Open Source Software for the Development of the Spanish Public Administration.

An Overview.
2008

National Observatory of
Open Source Software

cenatic

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Contents

Prologue

The enormous changes that are occurring in society as a result of the intense development in information and communication technologies is in turn bringing about changes in the way in which public administrations provide their services and communicate with the general public.

With this in mind, at Red.es we are working with Spanish public administrations to achieve technological formulas that will enable their services to continue increasing in flexibility, adaptability and accessibility via multiple channels, features that will translate directly into making them more convenient and bringing them closer to the public at large.

In the specific environment of public administrations, **open source software** is one of the technologies that is undergoing the greatest development, as is demonstrated by the fact that currently the larger part of the autonomous regional governments in Spain have technology strategies based on this type of software and they are developing their own applications and distributions based on open standards.

However, to date there is no study that fully shows the status of the implementation of such software and sets it within the context of the Spanish public administration. This information would also permit the creation of recommendations to help establish guidelines and decision-making with respect to the adoption of free software in a public environment.

This activity is perfectly covered by ONTSI at a generic level within the sphere of information and communications technologies, but the creation of an organisation that would permit this task is required within the world of open source. For this reason, together with CENATIC (National Competency Centre for the Application of Open Source Technologies) and all the institutions and organisations that form part of its board of management, we have taken the decision to create the **National Observatory for Open Source Software.**

Its main mission is the monitoring, capture, synthesis and systemisation of all the data from the open source software sector in Spain. But furthermore, its ultimate objective is to convert this data into knowledge and thereby, through cooperation with public administrations, universities, R+D+i groups, companies, educational groups, communities of developers, private users and the public in general, also enable the promotion of knowledge and the use of open source software, one of the key commitments of CENATIC.

As a public presentation of its work, the National Observatory for Open Source Software offers this open report to all those interested, under the title "**Open Source Software for the Development of the Spanish Public Administration. An Overview**" as the first in a collection of publications that will allow the National Observatory to become an instrument of reference, a meeting point and a source of dialogue between all the agents of the open source sector at state level.

Sebastián Muriel, *General Manager, Red.es and Vice President, CENATIC*

Report Presentation

On a regular basis, and through the organisations belonging to the central administrations, it is possible to access quantitative data concerning the use of new technologies in public administrations, as well as details on the investments made. Such organisations include the National Institute of Statistics or, more recently, the National Observatory of Telecommunications and the Information Society.

Studies also exist that present a detailed view on the position of open source software in local administrations and reports that contain broad recommendations on the lines the public administrations in general should follow to successfully adopt plans in the development of free software and to comply with the regulations established by law.

Nevertheless, to date no report exists with such a comprehensive picture as presented here. This report, the first drawn up by the National Observatory for Open Source Software at CENATIC, captures an up-to-the-minute and all-embracing global view of the situation that the development of free software in public administrations is experiencing in Spain. **"Open Source Software for the Development of the Spanish Public Administration. An Overview"**, is a project that brings together different elements, making it unique in the specialist bibliography of Spain on technologies and free software.

The study collects quantitative data on the spread of open source software in public administrations and analyses in depth the most outstanding paradigmatic study cases for the adoption of open source software. In addition, it introduces the most important legal aspects to take into account when deciding on this type of software in the public administration. It also provides an exhaustive review from the perspective of supply and demand for open source software projects promoted by public administrations.

All this is further complemented by a comparative view of the situation that the development of free software is undergoing in other public administrations beyond Spanish borders, particularly within the European Union.

Finally, one of the greatest and most valuable contributions of this document is the detailed proposal of recommendations issued by a group of specialist experts, whom we have brought together from the National Observatory for Open Source Software to incorporate their opinions into this report. These recommendations will serve as a guide to those public administrations and organisations concerned with assessing the best methodology for introducing the model of free software development into their own work groups, as well as companies and communities interested in participating proactively in these initiatives.

In summary, these many merits make this report a highly valuable document for developers, for those responsible for making decisions, managers, companies interested in exploring possible business paths in this area, development communities who wish to add their efforts to the development of the software for public administrations and anyone who may be interested in a more accurate understanding of the development of open source software in public administrations in Spain.

Carolina Grau, *General Manager CENATIC*
Jesús M. González Barahona, *Rey Juan Carlos University, Group GsyC/LibreSoft*

01. Executive **summary**

This chapter contains a summary of the main conclusions that have been drawn from open source software in the Spanish public administration, and also provides an explanation of the topics covered and the scope of this publication.

1.1. Contents and scope of the report

This report has been drawn up by CENATIC, Rey Juan Carlos University (Group GsyC/LibreSoft) and Telefónica I+D, with the purpose of analysing the state of open source software implementation in the Spanish public administration.

Over recent years, many studies have been carried out to provide a thorough explanation of what open source software consists of, to explore available products, and to ascertain, using quantitative data, its degree of use or expansion in differing environments, both in the public and private sector. This report exclusively presents the aspects that are of interest to the public administration. To this end, a series of success stories have been brought together which document the most noteworthy examples in the development and implementation of open source software in each autonomous region with information that has been obtained directly from the people responsible for each project or initiative. Similarly, some case studies have been included that have been considered particularly relevant within the Spanish Government.

At the same time, a comprehensive legislative context is provided to complement the report contents, paying special attention to the interoperability between the different public administration information systems. Furthermore, a list of training initiatives is provided in relation to open source software in the public administration.

Finally, the current attitude of the public administration with regard to adopting open source software has been studied through a Strengths, Weaknesses, Opportunities and Threats Analysis (SWOT). In light of this analysis, a set of recommendations and proposals for action has been drawn up in relation to open source software in the Spanish public administration.

1.2 Conclusions of the position of open source software in the public administration

In this report, special attention has been paid to the experiences provided in the different, analysed case studies and the following conclusions have been drawn, listed here as a summary:

1. The growth of open source software and its establishment as an ever-more popular alternative in the Spanish public administration has been confirmed.
In recent years, open source software has acquired growing prominence and has undergone constant expansion. The result of this is that the Spanish Government and autonomous administrations are considering the possibility, in many cases, of migrating their computers to open source software systems. Financing and support through the various programmes provided by the Ministry of Industry, Tourism and Trade have been a decisive factor in the development of this type of software in Spanish autonomous regions.

2. Spain is situated amongst the most active countries within the EU in terms of adopting open source software in its different public administrations.
IDABC[1] and other information sources demonstrate that Spain has a considerable number of initiatives for the adoption and creation of open source software which have been worthy of European attention. Amongst the most notable are: the Proposed Recommendations for the Spanish Government on Using Free and Open Source Software, the Gnu/Linex, Guadalinex, Guadalinfo, Linkat, Council of Zaragoza, Lliurex, MAX, Mancomun.org, MedusaX, gvSIG projects, etc.

3. Spain is at the forefront of European countries in terms of legislation that promotes the use of open source software, assisting interoperability between computer systems.
For example, we can observe the Proposed Recommendations for the Spanish Government on Using Free and Open Source Software; similarly, the Spanish Law 11/2007 of 22nd June, "Acceso Electrónico de los Ciudadanos a los Servicios Públicos" (Citizens' Electronic Access to Public Services) ; Spanish Law 56/2007 of 28th December, "Medidas de Impulso de la Sociedad de la Información" (Means to Promote the Information Society); and Spanish Decree 72/2003 of the Autonomous Government of Andalusia, expressly requesting the implementation of systems that use free and open source software in their educational system and conferring preference for their use in other areas.

4. The education sector is one of the most active sectors amongst those to adopt open source software in Spanish public administrations.
Educational projects are the most outstanding with regards to the number of computers installed, representing approximately 95% of the total number of systems taken into account, with over 1.2 million users having access to open source software.

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[1] IDABC: Interoperable Delivery of European eGovernment Services to Public Administrations, Businesses and Citizens. Website: http://ec.europa.eu/idabc/en/home

5. The savings in the cost of purchasing licenses, the independence of providers, the possibility of creating a community around the project and the ease with which programmes can be adapted to specific requirements are the main advantages that have been observed.

In all the case studies considered in this report, the savings in the cost of purchasing licenses has been highlighted as one of the main advantages of using open source software. The independence of the suppliers and the creation of communities around the different projects are noted as advantages in 50% of the cases analysed, whilst 60% mention the ease of adaptation as a determining factor.

6. The expansion of open source software varies greatly across the different levels of the administration, between autonomous regions, and even within the various sectors of the Spanish public administration.

To cite an example, some educational projects aim to undertake a total implementation plan, at times coexisting with proprietary systems within the same infrastructure, whilst others are beginning to encourage initiatives within the administration.

7. The success of these programmes and initiatives to introduce open source software is largely conditioned by the simultaneous deployment of training programmes for users and technical personnel.

In at least 75% of the study cases analysed, explicit mention is made of the need to accompany the implementation of these systems with a suitable training programme.

8. The public administrations are satisfied with the companies that provide services and equipment to cover their needs for open source software and computers that use it.

Many autonomous regions state that they have no difficulty in finding companies that provide the necessary services or that collaborate in development projects.

9. Open source software manifests itself as one of the principal tools for reducing the digital gap, making technological training programmes viable to members of the public.

Along these lines, projects such as the "Nuevos Centros del Conocimiento" (NCC) (New Knowledge Centres) can be found in Extremadura, along with the Guadalinfo Programme or the Melinux Initiative, where the significant savings in costs through the use of open source software enable the development of such qualification programmes, as financing problems no longer represent an insurmountable difficulty.

10. Costs are reduced thanks to the use of economies of scale and code reuse. There is an evident desire between the different autonomous regions to share experiences and results.

With respect to this, the different agents have identified positive and negative aspects in the use of open source software, providing strategies that may help other future projects and have shared tools, packages and developments that can be re-used.

02.

02. Introduction and Report **Plan**

This chapter presents the main advantages and benefits offered by implementing open source software in Public administrations and briefly defines the criteria public administrations should take into consideration with regard to security, normalisation and conservation, as well as the general considerations established for migrating to open source software. Finally, the work plan developed for this report is detailed.

2.1. Introduction

Over the last decade, numerous technologies that facilitate the development of what is called the "information society" have appeared. Open source software is, undoubtedly, one of the technologies with the greatest influence in promoting such development.

