessed 8 June 2015.

part of the investigation.

On the other hand, legal regulations (laws, decrees, etc.) relating to libre software and enacted in several countries were used. In this regard, the focus is on the legal regulations in South America, since that is the region at the center of this thesis. Additionally, reports, analyses, guides or other documents published by governments, or national and international organizations in which their work is related to libre software or the public sector, were taken into consideration.

Finally, another source for the thesis was the information provided by members of the libre software communities in South America. This was acquired through direct communication with them or their writings on Internet. As players with direct knowledge of the subject and in many cases with direct participation in the processes of migration in the public sector, they constitute an important source.

1.6 STRUCTURE

The thesis is structured in five chapters. After this introduction, in the second chapter the benefits of libre software for the public sector in South America will be examined, along with potential objections, criticism and possible counterarguments or countermeasures to them. The third chapter will present some experiences of South American governments in order to migrate to libre software. The fourth chapter will set forth aspects that should be considered when adopting or designing libre software policies for the government. In the same chapter, in light of the considerations given through the text, some recommendations will be made for South American countries in order to successfully advance to a libre software migration. Lastly, the fifth chapter will provide the conclusions of this work.

2. POTENTIAL DISADVANTAGES AND BENEFITS OF LIBRE SOFTWARE IN THE PUBLIC SECTOR

When considering the adoption of libre software for the public sector and its implications, it is necessary first to take into account that, although there may be some considerations that could apply similarly in the private sector, there are essential differences in the perspective of the public sector. This is easily explained by the nature of a democratic state. It is out of the scope of this thesis to discuss the theory of the state, but, generally speaking, it can be said that a democratic state should fundamentally seek to guarantee the rights of its population, or in other words, 'government should take into account society's long-term interests, not merely its own interests as a consumer'.[21] This is different for a private company, whose primary motivation is to generate profit for its owners and therefore, it only considers its interest as a purchaser.

Moreover, states in Latin America, and in the developing world in general, may have different priorities or motivations in their policies in comparison with developed countries. This can be explained by the different stage of development of those countries and the needs that, as a consequence, they have. Similarly, some of the benefits of libre software are more important for developing countries.[22]

Starting from these previous considerations, in this chapter will be presented some common objections or shortcomings that libre software arguably has. Likewise, some arguments to counter them and possible measures to mitigate them will be presented. Finally, the benefits of libre software will be stated.

2.1 POTENTIAL DISADVANTAGES

Before considering the benefits of libre software, it is necessary to look at the potential disadvantages that some people argue it has when it is adopted by the public sector. Along with them, it is important to consider possible ways to address these concerns. In this way, the position in favor of libre software is strengthened, the government can foresee possible problems and criticism that could arise and, therefore, prepare appropriate measures to counteract them.

21 Jyh-An Lee, 'Government Policy toward Open Source Software: The Puzzles of Neutrality and Competition' (Winter 2006) 18(4) Knowledge, Technology, & Policy 113, 113 <http://dx.doi.org/10.1007/s12130-006-1007-5> accessed 11 June 2015.

22 Osden Jokonya, 'Investigating Open Source Software Benefits in Public Sector' (48th Hawaii International Conference on System Sciences, Hawaii, 2015) 2250 <http://conferences.computer.org/hicss/2015/papers/7367c242.pdf> accessed 12 June 2015.

2.1.1 LEGAL RISKS

As it was mentioned in the first chapter, the libre software movement was born in the United States. For this reason, some of the most important libre software licenses, such as the GNU GPL, BSD or Apache, were created there and, therefore, respond to the American legal system. This may create a problem since the common law system of the United States is different from the civil law system that all South American countries use, with the exception of Guyana.[23]Consequently, there could be a potential risk that the legal validity of libre software licenses be challenged.

Another aspect is the risk of possible infringements of third parties' intellectual property rights. It is argued that, because the source code of libre software is publicly available, it is easier to spot potential infringements of copyrights or patents in the code. This could potentially result in civil and criminal litigation, the latter in case of copyright infringement.

On the other hand, it is known that libre software licenses usually contain clauses that provide no warranties and indemnities for the user of the software and exclude the liability of the licensor. This might be in contradiction with the law of South American countries, where usually legal regulations establish a minimum of obligations regarding warranties and indemnities for any product and prohibit the total exclusion of liability.

Finally, the terms of libre software licenses impose some conditions and restrictions that, in case of violation can create legal problems for the public institutions. One common complaint of some people is the viral effect of copyleft licenses. This means that all modified versions of a software under such licenses, or new software that uses code from a copyleft program, must be licensed under the same distribution terms, without any other significant restriction, and making available the source code.[24]If the public institution fails to meet these requirements, it would be possible for the copyright owner or owners of the software, to take legal actions against the institution. This impedes the creation of non-copyleft or proprietary versions by the government, or any other person or company who later receives the software.

Additionally, the terms of some libre software licenses make them incompatible with other libre software licenses. Under those circumstances, if an institution wants to create a modified version of a libre software, it is limited to use only code from programs under compatible licenses, therefore, limiting the code that can be used from other programs. However, a possible alternative

23 Government of Guyana, 'Legal System' <http://legalaffairs.gov.gy/information/legal-system> accessed 13 June 2015.

24 Free Software Foundation, 'Categories of free and nonfree software' <http://www.gnu.org/philosophy/categories.en.html> accessed 13 June 2015.

could be the use of dual-licensing.

Regarding the applicability of libre software licenses, and GPL in particular, there have been some studies in South American countries such as Brazil[25], Chile[26] and Colombia[27], and even in other similar jurisdictions such as Mexico[28] or Spain[29]. The conclusion of all of them was that libre licenses, as GPL, are applicable and compatible with their national law system. The Chilean text, for instance, concludes:

> From what was presented in this research, it can be concluded that the libre software licenses, in general (and the GPL in particular [see section 7.2]) are legally valid, as respecting the principles and rules contained in Chilean law (civil and intellectual property).[30]

Besides those studies, the fact that those licenses have been used in these countries for years without any significant legal challenge to their validity suggests that they are applicable within the legislation of South American countries. After all, it should be remembered that the use of libre software licenses does not mean renouncing copyright, on the contrary, it is a different way to exercise the rights that are granted by copyright laws.[31] In the same way that an author can restrict the use of his creations through restrictive licenses, one can give freedoms to users.

The risk of infringements of third parties' intellectual property rights (IPRs) is always present in any software project. There is no proof that this risk is higher for libre software. Good practices in the development of libre software contribute to guarantee that no third parties' IPRs are included. Moreover, apart from libre software companies, libre software communities are always willing to replace any code that is pointed out to be infringing third parties IPRs. In any case, many companies now have assurance programs to protect their customers from potential intellectual property infringements. Red Hat, one of the leaders of the sector, is an example of that.[32]

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25 Joaquim Falcão and others, 'Estudo sobre o Software Livre' (Instituto Nacional de Tecnologia da Informação, Rio de Janeiro, 18 March 2005) <http://www.softwarelivre.gov.br/documentos-oficiais/estudo-sobre-o-software-livre> accessed 14 June 2015

26 Daniel Bravo Silva, 'Aproximación a la validez y a la obligatoriedad de las licencias de software libre en el derecho chileno' (February 2005) <http://www.derecho-internet.org/files/licencias-sl-chile-v021.pdf> accessed 13 June 2015

27 Oscar Daniel Gomez, 'Validez Jurídica de la Licencia GPLv3' <http://www.etnassoft.com/biblioteca/validez-juridica-de-la-licencia-gplv3/> accessed 14 June 2015

28 Culebro Juárez and others, 'Software libre vs software propietario, Ventajas y desventajas' (May 2006) 44 <http://www.rebelion.org/docs/32693.pdf> accessed 14 June 2015

29 Elena Pérez Gómez, 'Estudio sobre la validez jurídica de la licencia GPL v3 en el marco normativo español de los derechos de autor y otras licencias opensource' (Sánchez-Crespo Abogados y Consultores, January 2009) <https://observatorio.iti.upv.es/media/managed_files/2009/01/20/EstudioGPLv3_.pdf> accessed 15 June 2015

30 Bravo Silva (n 26) 53.

31 Word Intellectual Property Organization (WIPO), 'Copyright Licensing in the Digital Environment' <http://www.wipo.int/copyright/en/activities/copyright_licensing.html> accessed 17 June 2015.

32 Red Hat, 'Open Source Assurance' <http://www.redhat.com/en/about/open-source-assurance> accessed 17 June 2015.

Similarly can be argued against the fact that libre software licenses provide no warranties and indemnities. Companies nowadays offer indemnifications for their libre software products. Being the government an important client for any software vendor, it would not be difficult to obtain them, if deemed necessary.

Any software license imposes conditions on the users. The most known restriction of proprietary software EULAs (end user license agreements) is the access to the source code, but there are many more, for instance, a limit in the number of computers on which you can install the program. On the other hand, libre software licenses provide freedoms to users, which among other actions allow them to modify the program and create their own versions. However, as it was explained in section 1.1, there are differences between copyleft and non-copyleft libre software licenses. These dissimilarities entail different consequences for the public sector. In the first case, any modified version created by a public institution must have the same licensing conditions of the original copyleft license, which obliges them to not only carefully comply with the terms of the licenses but to not modify them in the derived works. This seeks to guarantee the freedom of downstream users. On the contrary, non-copyleft licenses permit to change the license terms in the derived works allowing to transform them into proprietary software, therefore, allowing appropriation of the community work. If a government seeks to encourage a proprietary software business model with the work developed by the public sector, these licenses would be necessary.

Notwithstanding, the state does not have a private commercial view, and the copyleft licenses are in line with a public approach seeking to benefit through the public resources the highest number of people in the society. Not surprisingly, the European Union's license for the public sector is copyleft.[33] Nevertheless, if it is considered necessary for a particular situation to allow the creation of modified software versions under different licensing conditions, non-copyleft libre licenses like the Apache could be used.

As with any other software, public institutions must follow and respect the terms and conditions of the libre licenses. As any license, they impose conditions, but in any case they provide significantly more freedoms than proprietary licenses, which in most of the cases do not even allow to access the source code. Institutions should evaluate and consider in each case what is more convenient for the goals they are pursuing, and take into consideration factors as the compatibility of licenses.

The conclusion is that while it is true that there are legal risks, they are no significantly different from the legal risks in proprietary software. As with any other software, public institutions

33 Patrice-Emmanuel Schmitz, 'The European Union Public Licence (EUPL)' 5(2) International Free and Open Source Software Law Review <http://dx.doi.org/10.5033/ifosslr.v5i2.91> accessed 17 June 2015.

should evaluate the possible legal problems in each case according to the requirements of the institution and the legal system of the country.

2.1.2 HARDWARE COMPATIBILITY

A common argument against libre software is the issue of compatibility with hardware, especially new hardware. Most of the hardware manufacturers do not have an open source approach and therefore, usually do not release the specifications of the hardware, making difficult for libre software developers to release open source drivers.[34] Being proprietary software such as Windows a de facto standard, drivers for it are usually the first to be available.

The problems that libre software community and companies sometimes face for developing open drivers for new hardware are a reality. However, it has been becoming more common that hardware producers release drivers for libre software such as GNU/Linux, although those drivers are not always open source.

Furthermore, there are public databases, constantly growing, of hardware compatible with libre software operative systems. A well-know example of that is h-node project.[35] Moreover, and similarly as with indemnifications, nowadays libre software companies such as Canonical, have certified hardware that works with their software.[36]

Additionally, a common practice in the libre software community is the use of reverse engineering for creating open drivers of hardware with closed source specifications. The project Nouveau is a well-know example in this regard.[37] A governmental support of these initiatives can boost the pace of these developments. However, the legal restrictions that may exist must be analyzed and considered in each jurisdiction.

Finally, what could be considered the most powerful response of the government to this problem is its bargaining power. The public sector is usually a large client of hardware companies. This fact gives the state a bargaining power that may facilitate that private companies provide drivers compatible with libre software if it is required.

34 Arjan de Jager, Victor van Reijswoud, *FREE AND OPEN SOURCE SOFTWARE FOR DEVELOPMENT: exploring expectations, achievements and the future* (Polimetrica, 2008) 35 <http://arxiv.org/abs/0808.3717v1> accessed 19 June 2015.

35 H-node Project, 'FAQ' <https://h-node.org/faq/page/en/FAQ> accessed 19 June 2015.

36 Canonical, 'Certified hardware' <http://www.ubuntu.com/certification/> accessed 22 June 2015.

37 Nouveau, 'Nouveau: Accelerated Open Source driver for nVidia cards' <http://nouveau.freedesktop.org/wiki/> accessed 22 June 2015.

2.1.3 LACK OF SUPPORT

One of the most frequent arguments against the adoption of libre software is the lack of technical support.[38] This is particularly relevant for the public sector, especially in critical sectors such as the health system, due to the necessity of its continuous work and therefore, a reliable support system. It is common that this argument is employed as one of the main reasons to use commercial proprietary software instead of libre software.[39]Not surprisingly, considering that one of the main concerns found in many libre software studies is the availability of support.[40]

When technical support is required for new users and there are no contractors that can provide it at a sufficient level, it has been argued that libre software should not be used.[41]Moreover, the community support, usually widely available on Internet for this type of software, is deemed as not appropriate in these cases.

Libre software has always enjoyed of support from the community. However, it used to lack of significant support from companies. Nevertheless, as the libre software and its adoption at different levels has grown, also the support has grown. Nowadays, some of the companies that offer support to libre software are international giants like IBM or HP[42] and other big enterprises in the sector like Novell, Red Hat or Canonical. Additionally, in the national level there are many more companies and even cooperatives[43] and other non profit organizations[44] that offer support for libre software projects. Although public institutions should not only rely upon community support, it is still an important and useful source.

Proprietary software business model is based mainly on charging fees for licenses. Libre licenses on the other hand, although do not prohibit to sell the software, in practice is more feasible to rely upon other business models. The alternatives may include the packaging and distribution of libre software or the provision of services like development, training, support, etc.[45] In fact,

38 Betul Özkan Czerkawski, *Free and Open Source Software for E-Learning: Issues, Successes and Challenges* (Information Science Reference 2011) 29.

39 ibid

40 Brian Buffett, 'Meeting on the Management of Statistical Information Systems' (MSIS 2014) (17 February 2014) 10 'Factors influencing open source software adoption in public sector national and international statistical organisations' 9 <http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.50/2014/Topic_1_UNESCO.pdf> accessed 8 June 2015

41 Nicholas D Wells, 'Government use of Free Software' (Spring 2004) 33(3) Public Contract Law Journal 565, 590 <http://www.jstor.org/stable/25755285> accessed 22 June 2015.

42 Jager, Reijswoud (n 34) 34.

43 A recent example is Librecoop in Uruguay <http://libre.coop/> accessed 23 June 2015.

44 An example in Colombia is 'Fundación Casa del Bosque' <http://fcbosque.org/> accessed 23 June 2015.

45 Matthew Langham, 'The business of open source' (*OSS Watch*, 3 February 2009) <http://oss-watch.ac.uk/resources/businessofopensource> accessed 23 June 2015.

PaloSanto Solutions, an international libre software company from Ecuador that develops the successful libre software Elastix, has among its services: paid support for its product.[46] Moreover, they have already provided services of development to the General Office of Public Contracts of Dominican Republic.[47] In summary, while libre software continue advancing in the private and public sector, it is foreseeable that the availability of support will continue growing.

2.1.4 SECURITY

A key component of computer security is software.[48] Software security has been defined as 'the idea of engineering software so that it continues to function correctly under malicious attack'.[49] Software is therefore, vital for the computer security of the state, considering the range of attacks to which it can be subjected from different actors such as other states or hostile groups.[50] In this sense, a study of the Dense Department of the United States concluded that 'software provides the greatest mechanism for technical exploitation by a wide range of adversaries'.[51]

As it was the case with technical support, security has been found in some studies to be one of the main concerns for the adoption of libre software.[52] It is commonly argue that security is one of the flaws of this type of software because of the free availability of the source code. Despite these allegations, empirical research has found that this is not the case and in fact, shorter or similar times of respond were found for libre software vulnerabilities.[53]

The misconception about libre software security is based on the believe that security through obscurity is the most secure technique for software, at least more than an open approach. The logic behind it is that keeping the source code hidden is more secure than making it available. However, in the security world this is debunked. Experts have stated that 'obscuring security leads to a false sense of security, which is often more dangerous than not addressing security at all'.[54] The National Institute of Standards and Technology of the United States recommends that 'system security should

46 Elastix, 'Paid Support' <http://www.elastix.org/index.php/en/support/paid-support.html> accessed 23 June 2015.
47 Elastix, 'New features and improvements for users of the Contract System' <http://www.elastix.org/index.php/en/product-information/cases-of-success/512-new-features-and-improvements-for-users-of-the-contract-system.html> accessed 23 June 2015.
48 Gary McGraw, 'Software Security: Building Security In' (2012) 36(9) Datenschutz und Datensicherheit 662
49 ibid.
50 James A Lewis, 'Foreign influence on software: Risks and Recourse' (CSIS, March 2007) VII <http://csis.org/files/media/csis/pubs/070307_foreign_software.pdf> accessed 27 June 2015.
51 ibid 11.
52 Buffett (n 40) 9.
53 Guido Schryen, 'Security of open source and closed source software: An empirical comparison of published vulnerabilities' (15th Americas Conference on Information Systems, San Francisco , August 2009) <http://epub.uni-regensburg.de/21296/> accessed 27 June 2015.
54 Mark S. Merkow, Jim Breithaupt, *Information Security: Principles and Practices* (2nd edn, Pearson IT Certification 2014) 25.

not depend on the secrecy of the implementation or its components'.[55] Similarly, Bruce Schneier, a reputed and well-known security expert, considers that 'public scrutiny is the only reliable way to improve security'[56] and that 'public security is always more secure than proprietary security. It's true for cryptographic algorithms, security protocols, and security source code. For us, open source isn't just a business model; it's smart engineering practice'.[57]

Furthermore, considering the technological capabilities of world super-powers as the United States, it is not a good practice to base the software security of the states in South America on the secrecy of the source code. Moreover, if it is taken into account that most of the software that is used in the public sector (e.g. Windows, Microsoft Office, Oracle products, etc) is not developed by national companies in South America but for American companies in the United States or other countries, that makes even more compelling to adopt libre software solutions that allow to scrutiny the code of the software by the government and the community. This is a way to mitigate the risk.

The security risk of proprietary software has been noticed long ago in China, where:

> A growing number of Chinese have likened dependence on Microsoft to leaving the keys to the country's increasingly computerized economy in the hands of a potential enemy. Some warn that secret holes in Microsoft's computer code might allow the United States access to Chinese networks or even enable it, in time of war, to shut those networks down.[58]

Libre software may have bugs or flaws as any software.[59] However, owing to the fact that the source code is publicly available, more people, more security experts, can audit the software and therefore find bugs and security flaws more rapidly. This was explained in the famous text 'The Cathedral and the Bazaar'.[60] An example, of many that could be given, is a 2003 attempt to introduce malicious code in the Linux kernel.[61] This attempt was not successful because the community detected it, but it was only possible because of the open nature of Linux.

In view of what was presented above, it can be concluded that security of libre software is not

55 Karen Scarfone, Wayne Jansen, Miles Tracy, 'Guide to General Server Security: Recommendations of the National Institute of Standards and Technology ' (National Institute of Standards and Technology, July 2008) 2-4 <http://csrc.nist.gov/publications/nistpubs/800-123/SP800-123.pdf> accessed 25 June 2015.

56 Bruce Schneier, 'The Non-Security of Secrecy' (October 2004) <https://www.schneier.com/essays/archives/2004/10/the_non-security_of.html> accessed 26 June 2015.

57 Bruce Schneier, 'Crypto-Gram' (15 September 1999) <https://www.schneier.com/crypto-gram/archives/1999/0915.html#OpenSourceandSecurity> accessed 26 June 2015.

58 Craig S Smith, 'Fearing Control by Microsoft , China Backs the Linux System' *The New York Times* (New York, 7 July 2000) <http://www.nytimes.com/library/tech/00/07/biztech/articles/08soft.html> accessed 30 June 2015.

59 Gunnar Hellekson, '2014: Year of open source miracles' (*Opensource.com*, 25 November 2014) <https://opensource.com/government/14/11/open-source-software-security-vulnerabilities> accessed 1 July 2015.

60 Eric Steven Raymond, 'The Cathedral and the Bazaar' (22 August 2001) 9 <http://www.unterstein.net/su/docs/CathBaz.pdf> accessed 1 July 2015.

61 Lewis (n 50) 12.

a disadvantage as it has been argued. Despite there are still concerns from some organizations about the security of libre software, studies have shown that on the contrary the security is greater.[62] As a Canadian governmental study concluded, 'for military systems and government computing in general, the access to source code and the adoption of open standards are obvious advantages'.[63] However, in order to take fully advantage of the open security approach, South American governments should encourage the participation and scrutiny of security experts.

2.2 BENEFITS

The benefits of libre software are widely well-known, from reduction of costs to customization. Following, some of the most relevant for South American countries will be highlighted. These benefits are also relevant for other developing countries.

2.2.1 COSTS

One of the most common arguments in favor of implementing libre software in the public sector is the savings that can be made. However, it is worth noting that at least at the beginning of a process of migration this could not be always the case.[64] Adoption of libre software does not always translate immediately in reduction of cost.[65]

Total cost of ownership (TCO) is a common cost analysis method used in Information Technology (IT) projects. However, there is not a unique method of calculate the TCO[66] and there is no consensus about which costs should be included.[67]For instance, the licenses fee although important, is not the only cost associated to an IT project.[68]

In spite of this, lower costs is a benefit of libre software at least in the long term.[69] Some

62 Brian Fitzgerald, Jay P Kesan, Barbara Russo, *Adopting Open Source Software : A Practical Guideline* (The MIT Press 2011) 135.

