

Appendixes

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1. Appendix A. Learning guide

A.1. Introduction

What is free software? What is it and what are the implications of a free program licence? How is free software developed? How are free software projects financed and what are the business models associated to them that we are experiencing? What motivates developers, especially volunteers, to become involved in free software projects? What are these developers like? How are their projects coordinated, and what is the software that they produce like? In short, what is the overall panorama of free software?

These are the sort of questions that we will try to answer in this document. Because although free software is increasing its presence in the media and in debates among IT professionals, and although even citizens in general are starting to talk about it, it is still unknown for many people. And even those who are familiar with it are often aware of just some of its features, and mostly ignorant about others.

A.2. Aims

The general aim is, unquestionably, that the reader understand and think logically about basic free software concepts and their main implications. Let us look for more specific aims:

- Knowing what is (and what is not) free software and the main consequences that such a definition has.
- Exploring the rudiments of the legal questions surrounding free software and, particularly, the importance of licenses, the main types and their consequences.
- Having a perspective of the reality of free software, from a global and historical point of view and from the perspective of the most advanced and current projects.
- Learning and getting to know the methods in which free software projects may be financed (when such means exist) and the relevant business models.
- Learning the most important details of the free software development models and the methods for studying them from the perspective of software engineering.

A.3. Contents and learning plans

This text is structured into various chapters (didactic modules) and written in such a way that they are practically independent and self-contained, which means that, excepting the introduction, the book can be read in any order. However, readers are advised to follow the order established for the book, in accordance with the plan below.

The course will be structured in ECTS credits, which means that the planning will require an overall effort from the student, which will include exercises and debates, which will last 150 hours.

Chapter 1 (6 hours). Introductory module discussing all the specific aspects of free software and focusing essentially on an explanation of the underlying basis, for people who are learning about the matter for the first time and on highlighting its importance. An introduction covering the definition of *free software* and its main consequences, amongst other elements, will be provided.

Aims	Content	Materials	Activities	Time
Learning what <i>freedom</i> means with regard to software	The four freedoms	Section 1.1.1	Reading the material	2 hours
Distinguishing between <i>free software</i> and other related concepts	Definition of related concepts, whether they are similar or analogous	Section 1.1.2	Reading the material and making suggestions	1 hour
Introducing the reasons for which free software is made	Ethical and practical motivations	Section 1.2	Reading the material and making suggestions	1 hour
Introducing the consequences of free software	Consequences for the user, the State, the developer, etc.	Section 1.3	Reading the material and making suggestions	2 hours

Chapter 2 (14 hours). Historical development of the world of free software, from its beginning in the seventies to the current moment, offering a broad vision of the most notable milestones, the main projects, the financial, professional or social evolution, etc.

Aims	Content	Materials	Activities	Time
Learning about the "prehistory" of free software	Facts before the existence of the concept	Section 2.1 and beginning of annex B	Reading the material and making suggestions	2 hours
Learning about the history of free software all the way up to the present day	Most significant events in chronological order	Sections 2.2, 2.3, 2.4 and rest of annex B	Reading the material and making suggestions	10 hours
Trying to predict the future	Some predictions (hopes and problems)	Section 2.5	Reading the material and making suggestions	2 hours

Chapter 3 (9 hours). Legal aspects of free software. The most common free software licenses and their effects on business and development models will be analysed in detail.

Aims	Content	Materials	Activities	Time
Learning the basic concepts of intellectual and industrial property	Copyright, intellectual property, patents, brands, industrial secrets	Section 3.1	Reading the material and making suggestions	3 hours
Learning the legal basis of free software: the licenses	Definition of free licenses and the features of the most important licenses	Section 3.2	Reading the material and making suggestions	7 hours

Chapter 4 (8 hours). Characteristics of free software developers and the motivations that lead them to participate in the projects, thereby making the existence of free programs possible.

Aims	Content	Materials	Activities	Time
Getting to know the type of people that develop free software	Ages, genders, professions, geographical location, etc.	Sections 4.1, 4.2, 4.3 and 4.4	Reading the material and making suggestions	4 hours
Learning how much time to spend on it and why	Weekly dedication, motivations, questions of prestige and leadership	Sections 4.5, 4.6, 4.7 and 4.8	Reading the material and making suggestions	4 hours

Chapter 5 (22 hours). Financial aspects of free software and, especially, methods for financing the projects and business models that are being explored.

Aims	Content	Materials	Activities	Time
Learning about the sources of finance	Financial sources used	Section 5.1	Reading the material and making suggestions	8 hours
Learning how to profit from free software	Business models	Sections 5.2 and 5.3	Reading the material and making suggestions	8 hours
Learning about the relationship between free software and the monopolistic situations that are typical in the software industry	Monopolies and software. Free software's role	Sections 5.1, 5.2, 5.3 and 5.4	Reading the material and making suggestions	6 hours

Chapter 6 (28 hours). Relationship of policies and free software and, especially, policies for promoting free software and the use of free software by public administrations.

Aims	Content	Materials	Activities	Time
Learning about the effect of free software on public administrations.	Main effects and difficulties in implementation	Section 6.1	Reading the material and making suggestions	4 hours
Learning about what administrations do or can do with regard to free software	Solutions to needs, promotion and investment in R&D	Section 6.2	Reading the material and making suggestions	4 hours

Aims	Content	Materials	Activities	Time
Learning about legislative initiatives	Revision of legislative initiatives for implementing or supporting free software, including examples of specific texts.	Section 6.3	Reading the material and making suggestions	20 hours

Chapter 7 (12 hours). Management and development models for free software projects, techniques that have been successful and quantitative and qualitative studies of free software from the perspective of development.

Aims	Content	Materials	Activities	Time
Learning about the paradigmatic models of software development	"The cathedral and the bazaar"	Sections 7.1, 7.2, 7.3 and 7.5	Reading the material and suggested bibliography	3 hours
Learning about the processes involved in the development of free software	Characteristic processes	Section 7.4	Reading the material and suggested bibliography	3 hours
Learning about the possibilities and realities that the availability of sources and the associated registries bring to the free software engineering	Resources and quantitative studies	Section 7.6	Reading the material and suggested bibliography	3 hours
Learning what remains to be done in free software engineering	Future tasks	Section 7.7	Reading the material and suggested bibliography	3 hours

Chapter 8 (14 hours). Introduction of the technologies and development environments for free software and their effects on the management and evolution of the projects.

Aims	Content	Materials	Activities	Time
Learning the general features of the environments and the tools that free software developers use	General characterisation	Section 8.1	Reading the material and suggested bibliography	1/2 hour
Learning the basic development tools	Languages, compilers, operating systems, etc.	Section 8.2 and 8.3	Reading the material and suggested bibliography	2 hours
Learning the basic methods with which developers work together	Messaging, forums, repositories, chats and <i>wikis</i>	Section 8.4	Reading the material and suggested bibliography	2 hours
Learning the mechanisms used to manage sources and their versions	CVS and new alternatives	Section 8.5	Reading the material and suggested bibliography	4 hours
Learning how free software is documented	Languages and tools for documentation	Section 8.6	Reading the material and suggested bibliography	2 hours
Learning how errors and tasks are managed	Bug management systems	Section 8.7	Reading the material and suggested bibliography	1 hour
Learning how portability is supported	Resources for other architectures	Section 8.8	Reading the material and suggested bibliography	1/2 hour
Learning about the public environments of integrated development	SourceForge and others	Section 8.9	Reading the material and suggested bibliography	2 hours

Chapter 9 (30 hours). Studying free software projects (revising the most interesting classical free software projects, in terms of results obtained, management model, historical evolution, effect on other projects, etc.). Study of companies related to free software.

Aims	Content	Materials	Activities	Time
Learning an example of operating systems	Linux and *BSD	Sections 9.1 and 9.2	Reading the material and suggested bibliography	8 hours
Learning an example of desktop environments	Gnome and KDE	Sections 9.3 and 9.4	Reading the material and suggested bibliography	8 hours
Learning an example of system programs	Apache	Section 9.5	Reading the material and suggested bibliography	2 hours
Learning an example of end user programs	Mozilla and OpenOffice	Sections 9.6 and 9.7	Reading the material and suggested bibliography	4 hours
Learning an example of a distribution	Red Hat and Debian	Sections 9.8 and 9.9	Reading the material and suggested bibliography	8 hours

Chapter 10 (6 hours). Module in which free resources other than software are presented; these are resources that have been created partly thanks to free software and the model that it has given.

Aims	Content	Materials	Activities	Time
Learning other free resources	Free texts, hardware, teaching materials and art	Section 10.1	Reading the material and suggested bibliography	3 hours
Learning about the applicable licenses	Licenses, especially the Creative Commons licenses	Section 10.2	Reading the material and suggested bibliography	3 hours

2. Appendix B. Key dates in the history of free software

This is only a list of the dates that could be considered to be important in the history of free software. It is based on the one that appears in [132] and the one provided by the Open Source Initiative [146] and is not supposed to be comprehensive: there are certainly many important dates that have not been included in the list. However, we hope to provide a sufficiently complete view of the historical landscape in which the world of free software has evolved.

Dates	Events
1950s and 1960s	The software is distributed with its source code and without any restrictions on the user groups such as SHARE (IBM) and DECUS (DEC).
1969, April	RFC number 1, which describes the first Internet (then called ARPANET) is published. The free availability of the RFCs and, particularly, of the specifications of the protocols used in Internet were key factors for its development.
1970, January	IBM began selling its software separately, creating the beginning of the proprietary software industry.
1972	Unix begins to be distributed in universities and research centres.
1973	Unix arrives at Berkeley University, in California. The history of Unix BSD begins.
1973	SPICE is placed by Donald O. Penderson in the public domain. With time, it will become the standard in its field (integrated circuit simulators).
1978	Donald Knuth, of Stanford University, starts working on TeX, an electronic typesetting system that will be distributed as free software.
1983	Richard Stallman writes "The GNU Manifesto", in which he asks for software to be shared with the public again.
1984	The GNU project begins. The developers that work on it, initially coordinated by Richard Stallman, begin to create a large number of tools similar to those in Unix, including an editor (Emacs) and a compiler (GCC). The aim is to build an operating system that is completely free.
1985	The X Consortium, based at MIT, distributes the X Window system as free software, under a license that is hardly restrictive at all.
1985	Richard Stallman founds the Free Software Foundation. Among other tasks, the Foundation will work as a centre that receives the funds and resources that will assist the development of the GNU project and as the owner of the intellectual property generated by the project.
1989	Cygnus, the first company that essentially provides commercial services for free software (including support, development and adaptation of free programs), is founded.
1989	The Network Simulator (or simply, ns) begins to be developed as a variant of the REAL Network Simulator. Ns is a free telecommunication network simulator that will be used extensively by universities all over the world and that will become a standard in its field, to a certain extent.
1990	The Free Software Foundation announces that it intends to build a kernel that will be called GNU Hurd. The aim of this project is to complete what the GNU project's strategy was most missing: a complete operating system.