The significant cost savings, as you do not have to pay for each copy of a program (as is the case with proprietary software), is one of the most frequent reasons given for using this type of software. Other aspects such as free access to program code and the ability to adapt, modify and eliminate bugs progressively without depending on the exclusive support of a single company, are also important reasons in favour of using open source software.

Another significant reason for its use is the greater degree of security these programs normally provide in comparison with proprietary alternatives, as they benefit from a greater number of code revisions. Security is often the determining factor when deciding to use open source software in platforms that store and manage highly sensitive information.

Open source software is an essential element for the development of the information society.

2.1.1. Operating Requirements for the Development of Information Technology Systems for the Public Administration

One of the most significant environments for studying the adoption of open source software is that of public administration information systems, due to the enormous benefits that adopting open source software provides. Among the main benefits that can be highlighted are those presented in Chapter 5 of the document *Proposed Recommendations for the Spanish Government on Using Free and Open Source Software*[2], where the "Legal Framework and Requirements of the Public Administration" are discussed in the following terms:

"In the opinion of the Administration (an institution that generates and receives software), exercising the four liberties offered by free, open source software (i.e. execution, knowledge, modification and redistribution) has far-reaching consequences that can affect questions such as the defence of general interest, transparency, efficiency, technological independence, security, control over the programs and applications themselves and access to and conservation of information in electronic format, among others."

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[2] The *Proposed Recommendations for the Spanish Government on Using Free and Open Source Software* was prepared by the Spanish Government "Free and Open Source Software Group" and is available at: http://www.csi.map.es/csi/pg5s44.htm

This same chapter also states that open source software permits full execution of the four operative requirements defined for the development of information technology systems for the administration:

- **Freedom of choice:** applied to hardware as well as to programs and services. Update to or migration of information systems in an open source software environment does not depend on, nor is it conditioned by, a single supplier.
- **Investment protection:** with respect to hardware, software programs, technician/user training in the face of possible contingencies such as changes or disappearances of suppliers' commercial policies.
- **Better quality/price ratio:** competition is encouraged, because no proprietary license imposes any de facto monopoly, so alternative support offers are available.
- **System communication and interoperability guaranteed:** this point is especially significant because of the obligation to encourage on-line access to the administration's public services by all citizens, as well as guaranteeing communication between these services.

2.1.2. Advantages of Open Source Software in e-administration

Another fundamental environment for using open source software is in electronic administration or e-administration. The European Commission defines electronic government as the use of information and communication technologies (ICT) in public administrations in combination with organisational change and new techniques for improving public services and democratic processes, strengthening support for public policies.

From this perspective, adopting open source software for implementing e-administration provides a series of advantages in various elements, as is shown in the previously mentioned *Proposed Recommendations for the Spanish Government on Using Free and Open Source Software:*

- **Social dimension of open source software.** Cost reductions allow the public easier access to the latest technologies, making it easier to connect to e-administration services. This cost reduction also

Using open source software is especially advantageous for the development of electronic government.

makes it possible to eliminate barriers for some small and medium-sized businesses (PYMEs in Spanish) and less-favoured regions, besides saving the administration itself money.

- **Interoperability and normalisation.** Open source software products normally subscribe to open public regulations and specifications. Using open standards favours interoperability among systems and development of new services and content. These factors are essential when implementing e-administration, especially for guaranteeing that the services provided are accessible to all citizens.

- **Technological independence:** It is necessary to maintain technological independence so that administration systems are not forced to perform migrations or updates because of external factors not directly related to user needs or administration requirements, thus eliminating the obligation to be subject to the decisions of software manufacturers.

Main advantages:

- Social aspect
- Interoperability
- Technological independence
- Technical support and maintenance
- Security

- Information conservation
- Protection of linguistic forms
- Stability and quality
- Total ownership cost
- Intellectual property and patents

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- **Technical support and maintenance:** Choosing solutions based on open source software also avoids situations of exclusivity in technical support and maintenance services. The document *"Interchange of Data between Administrations" (IDA) Open Source Migration Guidelines*[3], developed by the European Commission, mentions at least three different ways of providing open source software support and maintenance:
  1. Using in-house resources.
  2. Contracting third-party services, under free competition conditions.
  3. Obtaining patches and updates from development communities.
- **Confidence and security:**The possibility of accessing information system code provides the opportunity to solve any errors or security breaches more quickly than with proprietary solutions. Greater agility when resolving these problems helps to reduce the window of vulnerability in our applications.
- **Conserving information:** Using open standards for open source software allows you to maintain sustained access to e-administration documents over time.
- **Protecting linguistic forms:** Open source software, by facilitating access to application source code, makes translating a product to other languages more dynamic, thus respecting regional characteristics that can be favoured by the government.

- **Stability and quality.** The possibility of public scrutiny of the code greatly facilitates stability and quality in some open source software solutions. To extend this stability and quality, certification initiatives are being adopted, fundamentally in questions related to compatibility with specific hardware or other software.
- **Total ownership cost.** The cost saving in implementation from using open source software is more obvious in the case of massive installations or updates of the large information and communication infrastructure of a public administration as a whole.
- **Intellectual property and patents.** Currently, software cannot be patented as such in Europe and is protected by author's rights (Intellectual Property Law and Directive 91/250/CE). There is clear concern over the possible consequences of including software patents. The incremental character of these products would be limited in this case, as well as evolution and competition in developing new solutions and services for the information society; in particular, the spread of electronic administration services would be limited.

[3] The "IDA Open Source Migration Guidelines" is a product of the IDA (Interchange of Data between Administrations) Community Programme. The complete document is available at: http://www.csi.map.es/csi/pg5s43.htm

2.1.3. Security, Normalisation and Conservation Criteria

The document *Security, Normalisation and Conservation Criteria for Applications Used for the Exercise of Powers* , prepared by the Higher Council for Information Technology and for Electronic Administration, states in Chapter 6, *Free, Open Source Software* (Section 6.1):

"Open source programs and applications should be adopted in environments where solutions of this type, which satisfy the needs and requirements of the application or information to be conserved, are possible. Specifically, the overall offer of available software distributed according to various types of licenses should be taken into consideration in acquiring products or development of custom-made software and technical and economic rationality criteria should be applied. Thus, all possible alternatives in the framework of the legitimate obligations and interests of the Government will be evaluated, independently of the acquisition procedures applicable in each case."

Recommendations are also made, such as:
- E-administration services must be accessible from any type of browser.
- Programs delivered by the government must work on all types of platforms.
- Administrative documents must be provided in formats that can be accessed by diverse software products.
- Regulations and standards used must be publicly available and of public rights and specifications, free from royalties and patents.

2.1.4. IDA Open Source Migration Guidelines

It is also worthwhile noting the general considerations established by the previously mentioned European Commission document, "IDA Open Source Migration Guidelines."

The Spanish Ministry of Public Administrations has participated actively in the expert group that have guided its preparation, together with other countries such as Germany, Denmark, Finland, Italy, Malta, the Netherlands, Switzerland and Turkey. Their recommendations are aimed at IT managers and professionals in European public administrations, with the goal of helping to reach a decision on whether an open source software migration should be performed and how to carry out such a migration successfully in the case of public-sector information systems.

In this situation, it is necessary to prepare a report that shows the current panorama of open source software within the Spanish public administration. It would thus be possible to properly put into context the extent to which this type of software is implemented within the government' s information systems. It would also be possible to draw up a recommendation plan to help in preparing future guidelines and decisions on the adoption of open source software in these systems.

The "IDA Open Source Migration Guidelines" establish recommendations for public administrations migrating to open source software

2.2. Report Structure and Plan

As has been indicated, the objective of this report is to offer a general view of open source software implementation in Spanish public administrations. Although the information gathered is presented within the framework of the different Autonomous Communities, it also offers a global vision of the state of open source software in the Spanish Public Administration as a whole, including some of the most relevant data that can be drawn from the REINA 2007 report. Likewise, an overview of open source software implementation in different European administrations is offered, providing a framework for comparing the Spanish situation within Community reality.

An interesting aspect with regard to content is that most of the information relating to cases of open source software implementation in Spanish public administrations was obtained by interviews with agents from different levels within the administration who were involved in projects for adopting this type of solution. Therefore, this first-hand information lets us prepare a much more detailed picture of the state of open source software implementation in the public administration.

The content is structured into eight chapters and an annex of references, as follows:

1. **Executive Summary.** This presents the most significant aspects of the report, as well as the main conclusions that can be drawn from the data and case studies provided.
2. **Introduction and Report Plan.** Introduces the report goals and presents its structure and content.

3. **Legal Framework.** This summarises the main aspects to bear in mind with respect to the current legal framework in Spain and Europe that can influence implementing open source software in the Spanish public administration.
4. **Open Source Software in the Spanish Public Administration.** This presents an overview of open source software implementation in the Spanish public administration, initiatives for adopting open source software and other open source software experiences that have been identified.
5. **Strategic Analysis.** Presents a SWOT Analysis (Strengths, Weaknesses, Opportunities and Threats) of the most significant aspects identified by analysing the data and case studies provided in this report.
6. **Conclusions and Recommendations.** This summarises the content and principal conclusions that can be drawn from the situation presented in the report, as well as recommendations prepared for the public administrations so they can manage the migration of their information systems to open source software and the adoption of this type of solution successfully.
7. **Methodology, Execution Team and Collaborators.** This summarises the main methodological lines followed in preparing this document, as well as presenting the individuals who participated in preparing it.
8. **Records of Relevant Cases in the Spanish Public Administration.** This presents a summary of the main characteristics of successful cases identified in the Spanish public administration.
9. **References.**

03.

03. Legal **framework**

This chapter presents the applicable legal regulations and requirements for the acquisition of software in Spanish public administrations, paying special attention to its application in the case of open source software.

3.1. General view

Current legislation establishes a clear and well-defined framework detailing which aspects the Central Administration should oversee in day-to-day activities such as its relations with the public, the services it offers them and the operative requirements that should be taken into account when implementing these services in their information systems.

Figure 3.1., *Proposed Recommendations for the Spanish Government on Using Free and Open Source Software*, presents a general view of the different interrelations detected between the agents participating in this process.