63 Robert Charpentier, Richard Carbone, 'Free and Open Source Software. Overview and Preliminary Guidelines for the Government of Canada' (Defence R&D Canada, December 2004) <http://www.sita.co.za/FOSS/Gov_Canada-OSS_Guide-Dec04.pdf> accessed 1 July 2015.

64 Fitzgerald,(n 62) 133.

65 Till Adam, 'Free Software in Public Administrations' in Lydia Pintscher (ed), *Open Advice, FOSS: What We Wish We Had Known When We Started* (2012) 260 <http://open-advice.org/Open-Advice.pdf> accessed 5 July 2015.

66 Rishab Ghosh, 'Legal aspects of free and open source software in procurement: guidelines developed at the EU level' (Workshop: Legal Aspects of Free and Open Source Software, Brussels, July 2013) 61 <http://www.europarl.europa.eu/RegData/etudes/workshop/join/2013/474400/IPOL-JURI_AT%282013%29474400_EN.pdf> accessed 8 July 2015.

67 Henry Haglund and others, 'Open Source and Proprietary Software in Latin America and the Caribbean: An Exploratory Study' (Inter-American Development Bank 2006) 9.

68 ibid

69 Fitzgerald (n 62) 133.

analysts have held that the licenses costs are proportionally more important in developing countries,[70] this makes proprietary software more expensive for those countries since proprietary software business model is based mainly on the cost of licenses. Moreover, existing migrations have already shown savings as in Munich[71] or the French Police,[72] two of the largest migrations in the public sector in the world. Experiences in South America also confirm this, cases in Chile[73] or Brazil[74] are just two examples. Similarly results have been found in the private sector.[75]

Said this, it should be stressed that the reduction of cost must not be the main or the sole reason to migrate to libre software. Proprietary vendors could offer a reduction in the price of the licenses, as it was the case in Munich,[76] making the migration to libre software much more expensive in the short term and weakening the position in favor of a migration. Moreover, the government should always consider the non-monetary cost and benefits of public expenditure, in this case for instance, the economic and social impact of acquiring licenses, especially from foreign companies, is not the same as hiring a national company to develop or support a software solution.

2.2.2 DEVELOPING LOCAL INDUSTRY AND JOB CREATION

Libre software does not mean non-commercial software, as it has been explained, it just entails different business models. There are many companies that are based on those alternatives, including big players in the technological sector like Red Hat or even companies in South America.[77]

The use of libre software by the government represents a significant opportunity for national

70 Louis-Dominique Ouédraogo, 'Policies of United Nations System Organizations Towards the Use of Open Source Software (OSS) in the Secretariats' (United Nations 2005) 6 <ftp://ftp.fao.org/docrep/fao/meeting/010/j7601e01.pdf> accessed 10 July 2015.

71 Loek Essers, 'Munich Mayor Says Switch to Linux Saved Money, Reduced Complaints' (*PC World* March 2012) <www.pcworld.com/article/252921/munich_mayor_says_switch_to_linux_saved_money_reduced_complaints.html > accessed 8 June

72 Major Stéphane Dumond, 'Linux on desktop: a success story' (26 September 2013) <https://joinup.ec.europa.eu/sites/default/files/3f/e8/9c/11-apresentacao-stephanedumond.pdf> accessed 9 November 2015.

73 Matthias Sax, 'Economic efficiency of free and open source software in the public sector: the example of Chile' (United Nations - ECLAC October 2006) 33 <www.cepal.org/en/publications/3535-economic-efficiency-free-and-open-source-software-public-sector-example-chile> accessed 8 June 2015.

74 Computer World Redação, 'Banco do Brasil estima economia de R$ 50 milhões com uso de software livre' (Computerworld Brasil, July 2015) <http://computerworld.com.br/banco-do-brasil-estima-economia-de-r-50-milhoes-com-uso-de-software-livre> accessed 8 June 2015.

75 Diomidis Spinellisa, Vaggelis Giannikasb, 'Organizational adoption of open source software' (2012) 85 Journal of Systems and Software 666, 679 <http://dx.doi.org/10.1016/j.jss.2011.09.037> accessed 8 June 2015.

76 Egan Orion, 'Microsoft loses big deal in Munich' (*The Inquirer*, 27 may 2003) <http://www.theinquirer.net/inquirer/news/1005124/microsoft-loses-big-deal-in--munich> accessed 18 October 2015.

77 United Nations Conference on Trade and Development (UNCTAD), *The Information Economy Report 2012: The Software Industry and Developing Countries* (2012) 64 <http://unctad.org/en/PublicationsLibrary/ier2012_en.pdf> accessed 14 July 2015.

software industry, and in fact some governments understand it in that way.[78]The main reason behind it, is that an open source approach allows companies to build upon already existing code, without having to start from scratch. This is particularly important for small and medium enterprises (SMEs),[79] which are the majority in South American countries. Libre software reduces the costs of entering into the software market.[80]

The use of libre software means that 'installation, training, support and maintenance can be flexibly contracted out to a range of local suppliers competing on quality and price'.[81]More contracts for national companies translates into more local jobs as the public IT budget is expended less in licenses fees, that in many cases go to foreign companiest, and more in services provided at the national level. It is worth to highlight in this regard that 'most proprietary software in developing countries is imported'.[82]

As the UNCTAD 2012 report concluded:

> For software enterprises and developers, FOSS can promote domestic market development and local innovation (…) local FOSS development, sales and services can help keep resources within the local economy, avoid dependency on specific vendors and provide opportunities for income generation and employment.[83]

Related to this, something that may be overlook when consider from the perspective of a developed country, is the contribution to closing the digital divide within the population of a country and between developing and developed countries. The development of local IT skills is an important way to address the problem of the digital divided.

2.2.3 VENDOR INDEPENDENCE

One of the most important advantages of libre software for the government is that it helps to guarantee vendor independence, to prevent the lock-in effect of proprietary software solutions. The vendor lock-in is 'a situation in which a customer is dependent on a vendor for products and services such that he or she cannot switch to another vendor without suffering substantial costs'.[84]

78 ibid.
79 ibid 65.
80 Fadi P Deek, James A M McHugh, *Open Source:Technology and Policy* (Cambridge University Press 2007) 314.
81 UNCTAD, *E-Commerce and Development Report 2003* (2003) 110 <http://unctad.org/en/pages/PublicationArchive.aspx?publicationid=1497> accessed 19 July 2015.
82 Jokonya (n 22) 2244.
83 UNCTAD (n 77) 108.
84 Kevin Xiaoguo Zhu, Zach Zhizhong Zhou, 'Lock-In Strategy in Software Competition: Open-Source Software vs.

This is undesirable and should be taken into consideration by policymakers.[85]

This has been one of the motivations of governments for migrating to libre software.[86] Libre software facilitates the entry of new suppliers and foster competition; this will be further discussed in the chapter fourth. The main reason that explain this benefit is that source code is available and therefore, any supplier with the technical knowledge could provide the products or services required by the government because the code is not property of a particular vendor. This dependence may be particularly serious if the the vendor has been providing the software solutions for a significant time and critical areas of the administration rely upon it.

In conclusion, libre software enables the goverment to freely choose its suppliers without suffering significant risks or costs. However, it should be noted that the availability of software documentation is key to enable smooth change of vendors, otherwise even with the source code the process could be burdensome.[87]

2.2.4 LOCALIZATION

Localization is defined as 'the process of adapting a product or content to a specific locale or market'[88] and as for any other product, it is important for the success and a better performance of software in the local conditions. The benefit that libre software entails is that allows adaptation of the software without having to remain locked-in with a specific software vendor.[89]

As it has been pointed out before, much of the software used by governments is proprietary and developed by multinational companies. They may overlook local needs if it is not profitable enough, which can be particularly true for translation to local languages.[90] Taking into consideration the wide number of native languages in South America, with countries in which those languages are used by an important percentage of the population, as in Bolivia or Paraguay, this benefit becomes significant for the governments of the region. A practical example of this is the recently developed translation of Libre Office to Guarani, a native language that is official in Paraguay, Bolivia and provinces of Brazil and Argentina.[91]

Proprietary Software' (2012) 23(2) Information Systems Research 536 <http://dx.doi.org/10.1287/isre.1110.0358> accessed 6 August 2015.

85 ibid 544.

86 Jokonya (n 22) .

87 Fitzgerald (n 62) 133.

88 Globalization and Localization Association, 'What is Localization?' <http://www.gala-global.org/what-localization> accessed 6 August 2015.

89 UNCTAD (n 77) 63.

90 Jokonya (n 22) 2243.

91 Italo Vignoli, 'The Document Foundation announces LibreOffice in Guarani, to offer the free office suite in yet another native language' (19 August 2015) <https://blog.documentfoundation.org/2015/08/19/the-document-foundation-announces-libreoffice-in-guarani-to-offer-the-free-office-suite-in-yet-another-native-language/>

2.2.5 LEGACY HARDWARE

A common situation in developing countries, including South America, is the important presence of legacy hardware.[92]This hardware, due to the highly increasing technical requirements that proprietary software like Windows usually demands, cannot support the most recent software and after certain deadlines established by software companies, they even lose the security updates, which constitutes an important threat for its security. The case of Windows XP is a good example of the negative implications of this. This operative system ended its period of support in 2014. However, because even in developed countries many public institutions are still using it, governments such as the British and the Dutch had to pay millions to Microsoft to extend its support.[93]

This situation contrast with the benefit that libre software offers. For instance, there are different operative systems based on the Linux kernel that are adapted to old hardware. Because of the availability of the source code, developers have been able to maintain and even to create new versions for old computers. This is not possible with proprietary software due to the fact that the source code is secret and usually belongs to a company. Moreover, libre software allows to third parties or even the governments itself, to keep providing support to the software for legacy hardware as long as it is considered necessary.

This fact entails also another benefit, a contribution to the reduction of costs. Since hardware can be used for longer, public institutions may replace less often their hardware[94] and as a consequence, expend less in unnecessary hardware acquisitions.

2.3 CONCLUSIONS

As a conclusion of this chapter it can be said that despite there are potential risks, and criticism will arise before, during and after any governmental process of migration to libre software, especially from companies that function based on a proprietary software business model, the risks are manageable if an adequate process of planning is put forward in advance. Critics can be counteracted showing to the population the benefits that libre software entails and that clearly

accessed 6 August 2015.

92 Deek (n 80) 315.

93 Samuel Gibbs, 'UK government pays Microsoft £5.5m to extend Windows XP support' *The Guardian* (London, 7 April 2014) <www.theguardian.com/technology/2014/apr/07/uk-government-microsoft-windows-xp-public-sector> accessed 7 August 2015.

94 Jager, Reijswoud (n 34) 37.

outweigh the possible drawbacks. Besides, the risks are not significantly higher than with any other software. In this respect, it is pertinent to quote a document elaborated by the Federal Financial Institutions Examination Council of the United States, 'the use of FOSS does not pose risks that are fundamentally different from the risks presented by the use of proprietary or self-developed software'[95].

95 Federal Financial Institutions Examination Council, 'Risk Management of Free and Open Source Software' (2004) 1 <www.federalreserve.gov/boarddocs/srletters/2004/sr0417a1.pdf> accessed 8 August 2015.

3. MEASURES ADOPTED IN SOUTH AMERICA

South America is the most favorable region in the world for libre software in terms of governmental support. The most similar would be Europe, however, there is no European country that mandates at the national level the use of libre software as in South America. Out of twelve countries, in five (Bolivia, Brazil, Ecuador, Uruguay and Venezuela) there is explicit national governmental support and some municipal and regional governments have also expressed their support. In most of them this has been translated in regulations containing a preference or even a mandate for the use of libre software. In other five countries (Argentina, Chile, Colombia, Paraguay and Peru), there have been governmental libre software initiatives in different levels of the administration. In these latter countries, municipalities, provinces, ministers or other public institutions have approved regulations in favor of libre software. Only in the two smallest countries (Guyana and Suriname), there is not known explicit governmental support.[96] Those experiences have not been exempt of failures and problems, which is understandable specially when they are pioneer initiatives, however, they constitute an important source of learning for the country itself and for others.[97]

The Venezuelan *Infogobierno* Law[98] illustrates what a mandate for libre software implies in practice. First, it requires that public institutions start a plan to migrate their current proprietary software solutions in order to comply with the legal dispositions.[99] Additionally, any new acquisition, development or implementation of software by the government must be under a libre license, and therefore public institutions must incorporate this requisite as mandatory in their public procurement. If an institution needs to implement a proprietary software it requires a special authorization from the national authority in charge of information technologies in the public sector. This permit in Venezuela can last maximum three years and is granted only if there is no libre software alternative or if there is a risk for the security of the state. Any violation of these dispositions by a public servant entails sanctions, as it will be explained later.

On the other hand, a 'preference' for libre software is illustrated in practice by Uruguay. The Decree 44 of 2015[100] develops the Law 19.179, Uruguayan law of libre software, and establishes

96 Lora Woodall, Michele Marius, 'Free and Open Source Software, Open Data, and Open Standards in the Caribbean: Situation Review and Recommendations'(UNESCO, August 2013) 39 <www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/ifap/open_solutions_report_en.pdf> accessed 08 October 2015.

97 Email from Octavio Rossell (Venezuelan libre software activist) to author (13 August 2015).

98 Venezuela, Ley de Infogobierno, Gaceta Oficial de la República Bolivariana de Venezuela 40274, 17 octubre 2013.

99 Ibid, 'Disposiciones Transitorias'.

100 Uruguay, Decreto 44 del 2015, 'Reglamentacion de la ley 19.179, relativo a la regulacion del formato para el procesamiento y almacenamiento de informacion digital por parte de determinados organismos y empresas'.

that when acquiring software, institutions must verify first if there is a solution in the public software repository that can satisfy the requirements of the software needed.Libre software should be preferred but a public institution may acquire or develop proprietary software if it is justified.. Only if the software in consideration is an operative system or an office software, e.g. word processor, the institution requires a specific authorization from the national authority.

Mandating or expressing a preference for libre software in the public sector are two common ways to materialize the governmental support. This support to libre software has been based on a number of motivations, among which are the advantages mentioned in the previous chapter and more political reasons like the desire to achieve 'technological sovereignty'. In the current chapter , significant common threads that were found among the countries of the region regarding libre software and the public sector will be presented.

3.1 LEGAL MEASURES

South America has been an advanced region with regards to legal regulations promoting the use of libre software in the public sector. Different types of legal regulations have been adopted, laws are commonly employed but there are also others such as decrees or resolutions. These legal regulations have been enacted in the municipal, provincial and national levels.

It was in the city of Recife in Brazil that the first law in the world concerning the use of libre software in the public sector was approved.[101] This milestone in the libre software movement was acknowledged in 2001 by Richard Stallman[102] the founder of the Free Software Foundation. The bill number 20[103] was passed in the city's legislative body in March 2000 and was finally enacted as the law 16639 of 2001 by the mayor of Recife.[104] The law prescribed in its first article that the municipal goverment shall use 'preferentially' libre software. Moreover, in its fourth article, it established that disregarding the type of software, open source or not, the program 'must be able to run on different operating platforms, regardless of the employee's operating system'.

The pioneer Recife norm was followed by laws in others municipalities and states of Brazil, being the law of Rio Grande do Sul one of the earliest and most well-known cases.[105] This trend

101 Arjan de Jager, Victor van Reijswoud, *FREE AND OPEN SOURCE SOFTWARE FOR DEVELOPMENT: exploring expectations, achievements and the future* (Polimetrica, 2008) 62 <http://arxiv.org/abs/0808.3717v1> accessed 10 August 2015.

102 Diario de Pernambuco, 'Recife é a cidade do software livre' *Diario de Pernambuco* (Recife, 28 March 2001) <www.old.pernambuco.com/diario/2001/03/28/info1_1.html> accessed 8 August 2015.

103 Brazil, Recife, Câmara Municipal, Projeto de Lei Nº 20/2000, 'Dispões sobre a utilização de programas e sistemas de computador abertos pela Prefeitura da Cidade do Recife'.

104 Brazil, Recife, Lei16639/2001, 16 April 2001, 'Dispõe sobre a utilização de programas e sistemas de computador abertos pela Prefeitura da Cidade do Recife'.

105 Brazil, Rio Grande Do Sul, Assembleia Legislativa, Lei 11871/2002, 19 Dezembro 2002, 'Dispõe sobre a utilização

started in Brazil and continued in other South American municipalities and provinces like the province of Santa Fe (Argentina) in 2004,[106] the municipality of Rosario (Argentina) in 2004,[107] the city of Bogotá (Colombia) in 2007[108] and the region of Lambayeque (Peru) in 2008.[109]

Although the aim of all of these legal regulations was the promotion of the use of libre software in the public sector, not all of them have used the same wording. In Brazil, all the enacted laws have established a 'preference' for the use of libre software, while the regional ordinance of Lambayeque, for instance, mandates the 'exclusive' use of libre software in the regional government. On the other hand, in the case of Bogotá an exclusive or even a preferential use of libre software was not directly mandated. The *Acuerdo* 279 of the Council of the city mandates the creation of a 'policy on the promotion and use of libre software'. Finally, it is important to highlight that all the local and regional norms, despite their different wording, have allowed some exceptions for the use of proprietary software.

With respect to national laws, it can be observed that there have been attempts in almost all the countries in South America of passing laws concerning libre software in the public sector. These attempts have had different results in each country. In Colombia for instance, despite there have been three bills in that sense, none of them have passed in the Congress, not even the first stage out of four rounds of debates needed in order for it to be approved. Conversely, in Uruguay in 2013 the parliament approved a law mandating the 'preferential' use of libre software in the public sector, including the regional governments.[110]The Uruguayan law was the third attempt of passing a libre software law, after two previous bills in 2003 and 2006.[111] After a failed attempt in 2006 that will be mentioned in the next chapter, the National Assembly of Venezuela approved the *Infogobierno* Law in 2013. This law among other provisions states that the public sector must use 'only' libre software.[112] The Venezuelan law was approved with the backing of the national government, unlike the bills of Colombia and the first two bills of Uruguay which lacked governmental support.

Another relevant case is the Peruvian law. The bill won a significant international attention owed to the opposition that it faced during its legislative process and the answers of Congressman Edgar Villanueva, author of the bill, to Microsoft's criticism.[113] In December 2001 Villanueva

de programas de computador no Estado do Rio Grande do Sul'.

106 Argentine, Santa Fe, Ley 12360/2004, Boletín Oficial 20 diciembre 2004.

107 Argentine, Rosario (Municipality), Ordenanza 7787/2004, Boletín Oficial 45 de 2005

108 Colombia, Bogotá, Concejo Distrital, Acuerdo 279, 29 Marzo 2007, 'Por el cual se dictan los lineamientos para la Política de Promoción y Uso del Software libre en el Sector Central, el Sector Descentralizado y el Sector de las Localidades del Distrito Capital'.

109 Peru, Lambayeque, Ordenanza Regional19-2008-GR.LAMB/CR.

110 Uruguay, Ley 19179/2014, Boletín Oficial 28879, 8 enero 2014.

111 Fernando da Rosa Morena, 'Un proyecto de ley de Software Libre y su evolución' (5 August 2013) <www.fedaro.info/2013/08/05/un-proyecto-de-ley-de-software-libre-y-su-evolucion/> accessed 16 August 2015.

112 Venezuela (n 98) art 34.

113 Open Source Initiative, 'Peruvian Congressman refutes Microsoft's 'Fear, Uncertainty and Doubt' (F.U.D.)

introduced the bill and in 2002 and 2003 five similar bills were introduced by other Peruvian Congressman.[114] All of them were processed together.

In spite of being finally approved,[115] the lobby and opposition seem to have been successful, the final Peruvian bill was distorted compared to its original wording. The initial title of the bill that Villanueva presented was 'Law of Libre Software',[116] but in the amended final version the title was 'Law that Regulates the Use, Acquisition and Adequacy of Software in the Public Administration'. This version completely eliminated the second article that mandated the 'exclusive' use of libre software in the government and instead introduced new articles related to 'technological neutrality'. The new article fourth requires that public institutions acquire hardware that does not 'oblige' to use 'only' one type of software, or hardware that in any way limits their 'informatics autonomy'. Nevertheless, the same article authorizes the computer department of the public institution that is purchasing the hardware to certify that such hardware for the specific need does not exist, avoiding consequently the compliance of this article. What was initially a libre software law was turned into a 'technological neutrality' law with no significant effect in the use of libre software in the public sector. Nonetheless, the efforts for having a Peruvian libre software law have not stopped and a new bill was presented in 2013.[117]

Finally, the case of Ecuador is also worth mentioning. Currently, there is no law of the National Assembly that includes a general mandate for using libre software in the government. However, the 'Organic Law of Higher Education' and the 'Organic Law of Public Companies' have dispositions in this respect for those sectors. The first law states in its article 32 that institutions of higher education shall use libre software 'compulsorily'.[118] In contrast, the latter law is significantly weaker, it does not mandate an exclusive use by public enterprises and excludes from this disposition the 'aspects not related to their core or course of business'.[119] More important, currently, a bill entitled 'Organic Code of Social Economy of Knowledge, Creativity and

concerning free and open source software" (28 September 2005) <http://opensource.org/docs/peru_and_ms.php> accessed 20 August 2015.

114 Peru, 'Expediente de la Ley 28612' <www2.congreso.gob.pe/Sicr/TraDocEstProc/TraDoc_expdig_2001.nsf/Sicr/TraDocEstProc/TraDoc_expdig_2001.nsf/Agenda/1FFC165040D293C10525745E007171B3?opendocument> accessed 20 August 2015.

115 Peru, Ley 28612, 'Ley que norma el uso, adquisición y adecuación del software en la administración pública', Diario Oficial 'El Peruano', 18 octubre 2005, pag 302522.