Dates	Events
1991	William and Lynne Jolitz write a series in <i>Dr. Dobbs Journal</i> on how to port BSD Unix to PC based on the i386.
1991, August	Linus Torvalds, a twenty-one year old Finnish student announces that he has begun work on a free Unix-type kernel using GNU tools, such as GCC. His aim at the time is to build a <i>free Minix</i> .
1991, October	Linus Torvalds releases the first version of his kernel, which is still very primitive and is called Linux.
1992	The US Air Force awards New York University a contract to build an open source compiler for the new version of Ada (a language that it was almost obligatory to use at that time in all contracts with the US military), Ada 95. The NYU team chooses GNU GCC for the generation of code and calls its compiler GNAT (GNU NYU Ada 95 Translator).
1992, July	William and Lynne Jolitz release 386BSD 0.1, which, with time, will give rise to the projects NetBSD, FreeBSD and later OpenBSD.
1993	SuSE is founded in Germany, which begins its business distributing Slackware Linux, translated into German.
1993, August	Ian Murdock starts a new distribution based on Linux called Debian GNU/Linux, which will become the distribution built by voluntary developers with the most participants.
1993, December	FreeBSD 1.0, one of the first stable distributions derived from the Jolitz's 386BSD is released on the Internet.
1994	The GNAT developers found the company Ada Core Technologies, with the aim of guaranteeing its development and evolution in the future and with a business model based on providing services to their clients' compiler (and not selling the compiler itself, which continues to be free software). With time, GNAT will become the leader in the market of Ada compilers.
1994, January	Version 0.91 of Debian GNU/Linux is released; it is the fruit of the efforts of twelve developers.
1994, March	The first edition of the <i>Linux Journal</i> is published.
1994, 29 th July	Marc Ewing publishes the first version of Red Hat Linux. As is the case with Debian, the aim is to improve the results of the predominant distribution in that time, Slackware.
1994, October	NetBSD 1.0. is released
1995	Bob Young founds Red Hat Software buying the Red Hat Linux distribution from its creator, Marc Ewing, and merging it with his own business, ACC, which has been selling materials related to Linux and Unix through catalogue since 1993. A little later, Red Hat Linux 2.0 is released; it is the first distribution that includes the RPM packaging format.
1995	DARPA supports the development of ns through the VINT project.
1995, January	FreeBSD 2.0. is released
1995, April	The first official release of Apache (0.6.2) takes place.
1996	The First Conference on Freely Redistributable Software takes place in Cambridge, Massachusetts, US.
1996, October	The KDE project is announced; it is one of the first to address usability problems in the Unix environment and the first that tries to do so on a large scale in the world of free software.
1997, January	Eric S. Raymond presents his paper "The cathedral and the bazaar", in which he expresses his opinions on why certain free software development models work.
1997, August	Miguel de Icaza announces the GNOME project, a <i>competitor</i> to KDE with similar aims, but with the explicit objective of ensuring that the whole of the resulting system is free software. Born as a reaction of the Free Software Foundation and others to the licensing problems that KDE had, which involved a fundamental component, the Qt library, which was not free software at that time.

Dates	Events
1998, 22 nd January	Netscape declares its intention of distributing as free software the code of its browser (Netscape Navigator), which had been the leader in the web browser market.
1998, 3 rd February	Chris Peterson, Todd Anderson, John Hall, Larry Augustin, Sam Ockman and Eric Raymond meet up to study the consequences of Netscape's announcement with regard to the release of its browser and decide to promote the term <i>open source software</i> [146], using it as a brand that guarantees that the products that have it consist of free software. The promoters of this term understand that it is more appropriate for the corporate world than the one that was more commonly used up to that moment, <i>free software</i> . The Open Source Initiative is created to manage the term.
1998, 31 st March	Netscape publishes a large part of its source code for Netscape Navigator on the Internet.
1998, 7 th May	Corel announces the NetWinder, a <i>network computer</i> based on Linux. It is the first time that a large company commercialises an element that uses software that is basically free software. Shortly afterwards, Corel announces its plan to port its office software (which includes WordPerfect) to Linux, which is also a novelty for the time.
1998, 28 th May	Sun Microsystems and Adaptec become part of Linux International. They are the first big IT companies to do so.
1998, June	The technical conference of USENIX, which is usually dedicated to Unix, opens a parallel session called FREENIX, focusing on free software.
1998, 22 nd June	IBM announces that it will commercialise and provide support for Apache, using it as the server of its WebSphere product line.
1998, July	Debian GNU/Linux 2.0 is released; it has been built by more than three hundred volunteers and the distribution includes more than one thousand five hundred packages.
1998, July	KDE 1.0 is released; it is the first version distributed as <i>stable</i> . Several GNU/Linux distributions incorporate it shortly afterwards.
1998, August	Linus Torvalds and Linux appear on the cover of <i>Forbes</i> magazine.
1998, 29 th September	Red Hat, which is the leading company in the market of Linux-based distributions at the time, announces that Intel and Netscape have bought a minority share in its capital. Free software begins to awaken interest among investors.
1998, November	MandrakeSoft is founded and shortly afterwards, it releases Mandrake Linux, its distribution of GNU/Linux.
1998, 1 st November	The <i>Halloween Documents</i> , in which Microsoft supposedly identifies GNU/Linux and free software as an important competitor and plans how to attack it, are published.
1999, 27 th January	HP and SGI announce that they will support Linux in their computers, which marks the beginning of a trend: the abandonment of proprietary Unix by the computer manufacturers that used them as <i>their</i> operating system, in favour of Linux.
1999, March	GNOME 1.0, which will subsequently be made more stable (October GNOME) and incorporated in several GNU/Linux distributions, is released.
1999, 9 th March	Debian GNU/Linux 2.1 is released, with more than two thousand packages.
1999, 15 th March	Apple releases Darwin, which will be the central component of its new Mac OS X, under a free license.
1999, August	Red Hat is floated on the stock exchange. The price of the shares increases enormously in the first days after the float, to the extent that it is capitalised at 4,800 million dollars. Later, other companies related to free software, such as VA Linux and Andover.net, will also be floated on the stock exchange. The value of the shares of all these companies will plummet a few years later, when the dotcom bubble explodes; many of these companies will not survive the event.

Dates	Events
1999, October	Two companies are founded in order to produce software in the framework of the GNOME project: Eazel (which will go bankrupt in 2002, after producing Nautilus, a file manager) and Helix Code (later renamed Ximian and subsequently bought by Novell, which will produce tools such as Red Carpet or Evolution).
1999, November	Red Hat Software buys Cygnus. The resulting company is the biggest company in the world in the field of free software.
2000, January	Mozilla M13, considered by many as the first reasonably stable version of Mozilla, is released almost two years after the release of a large part of Netscape Navigator's code.
2000, May	GNOME 1.2 (Bongo GNOME) is released.
2000, August	The creation of the GNOME Foundation is announced.
2000, 15 th August	Debian GNU/Linux 2.2 is released, with more than two thousand five hundred source packages, which comprise approximately 55 million lines of code.
2001, January	Version 2.4 of Linux is released.
2001, 15 th January	Wikipedia is started. The idea of building an encyclopaedia using a <i>wiki</i> as IT support, where, in principle, anyone can cooperate, applying working methods that are very similar to those used in free software, becomes a reality.
2002, 30 th January	ObjectWeb, an organisation founded in France by Bull, France Telecom and INRIA that is one of the first organisations designed to produce free software by cooperating with companies and research centres, is founded with clearly commercial objectives and the idea of being the nucleus of an international community of interests.
2002, 3 rd April	KDE 3.0, the third generation of the KDE desktop environment, is released. The quality of free desktops begins to match that of traditional commercial desktops.
2002, April	The gnuLinEx project is publicly announced; with this project, the Regional Government of Extremadura (Spain) wishes to use its own GNU/Linux distribution in the computers of all the public schools in the region.
2002, May	Mozilla 1.0, the first officially stable version of the project, is released.
2002, 1 st May	The office suite, OpenOffice.org 1.0, is released; it will soon become a standard office application suite in the free software world.
2002, 26 th June	GNOME 2.0, which represents an important step forward for users, with a more carefully designed interface and more attention to user-friendliness, is released. Other aspects that improve the accessibility are also introduced.
2002, 19 th July	Debian GNU/Linux 3.0 is released with more than 100 million lines of source code; more than nine hundred developers participate in this version.
2002, 28 th July	Version 3.0 of Knoppix is released; it is an evaluation distribution that can be installed on a hard disk quickly and easily, and it becomes a tremendous success.
2002, 23 rd September	The first version of Firefox (which is called Phoenix at the time) is released, as an experimental extension based on the code of Mozilla Suite that is supposed to be simpler.
2002, December	Red Hat Software announces that its cash flow in the second and third quarters of 2002 was positive.
2002, 16 th December	The first Creative Commons licenses are published (although the project was launched in 2001).
2003, January	MandrakeSoft, a company that produces the Mandrake Linux distribution, declares bankruptcy.
2003, 19 th January	FreeBSD 5.0-RELEASE is released, after almost three years of work since the previous stable large-scale version.