The existing legal regulations set out a series of guideline parameters and attributions concerning the use of open source by the Spanish Government, which are brought together in the Free and Open Source Software and Electronic Administration document:

· **Defending general interest.** Article 103 of the Constitution establishes that "The administration shall serve the general interest with objectivity and act in accordance with the principles of efficiency..."

An extensive legal conglomerate currently exists, which regulates the incorporation of technology into the public administration information systems.

· **Transparency in administrative activities.** Spanish Law 30/1992, on *Public Administrations and Common Administration Procedures*[4], Preamble, Section V, establishes that there should be a *"guarantee of quality and transparency in administrative activities"*.

· **Effectiveness and efficiency.** Spanish Law 30/1992, Article 3. General Principles: *"act in line with criteria concerning effectiveness and service to the public"*.

· **Security and conservation of information on electronic media.** Spanish Royal Decree 263/1996 (which develops Article 45 of Spanish Law 30/1992) establishes the obligation to adopt organisational and technical measures that guarantee *authenticity, confidentiality, integrity, availability and conservation*[5].

· **Accessibility.** Spanish Law 34/2002, on the Information Society Services and Electronic Commerce[6] establishes that "Public administrations should adopt measures to ensure that their websites are accessible to persons with disabilities and the elderly..."

· **Normalisation and interoperability.** Spanish Royal Decree 263/1996: "conformity with nationally and internationally enforceable regulations".

· **Protecting different linguistic forms.** Set out in the Spanish Constitution, Articles 3, 49 and 149.

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[4] http://www.boe.es/t/es/bases_datos/doc.php?coleccion=iberlex&id=1992/26318
[5] http://www.cert.fnmt.es/legsoporte/rdec263.PDF
[6] http://www.boe.es/boe/dias/2002/07/12/pdfs/A25388-25403.pdf

GOBIERNO DE ESPAÑA
MINISTERIO DE ADMINISTRACIONES PÚBLICAS

Overview

Software — *Without license or cannot be determined* → **Public domain SW**

Software — *Receives* / *Generates* → **Public Administration** — *Has numerous roles* → Provision of services / IT users / IT purchaser / Developer / Regulator / Reference

Software — *Distributed with* → **License** — *Acknowledges Denies* → **Rights**

License — *Limits* → **Responsibilities**

License — *Exist* → **Types of License**

Types of License — *Does not grant the 4 freedoms* → **Proprietary software**

Types of License — *Grant the 4 freedoms* → **Free open source software**

Proprietary software — *Subject to* → **Authors' rights** / **Intellectual property**

Free open source software — *Subject to* → **Authors' rights** / **Intellectual property**

Free open source software — *Possesses* / *Has* → **Characteristic aspects**

Public Administration — *Uses SW for* →
● Instrumental IT
● Applications for the exercise of powers
  ● E-administration

Includes → **E-services** / **E-documents** / **Programmes and applications made available to the public and companies**

Applicable

Benefits from → **Characteristic aspects**

Market
- Product offer
- Services offer
- Usage data

Characteristic aspects
- Total dimension
- Technological independence
- Normalisation
- Availability and continuity
- Stability and maturity
- Security
- Information access and conservation
- Total cost of rights
- Intellectual property and patents

Legal framework and AGE requirements

LEGAL FRAMEWORK – General interest. Effectiveness and efficiency. Transparency. Security. Conservation. Accessibility. Normalisation and Interoperability. Linguistic forms. Intellectual property and patents. Drawing up of contracts.

OPERATIVE REQUIREMENTS – Freedom of choice. Investment protection. Price/performance relationship. Interoperability

figure 3.1.

Proposed Recommendations for the Spanish Government on Using Free and Open Source Software

- **Intellectual property and patents.** Articles 95 to 104 of the *Intellectual Property Law*, established by Royal Legislative Decree 1/1996, of 12th April, deals with authors' rights and computer programmes[7]; subsequently, this law was supplemented by Spanish Law 23/2006, of 7th July, with the modification of Articles 25, 31 and 160. Similarly, the Patents and Utility Models Law establishes that programmes are not considered inventions and are therefore not subject to patentability.

- **Drawing up contracts.** Both the general legal framework (*Contracts in Public Administrations Law*) and the specific legal framework (RD 2572/1973, RD 533/1992, RD541/2001...) establish the means and conditions for drawing up contracts that should be followed by the Spanish Government.

The role played by the Spanish Government in this field is therefore complex, given that it can hold different profiles at the same time: service supplier; user and buyer of information system components; applications developer who controls and manages these systems; and also a regulator and benchmark in this sector. Of all these aspects, the most pertinent section is that which applies to the creation of services and electronic documents, and also programmes and applications that are made available to companies.

3.2. Interoperability between information systems

As the previous section has already underlined, one of the aspects that should be most carefully monitored in public administration information systems is guaranteeing interoperability between the different systems of the Spanish administration, and also ensuring that this interoperability can be equally extended to other EU countries. In this line, the *Proposed Recommendations for the Spanish Government on Using Free and Open Source Software* document specifically stresses the advantages that open source software offers as a guarantor of this interoperability.

This study on the use of open source software in public administrations, carried out by the IDA Programme, includes the respect of regulations and the encouragement of interoperability, amongst other fundamental reasons for its use. It outlines that the use of public and open specifications directly assists interoperability, and is closely related to the development of free, open source software. Also mentioned is the special relevance of interoperability with regard to horizontal interaction, also known as a chain effect, of public bodies with other

Interoperability is an essential element in public administration information systems

[7] http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=1996/8930&codmap=

bodies within the administration and in relationships with the public. The formats and open standards permit the adoption of protocols and specifications that are clearly defined and publicly available.

This has an important consequence which is closely related to open regulations and interoperability: the independence of standards. Through the use of open standards, the public administration is not subject to migrations of obligatory updates imposed by the software developer or proprietary standard.

Within this context, it is necessary to highlight the entry into force of Spanish Law 11/2007, of 22nd June, on *Citizens' Electronic Access to Public Services*. This state law specifically includes the rights that must be safeguarded with respect to public access to the services and information provided by the e-administration. Within the general principles outlined by the objectives of this law, explicit mention is made to guarantee the principle of technological neutrality in the preliminary Heading, Article 4, Section i):

The use of information technologies shall have restrictions established by the Constitution and the rest of the legal system, respecting the full right of the public to exercise their recognised rights, which are adjusted to the following principles: [...] i) Principle of technological neutrality and adaptability to the progress of electronic communications techniques and systems, guaranteeing independence in the selection of technological alternatives by the public and by public administrations, and the freedom to develop and implement technological advances within a free market. To ensure this, the public administrations shall use open standards and, as a complementary measure and wherever appropriate, standards that are in widespread use by the public.

Furthermore, in Heading IV of this Law, "*Cooperation between administrations to promote the Electronic Administration*", a specific

Open standards guarantee the independence of providers and assist the interoperability of public information systems

Spanish Law 11/2007 regulates the use of standards and establishes the principle of technological neutrality

summary of this topic can be found in Chapter II, *"Cooperation in relation to the interoperability of systems and applications"*. Article 41 of this chapter indicates:

Article 41. Interoperability of Information Systems. Public administrations shall use information technologies in their relationships with other administrations and with the public, applying IT, technological, organisational and security measures that shall guarantee an appropriate level of technical, semantic and organisational interoperability and that shall avoid discrimination towards the public as a consequence of their choice of technology.

Finally, Chapter III, *"Reuse of applications and technology transfer"*, includes another two articles that deserve special mention:

Article 45. Reuse of systems and applications owned by the administration.

1. Administrations that possess the intellectual property rights for applications - when developed by their services or when development has been the object of contractual agreements - may make them available to any administration without reimbursement and without the need for any written agreement.

2. The applications referred to in the previous section may be declared open source when they result in greater transparency in public administration operations or when they encourage the incorporation of the public into the information society.

The reuse of applications in public administrations is promoted in Spanish Law 11/2007

Article 46. Technology transfer between administrations.

1. The public administrations shall keep updated directories of applications for their free reuse, especially in fields of special interest for the development of electronic administration and in compliance with that laid out in the National Interoperability Standards.

2. By means of a technology transfer centre, the Spanish Government will keep a general directory of applications for reuse, will provide technical assistance for the free reuse of applications, and will promote the development of applications, formats and common standards of special interest for the development of electronic administration within the framework of national standards of interoperability and security.

As a special case, the Autonomous Government of Andalusia has issued a Decree proposal describing the new "Digital Interoperability Framework", a proposal for the management of its information systems. In the preamble of this decree proposal, the following is set out:

"...software is an omnipresent element at all levels of the information society. Its use by public bodies, in general, and its use by the administration in the development and supply of e-services must be carried out within the framework of the defence of general interest, transparency of administrative activity, efficacy and efficiency, security, conservation of information on electronic media, accessibility, normalisation and interoperability, the protection of different linguistic

The decree proposal of the Autonomous Government of Andalusia has the aim of:

- Guaranteeing neutral technological communication between the general public and the administration
- Guaranteeing interoperability
-Guaranteeing the conservation of knowledge
- Promoting the efficient use of ICT in the Autonomous Government of Andalusia

forms and of the governing principles in the public contracts system in public administrations. To this end, the use of open standards is the only path which guarantees that the participation of the different e-service agents within the administration of the Autonomous Government of Andalusia is carried out using their preferred options without being conditioned to the use or acquisition of specific technological environments, whilst concurrently promoting a greater presence in the market."

In this way, the need to assist interoperability in the functioning and communication of the different systems of public information is expressly established, accepting the relevant role played by open standards when endeavouring to achieve these objectives. In this proposed decree, four basic objectives are outlined, in accordance with those that have been set out in this chapter:

1. To guarantee that the general public and public and private institutions can communicate with each other electronically or access the Andalusian public administration services without either party obliging the other to use a specific information system, expressly safeguarding the principle of equity in digital accessibility.

2. To guarantee the interoperability of the services and information systems used, both for the relationship held by the Autonomous Government of Andalusia with other administrations, and with public and private bodies, and also within their own environment.