116 Peru, Proyecto de Ley 1609/2001 <www2.congreso.gob.pe/Sicr/TraDocEstProc/TraDoc_condoc_2001.nsf/d99575da99ebfbe305256f2e006d1cf0/ef85050891ade2250525745e006e5fb9/$FILE/01609.pdf> accessed 20 August 2015.

117 Peru, 'Expediente del Proyecto de Ley 02856' <www2.congreso.gob.pe/sicr/tradocestproc/Expvirt_2011.nsf/visbusqptramdoc/02856?opendocument> accessed 24 August 2015.

118 Ecuador, 'Ley Orgánica de Educación Superior', Registro Oficial 298,12 octubre 2010.

119 Ecuador, 'Ley Orgánica de Empresas Públicas', Registro Oficial Suplemento No 48, 16 de octubre 2009 <www.asambleanacional.gov.ec/documentos/Ley-Organica-de-Empresas-Publicas.pdf> accessed 26 August 2015.

Innovation'[120] (COESC+i), constructed collaboratively[121] and backed by the government, is in discussion in Ecuador. This new bill will introduce in its article 136 a general obligation of using 'exclusively' libre software in the public sector and in educational institutions.

In 2008 Ecuador became the third country in South America that created a libre software policy for the public sector.[122] The first two countries were Brazil and Venezuela. These three countries have in common that did not start their policies through national laws but other type of legal regulations. In fact, as it was highlighted before, to September 2015 in Brazil there is not a law of the National Congress in this regard. In Venezuela, the presidential Decree 3390 of 2004 started the libre software policy,[123] which was later continued and enhanced by laws and other regulations. What is noteworthy is that those two countries are the most advanced in terms of the use of libre software in the public sector, and Ecuador if not the third, is among the most advanced.

3.1.1 LEGAL DEFINITION OF LIBRE SOFTWARE

One of the key aspects that arise when creating a legal regulation promoting the use of libre software is the conceptualization of this software. It seems that most of the regulations in South America have followed the criteria of the Free Software Foundation to define libre software, the four freedoms mentioned in the introduction of this text. This can be seen clearly in the article 135 of the Ecuadorian bill COESC+I,[124] in the article fifth of the Uruguay law[125]and third of the Peruvian law,[126]one of the very few dispositions that was not changed from the original Peruvian bill.[127] This is even more explicit in Brazil, where, according to the third article of the federal *Instrução Normativa* SLTI/MP N° 1 of 2011, libre software is the software whose license 'meets the four freedoms defined by the Free Software Foundation'.[128]

120 Secretaría de Educación Superior, Ciencia, Tecnología e Innovación, 'Código orgánico de la economía social de los conocimientos, creatividad e innovación' (2015) <http://coesc.educacionsuperior.gob.ec/index.php/C%C3%B3digo_Org%C3%A1nico_de_Econom%C3%ADa_Social_del_Conocimiento_e_Innovaci%C3%B3n> accessed 27 August 2015.

121 Xabier E. Barandiaran, David Vila-Viñas, Daniel Vázquez, 'El proceso Buen Conocer / FLOK Society' in David Vila-Viñas and Xabier E. Barandiaran (eds), *BUEN CONOCER, FLOK Society, Modelos sostenibles y políticas públicas para una economía social del conocimiento común y abierto en el Ecuador* (2015) 53

122 Secretaría de Educación Superior, Ciencia, Tecnología e Innovación, 'COESC2+i fomenta la soberanía tecnológica y el software libre en el Ecuador' (15 December 2014) <www.educacionsuperior.gob.ec/coesc2i-fomenta-la-soberania-tecnologica-y-el-software-libre-en-el-ecuador/> accessed 31 August 2015.

123 Venezuela, Decreto Presidencial 3390, 23 Diciembre 2004, Gaceta Oficial 38095 del 28 Diciembre 2004.

124 Secretaría de Educación Superior, Ciencia, Tecnología e Innovación, 'Código orgánico de la economía social de los conocimientos, creatividad e innovación' (n 101).

125 Uruguay (n 110).

126 Peru, Ley 28612, (n 115).

127 Peru, Proyecto de Ley 1609/2001, (n 116)

128 Brazil, Secretária de Logística e Tecnologia da Informação do Ministério do Planejamento, Orçamento e Gestão, Instrução Normativa Nº 01, 17 janeiro 2011.

Although most of the legal regulations have followed the general trend, some of them have included a notable addition. The Resolution No. 914 of 2011 of the Health Minister of Paraguay mandates the use of libre software in the public health sector of the country.[129] What is more relevant is that in its second article when it defines what constitutes libre software, it says that the license shall guarantee that the modifications of the program are 'in the same licensing conditions' of the original program. Similarly, the Peruvian law in its already mentioned third article, includes an analogous disposition. This indicates that for these legal regulations, libre software is only copylefted software, excluding permissive libre licenses such as Apache or BSD licenses.

Finally, another relevant definition is contained in the article fifth of the Venezuelan *Infogobierno* Law. Apart from the usual freedoms, it adds at the end of the concept: 'preserving in any case the moral right of authorship'.[130] This constitutes an addition from the Civil Law tradition of which the countries of the region are part, and a contrast with the Common Law system of the United States, the country of origin of some of the most used libre licenses.

3.1.2 LICENSES USED

Another notable aspect is the licenses used. As with the definition of libre software, it seems that the Free Software Foundation has been a point of reference. The GPL has been directly used for licensing or has been the base for the creation of new licenses in the region.

In Brazil, a Portuguese translation of the GPL in its second version is mandated to be used in the Brazilian Public Software system, according to the fourth article of the *Instrução Normativa* SLTI/MP N° 1 of 2011.[131]However, it should be mentioned that the same article provides that other libre licenses can be approved by the respective federal authority.

Furthermore, the GPL has been used to create new licenses adapted to the national legislation. A clear example is the General Public License-Bolivia (LPG-Bolivia) published in 2014. This license is 'based' on the original GPL, seeks to be 'as faithful as possible to the letter and spirit of the GNU GPL' but adapted to 'the legal regulations in force in Bolivia'.[132] It is compatible with the GPL since the clause 17 states that users are 'authorized to license under the GNU GPL, officially published by the Free Software Foundation in its web site' any work that they receive under the

129 Paraguay, Ministerio de Salud Pública y Bienestar Social, Resolución S.G. 914/2011, 'Por la cual se establece el uso de software libre, se dispone su implementación obligatoria en todos los establecimientos de salud públicos dle país, y se designa a la Dirección General de Información Estratégica en Salud dependiente del Ministerio de Salud Pública y Bienestar Social como responsible del seguimiento y la consolidación de este proyecto'.

130 Venezuela, (n 98).

131 Brazil (n 128)

132 Agencia para el Desarrollo de la Sociedad de la Información en Bolivia (ADSIB), 'Licencia Pública General – Bolivia' (13 May 2014) <www.softwarelibre.gob.bo/licencia.php> accessed 08 September 2015.

LPG-Bolivia.

Notwithstanding, there have been software licenses that are not necessary based on the GPL. A regional example from the Brazilian state of Paraná is the 'GPL for Computer Programs of the Public Administration' (GPL-AP).[133] The Decree 5111 of 2005 introduced the possibility for the government of Paraná of licensing its software under this license.[134] Despite its name, the GPL-AP is considered 'nonfree' by the Free Software Foundation and among the reasons is that 'its permissions lapse after 50 years'.[135] Nonetheless, it provides some of the benefits of libre software, such as accessing the source code.

The governmental efforts in South America for creating new libre licenses for licensing their software have not ceased. Currently, and after a period of public consultation,[136] the government of Venezuela has under consideration a draft for a future Venezuelan libre software license.[137] This new license will have a copyleft clause, which is in line with the current legislation that establishes that 'only' copyeleft licenses can be used by public authorities.[138]

In Chile there is a particular case apart from the general trends in the region. The Ministry General Secretariat of the Presidency enacted the Exempt Resolution No. 0976 of 2014, which authorize the licensing of the institution's software under the BSD-3 license.[139] In fact, one of its most famous programs, the awarded software *SIMPLE*,[140] is licensed under this license.[141]The use of this libre license is not common among the public sector of the region, even in the Chilean repository of public software most of the software is under a 'Public Software License (Chile)'[142] or a version of the GNU GPL.

133 Brazil, Paraná, Decreto 5111/2005, Diário Oficial Nº 7021 de 19 de Julho de 2005.
134 ibid
135 Free Software Foundation, 'Various Licenses and Comments about Them' <www.gnu.org/licenses/license-list.en.html#GPL-PA> accessed 09 September 2015.
136 Centro Nacional de Tecnologías de Información (CNTI), 'Informe de Resultados - Consulta Pública Licencia Venezolana de Software Libre' (10 August 2015) <www.cnti.gob.ve/de-interes/enterate/4855-informe-de-resultados-consulta-publica-licencia-venezolana-de-software-libre.html> accessed 11 September 2015.
137 CNTI, 'Licencia Venezolana de Software Libre – LVSL' (2015) <http://cnti.gob.ve/images/stories/documentos_pdf/licencia_vsl.pdf> accessed 11September 2015.
138 Venezuela (n 98) art 35
139 Chile, Ministerio Secretaria General de la Presidencia (MSGP), Resolución Exenta No 0976 of 2014, 05 marzo 2014.
140 MSGP , 'Software público Chileno recibe importante premio regional en Colombia' (05 December 2014) <www.minsegpres.gob.cl/2014/12/software-publico-chileno-recibe-importante-premio-regional-en-colombia/> accessed 13 September 2015.
141 Repositorio Software Público Chile, 'SIMPLE (Beta) - Sistema de Implementación de Procesos Ligeramente Estandarizados' <www.softwarepublico.cl/aplicaciones/simple-beta-sistema-de-implementacion-de-procesos-ligeramente-estandarizados> accessed 14 September 2015.
142 Repositorio Software Público Chile, 'Licencia de Software Público (Chile) v1' <www.softwarepublico.cl/sites/default/files/licencia_de_software_publico_v_1.0_final_21.nov_.2012.docx> accessed 14 September 2015.

3.1.3 JUDICIAL DECISIONS

Finally, concerning the legal field in the region, an important aspect is judicial decisions. There have been very few rulings of South American courts regarding libre software. However, there was a recent decision of the Brazilian Supreme Federal Court with respect to the Rio Grande do Sul Law 11871 of 2002.

In 2003 the brazilian political party 'liberal front party' (*partido da frente liberal*), currently called 'democrats' (*democratas*), initiated a 'Direct Action of Unconstitutionality' (*ação direta de inconstitucionalidade*) against the regional law. The party argued that this regulation violates the constitutional principles of 'impartiality, efficiency and economy' (*impessoalidade, eficiência e economicidade*), which prevents the establishment of any preference for specific suppliers or products in public procurement.[143]

The Court finally held that this regional law does not contravene the constitutional principles since 'any manufacturer of computer programs can participate' (*todo fabricante de programas de computador poderá participar*), they 'just have to accept the licensing in the terms required by legislation' (*basta que aceitem celebrar licenciamento nos termos exigidos pela legislação*). Moreover, the preference for libre software 'far from violating the constitutional principle of efficiency, promotes and honors it, creating a favorable regulatory environment for the good management of public resources' (*a preferência pelo software livre, longe de violar o princípio constitucional da eficiência, o promove e o prestigia, criando um ambiente normativo propício para a boa gestão dos recursos públicos*).[144]

It is noteworthy to remark that it was also held that this law of Rio Grande do Sul was a 'legislative initiative worthy of recognition and praise' (*iniciativa legislativa digna de reconhecimento e louvor*).[145] This ruling sets a remarkable precedent for the country and the region.

3.2 OPEN STANDARDS REQUIREMENT

Open standards hold a significant importance for libre software, they enable interoperability and facilitate the migration from proprietary solutions.[146]Therefore, mandate their use is a logical step that has been taken by countries in the region that have expressed their desire to migrate their public sector. A significant number of the libre software legal regulations in the region, including

143 Brazil, Supremo Tribunal Federal, 'Ação Direta de Inconstitucionalidade 3.059 Rio Grande do Sul'.
144 ibid.
145 ibid.
146 Free Software Foundation Europe, 'Open Standards' <https://fsfe.org/activities/os/def.en.html> accessed 18 September 2015.

some of the already mentioned in this chapter, prescribe the use of open standards. Similar regulations have been also enacted in the regional and local levels, being the Province of Misiones and the municipality of Santa Fe,[147] two Argentinian examples.

There is no universal definition of open standards. Different organizations and countries have given their own. A key difference among the concepts, and one that have prompted discussions, is related to the intellectual property rights (IPRs) required to implement the standard. Some consider that an open standard must be royalty-free, while others argue that it should include standards with IPRs under reasonable and non-discriminatory (RAND) terms. An organization such as ITU (International Telecommunication Union) is an example of the latter. They allow an 'open standard' to have IPRs licensed 'on reasonable terms and conditions (which may include monetary compensation)'.[148]

The importance of considering as open standards only royalty-free standards is that the requirement of paying royalties hinders or, in practice, precludes the implementation of a standard by a libre software solution. Moreover, a libre software using a license like the GPL cannot implement those standards.[149] Therefore, it is relevant to define the scope of the concept of what it is consider an open standard.

In South America, some governments have included in their regulations the definition or the requirements to be considered an open standard. Two relevant examples are Brazil and Venezuela. As the rest of BRICS countries (Russia, India, China and South Africa),[150] Brazil has as one of the criteria that the standard must be royalty-free.[151] This however was not always the case. From the first version published in 2005[152] to the version 3.9 in 2008,[153] the Brazilian e-Government Interoperability Standards (ePING) had a definition that did not mention the aspect of royalties. Starting with the version 4.0 in 2008[154] and up to the 2015 version,[155] being royalty-free was

147 Argentine, Santa Fe de la Vera Cruz, Ordenanza 11063, 1 julio 2004.
148 International Union of Telecomunications (ITU), 'Definition of "Open Standards' <http://www.itu.int/en/ITU-T/ipr/Pages/open.aspx> accessed 16 September 2015.
149 Iain G Mitchell, Stephen Mason, 'Compatibility Of The Licensing Of Embedded Patents With Open Source Licensing Terms' (2010) 3(1) International Free and Open Source Software Law Review 25 <http://dx.doi.org/10.5033/ifosslr.v3i1.57> accessed 16 September 2015.
150 Gerry Gavigan, 'Public Sector ICT Royalty Free Open Standards' (2nd edition, April 2012) 3 <http://new.opensourceconsortium.org/wp-content/uploads/2012/03/rfos.pdf> accessed 16 September 2015.
151 Brazil, Padrões de Interoperabilidade de Governo Eletrônico – ePING, version 2015 <http://eping.governoeletronico.gov.br/> accessed 17 September 2015.
152 Brazil, e-PING Padrões de Interoperabilidade de Governo Eletrônico, version 1.0, 13 July 2005 <www.governoeletronico.gov.br/acoes-e-projetos/e-ping-padroes-de-interoperabilidade/anexos/E15_241e-PING%20v1.0%2013%2007%202005.pdf> accessed 17 September 2015.
153 Brazil, e-PING Padrões de Interoperabilidade de Governo Eletrônico, version 3.9, 17 october 2008 <www.governoeletronico.gov.br/acoes-e-projetos/anexos/e-ping-versao-3.9> accessed 17 September 2015.
154 Brazil, e-PING Padrões de Interoperabilidade de Governo Eletrônico, version 4.0, 16 December 2008 <www.governoeletronico.gov.br/acoes-e-projetos/anexos/e-ping-versao-4.0> accessed 17 September 2015.
155 Brazil (n 151).

included as one of the criteria. In the case of Venezuela, the Decree 3390 of 2004 had a definition of open standard that was similar to the initial Brazilian concept.[156] Interestingly, the *Infogobierno* Law in 2013 maintained such definition in its fifth article and therefore, non-royalty-free standards are not explicitly excluded.

National governments that are not seeking to migrate to libre software, accept or even recommend proprietary standards along with open standards. Peru[157] and Colombia[158] are two examples of that. This happens despite the fact that in Peru the same regulation mandates the use of 'open standards'[159] and in Colombia a decree establishes that 'open standards that are not dependent on a particular technology should be used'.[160] This situation in practice has facilitated the perpetuation of proprietary software solutions such as Microsoft Office.

Conversely, since the ePING version of 2010, the Brazilian government does not accept any more proprietary formats like .doc or .xls.[161] Newer versions of the ePING have continued finishing the inclusions of proprietary formats that were still accepted as 'in transition' and, for instance, the 2015 version only accepts the formats .ogg and .flac for audio,[162] both considered open formats.

The active and leading role of Brazil in relation to open standards have served as an example for the region and it is consistent with its role regarding libre software. It is not strange therefore, that the country has been regarded as the first country in the developing world to have a 'formal policy mandating open standards'.[163]

As it was mentioned before, the requirements for open standards are usually incorporated in the same regulations of libre software. In consequence, it usually follows a similar process of adoption. As it was seen in the case of Brazil, its adoption is normally a gradual process, accepting temporarily closed formats but advancing towards a full adoption of open standards.

3.3 PUBLIC SOFTWARE MODEL

156 Venezuela (n 123).
157 Peru, Estándares y Especificaciones de Interoperabilidad del Estado Peruano, 2008 <www.softwarepublico.gob.pe/files/contenidos/NORMA_1934.pdf> accessed 18 September 2015.
158 Ministerio de Tecnologías de la Información y Comunicaciones (MinTIC), 'Prácticas Recomendadas' <http://css.mintic.gov.co/ap/gel4/html/como_se_logra/interoperabilidad/practicas_recomendadas.html#protocolos> accessed 18 September 2015.
159 Peru (n 157)
160 Colombia, Ministerio de Cultura, Decreto número 2609 de 2012, ' Por el cual se reglamenta el Título V de la Ley 594 de 200, parcialmete los artículos 58 y 59 de la Ley 1437 de 2011 y se dictan otras disposiciones en materia de Gestión Documental para todas las Entidades del Estado' , 14 diciembre 2012.
161 Brazil, e-PING Padrões de Interoperabilidade de Governo Eletrônico, version 2010, 11 December 2009 <www.governoeletronico.gov.br/acoes-e-projetos/anexos/e-ping-versao-2010> accessed 18 September 2015.
162 Brazil (n 151).
163 Deepa Kurup, 'A radical shift in e-governance' *The Hindu* (Chennai, 26 November 2010) <www.thehindu.com/sci-tech/technology/article907442.ece> accessed 19 September 2015.

One prominent development in South America that has been present in many of its countries is the public software model. It was created in Brazil and has expanded to the rest of Latin America and even beyond.[164] However, every country has implemented the model in its own way.[165]

The difference in approaches can be seen in their definitions of public software. Some countries consider that public software must always be libre software, while others have a broader concept that may include proprietary software.[166] Nonetheless, apparently the following concept of public software has been used recently in regional discussions: 'Public good that is software in its nature, based on the principles and elements of the Free and Open Source Software (FLOSS), funded by public funds and for the achievement of its objectives.'[167] However, there is not yet an official unified concept in the region.[168]

To illustrate the differences of concepts in the region, the public repositories of Peru and Bolivia may be observed. It is through a web portal, which includes a public repository, that the concept of public software is made operational.[169] In Peru, the public software repository includes software that 'can only be requested by Public Entities' and 'libre software'.[170] In contrast, the policy of the public repository of Bolivia establishes that it only contains 'libre software', in fact it requires to license the software under the LPG-Bolivia.[171]

On the other hand, it is relevant to mention that in the case of Brazil it is explicitly enshrined in its regulation that public software is software that 'adopt a model of libre license',[172] by default it is the GPLv2 in Portuguese.[173] Moreover, the regulation provides that software must use the *Licença Pública de Marca (LPM)*.[174]

Despite these different approaches, the original concept of public software is based on considering software as a public good. This new model 'create[s] a framework whereby software is

164 Eduardo Santos, Luis Felipe Acosta, 'Brazil and South Africa Collaboration for Public Software: building the South Africa public software ecosystem' (Fifth International Conference on Management of Emergent Digital EcoSystems, Luxembourg, October 2013) <www.eduardosan.com/publication/view/brazil-and-south-africa-collaboration-for-public-software/> accessed 19 September 2015.

165 Red GEALC, 'e-Gobierno y Software Público' (October 2013) 5 <http://portal.oas.org/LinkClick.aspx?fileticket=2V1hWz7y9xo%3D&tabid=1729> accessed 19 September 2015.

166 Email from Andrés Delgado to ASLE (Asociación de Software Libre del Ecuador) public email list (17 April 2015) <www.mail-archive.com/asociacion@listas.asle.ec/msg02405.html> accessed 19 September 2015.

167 ibid

168 Red GEALC, (n 149) 4.

169 A M Alves, Marcelo Pessôa, 'Brazilian Public Software: beyond Sharing' (International Conference on Management of Emergent Digital EcoSystems, Bangkok, October 2010) <http://businesscomplexity.com/bizcom2010/papers/p584f01r311ed40c.pdf> accessed 20 September 2015.

170 Repositorio de Software Público Peru, 'Cómo Funciona' <www.softwarepublico.gob.pe/pages/mostrar_seccion/4> accessed 20 September 2015.

171 Repositorio de Software Público Bolivia, 'Políticas' <http://www.softwarelibre.gob.bo/politica.php> accessed 20 September 2015.

172 Brasil (n 128) art 2.

173 Brasil (n 128) art 4.

174 Brasil (n 128) art 2.

converted from a proprietary commodity to a public good in the form of FOSS'.[175]

Notwithstanding there is 'practical convergence' between public software and libre software,[176] as it is seen in some South American countries, the concepts are not exactly the same. Public software is libre software because it has a libre license, but it goes beyond and establishes responsibilities to the government.[177] These responsibilities are for instance the availability of the program in a public repository of the government and the maintenance of a community around the software. Regular libre software would not entail any responsibility for the government apart from respecting the terms of the license.