Dates	Events
2003, 22 nd January	The number of articles in English on Wikipedia reaches one hundred thousand articles. Shortly afterwards, the number of German articles reaches ten thousand.
2003, February	Motorola begins selling the A760 in China; it is the first mobile telephone that uses an operating system based on Linux (the MontaVista Linux distribution).
2003, 6 th March	The SCO group files a lawsuit against IBM for <i>devaluing</i> its version of Unix. This marks the beginning of a lawsuit in which IBM is accused of contributing code that belongs to SCO to the Linux kernel.
2003, 28 th May	Munich City Council (Germany) announces that Linux will replace Windows in most of its computer systems.
2003, July	MandrakeSoft announces that its finances have been positive for the whole year and that it expects to come out of receivership in late 2003.
2003, 7 th July	An open letter [220] is written to the WIPO (World Intellectual Property Organization) asking it to examine new open models of collaborative creation (including free software but also the Human Genome project or open scientific journals).
2003, 15 th July	The Mozilla Foundation is established. Netscape Inc. (now the property of AOL) announces that it will no longer develop the Netscape browser and, therefore, it will no longer work on the Mozilla project. The Mozilla Foundation is established with a donation of two million dollars from AOL and material support and human resources from various companies, including AOL itself, Red Hat and Sun Microsystems.
2003, 4 th August	Novell buys Ximian Inc., one of the leading companies in the development of free software (especially for GNOME), as part of its strategy to establish itself in the market for Linux-related solutions.
2003, 2 nd September	OpenOffice.org 1.1 is released.
2003, 24 th September	The European Parliament amends the Directive on Patentability of Computer-Implemented Inventions so that (if it is approved as it stands) software patents are not allowed in the European Union. The Directive, which was originally proposed by the European Commission precisely to ensure that these types of patents were legal, is still in the codecision procedure, in which the Council of Ministers will also have to provide its opinion.
2003, 5 th November	Version 1 (FC1) of de Fedora Core, the fruit of the communal development process that Red Hat had announced a few months before, is released. As of this moment, the company Red Hat will commercialise Red Hat Enterprise Linux, whilst the Fedora Core collections are not officially maintained by Red Hat, but by the community of voluntary developers that build it with the assistance of Red Hat (which already existed before Red Hat decides on this collaboration).
2004, 13 th January	Novell finishes its purchase of SuSE for a total of 210 million dollars.
2004, 9 th February	The Mozilla Foundation decides to change the Mozilla Firebird name (previously called Phoenix) to Mozilla Firefox. This will be the definitive name of the browser, while its development is close to version 1.0.
2004, 18 th May	The European Council, as part of the codecision process on the European Directive on the Patentability of Computer-Implemented Inventions, decides to submit a <i>compromise</i> version of the text to the European Parliament; however, it is accused of ignoring the Parliament's vote, as the new version permits the patenting of software. The decision is so contentious, even within the Council itself, that it is not formally approved until March 2005.
2004, 8 th September	Pepper Computer announces that it will launch the first miniPC with a touch screen that uses an operating system that is completely free, based on Fedora Core.
2004, 20 th September	The number of articles on Wikipedia reaches one million, in one hundred and five languages.
2004, 20 th October	The first version of Ubuntu is released; it is based on Debian and the aim is to publish new versions regularly. The construction of the distribution is financed by the company Canonical, which offers maintenance and services for the distribution. The distribution will become very successful, fairly quickly.

Dates	Events
2004, 9 th November	Version 1.0 of Firefox is released, after a long series of preparatory versions. This version was downloaded more than 25 million times in the one hundred days following its release.
2005, 24 th January	MandrakeSoft announces that it is buying the Brazilian company Conectiva, which releases a distribution based on linux with the same name. Shortly afterwards, MandrakeSoft announces that it is changing its name to Mandriva.
2005, 1 st May	OASIS recognises ODF (<i>open document format</i>), the data format use by OpenOffice.org 2.0, among others, as a standard.
2005, 25 th May	Nokia announces its Nokia 770, a miniPC that uses a version of Debian GNU/Linux with the X Window system and GTK+.
2005, 6 th June	Debian GNU/Linux 3.1 is released; it now has more than 200 million lines of source code.
2005, 14 th June	Sun Microsystems releases Open Solaris, the free version of its Solaris operating system.
2005, 15 th June	Mandriva buys the US company Lycoris (previously called Redmond Linux) and begins working on a distribution that incorporates the previous versions of Mandrake, Conectiva and Lycoris.
2005, 6 th ly	The European Parliament rejects the proposal of the Directive on the Patentability of Computer-Implemented Inventions received from the Council of Ministers, during the second reading. This means that the only legal text applicable to the subject in the European Union is the European Patent Convention of 1973.
2005, 20 th October	Version 2.0 of OpenOffice.org, which is distributed under the LGPL, is released.
2005, December	The first version of Ruby on Rails, a work environment for the development of web applications using the model-view-controller architecture, is released. Distributed with license X11, it will be widely used in the prototyping and development of numerous web services.
2005, December	Nicholas Negroponte announces the OLPC (One Laptop Per Child) project, which has the aim of designing and building a portable PC of 100 dollars for children in developing countries. It uses free software with a GNU/Linux version called Sugar, based on Red Hat.
2005, 14 th December	The science journal <i>Nature</i> publishes a paper comparing Wikipedia with the <i>Encyclopaedia Britannica</i> ; according to the paper, the degree of precision with regard to scientific subjects of both encyclopaedias is similar.
2006, 16 th January	The first draft of the GPLv3 is published; it is an attempt to update the GPL, which is the license that is most commonly used for free software projects at the time (and by a long way). At this point, an open debating process begins with regard to the changes.
2006, 1 st March	The number of articles in English on Wikipedia reaches one million.
2006, 20 th March	Fedora Core 5 is released.
2006, 1 st June	Ubuntu 6.06 LTS is released; it is advertised as being supported by the company Canonical for three years.
2006, August	The number of Firefox downloads reaches 200 million (there are many more downloads from unofficial sites, which are not taken into account). Around this time, it is estimated that the browser has a 12% share of the global market (approximately 20% in Europe).
2006, 12 th November	Sun announces that it will release the different versions of the Java platform under the GPL. Up until this moment, these versions had been distributed for free in binary, which Sun had justified citing compatibility and stability issues; however this has made it extremely difficult to use Java in free software distributions.
2006, 30 th November	The ISO (International Standards Organization) and the IEC (International Electrotechnical Commission) jointly publish OASIS' ODF version as an international standard (ISO/IEC 26300:2006) for the exchange of office information.

Dates	Events
2006, December	The Taiwanese company First International Computer (FIC) presents the first advanced mobile telephone based on code that is completely open, in the Open Source in Mobile conference. It is called Neo1973, it costs 350 dollars and it uses a software platform called OpenMoko, based on the kernel of Linux 2.6, GTK+, X Windows and Matchbox.
2007, January	The FLOSSImpact [80] study, on the effect (especially the economic effect) of free software, is published. The study has been financed by the European Commission and it is the first large-scale study in the field.
2007, 23 rd February	Version 3.0 of the Creative Commons Licenses is published.
2007, 8 th april	Version 4.0 of Debian GNU/Linux is released.

3. Appendix C. GNU Public License

Version 2, June 1991

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Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Lesser General Public License instead.) You can apply it to your programs, too.

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Also add information on how to contact you by electronic and paper mail.

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Gnomovision version 69, Copyright (C) *yearname of author* Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

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signature of Ty Coon, 1 April 1989 Ty Coon, President of Vice

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4. Appendix D. Texts of some legislative proposals and related documents

Below is the literal text of some of the legislative proposals mentioned in chapter 6 and of some of the related documents.

D.1. Draft bill brought by Laffitte, Trégouët and Cabanel (France)

We provide below a translation of the proposed law made in October 1999 by the French senators Pierre Laffitte, René Trégouët and Guy Cabanel [laffitte99:_propos].

D.1.1. Recitals

(Only the paragraphs on free software are included.)

[...] In order to guarantee the perpetuity of accessible data, facilitate its exchange and ensure that citizens have free access to information, the use of this information by the Administration must not depend on the goodwill of software manufacturers. It is necessary to have free systems whose development may be guaranteed thanks to the manufacturers' source code being available to all.

Free software is currently developing very fast. There are many IT companies that recognise that the future of their business is not in selling software, but in assisting people that use it, by providing the associated services.

Our bill would establish that, after a transitional period defined by decree, the use of free software will be obligatory in all public administrations.

Proprietary software, whose source code is not freely available, may only be used in specific cases, when an authorisation is provided by a free software agency. [...]

D.1.2. Articles

- Article 1. On the dematerialisation of information and data exchange between public administrations.
State services, local administrations and public bodies will ensure that their information and data are put into an electronic format, with electronic networks, as of 1st January 2002.

The conditions that regulate the transition from the current paper-based exchange and the future exchange using electronic formats and networks will be specified by decree.

- **Article 2. On the dematerialisation of public market processes.**
In order to guarantee a great degree of transparency and quick access to information for companies, all public tenders and the attached documents, will be published in electronic formats and networks, as of 1st January 2002. Likewise, all bids for public tenders must be published in electronic formats and networks.
A decree will determine the mechanisms of the transition to electronic processes.
- **Article 3. On open technologies.**
Subject to the exceptions mentioned in article 4, as of 1st January 2002, State services, local administrations and public bodies may only use software that is free to use and modify and for which the source code is available.
A decree will determine the terms and conditions of the transition.
- **Article 4. On the Free Software Agency.**
A Free Software Agency will be created. It will be in charge of informing the State services, local administration and public bodies of the conditions in which this law must be applied. The Agency will determine the use of software licenses that are appropriate in the context established by this law.
The Agency will ensure the interoperability of the free software used by the public administrations.
The Agency will make an inventory, for each sector, of any fields in which there is no available free software, no applicable software that can be freely used and modified or no applicable software whose source code is available. On the basis of this inventory, the Agency will declare the relevant public administrations as exempt from this law.
The Free Software Agency will be open to all Internet users, and their decisions must be preceded by consultations made on the Internet.
A representative of the Free Software Agency will be appointed in each prefecture.
The Free Software Agency's methods of working will be established by decree.
- **Article 5. On the dissemination of the modifications to the software used in the context of this law.**
The Free Software Agency will ensure, whilst respecting copyrights, that the modifications to the software are disseminated in accordance with the framework of this law.

- Article 6.
The costs incurred by the State as a result of this law will be compensated through increases in the rights defined in articles 575 and 575A of the General Tax Code.