3. To conserve the knowledge generated, permitting transparent, controlled and secure access to the stored information and documents, of their ownership or others', which form the basis and are the result of all the activities and internal processes of the Autonomous Government of Andalusia.

4. To establish conditions that guarantee the effective and efficient use of information and communications technologies, hereinafter known as ICT, with the objective that they serve as an instrument to modernise the administration and fulfil the general objectives set out by the Governing Council.
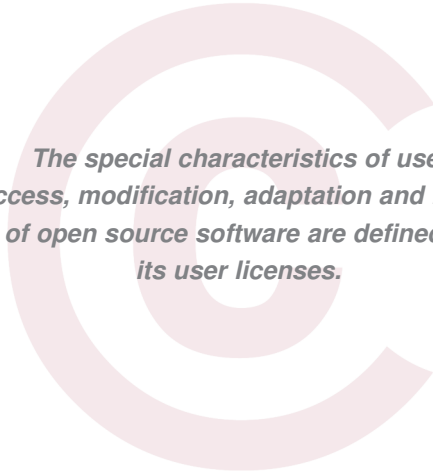
3.3. Intellectual property, author's rights and software licenses

The licenses under which open source software is published in the public administration is another of the most relevant topics that should be commented upon within this section of legal aspects. In the document *Pooling Open Source Software*[8], created in 2002, within the framework of the activities carried out by the IDA Programme, extensive information was provided on the different licenses that can be found in open source software and their implications for public administrations when assessing which of these licenses are most recommendable for their specific needs.

Licenses are relevant in the case of open source software because it is precisely the licenses that grant these programmes their special properties with respect to their use, expansion, adaptation, development, access to source code and reuse in other software projects. Essentially, all open source software licenses present common ideas in relation to the freedom of software use for

The special characteristics of use, access, modification, adaptation and reuse of open source software are defined in its user licenses.

any purpose, without the need to pay per terminal or number of users; the freedom of access to open source; the ability to reuse the software (whilst always maintaining the relevant credits for the work of the original author or authors); plus freedom in the expansion of its use so that other users can also use it. Nevertheless, although all free licenses share these four freedoms, many of them present numerous special characteristics, additional clauses and obligations that many users, including the public administrations themselves, may not be aware of.

The *Pooling Open Source Software* document clearly describes this point. It offers a classification of all the open source software licenses in five broad groups:

· **Copyleft-type licenses.** The two best known free software licenses in this group are the GPL (*GNU Public License*) and the LGPL (*GNU Lesser General Public License*). Both were created by Richard Stallman for the distribution of software developed within the GNU project. Its principal objective is to promote the creation of free and open source software and a specific section called copyleft (Article 4 of the GPL license) was created for this purpose, which expressly prohibits software that is distributed under the GPL license to be adopted by another software and distributed under a proprietary license. Other main characteristics of GPL are:

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[8] http://europa.eu.int/idabc/en/document/2623

- To permit the distribution of (executable) binary code, providing that access to the programme's source code has been supplied, as well as the redistribution of the actual source code (obligatory in the case of binary code).
- To permit the unrestricted modification of the source code, providing that the result is also licensed under GPL.
- To permit integration with other software programmes, providing these programmes are equally protected under GPL.

LGPL was created for cases where integration with other proprietary software is required.

- **BSD-type licenses.** This group includes licenses used in many of the best known free and open source software solutions: BSD and BSD modified license, Software Apache license, X-11 license and X-Type licenses, Copyright Python license, Zope public license and LDAP public license, to name but a few. These licenses have very little content and many of them simply contain a small piece of text which sets out several conditions for the users. Specifically, there are no *copyleft*type clauses, which means that open source software released under these licenses can be freely adopted by other proprietary software. Unlimited rights are provided to: use, copy, modify, mix, publish, distribute and/or sell copies of software. Occasionally, the need to grant specific author's attribution to the programmer or project creator of the software is indicated, such as, when using the software developed by the *Apache Software Foundation.*

- **Mozilla-type licenses.** Also known as MPL-type licenses (*Mozilla Public License*). These grant the developers and users certain privileges. More specifically, this is a license that enforces the copyleft principle, but only on the source code. Binary programmes, on the other hand, can be redistributed under any type of license, generating an agreement solution between the commercial interests of

Classification of open source licenses:

- Copyleft-type
- BSD-type
- Mozilla-type
- Artistic

proprietary software companies and the rights of the original developers to continue accessing the source code, modifying it or generating new future versions. According to the experts, GPL and MPL licenses are incompatible. The first reason is due to the fact that the effect of copyleft is different, and therefore an MPL programme cannot become GPL except when the developer expressly decides otherwise (with the complicated exceptions of those cases in which the binary files have already been adopted by proprietary solutions, in which case they would be compelled to cease using it). The MPL license also provides the developer with the possibility of partially licensing their software under this mode, enabling other modules to be granted a proprietary license.

- **Artistic licenses.** These consist of a family of licenses that appear infrequently and which started with the Perl language license, to develop scripts. Currently, very few open source software licenses are included in this classification.

- **Other types of specific licenses.** These are licenses that grant highly specific rights to the authors. For example, Netscape Public License, Apple Public License and Q Public License can be found within this group. The EUPL license is also classified in this group, approved by the European Commission (Decision C(2006) 7108 of 9th January 2007).

The most significant aspects of each type of license can be found in the following table.

License family	Notable examples	Enforce copyleft	Principal characteristics
Copyleft-type	GPL, GFDL	Yes, for both source code and binary code.	Forces publication of source code when binary code is released; special concern to enforce the copyleft effect in programmes that include code under this type of license.
BSD-type	BSD license, modified BSD, Apache Software License	No. Yes, for source code; binary code is excluded.	The licensed code can be freely mixed with proprietary software code; some specify the obligation of attributing authorship to the project that the code generated normally.
MPL-type	Mozilla Public License		Incompatible with GPL-type licenses; assists in the adoption of binary code by proprietary software companies; permits proprietary licenses to be applied to certain parts of the code, leaving the remainder free.
Artistic licenses	Perl artistic licence	No.	Very poor definition in legal terms; used very little.
Other specific licenses	EUPL	Permitted, where copyleft-type license code is included.	Created specifically for certain environments: for example, the EUPL has been devised to license European public administrations' open source programmes.

table 3.1.

Comparison of the main family license characteristics in open source software

To solve all the problems and possible doubts that this diversity of licenses may give rise to in public administrations, the European Commission, within the IDABC Programme, approved the EUPL open source software license on 9th January 2007[9]. This is a license for the distribution of software that is developed within the context of this programme, which is specifically aimed at assisting the interoperability of the different public administrations' information systems across the European Union. Therefore, it is a license that can be used for the release of software by European public administrations. One of its prime objectives is to guarantee its adaptation to applicable *copyright* and authors' rights regulations in all the member states of the European Union whilst endeavouring to assist compatibility with other free licenses. A compatibility study with other open source software licenses can be found in its annexes. Compatibility is specifically guaranteed with the following licenses:

- GNU GPL, version 2
- Open Software License, versions 2.1 and 3.0
- Common Public License, version 1.0
- Eclipse Public License, version 1.0
- CeCILL, version 2.0

The EUPL license is compatible with the specific GPLv2 for the release of software by public administrations in the European Union.

It should be pointed out that, in spite of guaranteed compatibility with the GPL license, all EUPL software that is integrated with software released under GPL will be automatically licensed under GPL (owing to the demands of copyleft laid down by this license).

The EUPL also explicitly guarantees its use in various languages of the member states of the European Union, avoiding problems of free licenses, as in the case of the French public administration, where licenses must compulsorily be written in French. Therefore, all the necessary elements are provided so that European public administrations can release software that not only protects the licensor and licensee, but also the projects. Finally, it should be stressed that license compatibility in all Member States has been guaranteed thanks to a review undertaken by numerous teams of European legal experts.
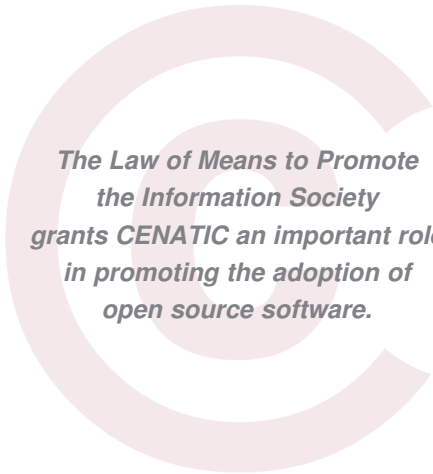
3.4. Law of Means to Promote the Information Society[10]

The Spanish Law 56/2007, of 28th December, on *Means to Promote the Information Society*, sets out some interesting points that specifically attempt to promote the adoption and development of open source software within Spanish public administrations.

The Fourteenth Supplementary Provision establishes that:

"The National Competency Centre for the Application of Open Source Technologies (CENATIC), in collaboration with benchmark autonomous centres and with the Centre of Technology Transfer between Public Administrations of the Spanish Government, shall take responsibility for the adaptation and expansion of all applications that are declared as being open source by public administrations between private bodies and the general public, ensuring that any improvement or contribution that is carried out on them is transmitted to the authors or development communities.

Similarly, CENATIC shall take responsibility for the general assessment of the legal, technological and methodological aspects that would be most appropriate for the release of software and knowledge."

The Law of Means to Promote the Information Society grants CENATIC an important role in promoting the adoption of open source software.

In the Sixteenth Supplementary Provision, "*Digital contents of public ownership to be made available to the general public*", the following is established:

"Providing that their characteristics do not prejudice the normal operation of the administration, nor affect the public or general interest, the digital or digitalized contents provided by the public administrations, whose rights of intellectual property may wholly belong to them or to the public domain, shall be made available to the public in the terms legally established, on-line and without technological restrictions, for their consistent use for study, copying or redistribution, providing that the works used name the author and are distributed under the same terms, in accordance with that previously laid out."

The explicit inclusion of the term "without technological restrictions" has major implications when guaranteeing the compatibility and interoperability between the public administrations' access platforms and the programmes used by the end-users who access said information. For example, this includes the use of any operating system, browser, etc that is based on, or is developed as open source software.