It should be noted that there is a risk that the concept be deviated and therefore, deeming proprietary software as 'public software'. This can be seen from some of the adaptations that the public software model has had in the region. If public software is understood simply as the software owned by the government, disregarding its license, the concept loses meaning and has no effect in the promotion of libre software in the public sector. This was the criticism that it received in Argentina.[178] A practical example of how this deviated concept may include proprietary software is the following: a software developed for the government, under a license that allows to be shared only with public institutions and without disclosing its source code. This could be considered 'public software', but it is clearly not libre software, it is proprietary software.

In conclusion, public software can be an opportunity for the advancement of libre software in the public sector. In fact, it has served in that way in countries of South America as Brazil. The broadening of meaning in order to include proprietary software is a distortion of the concept, not part of its original conception.

3.4 RESEARCH AND DEVELOPMENT POLICY

Another common policy adopted by many countries in the region has been the funding of research and development (R&D) of libre software solutions. This policy has included the funding of private and public initiatives. The GNU/Linux distributions developed with public funds have been prominent of this policy. Canaima from Venezuela and more recently Huayra from Argentina

175 Daniel O'Maley, 'Software Público Brasilerio (SPB): The State in the Commons' (Workshop de Software Livre, Porto Alegre, 2013) <http://wsl.softwarelivre.org/2013/0009/> accessed 20 September 2015.

176 Gurumurthy Kasinathan, 'What is public software' (03 September 2010) <http://public-software.in/node/2447> accessed 20 September 2015.

177 Angela Maria Alves and others, 'Software Público Brasileiro: muito além do compartilhamento de software' (2009) 7 Revista InfoBrasil 19, 21.

178 Vía Libre, 'Software Público: cambiar para que nada cambie' (9 September 2011) <www.vialibre.org.ar/2011/09/09/software-publico-el-nuevo-programa-del-emperador/> accessed 20 September 2015.

are two known examples.

Canaima is based on Debian GNU/Linux. It was officially released in 2008 as Canaima GNU/Linux[179] and its development has continued to date. The participants of the ‘Canaima Project’ are from the public and private sector, including libre software activists.[180] In 2011, the Resolution 025 of the 'Ministry of the Popular Power for Science, Technology and Intermediate Industries' established its mandatory use in the 'workstations' of the 'National Public Administration'.[181] Furthermore, this GNU/Linux distribution has been used for different public and private projects.[182] One of them has been its inclusion in the computers manufactured in *Venezolana de Industria Tecnológica (VIT)*.[183] Another relevant use has been its inclusion in the computers of the “Canaima Educativo” project, which provides netbooks to Venezuelan schools.[184] More than 3.3 million of computers have been given to students in Venezuela.[185]

In this educative context the Argentinian Huayra GNU/Linux was created. Like Canaima, it is based on Debian GNU/Linux.[186] It has been developed since 2012 by CENITAL (National Center for Research and Development of Libre Technologies) to be used in the ‘Conectar Igualdad’ program,[187] similar to 'Canaima Educativo' project. Since then, Huayra has gained recognition and recently its development was declared of 'National Educational Interest' by the Argentinian Federal Council of Education.[188] Although currently it is still only used in the educational system, it aspires to be spread to other areas of the 'Argentinian State'.[189]

Considering the similarities between Huayra and Canaima, recently the two projects have established contact and started to work together.[190] It should be mentioned that these operative

179 Proyecto Canaima, 'Release Notes Canaima 2.1' (31 May 2010) <http://wiki.canaima.softwarelibre.gob.ve/wiki/Notas_de_lanzamiento_2.1> accessed 20 September 2015.

180 Proyecto Canaima, 'Acerca de Canaima' http://canaima.softwarelibre.gob.ve/acerca-de> accessed 20 September 2015.

181 Ministerio del Poder Popular para Ciencia, Tecnología e Industrias Intermedias, Resolución 25, 2011.

182 Proyecto Canaima, Canaima GNU/Linux <http://canaima.softwarelibre.gob.ve/> accessed 20 September 2015.

183 Rafael Eduardo Marín Smith, 'Implantación del sistema CANAIMA GNU/Linux en los computadores VIT' (Noviembre 2008) <http://canaima.softwarelibre.gob.ve/documentos/VIT-CANAIMA2.0.pdf/at_download/file> accessed 20 September 2015.

184 Canaima Educativo, '¿Qué es el proyecto Canaima Educativo?' <www.canaimaeducativo.gob.ve/index.php?option=com_content&view=category&layout=blog&id=14&Itemid=282> accessed 20 September 2015.

185 Agencia Venezolana de Noticias, 'Industria venezolana llegó al millón de computadoras Canaima ensambladas en el país' (24 April 2014) <www.avn.info.ve/node/235285> accessed 20 September 2015.

186 Programa Conectar Igualdad, 'Huayra - El Sistema Operativo de Conectar Igualdad' (17 September 2012) <http://huayra.conectarigualdad.gob.ar/noticias/2012/09/17/huayra-el-linux-de-conectar-igualdad> accessed 20 September 2015.

187 Programa Conectar Igualdad, 'Institucional' <http://huayra.conectarigualdad.gob.ar/institucional> accessed 20 September 2015.

188 Programa Conectar Igualdad, 'Huayra declarado de Interés Educativo Nacional' (26 August 2015) <http://huayra.conectarigualdad.gob.ar/noticias/2015/08/26/huayra-declarado-de-inter%C3%A9s-educativo-nacional-0> accessed 20 September 2015.

189 Programa Conectar Igualdad (n 186)

190 Programa Conectar Igualdad, 'Huayra y Canaima GNU/Linux: el abrazo de Guayaquil del Software Libre' (20 January 2014) http://huayra.conectarigualdad.gob.ar/noticias/2014/01/20/huayra-y-canaima-gnulinux-el-abrazo-de-

systems have not been the only public funded GNU/Linux distribution, however they have been the most successful so far. Initiatives such as EduLinux from Chile were discontinued.[191] In spite of this, there is a recent atypical case in the municipality of Quilicura in Chile. The municipality opened a public tender for the developing of a GNU/Linux distribution.[192] This is the only known case in South America where a municipality will develop its own GNU/Linux distribution.

The public investments in libre software R&D have not just been expressed in the development of operative systems. In fact, most of the software available in the state repositories of 'public software' are a manifestation of this investment in libre software. Brazil does not have a public funded GNU/Linux distribution but it has funded the development of many libre programs. Similarly has been done by other states, like Chile and its SIMPLE software.[193]

Particular mention deserved OrfeoGPL. This is a document management system under a GPL license that was initially developed in a public institution in Colombia.[194] It has been widely adopted in the Colombian public sector,[195] and it has spread to other countries being the most relevant case the Ecuadorian public sector, where it was adapted to their needs and transformed into a new software called Quipux.[196]

Finally, the dispositions included in the Venezuelan *Infogobierno* Law can be mentioned as one of the most advanced examples of the promotion of libre software R&D. The Title V of the Law is called 'Development of the Libre Information Technologies Sector' and incorporates different policies for the promotion of the research and development of libre technologies, including eventually even tax breaks for companies.[197] The law came into force in August 2014 so its effectiveness in this area is still to be seen.

3.5 INTERNATIONAL COOPERATION

Libre software is by nature a collaborative creation that does not know national borders. Furthermore, undertake a libre software migration of the public sector is not an easy task, especially

guayaquil-del-software-libre> accessed 20 September 2015.

191 Distrowatch, EduLinux (2015) <http://distrowatch.com/table.php?distribution=edulinux> accessed 20 September 2015.

192 Eric, 'CHILE: MUNICIPIO DE QUILICURA LICITA MIGRACIÓN DE SUS PLATAFORMAS TECNOLÓGICA A GNU/LINUX' (12 May 2015) <http://www.softwarelibre.cl/blog/2015/05/12/chile-municipio-de-quilicura-licita-migracion-de-sus-plataformas-tecnologica-a-gnulinux/> accessed 20 September 2015.

193 Repositorio Software Público Chile (n 141)

194 Comunidad OrfeoGPL, 'Bienvenido a Nuestra Comunidad OrfeoGpl' (20 june 2008) <http://orfeogpl.org/ata/?q=node/1> accessed 19 November 2015.

195 ibid

196 Secretaría Nacional de la Administración Pública , 'SGDQ – Sistema de Gestión Documental Quipux' <http://www.administracionpublica.gob.ec/sgdq-sistema-de-gestion-documental-quipux/> accessed 19 November 2015.

197 Venezuela (n 98) art 72.

considering the number of people and infrastructure involved. In some cases, just the fact of developing a particular libre software solution that is not yet available in the market can be a challenge for a government if it does not have the knowledge required. Considering all the difficulties that any process of migration entails, and the opposition that may provoke, it is logical that governments seek international cooperation. Ecuador has an example of the explicit inclusion of this. In its 2009 'Strategy for the implementation of Libre Software in the Central Public Administration', the government included 'International Cooperation' as one of the components to build the 'critical mass' necessary for its migration.

In practice, the international policies have been translated into bilateral and multilateral actions. Examples of bilateral actions have been the recent collaboration between Canaima and Huayra projects or the help that Brazil provided to Paraguay to implement the public software model.[198] Paraguay has been one of the many countries, in the region and outside the continent,[199] that have collaborated with Brazil in this respect. In a multilateral level, one of the first expressions of support to libre software in the public sector was seen in 2007 in the 'Ibero-American Charter of Electronic Government'. One of the principles of e-government that the Chapter has is the following:

> g. Principle of technological adaptation: The governments will choose the most appropriate technologies to meet their needs. It is recommended the use of open standards and open source software on account of safety, long-term sustainability and to avoid the privatization of the public knowledge.[200]

Years later, this disposition and the Brazilian experience with public software were the base of the initiative 'International Public Software'. This project had the support of the Brazilian Ministry of Planning, the United Nations Development Programme (UNDP) and the Latin American Centre for Development Administration (CLAD).[201] It sought to expand the public software in the region and the creation of a portal with international public software. The original project however has not continued.

Nevertheless, the international efforts have not ceased. Currently, the project 'Mechanism for

198 Agencia de Gobierno electrónico y Sociedad de la Información y del Conocimiento (AGESIC), 'Gobierno Abierto' <www.agesic.gub.uy/innovaportal/v/2391/1/agesic/antecedentes.html> accessed 19 September 2015.

199 Santos, Acosta (n 164)

200 Centro Latinoamericano de Administración para el Desarrollo (CLAD), 'Carta Iberoamericana de Gobierno Electrónico' (10 November 2007) 7 <http://www.clad.org/images/declaraciones/cartagobelec.pdf> accessed 20 September 2015.

201 United Nations Development Programme (UNDP), 'AL terá portal para divulgar software livre' (20 July 2010) <http://www.pnud.org.br/Noticia.aspx?id=561> accessed 20 September 2015.

Regional Cooperation on Public Software' is being developed with coordination of the Network on E-Government of Latin America and the Caribbean (*Red Gealc*) and with funds of the Inter-American Development Bank (IDB). One of the components of this project is the creation of a public software portal,[202] an item that was included in the previous 'International Public Software' project.

Finally, and more as a symbolic gesture, it can be mentioned the 'Joint Declaration of the Presidents of the MERCOSUR Countries' issued on the 12 of july 2013. In the item 45th of this declaration, the presidents of Argentina, Bolivia, Brazil, Uruguay and Venezuela expressed their support to the 'development of libre software' and finally 'ratified the need to promote and encourage the realization of standards at the MERCOSUR level for the effective implementation of policies to promote the use, development, implementation, research and technology transfer based on libre software.'[203]

202 Inter-American Development Bank (IDB), 'Convenio - Mecanismo Colaborativo Regional de Software Público' (June 2014) http://www.iadb.org/Document.cfm?id=39248298> accessed 20 September 2015.

203 MERCOSUR, 'Comunicado conjunto de los Presidentes de los Estados partes del MERCOSUR' (12 July 2013) <http://www.presidencia.gub.uy/comunicacion/comunicacionnoticias/declaracion-final-mercosur-> accessed 20 September 2015.

4. RECOMMENDATIONS FOR LIBRE SOFTWARE ADOPTION IN THE PUBLIC SECTOR

In this chapter, some relevant aspects to be considered when a government decides to create and implement a policy for migrating to libre software will be presented. More importantly, some recommendations to improve its implementation and address possible problematic aspects will be proposed.

4.1 OPEN STANDARDS

The logical first step in any process towards a migration must be the implementation of open standards. This is a neutral measure since, in principle, any software solution, proprietary or libre, could implement an open standard. Even if a government is not aiming to migrate to libre software, an open standards policy is advisable. Open standards facilitate migrations but also contribute to avoid the vendor lock-in and, therefore, a policy in this sense constitutes a good practice for any public administration. However, even a neutral measure like this could be received with resistance by some.

An example concerning this was the discussion of the second European Interoperability Framework (EIFv2). The Software Alliance (BSA) made comments to EIFv2 drafts.[204] Despite they stated that they do not oppose to 'foster interoperability', they considered that it should be done using what they deem is an 'open specification', concept that for them includes standards containing patents.[205]

As it was pointed out in the section 3.2, there is no agreement about the concept of open standards. As it is seen in the European example, this is a main source of contention. However, considering the difficulties that a standard encumbered by patents may involve for its adoption by libre software, as it has been seen since long ago,[206] it is advisable to incorporate as a criteria for being considered an open standard that the standard is free of IPRs restrictions and royalties. Moreover, it should be remembered that the GNU GPL license, widely used in the libre software of South American public sector, is incompatible with standards encumbered by patents, even when no

204 Hugo Roy, Karsten Gerloff, 'EIFv2: Tracking the loss of interoperability' (*FSFE*, 27 November 2009) <http://fsfe.org/activities/os/eifv2.en.html> accessed 02 October 2015.

205 Software Alliance (BSA), Letter to the European Commission (7 October 2010) <https://fsfe.org/activities/os/bsa-letter-ec.pdf> accessed 02 October 2015.

206 David Berlind, 'Apache falls victim to OASIS patent shelter' (*ZDNet*, 11 July 2005) <http://www.zdnet.com/article/apache-falls-victim-to-oasis-patent-shelter/> accessed 29 October 2015.

royalties are charged.[207]

As with any process of migration, and considering the fact that there could be standards in used by the government that are encumbered by patents, the adoption of open standards should be gradual and allowing exceptions. Planning should be done in order to not affect greatly the operation of the public administration and keep advancing towards a migration to open standards to the greatest extent possible.

Consistently with this, it is advisable that governments participate in international bodies of standardization in order to promote a position in favor of patent-free standards. Such position is not new and exclusive of the public sector,[208] but it would be strengthened with the support of public institutions. Equally important is that governments invest in research and development in order to adapt or develop open standards if the standards available are not suitable to their needs advisable that governments participate in international bodies of standardization in order to promote a position in favor of patent-free standards. Thereafter, these new standards could be adopted by international standardization organizations and serve to other countries with similar needs.

A country that has been already following the path suggested, and that can serve as an example, is Brazil. Since 2005 the Electronic Government Interoperability Standards (ePING) was institutionalized through the *Portaria* Nº 05 of 2005,[209] a regulation of the Secretary of Logistics and Information Technology of the federal Ministry of Planning, Budget and Management (SLTI/MP).[210] The ePING is a periodically updated document, mandatory for the executive federal government, that establishes the policies and technical specifications for the interoperability of the information and communication technologies (ITC) in the government.[211]

The ePING prescribes as a general policy the use of open standards. However, it also permits the use of proprietary standards under the following conditions: transitorily, keeping the 'replacement perspectives'; in the absence of an open standard.[212] Nevertheless, as mentioned in the

207 Iain G Mitchell, Stephen Mason, 'Compatibility of the Licensing of Embedded Patents with Open Source Licensing Terms' (2010) 3(1) International Free and Open Source Software Law Review 25 <http://dx.doi.org/10.5033/ifosslr.v3i1.57> accessed 02 October 2015.

208 Jay Lyman, 'OASIS: Meaningful open standards or mirage?' (*Linux.com*, 24 May 2005) <http://archive09.linux.com/articles/45151> accessed 29 October 2015.

209 Brazil, Ministério do Planejamento, Orçamento e Gestão - Secretária de Logística e Tecnologia da Informação, Portaria nº 05 de 14 de Julho de 2005, 'Institucionaliza os Padrões de Interoperabilidade de Governo Eletrônico - e-PING, no âmbito do Sistema de Administração dos Recursos de Informação e Informática – SISP, cria sua Coordenação, definindo a competência de seus integrantes e a forma de atualização das versões do Documento'.

210 Secretária de Logística e Tecnologia da Informação do Ministério do Planejamento, Orçamento e Gestão.

211 Brazil, Ministério do Planejamento, Orçamento e Gestão - Secretária de Logística e Tecnologia da Informação, Portaria nº 92, de 24 de Dezembro de 2014, 'Institui a arquitetura ePING (Padrões de Interoperabilidade de Governo Eletrônico), que define um conjunto mínimo de premissas, políticas e especificações técnicas que regulamentam a utilização da Tecnologia de Informação e Comunicação (TIC) na interoperabilidade de serviços de Governo Eletrônico'.

212 Brazil, Ministério do Planejamento, Orçamento e Gestão - Secretária de Logística e Tecnologia da Informação - Departamento de Governo Eletrônico, 'Padrões de Interoperabilidade de Governo Eletrônico', Versão 2015, 5

section 3.2, it has been gradually reducing the use of proprietary formats. Another relevant general policy is that it prioritizes the use of libre software for the implementation of open standards.[213] A final aspect to be highlighted is the ePING definition of open standard, which includes the following requirement: ‘allow application without any restrictions or royalty payments’.[214]

The Brazilian approach is in line with the recommendations given and has proved to be feasible in practice. Brazil already participate in standardization organizations as W3C[215] and has invested in developing and adapting technologies to its needs. The prime example is the digital TV standard, an improved version of the Japanese standard adapted to the Brazilian needs.[216] It was mainly aim to reduce the digital divide of the country.[217] GINGA, the middleware of the standard, was not only developed in Brazil but it is ‘free of royalties’, under a GPLv2 license and became an 'ITU-T Recommendation for IPTV services'.[218] The success of this standard can be seen in its adoption by a great number of Latin American countries, including almost all South America, except Colombia, Guyana and Suriname.[219]

To conclude, the adoption of open standards is fundamental for a successful migration to libre software. Migration experiences in South America and in other regions have showed that one common issue is interoperability. Governments normally have used de facto standards, in many cases proprietary formats, which creates difficulties for libre software. Consequently, a migration in a public institution already employing open standards would be smoother and more likely to be successful.

4.2 LEGAL

Although the complexity that entails a policy of migration includes significant technical aspects, a thoroughly conceive policy can help to prevent or mitigate problems that might arise. South America represents a significant source of experience that can be employed in the region and in other parts of the world.

<www.governoeletronico.gov.br/biblioteca/arquivos/documento-da-eping-versao-2015/> accessed 04 November 2015.

213 ibid.

214 Brazil(n 212) 38.

215 W3C, 'Current Members' <http://www.w3.org/Consortium/Member/List> accessed 30 October 2015.

216 Taynah Lopes de Souza, Rodolfo Saboia Lima de Souza, 'Building the digital TV standard: The Brazilian experience' (GLOBELICS Conference, Dakar, October 2009) 9 <https://smartech.gatech.edu/bitstream/handle/1853/36629/1238983482_TS.pdf> accessed 09 November 2015.

217 Gabriel Baum, Luiz Fernando G Soares, 'Ginga Middleware and Digital TV in Latin America', (2012) 14(4) IT Professional 59 <http://www.telemidia.puc-rio.br/sites/telemidia.puc-rio.br/files/baum_2012.pdf> accessed 09 November 2015.

218 Official Site of Ginga Middleware,'About Ginga' <http://www.ginga.org.br/en/sobre> accessed 02 October 2015.

219 DTV Status, 'ATSC, DTMB, DVB-T/DVB-T2, and ISDB-T' <http://en.dtvstatus.net/> accessed 09 November 2015.

Despite the existence of a wide range of legal regulations that mandate or promote in some form the adoption of libre software, the pace of migration in the public sector is not always as expected. In some cases, regulations have been in force for a significant period of time, like the Venezuelan Decree 3390 of 2004, which suggests that the legal framework can be improved.

It has been precisely through their experience that some countries have been developing and improving their legal tools. In this regard, and relevant to the recommendations that are given in this thesis, it is important to provide more details about the Brazilian Public Software (BPS), the Brazilian *Licença Pública de Marca (LPM)* and the Venezuelan *Infogobierno* Law.

The Brazilian Public Software (BPS) project officially started in 2006 and subsequently its web portal was created.[220] However, the BPS was comprehensively regulated through the *Instrução Normativa* N° 1 of 2011. This regulation was promulgated by the Secretary of Logistics and Information Technology of the federal Ministry of Planning, Budget and Management.

This regulation established the technical and legal requisites to be part of the BPS system. These are: having a stable version; having a manual of installation, whose minimum content is specify in the first annex of the regulation; the availability of the source code; and the availability of all the scripts necessary for the installation and use of the software.[221] As for the legal requisites: the program must be registered in the National Institute of Industrial Property, it must have a GPLv2 license, and the software brand name must use a *Licença Pública de Marca (LPM).*[222] Furthermore, it is explicitly forbidden: the use of proprietary 'libraries, components, tools, source codes and utilities'; that the program depends only on proprietary platforms; and that it depends only on a single vendor.[223]

The *Instrução Normativa* permits that a program part of the BPS be created by any private or public person, as long as it complies with the requisites and conditions established.[224] Importantly, the regulation also prescribes that the program will be available in the portal along with 'associated services', which include among others: forums, wikis, chats, discussion lists, etc.[225] Finally, it can be highlighted that the regulation created a 'Commission of Coordination' which is in charge of the BPS.