D.2. Draft Bill of Le Déaut, Paul and Cohen (France)

We will now provide a translation of practically the whole of the draft bill presented by Jean-Yves Le Déaut, Christian Paul and Pierre Cohen in April 2000.

D.2.1. Recitals

The tremendous growth in the use of new information technologies and telecommunications has made it necessary to produce accompanying legislation. The public services and the local administrations must become the model and engine of the information society that will guarantee individual freedoms, consumer safety and equal opportunities in the field in question.

Various examples show that, despite some significant progress achieved thanks to the actions of the Government in the field of the information society, the State services tend to use communication standards that are intimately linked to one single private provider, which means that a user or collective is bound to act as the client of this same provider, thereby strongly reinforcing the phenomena of abuse of dominant position.

The State service often use software with source code that is not available, which makes it impossible to correct the bugs and faults that the suppliers themselves refuse to correct or check whether there are security deficiencies in sensitive applications. The State services use, sometimes unknowingly, software that secretly transmits information that is *a priori* considered confidential, to foreign societies or organisations.

However, the economic models of the software and telecommunications industry developed by the market are based, to a large extent, on the appropriation of clientele and the exponential valuation of the obtainment of user profiles. These economic models reward strategies of providing incompatible products, of industrial secrets and of planned obsolescence and the violation of individual freedoms. Although the French State cannot eliminate these underlying tendencies using the law due to the transnational nature of communication networks, it can, however, facilitate the development of an information society on French soil that is respectful of public freedoms, of consumer safety and of equal opportunities, and this would hopefully set a precedent for Europe and the world.

The law is based on five principles: a citizen's right to have free access to public information, the perpetuity of public data, the security of the State, consumer safety in the information society and the principle of software interoperability.

In order to guarantee the citizen's free access to public information, the code of the computerised data provided by the Administration must not be linked to one single supplier. Open standards, in other words, those in which the data coding regulations are public, make it possible to guarantee free access, as they permit, where necessary, the development of free compatible software.

In order to guarantee the perpetuity of the public data, the use and maintenance of the software must not depend on the goodwill of the software's creators. It is necessary to have systems whose development is always guaranteed by the availability of the source code. The principle of source code availability in the framework of license-based contracts, which is a principle that to date has only been present as an option in the legislation on public utility and software package purchases, must become the rule and be applied to all public software purchases.

We have deliberately avoided an ambiguous legislative approach based exclusively on the use of free software. It would not be appropriate for the State, regardless of the recognised quality of the free software, to favour a determined economic model for the publication of software. On the contrary, the obligatory resort to open communication standards and the publication of source code will guarantee equal opportunities, in accordance with the principles of interoperability of the legislation on software.

In order to guarantee national security, it is necessary to have systems that are free of elements that may provide remote control of the system or the involuntary transmission of information to any third parties. We need systems whose source code is freely accessible to the public, so that it can be examined by a large number of independent world experts. The bill that we propose should provide more security for the State, as full working knowledge of the source code would eliminate the growing number of pieces of software containing "backdoors".

The bill that we propose would likewise reinforce consumer safety in the information society, as it would allow for the emergence of new offers of software without "backdoors", which would not threaten the right to a private life and individual freedoms.

But for equal opportunities to emerge, it will be necessary to reaffirm and reinforce the principle of interoperability in the legislation on software and legislation on compatibility. Today, both of these rights are threatened by the parties that benefit from their dominant monopolistic position, who put obstacles to avoid the emergence of any competition.

In order to guarantee the interoperability of software, the intellectual or industrial property rights of a software creator must not block the development of new compatible software that would compete with him. The right to compatibility for all, in other words, the right to freely develop, publish and use original software that is compatible with other software, must be guaranteed by the law. Likewise, the principle of interoperability introduced by European laws on software must prevail over the other intellectual or industrial property rights that may apply. Particularly, the existence of a brand on a communications standard or a patent on an industrial process that is necessary to implement a communications standard, must not permit its owner to block or limit the free dissemination of compatible free software.

The bill that we propose could be applied immediately. In effect, most software editors are prepared to adopt open communication standards, such as those defined in Paris, Boston and Tokyo by the World Wide Web Consortium. There are many proprietary software editors that are likewise prepared to provide the French Government with the source code of their products. In addition, the offer of free software based on the Linux operating system will cover many of the Administration's needs, now and in the future. However, the Administrations and its collective bodies are not sufficiently informed about the existence of open standards or the offers of software published with its source code.

In order to facilitate the fast implementation of free standards, it is necessary to reinforce the role of the Inter-ministerial Commission on Technical Support for the Development of Information Technologies and Communication in the Administration (Mission Interministérielle de Soutien Technique pour le Développement des Technologies de l'Information et de la Communication dans l'Administration), and entrust it with the mission of carrying out and disseminating within the Administration, a census of the offer of open standards and software published with its source code. If there is no market for this, the MTIC will be in charge of developing new standards or new software published with its source code. In order to carry out these new tasks, the MTIC will be transformed into the Agency of Information Technologies and Communication (AITC).

When there is no market, the AITC will be in charge of developing new standards or new software published with its source code. In order to ensure equal opportunities, the software developments that occur will be put in the public domain; therefore, these developments may be sold as proprietary software or as free software, according to the license freely chosen by the editor. The AITC will also be in charge of evaluating the levels of interoperability, perpetuity and security of the software purchased by the French Administration.

More generally, the open communication systems and the availability of the source code are essential to guarantee the interoperability, on a European level, between the IT systems of the different administrations and the nation-

al public bodies, and to avoid that the interconnection between systems depend solely on the goodwill of the software editors. The AITC will also be in charge of participating in the international cooperation projects in the sphere of information technologies and communications, and of facilitating interoperability with the information systems of the other European Union member countries.

The bill that we propose would cover the concerns listed above. It reminds us that the State can play an important role in the economy, preserving national and European interests, whilst defending the market economy. This bill would allow France to stand as the defender of freedom within the new information and communication technologies.

D.2.2. Articles

- Article 1.
For all computerised data exchanges, the State Administration, the local administrations and the local bodies would have the obligation of using open communication standards, constituted by public regulations and procedures for exchanging digital data.
- Article 2.
The Administration, the public bodies and the territorial public administrations are obliged to use software whose source code is accessible.
- Article 3.
All individuals or corporate entities have the right to develop, publish or use original software that is compatible with the communication standards of any other software.
- Article 4.
A public State body will be created, called the Agency of Information Technologies and Communications. This body would report to the Ministry of Industry. The AITC will have the task of reporting to and advising the State services, the collective bodies and the public bodies on the creation and identification of the technical requirements with regard to information and communication technologies. It will identify the needs of the public services with regard to equipment and software, ensure that the communication standards are harmonised and propose the technical practices that must be applied. It will carry out inventories in each sector of activity of the open standards and the available software.
Depending on the results of the inventory, it will support the development of open standards and software published with its source code and promote the use of this type of software in the public domain to mitigate any deficiencies in the market.
The AITC will favour the interoperability with the information systems of other EU member States and participate in the international cooperation

projects in the sphere of information and communication technologies.
The AITC will have a representative in each prefecture.
The AITC's ways of working will be established by decree.

- Article 5.
The modes of applying this law, as well as the conditions of the transition from the current situation, will be established by decree issued by the Council of State.
- Article 6.
The expenses incurred by the State as a result of applying this law will be paid using the sums established in articles 575 and 575A of the General Tax Code.

D.3. Bill proposed by Villanueva and Rodrich (Peru)

We will now provide the translation into English of the literal text of most of Draft Bill number 2485, on the Law on Free Software in Public Agencies, of the Peruvian congressmen Edgar Villanueva Núñez and Jacques Rodrich Ackerman [223].

D.3.1. Recitals

The complexity of the world we are living in demands permanent review and constant adaptation of its institutional framework to be up to date with the current technological trends that the world imposes.

The discovery of new information technologies and among them, free software, has become an ideal instrument to assure the preservation of the State's data.

In this way technology fulfils its role of facilitating the different and multiple human activities, being one of them, the handling of public information.

According to the Peruvian Constitution, in section 5 of article 2, "all persons have the right to solicit information that they need without disclosing the reason, and to receive that information from any public entity within the period specified by law, at a reasonable cost. Information that affects personal intimacy and that is expressly excluded by law or for reasons of national security is not subject to disclosure".

Section 6 of the same article emphasises the right all persons have "to be assured that information services, computerised or not, public or private, do not provide information that affects personal and family privacy".

Having said this, it is obvious the concern of our Constitution for establishing institutional bases that protect the citizens' freedom to information access and the non-disclosure of information that affects personal and familiar intimacy, likewise for reasons of national security.

The guarantee of these rights in our Constitution isn't solely based in the goodwill of the State's agents to fulfil the norms of the Constitution, but also by the use of technologies that in some cases contribute and in others do not, to an effective protection of said citizens' rights.

It is in this context that it is of utmost importance for the State the incorporation of those technologies that help to reinforce the exercise of the citizens' access to information and its due reserve in cases that require so.

The use of free software in all of the State's agencies points in this direction. Basically we can say that the fundamental principles that drive the present Bill are tightly related to the basic guarantees of a democratic State and we can sum them up in the following:

- 1) Free access of the citizens to public information
- 2) Perpetuity of public data
- 3) Security of the State and of the citizens

To guarantee the citizens' free access to public information, it is essential that the coding of the data is not tied to a sole provider. The use of standard and open formats assures this free access, making possible the creation of compatible software.

To guarantee the perpetuity of public data, it is indispensable that the use and maintenance of software do not depend on the goodwill of the providers, nor on monopoly conditions, imposed by those. Systems whose evolution can be guaranteed by the availableness of source code are needed.

To guarantee national security it's vital to have systems that are devoid of elements that allow remote control or the transmission of non-desired information to third-parties. Therefore, it is essential to have systems whose source code is freely accessible to the public, so that its inspection is allowed to the State, the citizens and a great number of independent experts in the world.

This proposal provides more security, because the knowledge of the source code will eliminate the growing number of programs with spy-ware.

In the same way, this Bill furthers the security of the citizens, both in their condition of legitimate holders of the information handled by the State as in their condition of consumers. In this last case it would allow the growth of an extensive supply of free software devoid of potential spy-ware that makes it possible to jeopardise private life and individual freedoms.