Finally, in the Seventeenth Supplementary Provision, *"Content transfer to be made available to the general public"*, it is established that:

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[10] http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/22440

"Natural or legal persons may transfer their rights of use on works so that a digitalized copy of the works may be made available to the public on-line, without technological or methodological restrictions, and be used freely for any purpose, studied, copied, modified or redistributed, providing that the derivative works are distributed under the same terms."

It therefore guarantees the right of any person, natural or legal, to publish contents and digitalized works under free or open source licenses.

The release of publicly-owned digital contents should not impose technological restrictions on the public.

04.

04. Open Source Software in the Spanish **Public Administration**

This chapter summarises the historical growth of open source software in Spanish public administrations, an analysis based on quantitative data of the current penetration of open source software in the administrations and a description of some of the most significant initiatives in progress.

4.1. Evolution and Quantitative Data

4.1.1. From the Beginning

In the history of open source software development, Spain stands as a pioneer in Europe in implementing open source software in its public administrations. In 1999, the Ministry of Public Administration developed services provided by government delegations on GNU/Linux servers. These servers handled permanent data storage via SMB, connectivity (IP over RTC or RDSI), software distribution, e-mail and Intranet/Internet access. In 2001, the Ministry of Justice joined this initiative, migrating offices under its jurisdiction to GNU/Linux servers by 2005.

At the autonomous community level, the Autonomous Government of Extremadura was a pioneer in implementing initiatives based on open source software. These projects were mainly implemented with their own variant of the GNU/Linux OS, called gnuLinNeX. By November 2002, they had already migrated 10,000 computers to this OS, mainly in educational centres. A specific variant,

Since 1999, the Spanish public administrations have been pioneers in implementing open source software.

Extremadura was the first autonomous community to make a firm commitment to open source software.

gnuLinEx Colegios, was later developed, specially designed to make educators' work easier, with OS adaptations for the different primary education levels. GnuLinEx has received various awards testifying to its success, including the European Award for Regional Innovation in the information society category (from the European Commission within the European Regional Innovative Action Program).

The Autonomous Government of Andalusia later followed the Extremadura initiative, taking gnuLinEx as the basis for creating their own distribution, called Guadalinex. Their official project web site was inaugurated on 11 August 2003. Published on 18 March 2003, Decree 72/2003 of the Autonomous Government of Andalusia set out the legal basis for this initiative and included various means for promoting the knowledge society in Andalusia. Encouragement for adopting open source software in educational environments is especially significant among these means, along with the stipulation that public Internet access equipment must be based on open source software and all hardware acquired must be compatible with free, open source operating systems. The Guadalinfo[11]Project, also initiated in 2003, attempts to promote access to the knowledge society by installing Guadalinfo centres that provide broadband Internet access to the most rural or less favoured areas in Andalusia.

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[11] http://www.guadalinfo.net/

By June 2004, 26 of these centres had been created in towns with fewer than 20,000 inhabitants. An agreement to create public Internet access centres in 636 Andalusian municipalities with fewer than 10,000 inhabitants was signed in December 2003.

Together with these initial examples of adopting open source software by Spanish public administrations, there are other, less well known initiatives that have been carried out by various autonomous communities and town councils since 2003. These autonomous communities include those of Madrid, the Basque Country, Valencia, Navarra and Galicia. In the case of town councils, many of the open source software initiatives centre on migrating some elements of their communication infrastructure. Institutional web servers clearly stand out in the councils' infrastructure. For example, noteworthy initiatives have been carried out by the following town councils: A Coruña (Coruña), Altzo (Guipúzcoa), Aramio (Álava), Atarfe (Granada), Arrasate-Mondragón (Guipúzcoa), Benicarló (Castellón), Bergara (Guipúzcoa), Donostia-San Sebastián (Guipúzcoa), Eibar (Guipúzcoa), Elgeta (Guipúzcoa), Eskoriatza (Guipúzcoa), Nava (Asturias), Ondarroa (Vizcaya), Orio (Guipúzcoa), Roquetas de Mar (Almería),

Andalusia started out on the road to open source software with the distribution of GNU/Linux Guadalinex.

Many town councils later incorporated the use of open source software into their corporate systems.

The study "Proposed Recommendations for the Spanish Government on Using Free and Open Source Software" has been the basic point of reference for adopting open source software.

According to the II Andago Report in 2004, 48% of public administrations used OSS.

Santa Pola (Alicante), Sant Bartomeu del Grau (Barcelona), Torrelles de Llobregat (Barcelona) and Villaviciosa (Asturias).

The first indication of proposals to adopt open source software came from the Central Spanish Government; the Ministry of Public Administrations presented its own experience in this field (previously mentioned) within the framework of the 2001 IDA European Symposium. Later, in June 2005, the recommendation of the ministry's Higher Council for Information Technology, titled "Proposed Recommendations for the Spanish Government on Using Free and Open Source Software", was published. These recommendations specifically indicate that it would be best to use standard formats not subject to patents or royalties, explicitly mentioning open source software as a good option.

Although there are few studies that offer quantitative data on open source software penetration in the public sector, some of them are especially significant. The first available was the 2001 "Informe Reina", indicating that only 3% of Spanish public administration equipment used the Linux OS at that time.

Some years later, the 2004 *"II Andago Report on the Use of Open Source in Spanish Corporations"* [12](which also covered the public administrations) indicated that 48% of the administrations surveyed used open source software to a greater or lesser degree. It also mentioned that 95% of the individuals responsible for public administration information technologies (who were aware of open source software and still did not use GNU/Linux in their corporative systems) had indicated their clear intention of incorporating it in the near future. As to the type of open source software technologies those individuals were interested in implementing, servers for Internet, applications and data were mentioned by 80%, 67% and 65% respectively. A smaller percentage of those individuals (43%) mentioned interest in user terminal servers.

In 2005, total software expenses for the Spanish Government were 116.8 million euros.

The Ministries of Work and Social Affairs, Economy and Finance, and Health and Consumer Affairs were the entities that spent the largest proportion of their budgets on acquiring software.

In conclusion, open source software implementation dates from almost the beginning of the 21st century; this type of solutions was of great interest to professionals in the sector in 2003 and large-scale initiatives commenced around this time. Several of these were pioneering concepts at a global level and have led us to the current situation.

4.1.2. Quantitative Data: Central Spanish Government and Local Administration

The most complete view of quantitative data on the present situation of open source software in the Spanish public administration comes from analysing the extensive findings published in the two reports *"IRIA: Information Technologies in Public Administrations"* and *"REINA: Information and Communication Technologies in Government Administration",* published by the Higher Council for Electronic Administration since 1998.

According to the 2006 IRIA Report (based on 2005 data), total Spanish public administration software expenses were €116,825,000 (excluding custom-made software development, which is included under computer services). This represents a 7% decrease from 2004.

The areas of greatest software investment were work and social affairs (16%), economy and finances (15%), health and consumer affairs (13%), defence (12%) and promotion (10%). The largest software expense category was operating systems (34% of total expenses), as in previous years. Acquisition of horizontal applications was second (13%), followed by information management systems (12%). None of the remaining categories (communication, web tools, system utilities, development tools, etc.) exceeded 10% of the total software expenses.

[12] http://www.libroblanco.com/joomla/document/Informe_Andago_II_2004.pdf

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With respect to how software expenses were distributed among different providers, the great diversity in their selection was notable. Only IBM maintains a high percentage (33% of total software expenses), with El Corte Inglés (10%) and Oracle Ibérica (5%) trailing far behind. Fifty-three percent of total software purchase expenses is divided among numerous providers, each of which reach less than 5%.

According to the 2007 REINA report, the Spanish Government's total computer expenses (including services, personnel, material and software) were 1,237 million euros in 2006. Of this amount, 33% corresponds to computer services. It is worth mentioning that software expenses had a year-to-year increase of 33% and represented 13% of overall computer expenses in 2006. Internally, software expenses are still highly diverse, similar to those published in the 2006 IRIA report.

In addition to this general information, the 2006 IRIA Report also presents a specific study on open source penetration in public administrations compared to that of proprietary software. To understand the IRIA Report data properly, it must be remembered that the report divides systems into three size categories as

In 2006, total software expenses for the Spanish Central Government were 160.8 million euros.

In 2002, 9% of the large systems had GNU/Linux installed, a figure that rose to 50% in 2006.

In 2007, the REINA report indicated an advance in the use of Linux as an operating system on the public administration's servers.
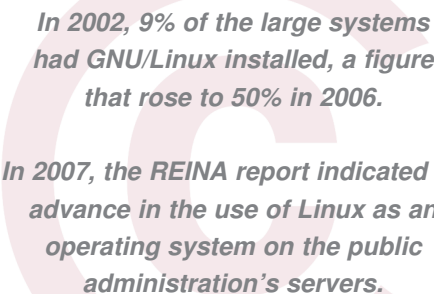
follows: Large systems, whose central unit costs over €601,012 (not including storage units); medium-sized systems, whose central unit costs between €60,101 and €601,012 (likewise without storage units); and small systems, costing between €6,010 and €60,101 (in this case including any storage units).

The following sections describe the data for each of the most important software applications in the Spanish Government in detail. The last segment refers to local administration.

4.1.2.1. Operating Systems

Unix-type operating systems clearly dominate large and medium-sized systems, while the GNU/Linux OS is the most frequent option for small systems. In even smaller systems (PCs), most computers use proprietary software (Microsoft Windows XP, 2000 and NT).

The 2007 Reina report shows a significant GNU/Linux advance in the large system environment, divided equally between systems that use some type of UNIX and those that use GNU/Linux. GNU/Linux installation in large systems thus increased by 41% between 2002 and 2006.

Large Scale Systems	
Linux	50%
Unix	50%
Medium Systems	
Linux	10%
Unix	15%
Windows 2000	40%
Windows 2003	28%
Others	7%
Small Systems	
Linux	16%
Windows XP	40%
Windows 2000	10%
Windows 2003	28%
Others	6%
PCs	
Windows XP	71%
Windows 2000	22%
Others	7%

Table 4.1

Distribution of operating systems by computer size. Data taken from the 2007 REINA report.

As for medium-sized systems, it is notable that 10% of the computers worked with GNU/Linux OS for the first time in 2006.