The *Licença Pública de Marca (LPM)* or Trademark Public License deserved a particular

220 A M Alves, Marcelo Pessôa, 'Brazilian Public Software: beyond Sharing' (International Conference on Management of Emergent Digital EcoSystems, Bangkok, October 2010) <http://businesscomplexity.com/bizcom2010/papers/p584f01r311ed40c.pdf> accessed 01 November 2015.

221 Brazil, Ministério do Planejamento, Orçamento e Gestão - Secretária de Logística e Tecnologia da Informação, Instrução Normativa Nº 01, 17 janeiro 2011, art 4.

222 Ibid, art 7.

223 ibid, art 5.

224 ibid, art 15.

225 ibid, art 12.

mention. It was the result of the first years of experience of the BPS model and it is regulated in the *Instrução Normativa* of the BPS. It translates to the trademarks legal field the philosophy behinds libre software, the concept of the 'commons'.[226] Who provides the software to the BPS should register the trademark and its usage policy. The policy must guarantee, ‘without needing any kind of prior or specific authorization’, the use of the trademark at zero cost for 'copying, distribution, sharing and transmission in any physical or virtual device', as long as the 'definition and proportionality' of the trademark are respected.[227] However, the policy must also prohibit that the user of the trademark suggests that the trademark holder endorses the use of any product or service that is not the specific of the BPS.[228] Additionally, if the trademark is used in an advertising or commercial piece, a backward registered trademark symbol must be added, something similar to the copyleft symbol. In essence, the LPM seeks to guarantee the libre nature of software, preventing possible chilling effects of the trademark use.[229]

Finally, in 2013 the *Infogobierno* Law was promulgated in Venezuela. It established 'the principles, rules and guidelines that govern the use of information technologies' in the public sector.[230] Some of its content was mentioned in the previous chapter, most importantly, this law established the mandatory use of libre software. However, more dispositions of the law will be referred or explained in this chapter. At this point, it is important to highlight that unlike Brazil, this is a law of the National Assembly, the Venezuelan parliament, and it obliges all the entities of the state, not only the executive federal government. This law created an improved and more comprehensive regulation for libre software in the public sector and repealed the Decree 3390 of 2004, the first Venezuelan legal regulation related to this subject.

4.2.1 MANDATORY USE

One of the first and most heated debates that arise when discussing legal regulations concerning libre software is to what extent its use should be mandatory in the government. For instance, this discussion was one of the reasons why the first *Infogobierno* Law was not approved in the Venezuelan National Assembly in 2006.[231] This happened despite the commitment that the

226 Portal do Software Público Brasileiro, 'Licença Pública de Marca' <http://antigo.softwarepublico.gov.br/lpm> accessed 15 September 2015.
227 Brazil, (n 221) article 35.
228 ibid
229 Simon Phipps, 'Brazil's New Trademark License' (*Computerworld Brasil*, 25 January 2011) <www.computerworlduk.com/blogs/simon-says/brazils-new-trademark-license-3569564/> accessed 15 September 2015.
230 Venezuela, Ley de Infogobierno, Gaceta Oficial de la República Bolivariana de Venezuela 40274, 17 octubre 2013.
231 Embassy of the United States in Caracas, 'BRV INFORMATION TECHNOLOGY DRAFT LAW AND THE OPEN-SOURCE SOFTWARE DEBATE' (16 June 2006)

Venezuelan executive had shown towards libre software and the majority that it had in the legislative branch. In view of this, before giving a recommendation it is necessary to consider experiences in countries of the region with different degrees of obligation towards the use of libre software.

In Colombia, where there is no national legal regulation for the use of libre software in the government, the use of libre software remains an exception despite some isolated efforts.. Nevertheless, in Bogotá, the capital, there has been some progress because the local regulations[232] and some political support. As it was mentioned in the section 3.1, in Bogotá there is no mandate for an exclusive or preferential use of libre software. In fact, the Resolution 305 of 2008, that establishes the policies for the use of information technologies in the city government, specifies that the libre software policy does not try to 'impose' the use of libre software but rather it should be 'considered as an alternative' along with other solutions on the market.[233] In the same article, the resolution prescribes as one of the principles of the policy the 'technological neutrality', which means that the regulatory framework 'should not opt for a particular type of technology'.[234] Although there is little data available yet, apparently the results of Bogotá's regulations have been limited.[235]

On the other hand, as it was explained in the section 3.1, the failed Peruvian attempt of creating a libre software law resulted in the law that regulates 'the use, acquisition and adequacy of software in the public administration'.[236] It establishes that the acquisition of software must be done under conditions of 'neutrality, technological validity, free participation and fair and equal treatment of suppliers'.[237] Additionally, the law's fifth article requires a previous report that justify the acquisition of a program. The report must include the alternatives available on the market and the cost and benefits. However, if there is only one type of software available, the report should only state that fact.

In practice, this law has not had a significant effect in the adoption of libre software, and institutions continue acquiring specific proprietary solutions arguing that they are the 'standard'.[238]

<https://wikileaks.org/plusd/cables/06CARACAS1778_a.html> accessed 24 September 2015.

232 Colombia, Bogotá, Concejo Distrital, Acuerdo 279, 29 Marzo 2007, 'Por el cual se dictan los lineamientos para la Política de Promoción y Uso del Software libre en el Sector Central, el Sector Descentralizado y el Sector de las Localidades del Distrito Capital'.

233 Colombia, Bogotá, Comisión Distrital de Sistemas, Resolución 305 de 2008, 20 de octubre del 2008, art 66.

234 ibid.

235 Kleper, '¿Que pasa con el Software Libre en Bogotá?' (14 November 2013) <https://kleper.wordpress.com/2013/11/14/que-pasa-con-el-software-libre-en-bogota/> accessed 04 November 2015.

236 Peru, Ley 28612, 'Ley que norma el uso, adquisición y adecuación del software en la administración pública', Diario Oficial 'El Peruano', 18 octubre 2005, pag 302522.

237 ibid

238 Message from Ernesto Quiñonez to author in APESOL (*Asociación Peruana de Software Libr*e) online forum (18 August 2015) <https://groups.google.com/forum/#!msg/apesol_activismo/vHzNnw9W5LM/GLtkVL8QDAAJ> accessed 24 September 2015.

This situation is facilitated by the lack of use of open standards and once again highlights the importance of mandating its use in the public sector as a first step to implement libre software.

In contrast, the Ecuadorian libre software decree has had positive effects and there have been successful cases such as the migration of the National Assembly, where 90% of workstations use GNU/Linux.[239] In its first article, the decree established 'as public policy for the entities of the Central Public Administration the use of Libre Software in their systems and equipment'.[240] However, the exceptions contained in the article fourth have allowed that some officials in the government continue employing proprietary software without seeking to migrate.[241] The decree has been positive but 'insufficient', among other reasons due to the lack of clear sanctions for the public servants that do not comply with the decree and the indefinite use of the exceptions.[242]

Finally, two relevant cases are Venezuela and Brazil, the most advanced countries of the region in terms of libre software in the public sector. Brazil, despite some attempts,[243] has not approved yet a federal law in its National Congress mandating the use of libre software. Nevertheless, the federal government, and some local and regional authorities, have expressed their political support, which has been translated in important tools like the Brazilian Public Software (BPS) and the ePING standards. Moreover, the *Instrução Normativa* Nº 04 of 2008 mandated that when acquiring software, the solutions available in the BPS repository and other libre software solutions must be considered.[244] However, it should be noted that because the national Brazilian legal regulations are executive regulations, not embodied in a law of the National Congress, they are more vulnerable to political changes with new governments. In turn, Venezuela has supported libre software through legal regulations such as the Decree 3390 of 2004 and currently the *Infogobierno* Law. The latter, unlike the decree, explicitly mandates an exclusive use of libre software.

Regarding the exceptions that permit the use of proprietary software, South American legal regulations have always included some, which may vary in each regulation. However, two commonly included are the lack of a libre software alternative and when there is a 'risk' to the 'security' of the state. The former could be used for instance when it is required a very specialized

239 Luis Sánchez Estrada, 'Asamblea Nacional del Ecuador' (World e-Parliament Conference 2014, Seoul, May 2014) <https://wepc2014.files.wordpress.com/2014/05/sanchez.pdf> accessed 24 September 2015.

240 Ecuador, Decreto Ejecutivo N° 1014 de 2008, Registro Oficial N° 322, 23 de abril 2008.

241 Email from Juan Carlos Sevillano (Ecuadorian libre software activist) to author (12 August 2015).

242 Jenny Torres, Mariangela Petrizzo, 'Programas libres y de código abierto en la Administración Pública' in David Vila-Viñas and Xabier E. Barandiaran (eds), *BUEN CONOCER, FLOK Society, Modelos sostenibles y políticas públicas para una economía social del conocimiento común y abierto en el Ecuador* (2015) 688.

243 Software Livre Brasil, 'Projetos de Lei sobre Softwares Livres no Brasil' (14 July 2010) <http://softwarelivre.org/portal/noticias/projetos-de-lei-sobre-softwares-livres-no-brasil> accessed 08 November 2015.

244 Brazil, Ministério do Planejamento, Orçamento e Gestão - Secretária de Logística e Tecnologia da Informação, Instrução Normativa Nº 04, 19 de maio de 2008, art 10.

software but there is no libre software alternative available, and the latter is usually employ for some software of the military sector.

Sometimes exceptions are misused as an excuse for not migrating at all. This is facilitated by the lack of limits, e.g. indefinite use over time, and the discretion that some exceptions allow such as: 'when the project is at a point of no return'.[245] This exception just mentioned is included in the Ecuadorian decree. It applies in two cases, first, when the system is 'working satisfactorily' and a cost benefit analysis indicates that is not 'reasonable or convenient' to migrate, and second, when there is a project in development in which a cost benefit analysis indicates that is not convenient to modify the project to use libre software.[246]

Overall, it can be concluded that if a government truly seek to migrate to libre software and fully benefit from its advantages, it is advisable to prescribe a mandatory use of libre licenses. 'Technological neutrality' laws in practice do not translate in a significant advance of libre software in the public sector. A way of prescribing that could be the following: the government must not license or acquire software under a license that impede: to use the program for any purpose, study the program, create modified versions of it, or redistribute copies either of the original program or derived works.[247] As noted by Luis Rejas Alurralde, member of the Bolivian libre software community, the experience indicates that it would be advisable to have a national law with clear dispositions that seek to avoid loopholes for not migrating.[248]

Nonetheless, exceptions should be included to provide certain flexibility when that can be actually required, especially when the policy is starting. These exceptions however should be as limited as possible and measures to reduce its use over time should be introduced. An example in that sense can be seen in the Chapter II of the *Infogobierno* Law. The public entities authorized to use a proprietary software must pay a ‘special contribution’ to the ‘National Fund for Science, Technology and Innovation’. The sum of money to be paid is a percentage between 5% and 10% of the cost of the proprietary software and must be paid until the use of the software ceases. At least 50% of these resources must be used for the ‘development and promotion of libre information technology sector’.

A policy of migration should include a disposition to mandate the investment in the development or improvement of libre solutions when there is not appropriate available solution, and such program is required by a public institution. In that way, the government will reduce its

245 Ecuador (n 240) art 4.
246 ibid
247 Federico Heinz, email to FSFLA (Free Software Foundation Latin America) public email list (11 May 2006) <www.fsfla.org/pipermail/legales/2006-May/000033.html> accessed 25 September 2015.
248 Email from Luis Rejas Alurralde (Bolivian libre software activist) to author (2 September 2015).

spending on licenses and its dependence on libre software.[249] This facilitates a full migration in the long term and it is a valuable contribution of the public sector to the libre software ecosystem.

4.2.2 COMPETITION AND DISCRIMINATION

Expressing a preference for libre software prompts the debate about a possible violation of ‘free competition’. Large proprietary software companies have expressed their opposition to libre software policies that include any preference for its use.[250] It has been argued that the government intervention in favor of libre software 'may negatively distort market mechanisms'.[251]

The question of whether or not such regulations are in conformity to the constitution of a particular country logically depend on each case. However, all the national legal frameworks in South America include in some way or another the principle of 'free competition', in many cases directly in their national constitutions, such as in Brazil (article 170), Colombia (article 333) or Venezuela (article 299). However, this principle is not absolute and in every jurisdiction has limitations, usually the 'general interest' or the 'environment'. Under those circumstances, it is relevant for policymakers to consider this principle, including its limitations.

The key point here is to understand libre software in its legal nature. First, it is not a brand, product or service propriety of any person, company, government or organization whatsoever. This clarification is necessary because sometimes is used to attack libre software. In fact, this argument was used during the discussion of the first *Infogobierno* Law, when congressman Luis Tascón said that libre software is a 'brand' and its adoption favors specific companies.[252] Libre software does not allow appropriation by anybody; even if an specific company writes the whole code of a program, anybody could use it, modify it and even commercialize it. Even in case of a permissive license, it is possible to fork the software if it is decided to change to a proprietary license.

Libre software and proprietary software can be technically equivalent, they differ in the way they are licensed. Disregarding the technical advantages that the former may entail, it can be said that their differences are legal rather than technical. From the legal perspective of public procurement, libre software represents a different contracting model but the same product:

249 Email from Juan Carlos Sevillano (Ecuadorian libre software activist) to author (12 August 2015).

250 Neha Alawadhi, Jayadevan PK, 'How open software has become a source of grief for tech majors like Cisco, IBM & Oracle' *The Economic Times* (New Delhi, 3 June 2015) <http://economictimes.indiatimes.com/tech/software/how-open-software-has-become-a-source-of-grief-for-tech-majors-like-cisco-ibm-oracle/articleshow/47521852.cms> accessed 25 September 2015.

251 Osden Jokonya, 'Investigating Open Source Software Benefits in Public Sector', (48th Hawaii International Conference on System Sciences, Hawaii, 2015) 2242, 2243 <http://doi.ieeecomputersociety.org/10.1109/HICSS.2015.268> accessed 25 September 2015.

252 Heberto E Alvarado Vallejo, 'Software libre es una marca', *Ultimas Noticias* (Caracas, 25 June 2006) 12.

software.[253]

This means that when the state prescribes a mandate for using libre software it is not discriminating a product but choosing what it deems a more appropriate legal model for the same product. This different legal approach entails a different business model; but it is legitimate for the state to prefer this model as long as it fits better the public administration requirements.[254] Libre software business models do not rely upon selling licenses but rather in services as technical support or training, and therefore, they are suitable under the requirement of providing the software with a license that allow freely: the use, distribution and modification of the software.

More important, the state is by definition a political entity and unlike private companies, it has to adhere to political principles like sovereignty and the democratic principle. The first one is guaranteed through the freedoms of libre software,[255] and in relation to the second, it is best expressed in the words of Marcelo Thompson: ‘there is a moral duty of any democratic state to adopt a contractual model which preserves more rights to the government and to its citizens’.[256]

A regulation mandating the use of libre software does not preclude any vendor to participate in public tenders, they just have to comply with the requirements of the product as in any public tender. Even a company that has championed proprietary software, like Microsoft, could participate. Currently Microsoft has two libre software licenses approved by the Free Software Foundation,[257] and recently launched Azure Cloud Switch which is based on Linux.[258] Additionally, since 2003 it has the 'Government Security Program' that allows governments to have 'controlled access to the source code' of its products in order to 'reassure customers' about the security of them.[259] These facts show that proprietary software companies can adopt a more open approach if they desire. The fact that they decide to not adopt the licensing conditions requested by the state is legitimate, but it is an autonomous business decision, not discrimination against specific vendors. It should be

253 Marcelo Thompson, 'The Democracy of FLOSS: Software Procurement under the Democratic Principle' (2008) 5 UOLTJ 79, 94 <www.uoltj.ca/articles/vol5.1-2/2008.5.1-2.uoltj.Thompson.79-124.pdf> accessed 26 September 2015.

254 Rishab Ghosh, 'Legal aspects of free and open source software in procurement: guidelines developed at the EU level', (Workshop: Legal Aspects of Free and Open Source Software, Brussels, July 2013) 57 <www.europarl.europa.eu/document/activities/cont/201307/20130708ATT69346/20130708ATT69346EN.pdf> accessed 26 September 2015.

255 EFE, 'Experts see open source software as "guarantee of sovereignty" ' *Agencia EFE* (Montevideo, 18 September 2015) <www.efe.com/efe/english/technology/experts-see-open-source-software-as-guarantee-of-sovereignty/50000267-2716204> accessed 26 September 2015.

256 Thompson (n 253) 123

257 Free Software Foundation, 'Various Licenses and Comments about Them' <www.gnu.org/licenses/license-list.en.html#GPL-PA> accessed 10 November 2015.

258 Kamala Subramaniam, 'Microsoft showcases the Azure Cloud Switch (ACS)' (17 September 2015) <https://azure.microsoft.com/en-us/blog/microsoft-showcases-the-azure-cloud-switch-acs/> accessed 10 November 2015.

259 Microsoft, 'Microsoft Government Security Program (GSP)' (September 2014) <http://download.microsoft.com/download/B/C/A/BCAFF3F5-5DB5-4AB4-9AAB-5CF0814E0948/GovernmentSecurityProgram.pdf> accessed 10 November 2015.

remembered that ‘there is no obligation on the part of a public body to adapt its requirements to the preferred business models of particular firms’.[260]

Libre software does not only do not contravene ‘free competition’ but on the contrary enable and foster competition. This was recognized in an important case for the libre software movement in the United States. The plaintiff alleged a 'predatory price fixing agreement' of the Free Software Foundation and companies as IBM and Red Hat, using the GNU GPL, which allows free distribution of software and therefore, according to the plaintiff, forecloses competition in the market. The Court finally held that ‘GPL encourages, rather than discourages, free competition and the distribution of computer operating systems, the benefits of which directly pass to consumers’.[261]

Equally important is the fact that owing to its characteristics, even if ‘a certain open-source programme may come to dominate its market niche, no particular institution or business can use it to build a monopoly market position’.[262] The United Nations has recognized that it has an ‘anti-monopolistic effect on the IT market and industry’.[263] By avoiding the vendor lock-in, traditional with proprietary software, it opens the market for more companies that could become suppliers of the public sector.[264]

The experience in South America ratified the aforementioned argument. Despite claims made by detractors of public software in Brazil, many companies have participated in the Brazilian Public Software, generating competition.[265] Private companies now participate and believe in the new model.[266]

As it was explained in the section 3.1.3, in 2015, the Brazilian Supreme Federal Court ruled that the Rio Grande do Sul law that established a preference for the use of libre software in the regional public sector, does not contravene the constitutional principles of 'impartiality, efficiency and economy'. Moreover, it was held that 'any manufacturer of computer programs can participate' (*todo fabricante de programas de computador poderá participar*) as long as they 'accept the licensing in the terms required by legislation' (*aceitem celebrar licenciamento nos termos exigidos*

260 Ghosh (n 254) 57.
261 Wallace v Free Software Foundation Inc, No 05 – 618, 6 (S D Ind, March 20 2006) .
262 United Nations Conference on Trade and Development (UNCTAD), E-*Commerce And Development Report 2003* (United Nations, 2003) 110 <http://unctad.org/en/pages/PublicationArchive.aspx?publicationid=1497> accessed 26 September 2015.
263 ibid
264 UNCTAD, *Information Economy Report 2012: The Software Industry and Developing Countries* (United Nations, 2012) 62.
265 Corinto Meffe, ‘O primeiro ciclo virtuoso de produção do software público’ (*Computerworld Brasil*, 21 April 2015) <http://computerworld.com.br/o-primeiro-ciclo-virtuoso-de-producao-do-software-publico> accessed 26 September 2015.
266 Organización de los Estados Americanos (OEA), 'FORO e-GOBIERNO OEA/RedGEALC|BOLETÍN: e-Gobierno y Software Público' (October 2013) 37 <http://portal.oas.org/LinkClick.aspx?fileticket=2V1hWz7y9xo%3D&tabid=1729> accessed 27 September 2015.

pela legislação).[267]

In the international level, there have been very few rulings regarding libre software legal regulations. However, the Brazilian Supreme Federal Court is not alone. Italian and French cases reinforce the arguments of the Brazilian ruling and are in line with what has been argued in this section.

In 2010, the Italian National Government challenged a Piedmont regional law that established a preference for libre software and open standards in the regional public administration; however, it allowed to use proprietary software if the decision was justified.[268] The Constitutional Court found that the regional law was not ‘against the rules of competition as laid down by the jurisprudence of the European Court of Justice and implemented by the Code of Public Contracts’, and held that libre software does not refer to a specific 'brand or product' but rather to a 'legal characteristic'.[269]

In the same year, the French Council of State ‘clarified the right of contracting authorities to require suppliers to use specific open source software in the context of public procurement’.[270] In this case, a French region mentioned a specific libre software solution (Lilie) in the technical specifications of a public tender. The process was brought to court by two companies. The Council of State concluded that 'the contract in question did not consist of providing software but of providing adaptation, installation and maintenance services for the Lilie software', and held that despite there was a company that developed the program, considering the 'libre' nature of the software, any provider could adapt it freely and therefore, participate in the public tender.[271]

4.2.3 IMPLEMENTATION AND COMPLIANCE

Finally, as in other areas of law, one aspect that has proved to be problematic in practice is the compliance. Despite legal dispositions prescribing the use of libre software by the public sector, sometimes public institutions do not comply with them. For instance, the presidential Decree 3390 of 2004 established that the Venezuelan ‘National Public Administration’ shall employ ‘first and

267 Brazil, Supremo Tribunal Federal, 'Ação Direta de Inconstitucionalidade 3.059 Rio Grande do Sul', 23.
268 Carlo Piana, 'Italian Constitutional Court gives way to Free Software friendly laws' (2010) 2(1) International Free and Open Source Software Law Review 61, 62 <http://dx.doi.org/10.5033/ifosslr.v2i1.38> accessed 28 September 2015.
269 ibid 64.
270 Osor Editorial Team, ‘FR: Council of State clarifies right of local government to opt for open source’ (13 October 2011) <https://joinup.ec.europa.eu/news/fr-council-state-clarifies-right-local-government-opt-open-source> accessed 28 September 2015.
271 ibid.

foremost'[272] libre software.[273] However, one criticism that this decree received was that it did not provide mechanisms to enforce it and therefore, in practice was not applied by some.[274]

In this regard, the measure to be proposed is to incorporate into the legal regulations tools that facilitate its enforcement. A policy without effective mechanisms to be enforced is likely to remain unheeded, especially if as in this case, it has powerful opponents.