The State, looking to improve the quality of public administration as both keeper and manager of private information, will establish the conditions in which agencies of the State will acquire software in the future, that is, in a manner that is compatible with the constitutional guarantees and basic principles previously stated.

The project clearly states that any given software in order to be acceptable for the State must not only be technically adequate to carry out a given task, but must also fulfil some requirements in license matters, without which the State could not guarantee the citizens the adequate process of their data, looking over for their integrity, confidentiality and permanent accessibility, all of which are critical elements for its fulfilment.

The State establishes conditions for the use of software by the agencies of the State, without meddling in any way in the transactions of the private sector. It is acknowledged that the State does not have the ample spectrum of contractual freedom that the private sector has, because it is restricted due to the requirement of transparency of all public acts, and in this sense the common benefit must be the leading factor to take into account when legislating over this matter.

The project also guarantees the principle of equality before the Law, because no natural or legal entity is excluded of the right to purvey those goods, under the conditions stated in this Bill and without any more limitations than the ones that are established in the Bill of Contracts and Acquisitions of the State (TUO Supreme Decree number 012-2001-PCM).

Additionally to these advantages we could highlight benefits that would begin to show up as a consequence of these measures, immediately after being carried out.

To begin with, there are the job opportunities for local programmers. Of the universe of server Software commercialised in the USA, over the last year, 27% belongs to "free" software, a truly significant portion for that huge and competitive market. The number speaks for itself and constitutes a firm answer to those who would think that free software would imply a hefty limitation to the employment of programmers of the country. On the contrary, the initiative will allow the release of a great amount of resources, and an incentive to boost human creativity.

By making use of free software, professionals can analyse the root of the problems and improve the development in whatever cases are necessary, using the globally available free software, under different licenses. It is an ideal area to employ creativity, an aspect in which young Peruvians would be able to reach good levels.

On the other hand, by means of the free software we get rid of illegal software that is present in some agencies of the State. The non-permitted use of software inside the State or the mere suspicion of this constitutes a powerful incentive to make any given public employee modify the situation that goes against intellectual property.

Although it is correct to say that the adoption of free software is not necessary to abide by the law, its use will drastically reduce the irregular occurrences and will act as a *medium of legal infection*, both in the State and the private sector.

We can count many countries that are formally acknowledging an exclusive use of Free Software in the public sector.

Among them we have France, where a legal norm about this subject is being debated. The government of the city of Mexico (DF) has already started an important migration to adopt free software in a general way and this is the leading country in this field in the western world. Also, in Brazil, the State of Recife has ruled its adoption. The Popular Republic of China has been using free software for several years as a policy of the State. The same applies to Scandinavian countries. In the US both NASA and the US Navy among other organisations have adopted free software for some of their needs, as have also done so other government and private entities.

Finally, the project grants the execution of this law to the Presidency of the Council of Ministers for being this organism the one that concentrates the direction of all government institutions. In this sense it has a strategic advantage for carrying out the given reform and the migratory process of proprietary software to free software.

These are the types of ideas in which these aspects have been specified in this legislative proposal.

D.3.2. Cost/Benefit analysis

This initiative does not imply any expense to the national treasury. However, for the fulfilment of its aims, it will be necessary to reassign the governmental expenditure whose incidence confines itself to what is effectively expended by each governmental organism in the processes of contracts and bids of the State for the acquisition of software.

Although it is true that free software represents a substantial saving for the State's economy, when compared with proprietary software, this is not the central point of support of this Bill. As we have pointed out, its advantage focuses on the technological reassurances that the program conveys to the information that the State handles, information that in many instances is of a reserved nature.

In this sense a better protection of the citizens' rights constitutes a non-measurable benefit that must be taking into account from the cost/benefit analysis point of view.

We can sum up the benefits of the project in the following subjects:

- National Security.

In order to perform its functions, the State must store and process information on its citizens. The relationship between the individual and the State depends on the privacy and integrity of this data, which must be adequately kept against three specific risks:

- 1) Disclosure risk: confidential data must be handled in such way that the access to them is made possible only to authorised persons and institutions.
- 2) Risk of impossibility of access: the data must be stored in such way that the access to them by authorised persons and institutions is guaranteed for all its period of usefulness.
- 3) Risk of alteration: the alteration of data must be restricted, again only to those authorised to do so.

With free software all these risks are considerably mitigated. It allows the user to make a complete and exhaustive inspection of the mechanisms that are used to process data. The fact that free software allows the inspection of its sources is an excellent security measure because having the mechanisms exposed to the eyes of trained professionals makes hiding malicious functions inside them exponentially more difficult, even if the end user does not take the time to search for them by himself.

- Technological Independence.

With proprietary software there is no freedom of contract in the aspects of extension and correction of the system in use, a technological dependence is forged, one in which the provider is in the position of ruling, one-way only, terms, deadlines and costs.

Free Software entitles the users with the freedom to control, correct and modify the program to suit it better to their needs. This freedom is not aimed at programmers only. Although they are the ones who can take advantage of it first-hand, the users benefit greatly too, for in this way they can hire any programmer (not necessarily the original author) to correct given errors or add functionality.

- Local development.

In the case of proprietary software, the user is able to execute or run a program, but not to inspect or modify it; consequently, the user cannot learn from it; the users become dependent on a technology that not only do they not understand but that is expressly prohibited to them. The professionals in their environment, who could help the users to achieve their aims, are equally limited: as the way in which the program works is secret and its inspection is not permitted, it is not possible to fix it. In this way, local professionals see their possibilities of offering added value constantly more limited and their employment horizons narrow, along with their chances to learn more. With free software, these disadvantages of proprietary software are enormously mitigated.

- **Cost of software.**
The cost is greatly reduced because, being free, there is no need to ask for additional licenses to continue using the program. This need does exist with proprietary software. It is important for the user to be able to keep these costs under control, because if he cannot, he might be impeded to further carry on with his goals, bound by unplanned occurrences. Again, here it is the technological dependence that threatens free software.
- **More sources of employment.**
With free software, handwork that was chained as a consequence of the technological dependency of the State to proprietary software is freed. Now user resources (in this case the State agencies) will be assigned for maintenance and support of free software.
- **Boost to creativity and entrepreneurship.**

D.3.2.1. Costs

The big cost that is involved with the change from proprietary to free software is limited to the migratory process. Even if it is true that the migratory process involves costs in studies, decision making to implement the new systems, handwork to implement the change, data conversion, retraining of personal and eventually expenses in licenses and/or development and time; it is no less certain that all these are fixed costs and are paid only once.

On the other hand, proprietary software has its costs, which were paid and which cannot be recovered. But aside from these costs there are others involved with proprietary software: permanent updates (sometimes reinforced by a self-supported monopoly) and above all the huge price for the State that is the loss of the freedoms that guarantee the control of its own information. These costs are permanent and with the passage of time, sooner or later they exceed the fixed costs of carrying out a migration.

To summarise, the benefits of the migratory process exceed its costs.

D.3.3. Legal Formula

D.3.3.1. Article 1. Aim of the law

Employ exclusively free software in all the systems and computer equipment of every State agency.

D.3.3.2. Article 2. Scope of application

The Executive, Legislative and Judicial branches as well as the autonomous regional or local decentralised organisms and the corporations where the State holds the majority of the shares will use free software in their systems and computer equipment.

D.3.3.3. Article 3. Authority of application

The authority in charge to execute the law shall be the Council of Ministers.

D.3.3.4. Article 4. Definition of *free software*

For the purposes of this law, *program* or *free software* shall be defined as that whose license shall guarantee the user, without additional cost, the following:

- Unrestricted use of the program for any purpose.
- Unrestricted access to the respective source code.
- Exhaustive inspection of the working mechanisms of the program.
- Use of the internal mechanisms and arbitrary portions of the software, to adapt them to the needs of the user.
- Freedom to make and distribute copies of the software.
- Modification of the software and freedom to distribute said modifications of the new resulting software, under the same license of the original software.

D.3.3.5. Article 5. Exceptions

Given the case where no solution which uses free software exists, that could satisfy the determined necessity, the State Agencies could adopt the following alternatives adhering to their order.

If verifiable time constraints should occur in attending a technical problem and proprietary software was found to be available, the organism that needed it could negotiate a permission of exception before the competent authority to utilise proprietary software that has the following characteristics:

- The programs shall comply with the stipulations mentioned in section 4 of the law, except for the free distribution of the modified program. In such a case the permission of exception could be definitive.
- If no programs of the preceding category were available, those that exist in a free project of advanced development shall be chosen. The permission in this case shall be transitory and will automatically expire when the free software becomes mature with the functionality that is necessary.
- If no products could be found that met these conditions, then proprietary software could be used, but the demanded permission of exception from the competent authority will expire automatically two years after it was issued, having to be renewed previous establishment that a satisfactory solution of free software was not available.

The competent authority shall emit a permission of exception only if the State organism guarantees the storage of data in open formats, without prejudice of payment for the proprietary licenses.

D.3.3.6. Article 6. Educational permissions

All educational establishments that depend on the State are able to manage its proprietary software license of its use in research, after paying the corresponding intellectual property rights and applicable licenses, provided that the aim of the research is directly associated to the use of the program in question.

D.3.3.7. Article 7. Transparency of the exceptions

The exceptions that originate in the authority of a given application must be sustained and published in the website of the State's Portal.

The resolution that authorises the exception must enumerate the functional requirements that the program must fulfil.

D.3.3.8. Article 8. Exceptional authorisation

In case some State agency cannot fulfil its requirements with software stated in article 2 of this law then it is authorised to acquire proprietary software to store or process data which must be kept in reserve, the respective authority must publish in the State's portal a report where the risks associated with the use of given software for a particular application must be explained.

The exceptional permissions granted to State agencies related with security and national defence are exempted from the previously stated obligation.

D.3.3.9. Article 9. Responsibilities

The maximum administrative authority and the technical and informative authority of each agencies of the State assume the responsibility for the fulfilment of this law.

D.3.3.10. Article 10. Regulatory norm

The executive branch of the government will rule within one hundred and eighty days deadline, the conditions, deadlines and forms in which the current status quo will be changed to one which satisfies the conditions of this law, and will guide, in that sense, all future contracts and negotiations for software acquisition.