Windows (in one of its versions) is installed in 92% of all PCs. Table 4.1 presents a summary of the situation.

4.1.2.2. Databases

Proprietary software products capture most of the market for databases, specifically Oracle, SQLServer and Adabas. These brands represent 87% of all systems installed, as can be seen in Figure 4.1.

- SQL server
- Oracle
- Adabas
- Others
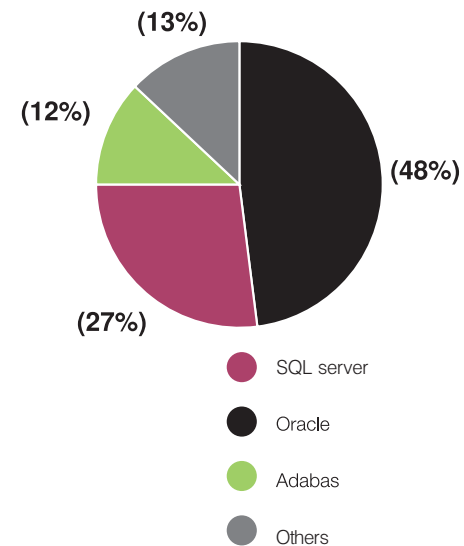
Figure 4.1

Penetration of database software in percent. Data taken from the 2006 REINA report.

If only open source software used in this environment is considered, 30% of the systems using open source databases utilise MySQL. PostGreSQL follows far behind, with 5% of the total, and the rest (65%) are divided among other databases with a lesser presence.

4.1.2.3. E-mail
In the case of e-mail server software, open source software has barely penetrated (2%). Most systems use Lotus (41%), followed by MS Exchange (20%). Up to 37% of all the systems analysed used some other type of proprietary software. A general summary of this situation is presented in Figure 4.2.
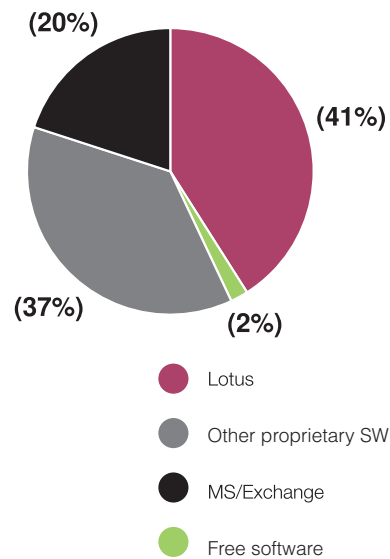
Figure 4.2

Penetration of e-mail software in percent (01/01/2006).
Data taken from the 2006 REINA report.

With regard to the type of open source e-mail software used, the panorama is very diverse. Sendmail is the package used most frequently, installed in 4% of all the computers analysed. The other 96% are divided among other software packages (not specified in the report), each with a very low share. In fact, e-mail is the sector with the greatest range of open source software used among all the sectors analysed, indicating that no solution stands out clearly over its competitors. This excessive diversity can reduce chances of offering a clear, attractive alternative to proprietary software packages.

4.1.2.4. Object-Oriented Development
The situation for object-oriented software development is quite different. Open source software is found in 33% of the applications used. Specifically, 18% is PHP, while Python accounts for the other 15%. That both software packages are supported by numerous operating systems probably contributes to increasing their penetration. The remaining 63% of the applications in this environment consist of proprietary software. It should be remembered that when this data was gathered, Sun Microsystems had not yet announced its intention to distribute its Java

platform under an open source license, nor had it finished its open-sourcing plans when this report was written. If it does so later on, the use of open source software in this area can be expected to increase substantially in the next few years. Figure 4.3 presents a general overview of the situation in this area.

- PHP
- Python
- Proprietary software
- Others
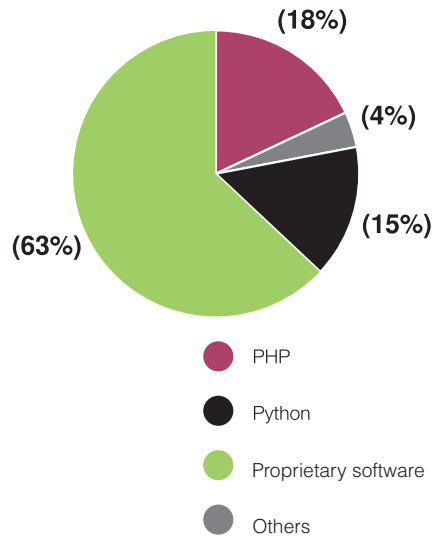
Figure 4.3

Penetration of e-mail software in percent (01/01/2006).
Data taken from the 2006 IRIA report.

With 49% and 41% of all application installed, PHP and Python, respectively, clearly dominate open source software packages. That leaves a mere 10% to be divided among remaining free packages.

4.1.2.5. Office Automation

In this area, MS Office is still the most frequently used suite, with 61% of all the systems analysed. Lotus Smart Suite and WordPerfect Office, with percentages of 8% and 5% respectively, trail behind at a great distance. Open source software packages do not achieve a sufficiently significant penetration in this area.

Within open source software specifically, OpenOffice is the most frequently used free open source solution, present in 69% of computers using open source in this area.

According to the 2006 IRIA report, OpenOffice.org is the most frequently used OSS-based office automation suite.

4.1.2.6. Web Servers

The main alternative to the dominant proprietary web server, Microsoft IIS (installed in 57% of all systems), is the open source software server Apache, which is used in 13% of all Spanish Government web servers. The proprietary software server Netscape/Iplanet reaches only 3% of the total.
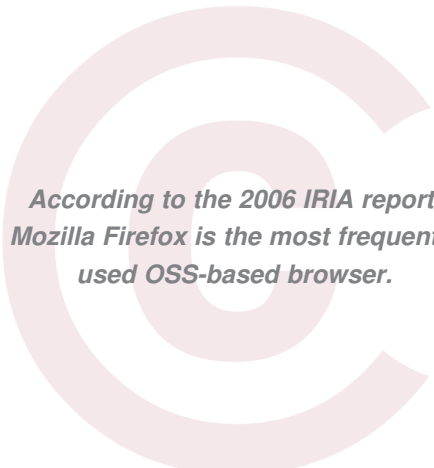
In the exclusive environment of computers with open source software packages installed, Apache is the alternative most frequently chosen by administrators, constituting 92% of all web servers implemented with open source software. Even though Apache is still a minority solution, it is thus the most clearly defined open source alternative for this sector in public administrations.

4.1.2.7. Other Development Software

The main alternative to proprietary development tools is the free, open source package Perl, which is found in 13% of all systems analysed. The remaining 87% use some type of proprietary software. With respect to strictly open source applications, Perl has almost no competition. It is used by 99% of the systems having development tools based on open source software.

4.1.2.8. Other Web Tools

It is interesting to note how the browser Mozilla Firefox, an open source software tool, is making inroads in this sector, being used in 2% of the systems under analysis.[13] However, 98% of the remaining applications analysed use proprietary

According to the 2006 IRIA report, Mozilla Firefox is the most frequently used OSS-based browser.

Among the municipalities with over 500,000 inhabitants, 57% are developing OSS adoption policies.

software. Looking at open source software applications only, Mozilla Firefox is used on 98% of the computers with these solutions. It is unquestionably the most popular open source browser.

4.1.2.9. Open Source Software in Local Administration

As mentioned in Section 4.1.1, more and more town councils are undertaking initiatives for adopting open source software, focusing especially on migrating part of their local communication infrastructure, such as institutional web servers.

The IRIA report analyses the most significant situation indicators and the use of information and communication technologies and systems in local administration. One section in the report analyses policies of adopting open source software at municipal level.

In the light of data from the 2004 and 2006 IRIA reports (synthesised in Figure 4.4), it can be seen that towns with over 500,000 inhabitants have been especially active in developing policies for adopting open software over the last few years.

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[13] This data refers to the time when the analysis was made (2006); this figure may have grown significantly by 2008.

Councils (regional, government and island): 2004 17%, 2005 18%
+500 K inhabitants: 2004 17%, 2005 57%
100-500 K inhabitants: 2004 31%, 2005 35%
30-100 K inhabitants: 2004 11%, 2005 22%
10-30 K inhabitants: 2004 19%, 2005 20%
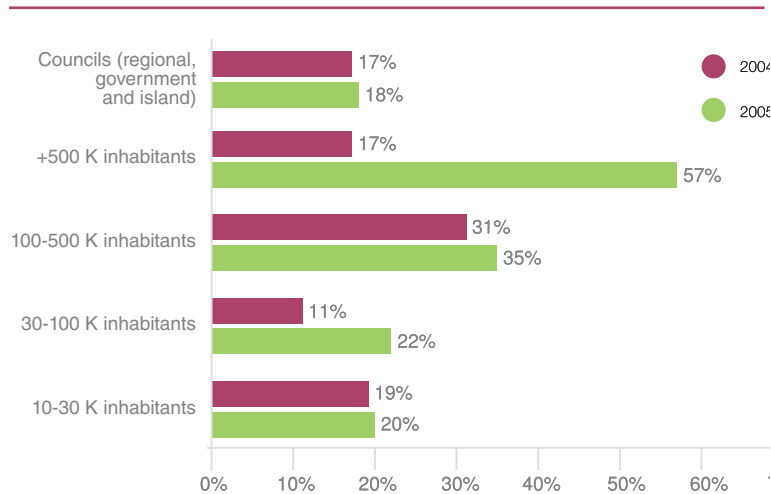
Figure 4.4

Percentage of municipalities with OSS adoption projects, by municipality size and year. Data from the 2004 and 2006 IRIA reports.

The largest increase can be found for this group of large municipalities. In 2007, 17% of those surveyed indicated that they were developing some type of strategy for adopting technologies based on open source technology, and that percentage increased to 57% a year later.

Towns with between 30,000 and 100,000 inhabitants doubled the 2004 figure in 2005, with municipalities that had developed this type of initiative increasing from 11% to 22%.

Although the smaller municipalities had no significant variations, the overall figures can be considered really positive. The data indicates an ever greater presence of open source software technologies at municipal level.