An example in the direction proposed is the *Infogobierno* Law. It introduced measures such as fines and disqualification from the public administration for the officials that infringe the dispositions of the law.[275] The law entered into force until recently and the effectiveness of its measures remains to be studied in detail, however, these dispositions can serve by way of example.

An important consideration that should not be overlooked is that 'the mere use of the legal instrument (…) is not enough to change behavior'.[276] The reasons for the non-compliance of libre software legal regulations may be varied, including cultural like 'familiarity with current software'[277] or technical like interoperability problems.[278] A detailed assessment of them is beyond the scope of this thesis, which is mainly focus on legal aspects. However, in view of the importance of the technical and cultural problems some general considerations will be presented.

Cultural difficulties are not only relevant but complex. The support of employees is key for a successful migration since they are the ones using the software in the day-to-day development of the public administration. In this regard, it is important that migrations are implemented by stages, that employees are well-informed and trained accordingly.[279] Particular attention should be paid to technical users, which could fear that their technical knowledge, already acquired, and that is usually related to proprietary software, become less relevant after the migration.[280]

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272 The actual word used in the decree was 'prioritariamente', which is translated as 'first and foremost' according to Oxford Dictionaries <www.oxforddictionaries.com/translate/spanish-english/prioritariamente> accessed 01 October 2015.

273 Venezuela, Decreto Presidencial 3390, 23 Diciembre 2004, Gaceta Oficial 38095 del 28 Diciembre 2004.

274 Luigino Bracci, 'Ley de Infogobierno impone multas, inhabilitaciones e impuestos para quienes se nieguen a usar software libre en el Estado' (*Alba Ciudad*, 18 August 2013) <http://albaciudad.org/wp/index.php/2013/08/ley-de-infogobierno-impone-multas-inhabilitaciones-e-impuestos-para-quienes-se-nieguen-a-usar-software-libre-en-el-estado/> accessed 01 October 2015.

275 Venezuela (n 230) art 81, art 83.

276 Mathieu Hendrik Paapst, 'Barrieres en doorwerking: Een onderzoek naar de invloed van het open source en open standaarden beleid op de Nederlandse aanbestedingspraktijk' (PhD thesis, University of Groningen, 2013) 206 <www.rug.nl/research/portal/publications/pub(cb68c60a-dce2-4451-8b43-7c73429e8da8).html> accessed 02 October 2015.

277 Andrew Oram, 'Promoting Open Source Software in Government: The Challenges of Motivation and Follow-Through', (2nd Annual Journal of Information Technology & Politics Thematic Conference, Amherst, 2010) 200, 205 <www.oss-institute.org/storage/documents/Resources/studies/the-politics-of-open-source.pdf> accessed 01 October 2015.

278 ibid 215

279 Klaus Felinto de Oliveira, 'Estudo sobre os fatores que influenciam a decisão pela adoção do software livre em instituições públicas' (Master thesis, Pontifícia Universidade Católica do Rio Grande do Sul 2010) 101 <http://hdl.handle.net/10923/1101> accessed 16 November 2015.

280 ibid 102.

In order to reduce these problems in the long term, it is important that the government promotes the teaching of libre software in the educational institutions. The almost exclusive teaching of proprietary software leads to a situation in which the majority of the population are only familiar with those type of programs.[281]

The complexity of the cultural resistance could require an interdisciplinary approach and even creative solutions. An example of a creative measure can be found in Schwäbisch, a German city pioneer in the use of libre software in the public sector.[282] One of the tactics used in the municipality was to provide 'Linux t-shirts and stuffed penguins[283]' to reluctant employees.

Concerning the technical problems, it is fundamental the implementation of open standards. As it was remarked in section 4.1, it is necessary to implement the adoption of open standards as the first measure of a libre software policy. Their use avoids the dependence on specific programs, which allows smoother migrations and can reduce significantly the technical problems when migrating, normally associated to interoperability. Nevertheless, even when open standards are already being used, migrations should be developed by stages. A migration by stages facilitates implementing testing groups in order to spot unforeseen technical problems and therefore, correct them before a greater deployment.

In conclusion, to achieve a better implementation and compliance, mechanisms to enforce the law are important. However, policymakers should also pay attention to the different aspects that may affect the implementation such as cultural and technical problems.

4.3 DEDICATED INSTITUTION OR AGENCY

An appropriate implementation of any policy requires officials and institutions responsible for its success. Therefore, when elaborating a libre software policy it is necessary to consider this aspect. Already existing entities and officials can be designated, as it was the case in Ecuador. The articles sixth and seventh of the Decree 1014, conferred the responsibility to the ‘Subsecretaría de Informática’ and the functionaries appointed were the ‘Ministros Coordinadores’ and the General Secretary of the Public Administration. This new duty was added to the many that they already had. This approach of hold responsible for the libre software policy to existing institutions with a broader range of functions is shared by the countries of the region. However, Brazil and Venezuela seem to deviate from that approach.

281 UNCTAD (n 262).

282 Stadt Schwäbisch Hall, 'OpenSource im Rathaus' <http://www.schwaebischhall.de/index.php?id=2688&sword_list[]=opensource> accessed 16 November 2015.

283 A penguin is the symbol of Linux.

In 2003, a presidential decree of the Brazilian president instituted several 'technical committees' as part of the 'Executive Committee of Electronic Government'. These committees have the purpose of 'coordinate and articulate the planning and implementation of projects and actions in their respective areas of competence'.[284] Among the new committees was the 'Technical Committee of Libre Software Implementation' (CISL). The CISL was one of the coordinators of the creation of a guide for the migration of Brazilian public institutions.[285] This guide was elaborated with participation of public entities and contributions of society through a process of public consultation. Moreover, the CISL develops periodically a plan containing guidelines, objectives and actions, in order to continue advancing with the migration towards libre software.[286]

Venezuela, meanwhile, initially designated the Minister of Science and Technology for the implementation of the libre software policy.[287] However, the *Infogobierno* Law in 2013 created a new institution for the sector of 'information technologies' in the Venezuelan public sector, the 'National Commission of Information Technologies' (CONATI).[288] This entity is currently in charge of libre software policies and has among its responsibilities to administer the Venezuelan libre software repository.[289] CONATI seeks to develop 'plans, policies and guidelines that contribute to the permanent development of the sector of Libre Information Technologies'.[290] An expression of this has been the elaboration of a guide with 'methodological guidelines' for the migration of public institutions.[291]

Considering South American and international experiences, and the problems that could arise when there is not central organization providing guide and support to the processes of migration, it is suggested to create specialized entities in charge of the policy of libre software in the government. Moreover, in support of such recommendation, it can be said there is a risk of dilution when the policy responsibility is in a body with a broad range of duties. Besides, it might serve as a message to public officials and the society in general of the importance that the policy represents for the state.

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284 Brazil, Presidência da República Casa Civil, Decreto de 29 de outubro de 2003, 'Institui Comitês Técnicos do Comitê Executivo do Governo Eletrônico e dá outras providências'.

285 Grupo de Trabalho Migração para Software Livre, 'Guia Livre, Referência de Migração para Software Livre do Governo Federal' (2005) 9 <www.governoeletronico.gov.br/anexos/guia-livre-versao-1.0> accessed 02 October 2015.

286 Portal Software Livre, 'Planejamentos Anteriores' <www.softwarelivre.gov.br/planejamento-anteriores> accessed 02 October 2015.

287 Venezuela (n 273).

288 Venezuela (230) art 40.

289 ibid, art 41.

290 Comisión Nacional de las Tecnologías de Información (CONATI), 'Misión y Visión' <www.conati.gob.ve/conati/conocenos/mision-y-vision> accessed 02 October 2015.

291 CONATI, 'Orientaciones Metodológicas para la Migración a Software Libre en el Poder Público' (May 2015) <http://conati.gob.ve/images/pdf/Orientaciones_Metodologicas_para_la_Migracion_SL.pdf> accessed 02 October 2015.

Additionally, specialized entities in training, education, research and development (R&D) could be created. In this regard, the Venezuelan experience with the 'Libre Software Academy',[292] which provides free education in libre software to public employees and the general population,[293] could serve as an example.

4.4 INTERNATIONAL TREATIES AND OBLIGATIONS

An important aspect that deserves particular analysis when conceiving a libre software policy is international treaties. International cooperation can serve for the advancement of libre software, as it is going to be discussed later in this chapter. Nevertheless, currently many treaties represent a threat for the public policies in favor of libre software.

Two bilateral instruments commonly used and relevant for this matter are Bilateral Investment Treaties (BITs) and Free Trade Agreements (FTA). Most of the countries in South America have BITs or FTAs with a European country or with the United States (USA),[294] headquarters of a great number of large proprietary software companies. The treaties signed with the United States are particularly important considering that many of the software companies that act in the region as suppliers of the government are from that country, e.g. Microsoft and Oracle.

Three countries in South America have FTAs with USA: Chile,[295] Colombia[296] and Peru.[297] The first was signed in 2003 and the last two in 2006. All of them are remarkably similar, not surprisingly considering that USA normally follows a same model, as can be clearly seen with the publicly available model for treaties related to investments.[298] These treaties include dispositions that may become an obstacle for a libre software policy. Particularly relevant in this regard is the 'Government Procurement' chapter and the 'Investment' chapter.

The 'Government Procurement' chapter includes an article about 'Technical Specifications'.[299] The third clause of this article in the Chilean FTA provides that an 'entity shall not prescribe technical specifications that require or refer to a particular trademark or trade name,

292 CONATI, 'Academia Nacional de Software Libre' <www.cnti.gob.ve/til-venezuela/sector-ti-venezolano/proyectos/formacion/academia-nacional-de-software-libre.html> accessed 02 October 2015.

293 Edgar Maldonado, 'The Process of Introducing FLOSS in the Public Administration: The Case of Venezuela' (2010) 11 ournal of the Association for Information Systems 756, 767 <http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1558&context=jais> accessed 27 October 2015.

294 UNCTAD, 'International Investment Agreements Navigator' <http://investmentpolicyhub.unctad.org/IIA/> accessed 28 September 2015.

295 Free Trade Agreement (Chile - United States) (signed 6 June 2003, entered into force 1 January 2004)

296 Trade Promotion Agreement (Colombia - United States) (signed 22 November 2006, entered into force 15 May 2012)

297 Trade Promotion Agreement (Peru - United States) (signed 12 April 2006, entered into force 1 February 2009).

298 United States Department of State, 'Bilateral Investment Treaties and Related Agreements' <http://www.state.gov/e/eb/ifd/bit/> accessed 13 November 2015.

299 Article 9.6 in the Chilean FTA and 9.7 in the Colombian and Peruvian FTAs.

patent, design or type, specific origin or producer or supplier'. Curiously enough, a word was added to the same disposition in the Colombian and Peruvian FTAs. The fifth clause of the respective articles states that entities 'may not prescribe any technical specifications that require or refer to a particular trademark or trade name, patent, **copyright**, design or type, specific origin, producer, or supplier'.[300]

In principle, software in South America is only protected by copyright. Despite the wordplay on copyright with the term copyleft, all libre software licenses, copyleft or not, are based upon copyright laws. Therefore, copyright owners of proprietary software can argue that in public procurements, a preference for libre software licenses is a requirement of a particular type of copyright. In consequence, the fact that legal regulations prescribe a preference for libre software licenses can be interpreted as a breach of the FTA.

Interestingly, it was from 2002 to 2005 that the debate for the Peruvian 'Libre Software Law' took place; meanwhile Colombian and Peruvian FTAs negotiations were developed during 2004 and 2005.[301] In view of that, it is possible to speculate that the Peruvian law could have influenced the decision to include the word 'copyright' in the article.

Even more problematic for a libre software policy can be the 'Investment' chapter of FTAs. The first issue is the broad concept of 'investment'. The following is taken from Section C of the FTAs 'Investment' chapter. Similar definitions, although sometimes more limited, can be found in BITs:

> [E]very asset that an investor owns or controls, directly or indirectly, that has the characteristics of an investment, including such characteristics as the commitment of capital or other resources, the expectation of gain or profit, or the assumption of risk. Forms that an investment may take include:
> (…)
> (f) intellectual property rights;

The inclusion of intellectual property rights (IPRs) means that copyright over a work is considered an investment. Likewise, 'the expectation of gain or profit, or the assumption of risk' is covered as an investment. As a result, expected earnings of copyright protected works, for instance, a computer program, are protected under investment chapters.

300 Emphasis added.

301 United States Trade Representative (USTR), 'United States and Colombia Conclude Free Trade Agreement' (February 2006) <https://ustr.gov/about-us/policy-offices/press-office/press-releases/archives/2006/february/united-states-and-colombia-conclude-free> accessed 29 September 2015.

Among the problematic dispositions of this chapter there is the article of ‘Performance Requirements’ and the article of ‘Expropriation and Compensation’. The former[302] prescribes that governments are prevented from 'impose or enforce any requirement or enforce any commitment or undertaking: (…) (f) to transfer a particular technology, a production process, **or other proprietary knowledge** to a person in its territory'.[303] In consequence, a public procurement requirement of disclosing the software source code, a 'proprietary knowledge', may be interpreted as a contravention of the article.

The latter article[304] poses a even greater risk. FTAs and BITs normally include clauses that arguing the protection of foreign investors allow private companies to sue a party-state when they consider that the government ‘expropriate or nationalize a covered investment either directly **or indirectly** through measures equivalent to expropriation or nationalization’.[305] The three FTAs referred have exactly the same sentence and similar dispositions can be found in many BITs with USA and European countries.

This protection of foreign investors is made operational through an investor-state dispute settlement (ISDS).[306] Using international private arbitration, companies can challenge decisions of the government. Decisions taken ‘for a public purpose’ are supposed to be excepted. However, international experiences have shown that in practice public measures to protect the environment or other public interests can be successfully challenged, reversing government's decisions and obtaining monetary indemnifications.[307] A case in the framework of NAFTA (North American Free Trade Agreement) that illustrates this is *S.D. Myers Inc. v. Government of Canada*. The American company sued the Canadian state owing to the ban on the export of PCB wastes. The final decision was adverse to Canada, despite its claims that this is 'in conflict with Canada's public policy'.[308]

A recent case relevant for the discussion is *Eli Lilly and Company v. Government of Canada*. A pharmaceutical company 'attempts to re-litigate two Federal Court proceedings' that invalidated two of the company patents.[309] The company argues a 'violation of legitimate expectations, and

302 Article 10.5 in the Chilean FTA and 10.9 in the Colombian and Peruvian FTAs.
303 Emphasis added.
304 Article 10.9 in the Chilean FTA and 10.7 in the Colombian and Peruvian FTAs.
305 Emphasis added.
306 Section B of the investment chapters.
307 Courtenay Barklem, Enrique Alberto Prieto Ríos, 'The Concept of “Indirect Expropriation”, its appearance in the international system and its effects in the regulatory activity of governments' (2010) 11(21) Civilizar Ciencias Sociales y Humanas 77, 86 <http://revistas.usergioarboleda.edu.co/index.php/ccsh/article/view/39> accessed 01 November 2015.
308 Government of Canada, 'Cases Filed Against the Government of Canada - S.D. Myers Inc. v. Government of Canada' <http://www.international.gc.ca/trade-agreements-accords-commerciaux/topics-domaines/disp-diff/SDM.aspx?lang=eng> accessed 11 November 2015.
309 Eli Lilly and Company v The Government of Canada, UNCITRAL, ICSID Case No UNCT/14/2, Government of Canada Counter Memorial [1].

discrimination'.[310] In turn, the government argues that the claimant is trying 'to substitute Canadian patent policy and requirements, for an alternative, detailed set of rules of its own making'.[311] There is not yet a final decision but it exemplifies how far companies may go not only against decisions of the executive branch, and moreover, how IPRs can be used as an 'investment' in the framework of FTAs.

These cases are just two examples of the extensive list of cases in which state decisions aiming to protect legitimate public interests have been challenged under the provisions of BITs and FTAs. Additionally, even if a state wins, it has to incur in expensive litigation costs and the mere threat of taking legal actions may have chilling effects on the state regulatory capacity.[312]

Moreover, 'legal scholars as well as several international arbitrators' have drawn attention to the discretion that these clauses for the 'protection of investments' allowed to private arbitrators.[313] In particular related to IPRs it has been noted that:

> Intellectual property obligations in the investment context thus pose a new threat to states' traditional lawmaking powers by providing foreign actors a singular opportunity to challenge laws that have been enacted with the domestic public interest in full view, even when they are in conformity with international intellectual property treaties.[314]

To summarize, the broad and ambiguous nature of the investment chapter clauses allow 'investors' to 'challenge internal public policies' not only of developed countries but particularly in developing countries.[315] Similarly, the 'Government Procurement' chapter of FTAs may be an additional obstacle. In consequence, a public policy preferring or mandating the use of libre software in the public sector would be under risk in light of FTAs and BITs provisions. For instance, a foreign proprietary software company as Microsoft could sue the state arguing that a preference for libre software prevents them to participate in public tenders and therefore, it affects their 'expectation of gain or profit, or the assumption of risk' as a foreign investor.

To prevent these risks, it is advisable that governments renegotiate or denounce treaties that include this type of provisions. If the thread to the state regulatory capacity and the other arguments

310 ibid Claimant's Memorial [294].
311 ibid (n 309) [419].
312 Deborah Gleeson, Sharon Friel, 'Emerging threats to public health from regional trade agreements' (2013) 381 Lancet 1507 <http://dx.doi.org/10.1016/S0140-6736(13)60312-8> accessed 12 November 2015.
313 Barklem, Prieto, (n 307) 78.
314 Ruth L Okediji, 'Is Intellectual Property "Investment"? Eli Lilly v. Canada and the International Intellectual Property System' (2014) 35 University of Pennsylvania Journal of International Law 1121, 1122 <http://scholarship.law.upenn.edu/jil/vol35/iss4/8> accessed 12 November 2015.
315 Barklem, Prieto, (n 307) 91.

presented here are not deemed sufficient to follow this recommendation, they, at the very least, can be added to already existing concerns in relation to these treaties in other areas. It is beyond the scope of this thesis to discuss the risk and impacts of FTAs and BITs for the whole economy of a country. However, as a way of example, dispositions of these treaties, including some aspects analyzed here, may negatively affect important areas such as the environment,[316] public health,[317] or the agriculture.[318] The recommendation of renegotiate or denounce treaties including these provisions is not far–fetched. In fact, South American countries have already taken steps in that direction.

Bolivia, for instance, has had in force a significant number of BITs. Nonetheless, since Evo Morales government started and a new constitution was proclaimed, many treaties have been denounced and in spite of that foreign investments have increased.[319] Bolivia was the first country in the world to withdraw from the International Centre for Settlement of Investment Disputes Disputes (ICSID),[320] 'the world's leading institution devoted to international investment dispute settlement' and the 'forum for investor-State dispute settlement in most international investment treaties and in numerous investment laws and contracts'.[321] Bolivia has been followed by Ecuador (2009), Venezuela (2012) and Argentina is likely to proceed similarly in the future.[322] This is not surprisingly, considering that South American countries constitute 27 percent of all arbitration cases.[323]

On the other hand, Brazil has never had a BIT in force, it signed some during the 90's but did not ratify any.[324] Moreover, recently Brazil signed new BITs but did not include the traditional

316 Diego Alejandro Martínez Ballesteros, 'Examination of the environmental consequences of trade regimes in Latin America' (2009) 9 Opera 173 <http://revistas.uexternado.edu.co/index.php/opera/article/view/694> accessed 13 November 2015.

317 Joint United Nations Programme on HIV/AIDS, 'The Potential Impact of Free Trade Agreements on Public Health' (May 2012) <http://www.unaids.org/sites/default/files/media_asset/JC2349_Issue_Brief_Free-Trade-Agreements_en_0.pdf> accessed 13 November 2015.

318 Dawn Mccarty, 'The Impact of the North American Free Trade Agreement (NAFTA) on Rural Children and Families in Mexico: Transnational Policy and Practice Implications' (2007) 1(4) Journal of Public Child Welfare 105 <http://dx.doi.org/10.1080/15548730802118314> accessed 13 November 2015.

319 Glyn Moody, 'Bolivia Shows How To Dismantle Corporate Sovereignty Provisions In Treaties Without Losing Foreign Investment'(*Techdirt*, 15 June 2014) <www.techdirt.com/articles/20140712/10031927860/bolivia-shows-how-to-dismantle-corporate-sovereignty-provisions-treaties-without-losing-foreign-investment.shtml> accessed 30 September 2015.

320 Max Valverde Soto, 'Bolivia se margina del CIADI' (2008) 9(1) Puentes ENTRE EL COMERCIO Y EL DESARROLLO SOSTENIBLE 16 <www.ictsd.org/sites/default/files/review/puentes/puentes9-1.pdf> accessed 30 September 2015.

321 International Centre for Settlement of Investment Disputes, 'About ICSID' <https://icsid.worldbank.org/apps/icsidweb/about/pages/default.aspx> accessed 30 September 2015.

322 Nicolas Boeglin, 'ICSID and Latin America: Criticisms, withdrawals and regional alternatives' (*bilaterals.org*, 25 June 2013) <http://www.bilaterals.org/?icsid-and-latin-america-criticisms> accessed 30 September 2015.