In the same way, it will direct the migratory process of the proprietary software systems to free software ones, in every case where the given circumstances so demand.

D.3.3.11. Article 11. Glossary of terms

a) Program or *software*: any sequence of instructions used by a digital data processing system to carry out a specific task or to solve a given problem.

b) Execution or use of a program: the act of using it on any digital data processing system to carry out a function.

c) User: natural or legal entity that makes use of the software.

d) Source code or source program: complete set of instructions and source digital files created or modified by those who programmed them, plus all the support digital files, like data tables, images, specifications, documentation, and any other element that is necessary to create the executable program. As an exception, all those tools that are usually available as free software in other media may be excluded, for example, compilers, operating systems and libraries.

e) Free software or program: that which guarantees the user, without further cost, the following:

- Unrestricted use of the program for any purpose.
- Unrestricted access to the respective source code.

- Exhaustive inspection of the working mechanisms of the program.
- Use of the internal mechanisms and arbitrary portions of the software, to adapt them to the needs of the user.
- Freedom to make and distribute copies of the software.
- Modification of the software and freedom to distribute said modifications of the new resulting software, under the same license of the original software.

f) Proprietary software (non-free software), that which does not fulfil all the requirements listed in the previous statement.

g) Open format: any manner of digitally coded information that satisfies both existent standards and the following conditions:

- Its technical documentation is publicly available.
- The source code of at least one complete reference implementation is publicly available.
- There are no restrictions for the creation of programs that store, transmit, receive or access data codified in such way.

D.4. Letters from Microsoft Peru and congressman Villanueva

On 21st March 2002, Juan Alberto González, the general manager of Microsoft Peru, sent a letter to congressman Edgar Villanueva Núñez with regard to his draft bill on free software [129]. On 8th April, the congressman replied [179]. We include here the English translation of a literal transcription of almost the whole text of both letters (the paragraphs not related to the draft bill have been edited out).

D.4.1. Letter from Microsoft Peru

As we arranged in our meeting, we attended the forum organised in the Congress of the Republic on March 6th regarding the law that you have proposed. There we got the chance to listen to several presentations on the subject. We would now like to present our position so that you have a better view of the real situation.

Your proposal mandates that every public organisation exclusively uses free software, also known as open source software. This is something which transgresses the principles of equality before the law, of no discrimination, of free private initiative, and of freedom of industry and contracting, which are protected by the Constitution.

Your proposal, by making mandatory the use of open source software, establishes discriminatory and non-competitive treatment in contracting and acquisitions by public organisations, violating the basic principles of the Law of State Contracting and Acquisitions (Number 26850).

By forcing the State to favour a business model supporting exclusively open source software, your proposal will discourage local and international software manufacturers who make real and important investments in the country, create a significant number of direct and indirect jobs, and thus contribute to the national income. In contrast, open source software development always has a lesser benefit to the economy, since it mainly creates jobs in the service sector.

Your proposal imposes the use of open source software without considering the risks this carries to security, warranty, and possible violation of the intellectual property rights of third parties.

It erroneously assumes that *open source software* is free software, that is, without cost, and therefore arrives at incorrect conclusions about money saved by the State. It has no cost-benefit analysis to back up this assumption.

It is wrong to think that open source software is free. Research by the Gartner Group (an important market researcher in the technology world, well-known worldwide) has shown that the cost of software acquisition (operating system and applications) is only 8% of the total cost of ownership that enterprises and organisations must face as a consequence of the rational and productive use of technology. The other 92% is costs of installation, training, support, maintenance, management, and downtime.

One of the arguments supporting your proposal is the supposed cheapness of open source software when compared to commercial software, without considering the possibility of volume licensing models. The State can really benefit from these, as other countries have.

Additionally, the approach chosen by your project (i) is clearly more expensive because of the high costs of migration; (ii) risks loss of interoperability among information systems, both inside the State and between the State and the private sector, due to the many different distributions of open source software on the market.

In most cases, open source software does not offer adequate levels of service to achieve better productivity by its users, nor does it offer warranties from well-known manufacturers. These things have caused many public entities to go back on their decisions to use open source software; they are now using commercial software in its place.

This project discourages creativity in the Peruvian software industry, which sells USD 40 million worth of goods every year, USD 4 million of that exported (10th place in the ranking of Peruvian non-traditional exports, more than handcrafted goods) and is a source of highly skilled jobs. With a law encouraging the use of open source software, programmers lose their intellectual property rights and their most important source of remuneration.

Since open source software can be freely distributed, it cannot make any money for its developers by exportation. In this way, it weakens the multiplier effect of software sales to other countries and stunts the growth of this local industry, which the State should be stimulating.

In the forum, the importance of the use of open source software in education was discussed, without commenting on the complete failure of this initiative in countries like Mexico. There, the same State officials who supported the project now say that open source software did not provide a learning experience to children in schools, adequate levels of training were not available nationwide, inadequate support for the platform was provided, and the software was not integrated well enough with existing school computer systems.

If open source software fulfils all the requirements of State entities, why should a law be needed to adopt its use? Should not the market freely choose which products provide more benefits and value?

D.4.2. Reply from Congressman Villanueva

First of all, I thank you for your letter of March 25, 2002 in which you state the official position of Microsoft relative to Bill Number 1609, Free Software in Public Administration, which is indubitably inspired by the desire for Peru to find a suitable place in the global technological context. In the same spirit, and convinced that we will find the best solutions through an exchange of clear and open ideas, I will take this opportunity to reply to the commentaries included in your letter.

While acknowledging that opinions such as yours constitute a significant contribution, it would have been even more worthwhile for me if, rather than formulating objections of a general nature (which we will analyse in detail later) you had gathered solid arguments for the advantages that proprietary

software could bring to the Peruvian State, and to its citizens in general, since this would have allowed a more enlightening exchange in respect of each of our positions.

With the aim of creating an orderly debate, we will assume that what you call *open source software* is what the bill defines as *free software*, since there exists software for which the source code is distributed together with the program, but which does not fall within the definition established by the bill; and that what you call *commercial software* is what the bill defines as *proprietary* or *non-free*, given that there exists free software which is sold in the market for a price like any other good or service.

It is also necessary to make it clear that the aim of the bill we are discussing is not directly related to the amount of direct savings that can be made by using free software in state institutions. That is in any case a marginal aggregate value, but in no way is it the chief focus of the bill. The basic principles which inspire the bill are linked to the basic guarantees of a state of law, such as:

- free access to public information by the citizen,
- permanence of public data,
- security of the State and citizens.

To guarantee the citizens' free access to public information, it is essential that the coding of the data is not tied to a sole provider. The use of standard and open formats gives a guarantee of this free access, if necessary through the creation of compatible free software.

To guarantee the permanence of public data, it is necessary that the usability and maintenance of the software does not depend on the goodwill of the suppliers, or on the monopoly conditions imposed by them. For this reason the State needs systems the development of which can be guaranteed due to the availability of the source code.

To guarantee national security or the security of the State, it is indispensable to be able to rely on systems without elements which allow control from a distance or the undesired transmission of information to third parties. Therefore, systems with source code freely accessible to the public are required to allow their inspection by the State itself, by the citizens, and by a large number of independent experts throughout the world. Our proposal brings further security, since the knowledge of the source code will eliminate the growing number of programs with *spy code*.

In the same way, our proposal strengthens the security of the citizens, both in their role as legitimate owners of information managed by the State, and in their role as consumers; in this second case, by allowing the growth of a widespread availability of free software not containing *spy code* able to put at risk privacy and individual freedoms.

In this sense, the bill is limited to establishing the conditions under which the State bodies will obtain software in the future, that is, in a way compatible with these basic principles.

From reading the bill it will be clear that once passed:

- the law does not forbid the production of proprietary software
- the law does not forbid the sale of proprietary software
- the law does not specify which concrete software to use
- the law does not dictate the supplier from whom software will be bought
- the law does not limit the terms under which a software product can be licensed.

What the bill does express clearly, is that, for software to be acceptable for the State it is not enough that it is technically capable of fulfilling a task, but that further the contractual conditions must satisfy a series of requirements regarding the license, without which the State cannot guarantee the citizen adequate processing of his data, watching over its integrity, confidentiality, and accessibility throughout time, as these are very critical aspects for its normal functioning.

We agree, Mr. González, that information and communication technology have a significant impact on the quality of life of the citizens (whether it be positive or negative). We surely also agree that the basic values I have pointed out above are fundamental in a democratic state like Peru. So we are very interested to know of any other way of guaranteeing these principles, other than through the use of free software in the terms defined by the bill.

As for the observations you have made, we will now go on to analyse them in detail:

Firstly, you point out that: 1. "Your proposal mandates that every public organisation exclusively use free software, also known as open source software. This is something which transgresses the principles of equality before the law, of no discrimination, of free private initiative, and of freedom of industry and contracting, which are protected by the Constitution."

This understanding is in error. The bill in no way affects the rights you list; it limits itself entirely to establishing conditions for the use of software on the part of state institutions, without in any way meddling in private sector transactions. It is a well established principle that the State does not enjoy the wide spectrum of contractual freedom of the private sector, as it is limited in its actions precisely by the requirement for transparency of public acts; and in this sense, the preservation of the greater common interest must prevail when legislating on the matter.

The bill protects equality under the law, since no natural or legal entity is excluded from the right of offering these goods to the State under the conditions defined in the bill and without more limitations than those established by the Law of State Contracts and Purchasing (TUO by Supreme Decree No. 012-2001-PCM).

The bill does not introduce any discrimination whatsoever, since it only establishes *how* the goods have to be provided (which is a State power) and not *who* has to provide them (which would effectively be discriminatory, if restrictions based on national origin, race religion, ideology, sexual preference etc. were imposed). On the contrary, the bill is decidedly anti-discriminatory. This is so because by defining with no room for doubt the conditions for the provision of software, it prevents State bodies from using software which has a license including discriminatory conditions.