4.1.3. Significant Implementations in Spain

Although the data does not stem from an exhaustive, detailed calculation of all the open source software systems that exist in the administration infrastructure, it does factor in information from the following sources:

· Ministry of Public Administrations (MPA), with 1,375 servers, of which 200 are department servers, 131 corporate and 1,044 are for alerts and services.
· Ministry of Justice, with 800 servers with OSS.
· Guadalinfo, with 4,500 PCs, and Guadalinex, with 300,000 educational deployments.
· PISTALocal+, with 450 portals in Castilla-La Mancha and a presence in 2,000 town halls in the rest of Spain.
· MedusaX, present in 1,110 centres.
· GnuLinex, with 70,000 installed in schools.
· MedusaX, with 35,000 installed in schools.
· MAX, with 60,000 installed in schools.

The estimated number of users exposed to open source software is indicated below (this is not an exhaustive list and there may be important initiatives that are not reflected here):

· Guadalinfo: 335,000 users.
· GnuLinEx: 200,000 children and adolescents and 15,000 teachers.
· MAX: 1 million students with the option of using such software.

4.1.4. Conclusions on Evolution and Quantitative Data

Considering the previous results, two significant conclusions on the situation of open source software in public administrations can be reached. First, free, open source operating systems are opening their way into the field of computer systems larger than PCs. That is, free, open source operating systems are most often chosen for the main computers that control information systems where stability, safety, reliability, accessibility and ease of administration are especially important. In contrast, the majority of PC users seem to be continuing to use proprietary operating systems.

Open source software applications have shown themselves to be clear alternatives to other proprietary solutions, achieving significant penetration. It cannot be mere coincidence that most open source applications are precisely those capable of functioning with almost total compatibility on various operating systems (whether open source or not). Portability and interoperability can thus be identified as two crucial factors when facilitating and promoting open source software adoption.

Conclusions on evolution and quantitative data:
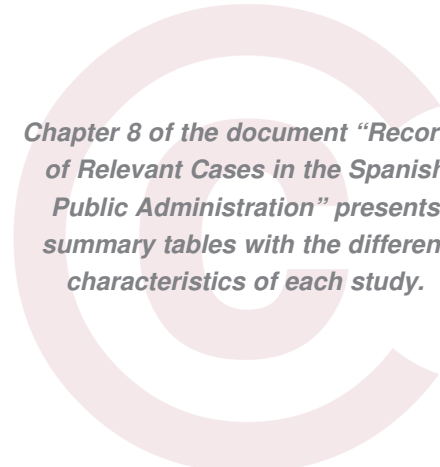
1) *Open source software is making its way into the larger information systems.*
2) *Multi-platform OSS solutions demonstrate a higher level of adoption.*

4.2. Spanish Government Study Cases

This section presents some of the most relevant initiatives being carried out by Spanish public administrations for implementing open source software. These study cases have essentially been prepared through personal interviews with the individuals directly involved in the initiatives.

Chapter 8 of the document "Records of Relevant Cases in the Spanish Public Administration" presents summary tables with the different characteristics of each study.

First, study cases applicable to the Spanish Government are presented; the most important study cases in the Spanish autonomous communities are then described. The annex *"Relevant Cases in Spanish Public Administrations"* includes comparative summary tables that present each case's characteristics.

This list of study cases is not exhaustive; it simply offers a range of real examples, which may be useful for imparting a general idea of the different environments and initiatives on open source software implementation in Spanish public administrations.

4.2.1. Ministry of Public Administrations (MPA)

The document *"Proposed Recommendations for the Spanish Government on Using Free and Open Source Software"* briefly describes some of the most notable initiatives for adopting open source software carried out by the Spanish Government.

4.2.1.1. Wide Area Network (WAN)

The MPA Deputy Minister is responsible for the management of a WAN made up of over 200 LANs. Each LAN has at least one server based on Linux distribution, which is Centos 4.4 in this case, modified by ministry personnel to adapt it to their needs.

The MPA manages a wide area network, composed of more than 200 local area networks. Each of these local networks has at least one Linux-based server.

Towards the end of 2007, there were more than 200 servers of this type, offering the following services, among others:

- Authentication, user management and directory services based on open source software (Fedora DS).
- Emulation of Windows domain servers through Samba.
- Automatic server update based on RPM package repositories.
- Rdist distributions from central services.
- Apache and MySQL servers at the main offices.
- DNS servers based on free, open source BIND software packages integrated in the MPA hierarchy.
- DHCP service at MPA headquarters.

Other free open source software packages are also used in MPA central servers: Proxy cache/Squid web, NAT utilities and transproxy.

Directory and central Windows domain emulation systems through Samba are responsible for generating meta-dictionaries based on main office information. These systems also export the meta-directories through several interfaces (web services, standard LDAP interfaces or centralised Window domains via Samba) by means of complex coordination and synchronisation systems. These allow the different directory systems (many of them thin and managed from the main offices) to unify and present multi-platform authentication and validation information. This is then used by the over 10,000 desktop computers, laptops, workstations and PDAs of ministry personnel. Finally, a new web-accessed e-mail system and centralised directory based on open source software is being developed. The following are used in this project: GNU/Linux OS, Fedora DS for LDAP directory, Postfix SMTP mail server, Courier-IMAP for IMAP-POP mail and IMP for webmail.

Other software used is:
- Snort for intrusion detection.
- Nessus for vulnerability analysis.
- BIND, Squid and Apache in high availability servers.

In some cases, these applications co-exist without problems with other proprietary software on machines that use GNU/Linux.
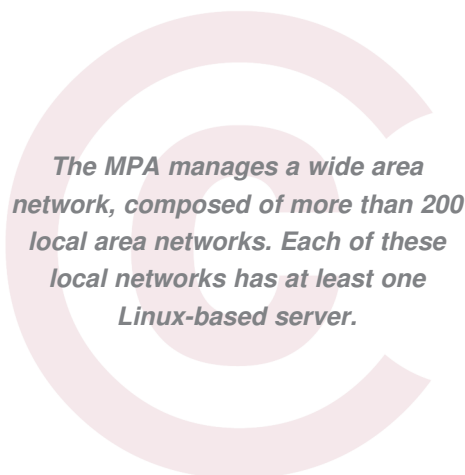
4.2.1.2. Significant Projects

The implementation of open source software within the MPA can be seen in several open source software projects, including the following noteworthy examples:

- Nagios[14], for system monitoring. This software is used because it is more efficient that the other alternatives available. Some changes have been made, such as the translation and modification of the interface, application of styles and templates, and addition of plug-ins and statistics. Two main Nagios servers are currently available: One for department computers and another for corporate. The main Nagios department server has over 200 servers, including statistics generation and alarms. The corporate system also has a large number of servers (131), as well as alerts and services (1,044).
- GLPI[15] (the Spanish acronym for free computer management), an inventory system that stores data on business contacts and hardware installed. Many plug-ins have been developed to consult contacts, list the buildings the computers are in, and so on.
- OCS[16], to maintain system and network hardware and software inventory. Projects for CPD management (significant because of its large scale) have been developed internally.
- Centos 4[17], adapted to script level to provide services for over 200 main offices.
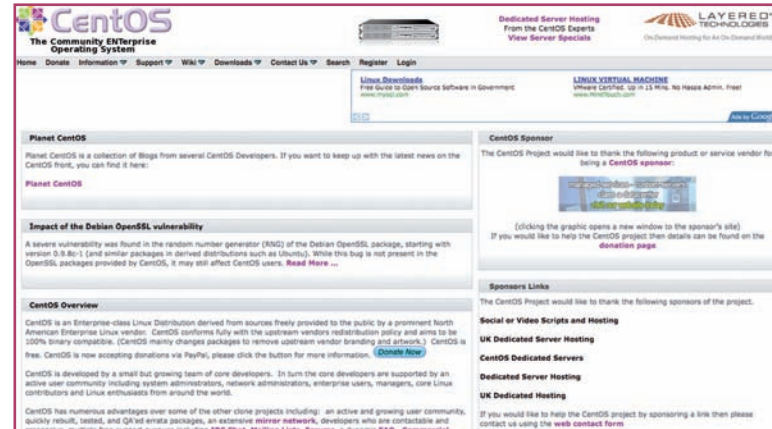
- There are other open source software applications for the management of IPs, backup tape copies and user profiles.

The MPA development and administration team has made numerous changes in open source applications: Many plug-ins and additional modules for Nagios, including actions to be activated in the face of specific alarms to solve problems automatically.

It could be of interest to spread the news about the MPA's own developments and even to promote an open source software community around them. This is especially true for CPD management, a very interesting project with great potential which could be exploited in other environments.

The development and administration team does not hesitate to adapt open source software to its systems if doing so would provide an improved solution.

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[14] http://www.nagios.org/
[15] http://glpi-project.org/
[16] http://www.ocsinventory-ng.org/
[17] http://www.centos.org/

Main advantages:

- Its versatility with regard to scaling and adding new modifications thanks to an ability to adapt to the specific requirements of each situation.
- Significant cost savings for licenses.

Main disadvantages:

- In the face of specific problems, the only solution possible has been for an internal development team to handle required modifications.

Overall balance:

- In this case, firm commitments to using open source software have not been affected in any way. Given that the majority of staff were already highly technologically aware, a specific OSS training program has not been necessary.

4.2.2. Ministry of Finance

The Deputy Ministry of Finance mainly uses open source software to implement safety measures: Squid proxy servers, firewalls, firewall management consoles, web services (Apache) and file servers (Samba).

4.2.3. Ministry of Justice

Open source software is used for massive updates and the exploitation of the ministry's LIBRA application, integrated in more than 800 servers. The system uses:

- OpenSSH for safe communication.
- Rsync for synchronisation.
- Tripware for integrity control.
- Snort as an intrusion detection system.
- Saint for vulnerability identification.
- GNU, Apache and Zope utility libraries, among others.