323 TeleSUR English, 'Argentina Government to Appeal World Bank Court Ruling' (14 April 2015) <www.telesurtv.net/english/news/Argentina-Government-to-Appeal-World-Bank-Court-Ruling--20150411-0008.html> accessed 30 September 2015.

324 Joaquim de Paiva Muniz, Luis Peretti, 'Brazil signs new bilateral investment treaties with Mozambique and

ISDS mechanisms and it has decided to follow a ‘new model’ for its treaties related to the protection of investments.[325]

In conclusion, it is possible to terminate, or renegotiate if the other part is willing, BITs and FTAs. It should be remembered that FTAs include a clause of termination. Other ways to protect foreign investments should be considered without hampering the capacity of the state to enact policies, as in this case in favor of libre software.

Finally, two large international treaties: Trans-Pacific Partnership (TPP) and Trade in Services Agreement (TiSA), pose risks for a libre software policy. As of August 2015, Chile, Colombia, Peru, Paraguay and Uruguay were part of TiSA negotiations, while Chile and Peru are part of TPP, and Colombia ‘has formally expressed interest in participating’.[326] These treaties are negotiated in secrecy, but it is expected to incorporate similar disposition to the ones already included in many BITs and FTAs.

In fact, recently it was finally disclose an official text of the TPP.[327] As expected, a ‘Government Procurement' chapter and an 'Investment' chapter are included with similar dispositions to the ones just explained. In consequence, the same arguments about their incompatibility with a preference or mandate for libre software can be applied to the TPP.

There is not yet an official release of the TiSA texts. However, a draft leaked in 2015 by Wikileaks provides a preliminary basis for analysis. Once again 'Government Procurement' disposition are included, in this case in an 'annex'.[328] This area is fundamental for South America and its libre software companies, as 'in developing countries, public procurement (of goods and services) can account for as much as 20% of gross domestic product' and 'the government is the main source of procurement for services'.[329]

The 'Awarding of contract' section, prescribes that 'impartiality of the procurement procedure shall be ensured especially through the non-discriminatory description of the subject-matter of the contract'. An interpretation of this disposition could conclude that, as in the French case explained at the end of section 4.1.2, specify a particular libre software solution for contracting

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Angola: new approach to BITs or “toothless lions”?’ (*Global Arbitration News*, 07 April 2015) <http://globalarbitrationnews.com/20150407-brazil-signs-new-bilateral-investment-treaties/> accessed 30 September 2015.

325 ibid.

326 Barbara Kotschwar, Jeffrey J Schott, 'The Next Big Thing? The Trans-Pacific Partnership & Latin America' (2013) <www.americasquarterly.org/next-big-thing-trans-pacific-partnership> accessed 30 September 2015.

327 United States Trade Representative, TPP Full Text <https://ustr.gov/trade-agreements/free-trade-agreements/trans-pacific-partnership/tpp-full-text> accessed 14 November 2015.

328 Draft of Trade in Services Agreement (TiSA) Annex on Government Procurement (April 2015) <https://wikileaks.org/tisa/procurement/page-1.html> accessed 15 November 2015.

329 Sanya Reid Smith, 'Preliminary analysis of leaked proposed TISA Annex on Government Procurement' (*Third World Network* 2015) 1 <https://wikileaks.org/tisa/procurement/analysis/Analysis-TiSA-Government-Procurement-Annex.pdf> accesses 15 November 2015.

a service is 'discriminatory' and therefore, constitutes a contravention of the treaty.

On the other hand, the 'Electronic Commerce' annex includes an article that could be regarded as the most explicit threat for a policy in favor of libre software in the government:

> Article 6: Transfer or Access to Source Code
>
> 1. No Party may require the transfer of, or access to, source code of software owned by a person of another Party, as a condition of providing services related to such software in its territory.[330]

The article explicitly prohibits that the government request the source code. If this article remains in the final text, public procurement could not require the software source code for providing services to the public sector, which goes against the terms of any libre software license, for which the access to the source code is mandatory.

It has been argued that the risk could go as far as creating difficulties for libre software suppliers even when there is not an explicit regulation in favor of libre software, as in the Peruvian 'neutrality law'. The reason for this would be that in a public tender, despite not being specifically mentioned a requirement for the source code, if the tender is won by a libre software solution, it could be argued by proprietary software competitors that it won due to the availability of its source code, which is a criterion not allowable under the terms of the treaty.[331]

A fact worth noting regarding TiSA and TPP is the committed support to these treaties from American proprietary software companies. Similar occurred with FTAs.[332] This suggests that the provisions of those international agreements are in line with proprietary software business model not with libre software. In fact, it has been denounced the deep corporate involvement in the negotiations.[333] 'Team TiSA' for instance, a business coalition 'dedicated to promoting and advocating' for TiSA,[334] is integrated, among others, by Microsoft, Oracle and the Software Alliance (BSA),[335] prominent advocates of proprietary software.

330 Draft of Trade in Services Agreement (TiSA) Annex on Electronic Commerce (20 February 2015) <https://wikileaks.org/tisa/ecommerce/page-7.html> accessed 01 October 2015.

331 Emma Woollacott, 'Leaked Draft Trade Agreement Could Threaten Open Source Deployment' (*Forbes*, 5 June 2015) <www.forbes.com/sites/emmawoollacott/2015/06/05/leaked-draft-trade-agreement-could-threaten-open-source-deployment/2/> accessed 01 October 2015.

332 Microsoft Corporate Blogs, 'Microsoft Voices Support for Passage of Free Trade Agreements with South Korea, Colombia & Panama' (13 october 2011) <http://blogs.microsoft.com/on-the-issues/2011/10/13/microsoft-voices-support-for-passage-of-free-trade-agreements-with-south-korea-colombia-panama/> accessed 16 November 2015.

333 William New, 'Confidential USTR Emails Show Close Industry Involvement In TPP Negotiations' (*IP Watch* 05 June 2015) <http://www.ip-watch.org/2015/06/05/confidential-ustr-emails-show-close-industry-involvement-in-tpp-negotiations/> accessed 16 November 2015.

334 Team TiSA, 'About Team TiSA' <http://www.teamtisa.org/about-the-coalition/about-team-tisa> accesses 14 November 2015.

335 Team TiSA, 'Coalition Members' <www.teamtisa.org/about-the-coalition/coalition-members> accesses 14

In light of the above considerations, countries willing to adopt libre software should avoid to participate in such treaties. As with BITs and FTAs, the reasons here presented could be deemed as not sufficient for taking such decision. However, as with the other treaties, there are many other areas of concern, and in consequence, at the very least, the arguments here explained could be added to those already existing issues. Once again, the experience in the region ratifies that it is feasible to proceed in the way here proposed.

In September 2015, Uruguay decided to withdraw from TiSA negotiations.[336] As it was suggested before, American proprietary software companies are some of the main winners of these treaties. However, there could be some national companies that aspire to be eventually benefited by treaties as TiSA. In the case of Uruguay, the Uruguayan Chamber of Information Technology (CUTI) expressed its concerns for not participate in the treaty and therefore, not improving the conditions to access other markets.[337]

Discuss the policies to access other markets goes beyond the scope of this thesis. However, an alternative that is possible to initially suggest here is the creation of a libre software policy for the private sector. Companies offering libre software products and services could take advantage of the libre software policy for the government and meet the demand of the national public sector. As it was highlighted above, public procurement is a significant part of the GDP of developing countries, and therefore, it constitutes an important tool for public policies. Eventually, these private suppliers could provide libre software products and services to foreign public institutions and businesses, considering there is a global trend for libre software solutions and as a consequence, a growing demand for professional suppliers in this area. An already existing practical example in that sense is Elastix, an Ecuadorian libre software company that has provided services to the Dominican state.[338]

4.5 INTERNATIONAL COOPERATION

As expressed previously, a natural field for libre software is the international stage. Efforts in this regard have already been done in South America. However, this has been limited and not exempted from difficulties, as the initiatives of international public software mentioned in the

November 2015.

336 TeleSUR English, 'Uruguay To Withdraw From Free Trade Deal on Services' (8 September 2015) <www.telesurtv.net/english/news/Uruguay-To-Withdraw-From-Free-Trade-Deal-on-Services--20150908-0032.html> accessed 01 October 2015.

337 Sputnik, 'Empresas de informática de Uruguay piden más mercados ante salida del TiSA' (15 September 2015) <http://sptnkne.ws/J9B> accessed 16 November 2015.

338 Elastix, 'New features and improvements for users of the Contract System' <www.elastix.org/index.php/en/product-information/cases-of-success/512-new-features-and-improvements-for-users-of-the-contract-system.html> accessed 23 June 2015.

previous chapter illustrate. Different perspectives and conceptions of libre software represent a hurdle. Nevertheless, as with any international initiative, it is possible to reach consensus and agreements in order to advance with projects in which there are common interests.

Consequently, the main recommendation for South American countries in this field is to work towards an institutionalization of open standards and libre software in the framework of their regional organizations of integration: 'Union of South American Nations' (UNASUR) and the 'Community of Latin American and Caribbean States' (CELAC). They constitute favorable scenarios for the advancement of libre software in the public sector. Both were created in the last decade, 2004 and 2011 respectively, and seek to strengthen the integration of the region without the participation of the United States and Canada.[339] This is a positive fact for a initiative in favor of libre software considering that a hypothetical attempt in the Organization of American States (OAS) would receive immediate opposition of the United States, as it has been seen in practice in many countries of the region.

UNASUR is naturally the first scenario of action for South American countries. Past regional experiences related with software can serve as a source of learning. Moreover, using the learnings and knowledge from each country experiences, better guidelines and recommendations could be drawn. Taking advantage of the know-how already developed by other countries, nations with limited deployments of libre software, e.g. Colombia or Peru, or without the capacities of larger states, e.g. Guyana and Suriname,[340] could initiate migrations more easily.

Clearly, an institutionalization of libre software and open standards in organizations as UNASUR, should take into consideration the current particularities of each country. For instance, as remarked above, Colombia, Peru and Chile have FTAs with USA that could limit their freedom to establish a preference for libre software in the public sector. Nonetheless, it is still possible to advance initiatives in favor of libre software.

In this regard, a concrete measure that could be taken is the creation in UNASUR of an institution that concentrate functions related with libre software and open standards. This hypothetical 'South American Institute of Libre Software and Open Standards' would be a support organization for libre software and open standards implementations in the public sector of the region and eventually, it could become a point of reference for other countries. Additionally, it could

339 Alex Main, 'CELAC: Speaking for Latin America and the Caribbean' (Center for Economy and Policy Research, 06 December 2011) <www.cepr.net/blogs/cepr-blog/celac-speaking-for-latin-america-and-the-caribbean> accessed 07 October 2015.

340 Lora Woodall, Michele Marius, 'Free and Open Source Software, Open Data, and Open Standards in the Caribbean: Situation Review and Recommendations'(UNESCO, August 2013) 39 <www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/ifap/open_solutions_report_en.pdf> accessed 08 October 2015.

serve national governments to develop better libre software policies.

Seeing the similarities shared with the rest of Latin American and Caribbean public sectors, a step further regarding international measures is to expand these actions to CELAC. The economy of scale that could be achieved is greater. Additionally, the pool of knowledge would be enriched with libre software experiences of other countries such as Cuba, Costa Rica or Nicaragua.

Finally, another measure to be taken is to work together with countries outside Latin America and the Caribbean; the countries of the 'Global South' for instance, are natural partners for that owing to their similarities. Moreover, great powers such as Russia[341] and China[342] have undertaken efforts to migrate to libre software. Additionally, recently India has adopted a libre software policy,[343] and the Indian state of Kerala has been a committed supporter of libre software. In 2009, Kerala created a specialized institution for its promotion, the International Centre for Free and Open Source Software (ICFOSS).[344] Likewise, South Africa have a libre software policy since 2006[345] and it has already worked with Brazil in the subject of 'public software'.[346]

The most important aspect of these efforts, disregarding of what they have achieved so far, is that shows the political will of these countries to move towards libre software, and this represents an important opportunity for collaboration. In view of this, a likely scenario to develop libre software projects is the BRICS. Their resources and knowledge may boost significantly libre software solutions for the government and the libre software sector overall.

4.6 POLITICAL AND COMMERCIAL OPPOSITION TO LIBRE SOFTWARE

Disregarding the country, a public policy for implementing libre software in the government will have opposition. The proprietary software business model has been customary in the software

341 Russian Federation Government, Распоряжение от 17 декабря 2010 г. №2299-р <http://government.consultant.ru/page.aspx?1536480> accessed 11 October 2015.

342 Chris Merriman,'China will move to Linux by 2020 in 'de-Windowsifying' process' (*The Inquir*er, 31 October 2014) <www.theinquirer.net/inquirer/news/2378820/china-will-move-to-linux-by-2020-in-de-windowsifying-process> accessed 11 October 2015.

343 Indian Government - Ministry of Communication & Information Technology - Department of Electronics & Information Technology, 'Policy on Adoption of Open Source Software for Government of India' (2014) <http://deity.gov.in/sites/upload_files/dit/files/policy_on_adoption_of_oss.pdf> accessed 11 October 2015.

344 International Centre for Free and Open Source Software, 'About ICFOSS' <www.icfoss.in/about.html> accessed 12 October 2015.

345 South African Government - Department of Public Service & Administration, 'Policy on Free and Open Source Software use for South African Government' (August 2006) <www.gov.za/sites/www.gov.za/files/foss_policy_0.pdf> accessed 12 October 2015.

346 Eduardo Santos, Luis Felipe Costa, 'Brazil and South Africa collaboration for public software: building the South Africa public software ecosystem' (Fifth International Conference on Management of Emergent Digital EcoSystems, Luxembourg, October 2013) <www.eduardosan.com/publication/view/brazil-and-south-africa-collaboration-for-public-software/> accessed 12 October 2015.

sector. In fact, the largest software companies in the world (Microsoft, Oracle and SAP[347]), are well-known proprietary software companies. It is logical to expect opposition from companies relying on proprietary software business model, which considering the importance of some of them, can be a decisive lobby against any libre software initiative. The South American experience ratifies this.

As it was mentioned in section 3.1, the Peruvian libre software bill gained international recognition at the beginning of the 2000's for the lobby that it faced. The bill was criticized by Microsoft as a 'danger to the nation's security and to corporate intellectual property rights'.[348] The American embassy in Peru reinforce the rejection through a 'threatening letter that reiterated Microsoft's disapproval of the bill's consideration, and warned its passage would harm U.S.-Peru relations'.[349] The American Chamber of Commerce of Peru and the Software Alliance (BSA) also opposed the bill.[350] It has been speculated that the lobby went as far as the president of Peru and the chairman of Microsoft. Bill Gates went to Peru to meet its president Alejandro Toledo and made a donation of USD $550,000 to the country.[351]

The result of the Peruvian bill has been already mentioned, it ended as a 'neutrality law' without any incentive for libre software. The importance of this case is that exemplified the fierce opposition that libre software initiatives normally have to withstand. Even in countries where libre software enjoys significant political support from the government, the lobby against libre software policies has been active and has achieved victories.

In 2005, Luis Tascón, member at that time of the Venezuelan National Assembly and the ruling party, was one of the leaders of the initiative of the first *Infogobierno* Law.[352] He initially supported libre software communities in introducing as mandatory the use of libre software in the public sector.[353] However, after attending 'the Global Leadership Forum in Washington, DC as a guest of Microsoft, where he met Bill Gates',[354] he changed his position[355] and started 'fighting the mandatory

347 Forbes, 'The World's Biggest Public Companies' (2015) <www.forbes.com/global2000/#industry:Software%20%26%20Programming> accessed 03 October 2015.

348 Anita Say Chan, 'Retiring the Network Spokesman: The Poly-Vocality of Free Software Networks in Peru' (2007) 20(2) Science Studies 78, 78 <www.sciencetechnologystudies.org/system/files/Chan.pdf> accessed 03 October 2015.

349 ibid.

350 Congreso de la República de Perú - Comisión de Defensa del Consumidor y Organimso Regulares, 'Dictamen recaído sobre los proyectos de ley Nros 1609/2001-CR, 2344/2001-CR, 3030/2001-CR, 7389/2002-CR, 8251/2003-CR y 9026/2003-CR que propone la utilización del software libre en las instituciones del Estado' (14 June 2004) 12 <www2.congreso.gob.pe/Sicr/TraDocEstProc/TraDoc_condoc_2001.nsf/d99575da99ebfbe305256f2e006d1cf0/6fb1dc2eccf9fbd10525745e0070b7d5/$FILE/02344DCMAY150604.pdf> accessed 03 October 2015.

351 John Lettice, 'Peru mulls Free Software, Gates gives $550k to Peru Prez' *(The Register*, 16 July 2002) <www.theregister.co.uk/2002/07/16/peru_mulls_free_software_gates/> accessed 03 October 2015.

352 Bracci (n 274).

353 Luigino Bracci Roa, 'Microsoft entregaba memos internos de PDVSA a la embajada estadounidense en Caracas, confirma cable de Wikileaks' (4 September 2011) <http://lubrio.blogspot.nl/2011/09/microsoft-entregaba-memos-internos-de.html> accessed 03 October 2015.

354 Embassy of the United States in Caracas (n 231).

355 Bracci (n 353).

OSS provisions in the law'.[356] After heated debates the bill was not approved. Years later, the new bill of *Infogobierno* Law received attacks from members of the National Assembly that were in the United States in a Microsfot sponsored event.[357] Nevertheless, in this occasion the bill was successful and it became the current *Infogobierno* Law.

In Brazil the lobby has been also present. Sergio Amadeu, who was president of the 'National Institute of Information Technology' (ITI), expressed that a 'combination of proprietary firm lobbyists and ideologically motivated opposition within the government ministries prevented him from executing FLOSS migrations and digital inclusion projects on a broader scale'.[358] The opposition in Brazil has gone as far as suing Amadeu for declarations given to a magazine related to Microsoft.[359] It is indicative of the power of the lobby the fact that in spite of the support libre software has received from the national government, and the different bills presented since 1999 in numerous occasions,[360] to date, no libre software bill has been approved in the National Congress.

These examples of Peru, Venezuela and Brazil are just a sample of many similar experiences in the region. In others parts of the world, Massachusetts (United States) and Munich (Germany) are two known international cases of lobby. In the first case, the lobby was successful and it apparently involved ‘personal attacks’ and eventually the resignation of the state chief information officer (CIO) Peter Quinn.[361] In the German case, the opposition has included, among other actions, a visit of Microsoft chief executive officer (CEO) Steve Ballmer. In the visit, he met with the mayor of the city and had a ‘confidential’ conversation.[362] However, to date, all the efforts have not been successful, despite imprecise reports in 2014 of a switch back to proprietary software.[363]

It should be said that opposition to libre software policies is likely to remain in the foreseeable future. However, it can be suggested as a measure to diminish its impact, the implementation of mechanisms to keep the creation policy process and its implementation as open and transparent as

356 Embassy of the United States in Caracas (n 231).

357 Revista Pillku, 'La pelea por no quedar fuera de la ley' (December 2013) <www.pillku.com/article/colectivos-de-software-libre-venezolanos-rechazan-/> accessed 03 October 2015.

358 Aaron Shaw, ‘Insurgent Expertise: The Politics of Free/Livre and Open Source Software in Brazil’, (2nd Annual Journal of Information Technology & Politics Thematic Conference, Amherst, 2010) 238, 259 <www.oss-institute.org/storage/documents/Resources/studies/the-politics-of-open-source.pdf> accessed 01 October 2015.

359 Instituto Nacional de Tecnologia da Informação (ITI), ‘MULTINACIONAL PROCESSA PRESIDENTE DO ITI’ (05 August 2004) <www.iti.gov.br/noticias/indice-de-noticias/2347-multinacional-processa-presidente-do-iti> accessed 04 October 2015.

360 Projeto Software Livre Brasil, 'Projetos de Lei sobre Softwares Livres no Brasil' (14 July 2010) <http://softwarelivre.org/portal/noticias/projetos-de-lei-sobre-softwares-livres-no-brasil> accessed 04 October 2015.

361 Tony Mobily, ‘Vienna failed to migrate to GNU/Linux: why?’ (*Free Software Magazine*, 09 June 2008)<http://fsmsh.com/2892> accessed 04 October 2015.

362 John Blau , ‘Microsoft's Ballmer fights Linux in Munich’ (*InfoWorld*. 7 April 2003) <www.infoworld.com/article/2681986/operating-systems/microsoft-s-ballmer-fights-linux-in-munich.html> accessed 06 October 2015.

363 Free Software Foundation Europe, ‘Munich sticks with Free Software’, (16 October 2014) <https://fsfe.org/news/2014/news-20141016-01.en.html> accessed 06 October 2015.

possible. Public information, open debates and open processes facilitate not only a reduction on the impact of lobbyist, internal and external to the government, but also result in better policies and processes of implementation.

The advancement towards libre software has had an important political component in many countries of South America, being Venezuela the most prominent example in this regard. There are many declarations of political leaders and public officials of the region in this regard. For instance, the Uruguayan foreign minister stated in 2013: 'Free software is part of our agenda and our future because the values it represents are the same values of Uruguay: equality, freedom, sovereignty, right to choose, democracy and development'.[364]

Nevertheless, it is important to remark that a continuous and committed political support is fundamental for the success of a libre software policy. A recent study regarding public software in Latin America, estimated that one of the problems that 'public software' has had in many countries was its 'low political priority'.[365]

The importance of the political support is illustrated by the case of Paraguay. A Paraguayan leftist government supported libre software through different measures such as the mandate for its use in the public health sector[366] or the adoption of the public software model, the first country to adopt it after Brazil.[367] However, a new right-wing government has stalled the previous efforts, and in fact, it was appointed as director of the Intellectual Property office an opponent of the libre software initiatives of the previous government,[368] a former representative of the Software Alliance (BSA).[369]

The relevance of political support is also ratified in Munich, in one of the best known examples of public sector migrations. The IT-architect of the city declared to the European Parliament Committee on Legal Affairs, 'The main reason for such a project to fail is the lack of political

364 United Nations Educational, Scientific and Cultural Organization (UNESCO), 'Free and open source software for development' (23 September 2013) <http://www.unesco.org/new/en/communication-and-information/resources/news-and-in-focus-articles/all-news/news/free_and_open_source_software_for_development#.Vk3h54SglyQ>

365 Red GEALC, 'La Red GEALC y el Software público' (April 2015) 6 <http://portal.oas.org/LinkClick.aspx?fileticket=iyUeIhQogGo%3d&tabid=1729> accessed 19 November 2015.