It should be obvious from the preceding two paragraphs that the bill does not harm free private enterprise, since the latter can always choose under what conditions it will produce software; some of these will be acceptable to the State, and others will not be since they contradict the guarantee of the basic principles listed above. This free initiative is of course compatible with the freedom of industry and freedom of contract (in the limited form in which the State can exercise the latter). Any private subject can produce software under the conditions which the State requires, or can refrain from doing so. Nobody is forced to adopt a model of production, but if they wish to provide software to the State, they must provide the mechanisms which guarantee the basic principles, and which are those described in the bill.

By way of an example: nothing in the text of the bill would prevent your company offering the State bodies an office *suite*, under the conditions defined in the bill and setting the price that you consider satisfactory. If you did not, it would not be due to restrictions imposed by the law, but to business decisions relative to the method of commercialising your products, decisions with which the State is not involved.

To continue, you note that: 2. "Your proposal, by making mandatory the use of open source software, establishes discriminatory and non-competitive treatment in contracting and acquisitions by public organizations...".

This statement is just a reiteration of the previous one, and so the response can be found above. However, let us concern ourselves for a moment with your comment regarding "non-competitive practices."

Of course, in defining any kind of purchase, the buyer sets conditions which relate to the proposed use of the good or service. From the start, this excludes certain manufacturers from the possibility of competing, but does not exclude them *a priori*, but rather based on a series of principles determined by the autonomous will of the purchaser, and so the process takes place in conformance with the law. And in the bill it is established that *no-one* is excluded from competing as far as he guarantees the fulfilment of the basic principles.

Furthermore, the bill *stimulates* competition, since it tends to generate a supply of software with better conditions of usability, and to better existing work, in a model of continuous improvement.

On the other hand, the central aspect of competition is the chance to provide better choices to the consumer. Now, it is impossible to ignore the fact that marketing does not play a neutral role when the product is offered on the market (since accepting the opposite would lead one to suppose that firms' expenses in marketing lack any sense), and that therefore a significant expense under this heading can influence the decisions of the purchaser. This influence of marketing is in large measure reduced by the bill that we are backing, since the choice within the framework proposed is based on the *technical merits* of the product and not on the effort put into commercialisation by the producer; in this sense, competition is increased, since the smallest software producer can compete on equal terms with the most powerful corporations.

It is necessary to stress that there is no position more anti-competitive than that of the big software producers, which frequently abuse their dominant position, since in innumerable cases they propose as a solution to problems raised by users: "update your software to the new version" (at the user's expense, naturally); furthermore, it is common to find arbitrary cessation of technical help for products, which, in the provider's judgement alone, are *old*; and so, to receive any kind of technical assistance, the user finds himself forced to migrate to new versions (with non-trivial costs, especially as changes in hardware platform are often involved). And as the whole infrastructure is based on proprietary data formats, the user stays *trapped* in the need to continue using products from the same supplier, or to make the huge effort to change to another environment (probably also proprietary).

You add: 3. "By forcing the State to favour a business model supporting exclusively open source software, your proposal will discourage local and international software manufacturers who make real and important investments in the country, create a significant number of direct and indirect jobs, and thus

contribute to the national income. *In contrast*, open source software development always has a lesser benefit to the economy, since it mainly creates jobs in the service sector."

I do not agree with your statement. Partly because of what you yourself point out in paragraph 6 of your letter, regarding the relative weight of services in the context of software use. This contradiction alone would invalidate your position. The service model, adopted by a large number of companies in the software industry, is much larger in economic terms, and with a tendency to increase, than the licensing of programs.

On the other hand, the private sector of the economy has the widest possible freedom to choose the economic model which best suits its interests, even if this freedom of choice is often obscured subliminally by the disproportionate expenditure on marketing by the producers of proprietary software.

In addition, a reading of your opinion would lead to the conclusion that the State market is crucial and essential for the proprietary software industry, to such a point that the choice made by the State in this bill would completely eliminate the market for these firms. If that is true, we can deduce that the State must be subsidising the proprietary software industry. In the unlikely event that this were true, the State would have the right to apply the subsidies in the area it considers of greatest social value; it is undeniable, in this improbable hypothesis, that if the State decided to subsidise software, it would have to do so choosing the free over the proprietary, considering its social effect and the rational use of taxpayer's money.

In respect of the jobs generated by proprietary software in countries like ours, these mainly concern technical tasks of little aggregate value; at the local level, the technicians who provide support for proprietary software produced by transnational companies do not have the possibility of fixing *bugs*, not necessarily for lack of technical capability or of talent, but because they do not have access to the source code to fix it. With free software one creates more technically qualified employment and a framework of free competence where success is only tied to the ability to offer good technical support and quality of service, one stimulates the market, and one increases the shared fund of knowledge, opening up alternatives to generate services of greater total value and a higher quality level, to the benefit of all involved: producers, service organisations, and consumers.

It is a common phenomenon in developing countries that local software industries obtain the majority of their takings in the service sector, or in the creation of *ad hoc* software. Therefore, any negative impact that the application of the bill might have in this sector will be more than compensated by a growth in demand for services (as long as these are carried out to high quality standards). If the transnational software companies decide not to compete under these new rules of the game, it is likely that they will undergo some

decrease in takings in terms of payment for licences; however, considering that these firms continue to allege that much of the software used by the State has been illegally copied, one can see that the impact will not be very serious. Certainly, in any case their fortune will be determined by market laws, changes in which cannot be avoided; many firms traditionally associated with proprietary software have already set out on the road (supported by copious expense) of providing services associated with free software, which shows that the models are not mutually exclusive.

With this bill the State is deciding that it needs to preserve certain fundamental values. And it is deciding this based on its sovereign power, without affecting any of the constitutional guarantees. If these values could be guaranteed without having to choose a particular economic model, the effects of the law would be even more beneficial. In any case, it should be clear that the State does not choose an economic model; if it happens that there only exists one economic model capable of providing software which provides the basic guarantee of these principles, this is because of historical circumstances, not because of an arbitrary choice of a given model.

Your letter continues: "4. "Your proposal imposes the use of open source software without considering the risks this carries to security, warranty, and possible violation of the intellectual property rights of third parties."

Alluding in an abstract way to "the risks this carries ", without specifically mentioning a single one of these supposed dangers, shows at the least some lack of knowledge of the topic. So, allow me to enlighten you on these points.

On security:

National security has already been mentioned in general terms in the initial discussion of the basic principles of the bill. In more specific terms, relative to the security of the software itself, it is well known that all software (whether proprietary or free) contains errors or *bugs* (in programmers' slang). But it is also well-known that the *bugs* in free software are fewer, and are fixed much more quickly, than in proprietary software. It is not in vain that numerous public bodies responsible for the IT security of State systems in developed countries require the use of free software for the same conditions of security and efficiency.

What is impossible to prove is that proprietary software is more secure than free, without the public and open inspection of the scientific community and users in general. This demonstration is impossible because the model of proprietary software itself prevents this analysis, so that any guarantee of security is based only on promises of good intentions (biased, by any reckoning) made by the producer itself, or its contractors.

It should be remembered that in many cases, the licensing conditions include *non-disclosure* clauses which prevent the user from publicly revealing security flaws found in the licensed proprietary product.

In respect of the guarantee:

As you know perfectly well, or could find out by reading the *End User License Agreement* of the products you license, in the great majority of cases the guarantees are limited to replacement of the storage medium in case of defects, but in no case is compensation given for direct or indirect damages, loss of profits, etc... If as a result of a security *bug* in one of your products, not fixed in time by yourselves, an attacker managed to compromise crucial State systems, what guarantees, reparations and compensation would your company make in accordance with your licensing conditions? The guarantees of proprietary software, inasmuch as programs are delivered *as is*, that is, in the state in which they are, with no additional responsibility of the provider in respect of function, in no way differ from those normal with free software.

On Intellectual Property:

Questions of intellectual property fall outside the scope of this bill, since they are covered by other specific laws. The free software model in no way implies ignorance of these laws, and in fact the great majority of free software is covered by *copyright*. In reality, the inclusion of this question in your observations shows your confusion in respect of the legal framework in which free software is developed. The inclusion of the intellectual property of others in works claimed as one's own is not a practice that has been noted in the free software community; whereas, unfortunately, it has been in the area of proprietary software. As an example, the condemnation by the Commercial Court of Nanterre, France, on 27th September 2001 of Microsoft Corp. to a penalty of 3 million francs in damages and interest, for violation of intellectual property (piracy, to use the unfortunate term that your firm commonly uses in its publicity).

You go on to say that: 5. "It erroneously assumes that *open source software* is free software, that is, without cost, and therefore arrives at incorrect conclusions about money saved by the State. It has no cost-benefit analysis to back up this assumption."

This observation is wrong; in principle, freedom and lack of cost are orthogonal concepts: there is software which is proprietary and charged for (for example, MS Office), software which is proprietary and free of charge (MS Internet Explorer), software which is free and charged for (Red Hat, SuSE etc., Gnu/Linux distributions), software which is free and not charged for (Apache, OpenOffice, Mozilla), and even software which can be licensed in a range of combinations (MySQL).

Certainly free software is not necessarily free of charge. And the text of the bill does not state that it has to be so, as you will have noted after reading it. The definitions included in the bill state clearly *what* should be considered free software, at no point referring to freedom from charges. Although the possibility of savings in payments for proprietary software licenses are mentioned, the foundations of the bill clearly refer to the fundamental guarantees to be preserved and to the stimulus to local technological development. Given that a democratic state must support these principles, it has no other choice than to use software with publicly available source code, and to exchange information only in standard formats.

If the State does not use software with these characteristics, it will be weakening basic republican principles. Luckily, free software also implies lower total costs; however, even given the hypothesis (easily disproved) that it was more expensive than proprietary software, the simple existence of an effective free software tool for a particular IT function would oblige the State to use it; not by command of this bill, but because of the basic principles we enumerated at the start, and which arise from the very essence of the lawful democratic State.

You continue: 6. "It is wrong to think that open source software is free. Research by the Gartner Group (an important market researcher in the technology world, well-known worldwide) has shown that the cost of software acquisition (operating system and applications) is only 8% of the total cost of ownership that enterprises and organisations must face as a consequence of the rational and productive use of technology. "The other 92% consists of: installation, training, support, maintenance, management and administration, and downtime."

This argument repeats that already given in paragraph 5 and partly contradicts paragraph 3. For the sake of brevity we refer to the comments on those paragraphs. However, allow me to point out that your conclusion is logically false: even if according to the Gartner Group the cost of software is on average only 8% of the total cost of use, this does not in any way deny the existence of software which is free of charge, that is, with a licensing cost of zero.

In addition, in this paragraph you correctly point out that the service components and losses due to down time make up the largest part of the total cost of software use, which, as you will note, contradicts your statement regarding the small value of services suggested in paragraph 3. Now the use of free software contributes significantly to reduce the remaining life-cycle costs. This reduction in the costs of installation, support etc. can be noted in several areas: in the first place, the competitive service model of free software, support and maintenance for which can be freely contracted out to a range of suppliers competing on the grounds of quality and low cost (this is true for installation, enabling, and support, and in large part for maintenance). In the second place, due to the reproductive characteristics of the model, maintenance carried out for an application is easily replicable, without incurring large costs (that is,

without paying more than once for the same thing) since modifications, if one wishes, can be incorporated in the common fund of knowledge. Thirdly, the huge costs caused by non-functioning software (*blue screens of death*, malicious code such as virus, *worms*, and trojans, exceptions, general protection faults and other well-known problems) are reduced considerably by using more stable software. And it is well-known that one of the most remarkable virtues of free software is its stability.

You further state that: 7. "One of the arguments supporting your proposal is the supposed cheapness of open source software when compared to commercial software, without considering the possibility of volume licensing models, which can be highly advantageous for the State, as has happened in other countries."

I have already pointed out that what is in question is not the cost of the software but the principles of freedom of information, accessibility, and security. These arguments have been covered extensively in the preceding paragraphs to which I would refer you.

On the other hand, there certainly exist types of volume licensing (although unfortunately proprietary software does not satisfy the basic principles). But as you correctly pointed out in the immediately preceding paragraph of your letter, they only manage to reduce the impact of a component which makes up no more than 8% of the total.

You continue: 8. "Additionally, the approach chosen by your project (i) is clearly more expensive because of the high costs of migration; (ii) risks loss of interoperability among information systems, both inside the State and between the State and the public sector, due to the many different distributions of open source software on the market."

Let us analyse your statement in two parts. Your first argument, that migration implies high costs, is in reality an argument in favour of the bill. Because the more time goes by, the more difficult migration to another technology will become; and at the same time, the security risks associated with proprietary software will continue to increase. In this way, the use of proprietary systems and formats will make the State ever more dependent on specific suppliers. On the contrary, once a policy of using free software has been established (which certainly, does imply some cost) then on the contrary migration from one system to another becomes very simple, since all data is stored in open formats. On the other hand, migration to an open software context implies no more costs than migration between two different proprietary software contexts, which invalidates your argument completely.

The second argument refers to "loss of interoperability among information systems, both inside the State and between the State and the private sector". This statement implies a certain lack of knowledge of the way in which free

software is built, which does not maximise the dependence of the user on a particular platform, as normally happens in the realm of proprietary software. Even when there are multiple free software distributions, and numerous programs which can be used for the same function, interoperability is guaranteed as much by the use of standard formats, as required by the bill, as by the possibility of creating interoperable software given the availability of the source code.

You then say that: 9. "In most cases, open source software does not offer adequate levels of service to achieve better productivity by its users, nor does it offer warranties from well-known manufacturers. These things have caused many public entities to go back on their decisions to use open source software; they are now using commercial software in its place."

This observation is without foundation. In respect of the guarantee, your argument was rebutted in the response to paragraph 4. In respect of support services, it is possible to use free software without them (just as also happens with proprietary software), but anyone who does need them can obtain support separately, whether from local firms or from international corporations, again just as in the case of proprietary software.

On the other hand, it would contribute greatly to our analysis if you could inform us about free software projects *established* in public bodies which have already been abandoned in favour of proprietary software. We know of a good number of cases where the opposite has taken place, but do not know of any where what you describe has taken place.

You continue by observing that: 10. "This project discourages creativity in the Peruvian software industry, which sells USD 40 million worth of goods every year, USD 4 million of that exported (10th place in the ranking of Peruvian non traditional exports, more than handcrafted goods) and is a source of highly skilled jobs. With a law encouraging the use of open source software, programmers lose their intellectual property rights and their most important source of remuneration."

It is clear enough that nobody is forced to commercialise their code as free software. The only thing to take into account is that if it is not free software, it cannot be sold to the public sector. This is not in any case the main market for the national software industry. We covered some questions referring to the influence of the bill on the generation of employment which would be both highly technically qualified and in better conditions for competition above, so it seems unnecessary to insist on this point.

What follows in your statement is incorrect. On the one hand, no author of free software loses his intellectual property rights, unless he expressly wishes to place his work in the public domain. The free software movement has always been very respectful of intellectual property, and has generated widespread

public recognition of authors. Names like those of Richard Stallman, Linus Torvalds, Guido van Rossum, Larry Wall, Miguel de Icaza, Andrew Tridgell, Theo de Raadt, Andrea Arcangeli, Bruce Perens, Darren Reed, Alan Cox, Eric Raymond, and many others, are recognised world-wide for their contributions to the development of software that is used today by millions of people throughout the world, whilst there are many material authors of excellent pieces of proprietary software who remain anonymous. On the other hand, to say that the rewards for authors rights make up the main source of payment of Peruvian programmers is in any case a guess, in particular since there is no proof to this effect, nor a demonstration of how the use of free software by the State would influence these payments.

You go on to say that: 11. "Since open source software can be freely distributed, it cannot make any money for its developers by exportation. In this way, it weakens the multiplier effect of software sales to other countries and stunts the growth of this local industry, which the State should be stimulating."

This statement shows once again complete ignorance of the mechanisms of and market for free software. It tries to claim that the market of sale of non-exclusive rights for use (sale of licences) is the only possible one for the software industry, when you yourself pointed out several paragraphs above that it is not even the most important one. The incentives that the bill offers for the growth of a supply of better qualified professionals, together with the increase in experience that working on a large scale with free software within the State will bring for Peruvian technicians, will place them in a highly competitive position to offer their services abroad.

You then state that: "12. In the forum, the importance of the use of open source software in education was discussed, without commenting on the complete failure of this initiative in countries like Mexico. There, the same State officials who supported the project now say that open source software did not provide a learning experience to children in schools, adequate levels of training were not available nationwide, inadequate support for the platform was provided, and the software was not integrated well enough with existing school computer systems."

In fact Mexico has gone into reverse with the Red Escolar (Schools Network) project. This is due precisely to the fact that the driving forces behind the Mexican project used license costs as their main argument, instead of the other reasons specified in our project, which are far more essential. Because of this conceptual mistake, and as a result of the lack of effective support from the SEP (Secretary of State for Public Education), the assumption was made that to implant free software in schools it would be enough to drop their software budget and send them a CD ROM with GNU/Linux instead. Of course this failed, and it could not have been otherwise, just as school laboratories fail when they use proprietary software and have no budget for implementation and maintenance. That is exactly why our bill is not limited to making the use

of free software mandatory, but recognises the need to create a viable migration plan, in which the State undertakes the technical transition in an orderly way in order to then enjoy the advantages of free software.

You end with a rhetorical question: 13. "If open source software fulfils all the requirements of State entities, why should a law be needed to adopt its use? Should not the market freely choose which products provide more benefits and value?"

We agree that in the private sector of the economy, it must be the market that decides which products to use, and no State interference is permissible there. However, in the case of the public sector, the reasoning is not the same: as we have already established, the State archives, handles, and transmits information which does not belong to it, but which is entrusted to it by citizens, who have no alternative under the rule of law. As a counterpart to this legal requirement, the State must take extreme measures to safeguard the integrity, confidentiality, and accessibility of this information. The use of proprietary software raises serious doubts as to whether these requirements can be fulfilled, lacks conclusive evidence in this respect, and so is not suitable for use in the public sector.

The need for a law is based, firstly, on the realisation of the fundamental principles listed above in the specific area of software; secondly, on the fact that the State is not an ideal homogeneous entity, but made up of multiple bodies with varying degrees of autonomy in decision making. Given that it is inappropriate to use proprietary software, the fact of establishing these rules in law will prevent the personal discretion of any State employee from putting at risk the information which belongs to citizens. And above all, because it constitutes an up-to-date reaffirmation in relation to the means of management and communication of information used today, it is based on the republican principle of openness to the public.

In conformance with this universally accepted principle, the citizen has the right to know all information held by the State and not covered by well-founded declarations of secrecy based on law. Now, software deals with information and is itself information. Information in a special form, capable of being interpreted by a machine in order to execute actions, but crucial information all the same because the citizen has a legitimate right to know, for example, how his vote is computed or his taxes calculated. And for that he must have free access to the source code and be able to prove to his satisfaction the programs used for electoral computations or calculation of his taxes.

D.5. Decree of Measures to Promote the Knowledge Society in Andalucía

Below are some of the articles, related to free software, of the abovementioned Decree on Measures to Encourage the Knowledge Society in Andalucía [99].

- Article 11. Educational materials in computer format.
 1. All public teaching centres will have educational materials and programs in computerised format, preferably based on free software. In any case, the centres will receive these formats from the Regional Government of Andalucía.
 2. Likewise, the teachers will receive incentives for using computerised curricular materials and programs or using Internet, especially with regard to developments made using free software.

- Article 31. Free software.
 1. When purchasing computer equipment that will be used in public teaching centres for educational activities, it should be ensured that all the hardware is compatible with operating systems based on free software. Computers will come preinstalled with all the free software that is necessary for the specific purposes for which they are intended.
 2. The computer equipment that the Regional Government of Andalucía provides for public access to Internet will be based on free software products.
 3. The Regional Government of Andalucía will foster the dissemination and the personal, domestic and educational use of free software. For these purposes, an online advice service will be established for the installation and use of these types of products.

- Article 49. Objective.
 1. There will be subsidies for the development of innovative projects that facilitate the integration of IT and communications in professional and occupational training.
 2. These projects will follow one of the following models:
 - a) Preparation of materials and contents of professional and occupational training for their use and dissemination by Internet, especially with regard to the developments made using free software.
 - b) Training initiatives using innovative methods, such as long-distance learning and methods whereby the students only need to attend the courses personally on certain occasions.

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