366 Paraguay, Ministerio de Salud Pública y Bienestar Social, Resolución S.G. 914/2011, 'Por la cual se establece el uso de software libre, se dispone su implementación obligatoria en todos los establecimientos de salud públicos dle país, y se designa a la Dirección General de Información Estratégica en Salud dependiente del Ministerio de Salud Pública y Bienestar Social como responsible del seguimiento y la consolidación de este proyecto'.

367 Agencia de Gobierno electrónico y Sociedad de la Información y del Conocimiento (AGESIC), 'Gobierno Abierto' <www.agesic.gub.uy/innovaportal/v/2391/1/agesic/antecedentes.html> accessed 19 November 2015.

368 ABC Color, 'Se abre un amplio debate sobre el software libre' (02 September 2009) <http://www.abc.com.py/ciencia/se-abre-un-amplio-debate-sobre-el-software-libre-16867.html> accessed 19 November 2015.

369 Paraguay.com, 'El 'azote' del software ilegal, directora de Propiedad Intelectual' (22 August 2013) <http://www.paraguay.com/nacionales/el-azote-del-software-ilegal-directora-de-propiedad-intelectual-96496> accessed 19 November 2015.

support'.[370] The support of the mayor was key according to him.

It is clear that the political support is important. In order to advance successfully with a libre software policy, governments should assign to the topic a relevant position in their political agendas, without relegating it to a secondary aspect. This can be expressed through different ways. Concrete measures in this regard are the creation of a dedicated institution, as suggested in section 4.3, and the allocation of enough budgetary resources in order to develop the libre software policy. Without resources the policy will be futile.

4.7 LIBRE SOFTWARE COMMUNITY

An aspect that policymakers should pay particular attention is the libre software community. This community is international, integrated by a diverse group of people, from technical and non-technical background, and it seeks to promote libre software.[371] At the national level, normally there are multiple organizations that that can be considered as part of this global movement, and its role is fundamental for a successful libre software policy. Its importance manifests in three aspects: the process of creation of the policy, its implementation, and its advocacy. Good examples of these different expressions can be found in Venezuela.

In 2005, the first bill of the *Infogobierno* Law initially had the support of the libre software communities. However, the changes introduced to the text made that the bill was considered by them as a setback in comparison to the Decree 3390.[372] They sent their recommendations,[373] which were not adopted, leading to their opposition to the bill, which finally resulted in its archive due to the heated debate caused by the community.[374] In 2013, the opposite occurred with the second bill. This time, the comments of the community were adopted, the text was improved and finally approved.[375] These two legislative processes illustrate the role that an active community can play during the creation of the policy.

A recent initiative in Venezuela shows how the community can also take part in the implementation of the policy. In order to consolidate the use of libre software in the government and meet its technical support requirements, CONATI is creating a 'National Support Network for

370 Gijs Hillenius, 'Free and open source software across the EU' (2013) 5(2) International Free and Open Source Software Law Review 153,162 <http://dx.doi.org/10.5033/ifosslr.v5i2.90> accessed 19 November 2015.
371 Free Software Foundation, 'Meet the Free Software Community' <https://www.fsf.org/working-together/profiles/meet-the-free-software-community> accessed 17 November 2015.
372 Bracci (n 267).
373 VELUG, SOLVE, UNPLUG, 'Propuestas de la Comunidad de Software Libre ante el Proyecto de Ley de Infogobierno' (11 july 2006) <http://www.aporrea.org/tecno/a23468.html> accessed 17 November 2015.
374 Bracci (n 274).
375 ibid.

Libre Technologies'. This network will be integrated not only by public employees but by 'libre software activists'.[376]

An interesting recent development in the Venezuelan community is the advocacy for libre software, including its public policy, not only in traditional settings as the academy or during the legislative processes.[377] Despite the commitment of the Venezuelan government, they have mobilized in support of libre software. For instance, in March 2015, they marched in the streets of Caracas in support of libre technologies.[378] This type of actions makes more visible the libre software movement and puts pressure in the government to advance with its public policies.

The social oversight is fundamental to keep policies advancing. Recently in Ecuador for instance, an acquisition of proprietary software licenses worth 2.7 US million dollars was canceled due to the pressure of the community.[379]

On the other hand, the Peruvian case is also noteworthy. In section 3.1of the thesis the famous Peruvian law was explained. The libre software bill enjoyed significant support not only from the national libre software community but from communities of other countries, particularly Argentina.[380] The national and international communities advocate for the bill and contributed to counteract the arguments against it. The famous letter in defense of the bill and responding to Microsoft claims, was the result of a collective effort from Peruvian and international activists.[381] At the national level, activists campaigned for the bill not only on the internet but also in the streets, including the dissemination of fliers and posters.[382] However, unlike Venezuela, the result in Peru was not positive concerning the final law. This is relevant because it shows that despite great national and international support from libre software communities, efforts should be persistent and coordinated. As one of the Peruvian activists remarked:

We showed a great commitment and always supported with very specific goals... but we’re

376 CONATI, 'Crearán Red Nacional de Soporte Técnico en Tecnologías Libres' (23 September 2015) <http://conati.gob.ve/noticias/actualidad-nacional/280-crearan-red-nacional-de-soporte-tecnico-en-tecnologias-libres> accessed 17 November 2015.

377 Fundación Casa del Bosque, 'Movilización por el Software Libre y la Soberanía Tecnológica en Venezuela. Del Laboratorio hacker a las calles' (10 March 2015) <http://fcbosque.org/activistas-tecnologicos-de-colombia-opinan/item/121-movilizacion-por-el-software-libre-y-la-soberania-tecnologica-en-venezuela-del-laboratorio-hacker-a-las-calles.html> accessed 18 November 2015.

378 Proyecto GNU de Venezuela, 'Movilización por el Software Libre' (15 March 2015) <http://gnu.org.ve/2015-03-15/movilizacion-por-el-software-libre/> accessed 17 November 2015.

379 Asociación de Software Libre del Ecuador (ASLE), 'Se canceló la compra de 2.7 millones de dólares en licencias de Software Privativo' (18 November 2015) <http://www.asle.ec/se-cancelo-la-compra-de-2-7-millones-de-licencias/> accessed 21 November.

380 Richard Vernon, Don Marti, 'An Interview with Dr. Edgar Villanueva' (*Linux Journal* 24 May 2002) <http://www.linuxjournal.com/article/6099> accessed 18 November 2015.

381 Chan (n 348) 85.

382 ibid 87.

> lacking the time and conviction to sit down and talk about strategies and mid-term plans... We got the 'geek' community involved in politics... but we've failed to have it organized and go.[383]

Finally, a relevant experience to be mentioned is Brazil. The existence of a large libre software community in the country facilitated the development of the governmental policy, which could enjoy of not only political but social and technical support.[384] An important characteristic of the Brazilian case was that some prominent activists had political experience, which facilitated the advocacy of libre software within the government[385] and eventually, even the participation of activists in public positions to lead the implementation of libre software.[386]

In conclusion, libre software communities are fundamental for the success of a libre software policy, and therefore, the government should try to encourage their participation. As with cultural problems faced during migrations, the government relation with communities and the promotion of their participation requires creativity and specially understanding.[387] Their dynamics and characteristics are particular, normally based on sharing and more altruistic perspectives.[388] Consequently, a first measure that can be suggested is to have competent libre software activists in public positions, not only to deal with the communities but to lead from the government the development and implementation of the public policies and the processes of migration.

As expressed in the previous section, transparency and public participation is important. Libre software communities normally have less possibilities of influencing public decisions as other interest groups such as corporations. Therefore, the government should have public channels for the participation of people interested, such as the organization of public forums, public consultations (including virtual participation) or workshops.

In order to guarantee an effective participation, it is necessary that the government publishes on Internet all the information related with the libre software policy, not only during the process of creation but also during its implementation. Having access to such information, communities can contribute more properly to the creation of better policies and exercise social oversight.

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383 Ibid 95.
384 Shaw (n 358) 252.
385 Ibid 247.
386 Ibid 253
387 Matthias Sax, 'Economic efficiency of free and open source software in the public sector: the example of Chile' (*United Nations - ECLAC* October 2006) 54 <www.cepal.org/en/publications/3535-economic-efficiency-free-and-open-source-software-public-sector-example-chile> accessed 18 November 2015.
388 Kevin Daniel André Carillo, Sid Huff, Brenda Chawner, 'It's Not Only about Writing Code: An Investigation of the Notion of Citizenship Behaviors in the Context of Free/Libre/ Open Source Software Communities' (47th Hawaii International Conference on System Sciences, Hawaii, 2014) 3276 <http://dx.doi.org/10.1109/HICSS.2014.406> accessed 18 November 2015.

In this regard, it is suggested to introduce an obligation for public institutions of publishing annually a report containing the advancements, difficulties and in general all the information related to the implementation of the libre software policy in the institution. This report should be socialized in a public forum and also be available on Internet. In both spaces (presential and virtual), the institution should receive comments and suggestions, and the report of the following year must include the actions taken concerning them.

Especially relevant is the participation of security experts. They should be particularly encouraged to participate, in order to fully take advantage of the security benefits that libre software can provide, as highlighted in the section 2.1.4. A measure that could be employed is the use of vulnerability rewards programs. Monetary and non-monetary rewards could be given in order to find vulnerabilities in the libre software that the government uses.

Finally, and particularly relevant for countries where libre software communities are small and not very mature, the government should facilitated and encourage the creation and development of them. This may include measures such as the support of libre software events, as a bill currently in discussion in Bolivia is aimed to do with FLISOL,[389] a community-organized activity[390] which is possibly the world largest libre software event. These spaces, in which libre software supporters can gather, constitute a breeding ground for the creation and consolidation of communities, and the dissemination of libre software.

389 Nélida Sifuentes Cueto, Proyecto de Ley CS No 013/2015-2016, 'Que declara al Festival Latinoamericano de Instalación de Software Libre (FLISoL)-Bolivia, como actividad oficial del Estado Plurinacional de Bolivia' <http://www.diputados.bo/images/Docs/PL/PL-inicial/2015-2016/PL-CS-013-15.pdf> accessed 07 October 2015.

390 Festival Latinoamericano de Instalación de Software Libre - Venezuela, 'FAQ' <www.flisol.org.ve/faq/> accessed 07 October 2015.

5. CONCLUSIONS

The use of libre software has been growing around the world and the public sector is one of its main adopters.[391] The experiences in South America concerning this have shown different degree of success, which indicates there is room for improvement. In consideration of that situation, this thesis sought to propose some recommendations that could be adopted by South American governments in order to improve the adoption of libre software in the public sector.

To this end, potential risks or disadvantages of libre software for South American governments were considered, concluding that as with any other software they exist, but they are manageable and can be counteracted. 'The use of FOSS does not pose risks that are fundamentally different from the risks presented by the use of proprietary or self-developed software',[392] and more important, the benefits are more significant for the government than the potential risks or disadvantages, especially in developing countries as South Americans, that need to localize the software or create jobs. This conclusion gives the basis for the development of a libre software policy and gives it more legitimacy before society, which makes the policy stronger.

One of the first analysis that should be made when creating a libre software policy is the potential limitations that the country could have due to international treaties. Particular problematic could be dispositions regarding ‘government procurement' and 'investments'. These are normally included in Free Trade Agreements (FTAs) and Bilateral Investment Treaties (BITs), but also multilateral treaties as the Trans-Pacific Partnership (TPP) or the Trade in Services Agreement (TiSA). Regarding TiSA, currently under negotiation, it has been denounced that it contains a direct prohibition to prefer libre software.[393] In conclusion, under some dispositions of these treaties, if the governments adopts a preference for libre software it could suffer expensive legal actions by proprietary software companies, which would be decided by private arbitrators. Due to this risk, governments should exit such treaties, avoid to participate in them or at the very least, renegotiate them to expressly allow a policy mandating the use of libre software.

On the other hand, there have been a great number of initiatives in the region aiming to adopt libre software in the government. The adoption of open standards has been a common measure

391 Brian Buffett, 'Meeting on the Management of Statistical Information Systems' (MSIS 2014) (17 February 2014) 10 'Factors influencing open source software adoption in public sector national and international statistical organisations' <www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.50/2014/Topic_1_UNESCO.pdf> accessed 18 november 2015.

392 Federal Financial Institutions Examination Council, 'Risk Management of Free and Open Source Software' (2004) 1 <www.federalreserve.gov/boarddocs/srletters/2004/sr0417a1.pdf> accessed 18 November 2015.

393 Emma Woollacott, 'Leaked Draft Trade Agreement Could Threaten Open Source Deployment' (*Forbes*, 5 June 2015) <www.forbes.com/sites/emmawoollacott/2015/06/05/leaked-draft-trade-agreement-could-threaten-open-source-deployment/> accessed 20 November 2015.

implemented by countries seeking to migrate to libre software, which is logical consider its importance for enabling interoperability and therefore, for facilitating an eventual migration. This highlights the fact that the first step for a policy of migration to libre software should be the implementation of open standards.

Brazil stands out in this field for its e-Government Interoperability Standards (ePING).[394] In fact, Brazil has been considered the first developing country to have a 'formal policy mandating open standards'.[395] The Brazilian experience illustrates the recommendations in regard of open standards. The definition of open standard to be included in the legal regulation should exclude standards encumbered by patents, in order to avoid potential problems with libre licenses as the GNU GPL.[396] This is particularly relevant for South American countries considering that GNU GPL licenses, or licenses based on them as the LPG-Bolivia,[397] are commonly used in their public sector. In spite of this, the adoption of open standards should be progressive and therefore, temporary exceptions for using non-open standards should be allowed in order to not disrupt significantly the work of the public administration.

Moreover, the legal field in the region has been particularly prolific, at different levels (municipal, regional and national) and including executive regulations, as presidential decrees, and national laws of the congress. Considering the South American experiences, it is concluded that the general regulations of a libre software policy should be embodied in a national law, which should establish a mandate for the use of libre software licenses, if the government is truly seeking to migrate the public sector and therefore, fully benefit from its advantages. However, exceptions should be allowed but limiting its use. Regarding this, the investment in R&D is important in order to advance in the replacement of proprietary software solutions currently without appropriate alternative.

For a better compliance it is recommended the incorporation of mechanisms for the enforcement of the law, as experiences in Ecuador[398] and Venezuela[399] indicates. Particularly

394 Brazil, 'Padrões de Interoperabilidade de Governo Eletrônico – ePING' <http://eping.governoeletronico.gov.br/> accessed 19 November 2015.

395 'Deepa Kurup , 'A radical shift in e-governance' *The Hindu* (Chennai, 26 November 2010) <www.thehindu.com/sci-tech/technology/article907442.ece> accessed 20 November 2015.

396 Iain G Mitchell, Stephen Mason, 'Compatibility of the Licensing of Embedded Patents with Open Source Licensing Terms' (2010) 3(1) International Free and Open Source Software Law Review 25 <http://dx.doi.org/10.5033/ifosslr.v3i1.57> accessed 19 November 2015.

397 Agencia para el Desarrollo de la Sociedad de la Información en Bolivia (ADSIB), 'Licencia Pública General – Bolivia' (13 May 2014) <www.softwarelibre.gob.bo/licencia.php> accessed 20 November 2015.

398 Jenny Torres, Mariangela Petrizzo, 'Programas libres y de código abierto en la Administración Pública' in David Vila-Viñas and Xabier E. Barandiaran (eds), *BUEN CONOCER, FLOK Society, Modelos sostenibles y políticas públicas para una economía social del conocimiento común y abierto en el Ecuador* (2015) 688.

399 Luigino Bracci, 'Ley de Infogobierno impone multas, inhabilitaciones e impuestos para quienes se nieguen a usar software libre en el Estado' (*Alba Ciudad*, 18 August 2013) <http://albaciudad.org/wp/index.php/2013/08/ley-de-infogobierno-impone-multas-inhabilitaciones-e-impuestos-para-quienes-se-nieguen-a-usar-software-libre-en-el-

relevant is the incorporation of clear sanctions for public servants that do not comply. An example concerning this could be the Venezuelan *Infogobierno* Law.[400] However, regarding compliance other aspects that affect it should be taken into consideration in order to tackle them accordingly, particularly cultural and technical problems.

One of the most important aspects to be consider when migrating the public sector to libre software is the opposition that will be faced, not only external to the government but also within it. The power of proprietary software lobby should not be underestimated. In this respect, it is recommended to have political support from the highest levels of the government, which should be translated in a relevant position of the libre software policy within the government agenda and therefore, in concrete measures such as the allocation of sufficient resources to implement the policy. The importance of the political support is ratified not only by experiences in South America but also from outside the continent.[401] Furthermore, in order to counteract opposition, it is recommended transparency and openness to the greatest degree possible. This will expose more clearly the lobby against libre software and will facilitate that advocates counterbalance such opposition.

Concerning this aspect just mentioned, and in order to have better policies and better implementations of them, the role of libre software communities is fundamental. Therefore, it is recommended that the government promotes their participation. Some concrete measures pertaining to this is to have public consultations and to introduce an obligation of publishing periodical reports in order to guarantee the oversight of the progress of the policy implementation. Accountability, transparency and openness are essential to guarantee not only the participation of communities but the continuous progress of the migrations.

Furthermore, it is also necessary that within the public sector there is an appropriate capacity to implement a libre software policy. In relation to this, an important recommendation is the creation of a dedicated body for its implementation. Such entity, using experiences and contributions from all over the country and specialized public employees, could develop better guiding and support to public institutions in their migration. Brazil and Venezuela, the most advance countries in terms of libre software in the public sector, seem to have a similar approach.

A final aspect to be highlighted for a better adoption of libre software, is the international cooperation. Libre software is by nature international. Under this consideration and seen there is a potential for collaboration at the international level, evident in cases as the adoption of OrfeoGPL in

estado/> accessed 20 November 2015.

400 Venezuela, Ley de Infogobierno, Gaceta Oficial de la República Bolivariana de Venezuela 40274, 17 octubre 2013, art 81, art 83

401 Gijs Hillenius, 'Free and open source software across the EU' (2013) 5(2) International Free and Open Source Software Law Review 153,162 <http://dx.doi.org/10.5033/ifosslr.v5i2.90> accessed 21 November 2015.

other countries,[402] it is advisable to undertake international initiatives of cooperation. More concretely, it is recommended that South American countries advance towards an institutionalization of libre software and open standards in the framework of their international organizations of integration, specifically UNASUR and CELAC. A dedicated body, similar as the one suggested previously for the national level, would be significantly more effective if implemented at the international level taking advantage of the expertise developed by each country. Finally, concerning this aspect, the similarities shared with other countries of the 'Global South', and the political will to adopt libre software expressed by BRICS, represent an opportunity for cooperation with them in libre software projects.

In conclusion, this set of recommendations just presented constitute the answer to the central research question of the thesis. Additionally, implicit in many of the aspects analyzed, it is found the necessity of planning and developing carefully the libre software policy. Likewise, its implementation should be progressive, migrations should not be done hastily. However, it is equally important that they keep advancing, which puts a great importance in social oversight and therefore, in libre software communities.

A migration of the public sector is undoubtedly a complex matter. The complexity and extension of the topic requires that further research be conducted. For instance, the role that cultural and technical issues have played in processes of migration in South America deserves special further detailed research in order to develop more effective methods to counteract them. In view of its importance, another area that deserves particular attention in further research is the role of South American libre software communities, their dynamics and how can they contribute more effectively to the implementation of libre software in the government.

On the other hand, similarities between South American countries allow to analyze them together and propose common recommendations as it was done in this thesis. However, as mentioned in the introduction, this thesis does not contain a detailed analysis of the situation of libre software in the public sector of each country. Instead, it takes common measures found along the region. In consideration of this, more detailed analysis of the particularities of each country experiences would be relevant. It can contribute not only to the specific country analyzed but to others with similar characteristics.

Regarding the limitations, it is also important to mention the lack of available quantitative data in relation to the migrations in South America. This data is usually very limited, which makes difficult to asses the effectiveness of measures. Therefore, future research could contribute

402 Secretaría Nacional de la Administración Pública , 'SGDQ – Sistema de Gestión Documental Quipux' <http://www.administracionpublica.gob.ec/sgdq-sistema-de-gestion-documental-quipux/> accessed 21 November 2015.

obtaining more quantitative data that allow to develop further studies.

Nevertheless, in spite of its limitations and the opportunities for further studies, this thesis is a contribution to the current debate regarding the adoption of libre software in the public sector of South America. Research concerning this is limited, mostly in Spanish and Portuguese, and usually focus on one country or institution. To the best knowledge of the author, there is no academic text in English focused on the adoption of libre software in the public sector of South American countries. This thesis contributes to fill this gap from a legal and policy perspective, and it is therefore, a contribution to the field of information technology law and public policy concerning libre software.

Moreover, it seeks to advance providing recommendations aiming to improve the adoption of libre software in the public sector. It is expected that it could serve for further research and particularly for policymakers in South America and Latin America, not only at the national level but at the international level in organizations such as UNASUR or CELAC. Likewise, it also can provide elements for analysis in other regions of the world. In addition, it is also expected that activists can take advantage of this work in order to have more elements of support for promoting a better migration of the public sector to libre software.

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