4.2.4. National Institute of Public Administration

Following the Resolution of 5 February 2004 (published in the official state gazette on 20 February 2004), the National Institute of Public Administration convoked training activities on information and communication technologies. The courses developed include the following, among others:

COURSES GIVEN

- Introduction to GNU/Linux and free open source software
- Advanced Linux
- Linux-based Internet/Intranet services
- Free (GPL) and open source software
- Linux as a server
- Perl programming language
- Implementing Internet access: Squid cache on Linux
- Integrating the directory service OpenLDAP on Linux

4.2.5. MIT&C: Strategic Action on Open Source Software in Information Systems, Communication and Information Society Services

In 2007, the Ministry of Industry, Tourism and Trade (MIT&C) published the document "Strategic Action for Open Source Software in Information Systems, Communications, and Services in the Information Society". This action was included in the 1/2007 call for funding by the National Plan for Scientific Research, Development and Technological Innovation (2004-2007) in the section for the promotion of technical investigation, which was to support R&D within the area of information society technologies. The distribution of 2007 proposals is shown in Figure 4.

Figure 4.5

Distribution of proposals accepted in the "Strategic Action for Open Source Software in Information Systems, Communications, and Services in the Information Society".

4.2.6. MIT&C: National Competency Centre for the Application of Open Source Technologies (CENATIC)

CENATIC is a national public foundation promoted by the MIT&C, with the support of the Autonomous Government of Extremadura, whose initial Board of Directors was established on 20 November 2006. This action is the only national strategic project for promoting knowledge and use of open source software, participation being open to all private individuals, public administrations, businesses, educational bodies, third-sector organisations and R&D&I groups, as well as users and developers of this type of technologies. This focus makes it easier to initiate cross projects of strategic interest for all individuals and groups involved.

MIT&C currently participates in the CENATIC Board of Directors through the national Department of Telecommunications and Information Society, six autonomous communities and four leading firms in the sector. Other entities, both public and private, are in the process of being incorporated.

Law 56/2007 (28 December) on measures for promoting the information society (LISI is the Spanish acronym) credits CENATIC with the diffusion of applications declared open source by the public administrations themselves. This law also indicates that CENATIC will control assessment on legal, technological and methodological aspects for liberating software and knowledge.

CENATIC's mission is to become a national centre of excellence in applying open source technologies with an international influence both in Europe and Latin America.

CENATIC's Objectives
1. To make the general public aware of the benefits of ICTs based on open source software and to promote the services offered by CENATIC at a national and international level. Also to position Spain as a point of reference in the application and development of open code.
2. To provide facilities for the development of the open source technology sector and market.
3. To boost the use of open standards enabling the broadest sector development.
4. To execute a National Training Plan which will involve the main national agents in open source technology training matters.
5. To facilitate the appearance of company and research collectives in Spain related to the development of open source technologies, and also to promote technological cooperation in the use of open source technologies in public administrations.
6. To seek financing and partners for the entities related to CENATIC.
7. To analyse and monitor the situation of the ICT sector based on open source software and to create a content index for the repositories of existing applications in Spain.

4.3. Initiatives in Autonomous Public Administrations

The following sections present a summary of some significant initiatives for adopting open source software in the autonomous public administrations in Spain. This description is not an exhaustive list that covers all the open source use and promotion projects that exist in Spain; its purpose is to point out some cases that provide an overview of open source software adoption and related initiatives in these environments.

4.3.1. CISOS

The Department of Information Technology of the Autonomous Government of Castilla-La Mancha is presently developing two projects: Higeia[18] and La Forja. Higeia is an enterprise application Integrator (EAI) under open source license. La Forja is an environment for managing the entire project development cycle. The project has been developed by the CISOS (open source software for the health sector) group, an internal department in the R&D&I area.

The Higeia project arose from the need to interconnect different applications involved in electronic medical records. In this integration framework, it is clear that a key part was needed to make interoperability complete: Multi-protocol, multi-platform and multi-format. Following the evaluation of various products that met these needs, it was decided to use

[18] http://sescam.jccm.es/web1/home.do?main=/ciudadanos/avancesMedTecn/higieia/higeiaFP.html

an open source software solution, BIE (Business Integration Engine). On the basis of this product, a solution was developed to enable work in a stable production environment. The result was Higeia: The standard integration engine for the Castilla-La Mancha health services (SESCAM).

La Forja came into being because, based on all the projects dealt with, the innovation department detected a need for an infrastructure that allows complete project management and orderly collaboration within projects. Different products were again evaluated, the final choice being GForge, an open source solution that could be adapted to these needs.

Higeia is currently being used in Castilla-La Mancha production environments, as would be expected, as well as in the community of Castilla y León.

For example, the dietetics, pharmacy and radiology information system (RIS) services are being integrated with the hospital information system (HIS) in the hospital in Puertollano (Ciudad Real). Primary care laboratories are also being integrated for consulting analytical tests.

> "The tendency is to integrate the different services with the hospital information system in all hospitals, which is the objective of electronic medical records."

The main users of the community hub are the individuals responsible for the projects, along with their developers. The project is currently in the

Higeia is an enterprise application integrator (EAI) under open source license developed in the public sector in Castilla-La Mancha.

implementation and publication phase. When this phase is complete, the number of potential users will be high, given that in addition to the personnel directly involved, anyone who sees an opportunity for acquiring knowledge or gaining benefits can also use the system.

As soon as the services were put into production, specific IT departments in each centre have been receiving training in the integration and use of the tool to make it easier for them to access its benefits.

An official training program that would cover the most important aspects is being considered. It would include installation and administration, integration development, and the development and innovation of the engine itself.

Higeia is working in a completely operative production environment. However, this fact should not lead to the conclusion that it is a finished project. Improvements and adaptations suggested by tool users and by continual technological changes are still being incorporated. As a constantly developing product, Higeia is capable of being adapted quickly to the changes that are taking place in all areas.

> Lessons learned: The project is considered a complete success and a milestone in health services. If success is fundamentally measured by the degree of satisfaction felt by the individuals who the project aims to help, it is worth pointing out that the integration of electronic medical records in all services is a reality that is benefiting all the personnel who contributed to creating the system.

4.3.2. COR-EDUX

Designed to cover the need for new technologies in the classroom, the COR-EDUX project started at the government-approved preschool centre "Corazón de María" in Palencia (Castilla y León) in 2003.

Realising this type of advance to computerised classrooms was very difficult, mainly because of the costs. The association of students' parents (the Spanish acronym is AMPA) came up with the initiative to cover these needs with open source technologies.

Some old equipment was recycled (at times donated by the Autonomous Government of Castilla y León) and equipment provided by the parents themselves was even used. In the end, a series of Pentium I computers with 16 MB of RAM were obtained. The first step was downloading different Linux distributions; the teachers then searched for applications that handled the organisation of activities for students.

As these computers were so hardware-limited, thin clients that worked against a server were chosen. ATNAG was selected as the tool for use by the teachers. The ATNAG developer spent some time in the centre to collaborate with teachers and discuss required tool improvements which had been detected by the "Corazón de María" school. The school was also in

COR-EDUX uses low specification computers for the educational environment because of their lower OSS requirements and the possibility of personalisation.

ATNAG was the classroom management tool chosen by the COR-EDUX project.

charge of translating the tool into Spanish and Galician. Free open source software communities such as Hispalinux and a Linux association in the Canary Islands provided help as well.

ATNAG [19] is a tool that allows the teaching staff to organise the study body by classrooms and levels and define game-based activities and tasks adapted according to student age and reading and writing ability.

Before a computerised classroom was generated, free open source software and GNU/Linux was first used in the teachers' own work. Once their training needs had been identified, Castilla y León's "Innovative Education Training Centres" organisation (CFIE in Spanish) handled the requested training courses for the following two years.

Based on project experience, the recommendation is: *"Strengthen the training and introduce it bit by bit, while following a clear schedule of dates and goals, so as not to leave everything until the last minute"*.

Once the training was complete and the teaching staff had acquired the skills and abilities needed for using the different open source software tools for their work, the computerised classroom was organised. A centre of limited means was thus able to overcome what is known as the "digital divide", which would have been unthinkable using proprietary software.

[19] http://www.cor-edux.org/modules.php?op=modload&name=dpHtml&file=compartimos

The project was primarily developed in response to the desire to:

1. Carry out a viability plan by implementing a scalable Intranet in the centres at a feasible cost.
2. Computerise the centres by using obsolete computers or buying new equipment (not the latest generation).
3. Train the teaching staff to use and become familiar with free open source software resources.
4. Use free open source software to transmit the values it promotes to the entire education community: Freedom, legitimacy, group work and social cooperation.
5. Promote teamwork in the following areas:
   - Analysing and evaluating educational software to improve and develop it.
   - Establishing collaborative ties with developers to share technical and pedagogical knowledge in preparing educational material.
   - Supporting and establishing ties of cooperation with open source software projects in the field of education.
   - Preparing resource libraries for teaching staff to use as teaching material applicable to the computerised classroom.
   - Having an on-line space: Web and server.

Lessons learned: Once again, the primary motive for choosing open source software was the great saving in license costs, which would have prevented the adoption of a proprietary software alternative. In this instance, the cost saving provided by open source software has thus been essential to the viability of the initiative.

4.3.3. Open Source Software FrameWork

In April 2004, the administration of the Principality of Asturias initiated a series of activities to bring its administration closer to the public by instituting electronic government, so as to simplify, speed up and reduce the number of processes that need to be carried out.

Concepts to be considered for these activities were:

- The need to have a common development platform. This gave rise to the standard development platform for the organisation, FrameWork for the Principality of Asturias (FWPA).
- The benefits of a technological model based on standards and reusable components. Web services and components with specific e-government functionality were thus identified, designed and implemented.
- Adaptation of service-oriented architectures to e-government. A business service bus was implemented to exploit the available technological capacities.
- OSS technology maturity and quality, enabling these objectives to be achieved. Open source software components were identified and evaluated for each of the previous elements, adapting them when possible.

Open Source Software FW has over 130 applications in productive use in the Principality of Asturias

Currently, all components, processing forms and public services are implemented on this technology, so the technology can be considered very solid. There are more than 130 applications in productive use and hundreds of trained developers, etc.

Deciding to use free open source software was the basic starting point, after different framework sections were analysed and free open source software tools were found to perform these functions.

"Evaluating elements of free open source software produced very favourable results, so all third-party components used in FWPA construction have been open source ones."

Code access and total availability are also significant advantages; they make it possible, regardless of the provider, to handle any problems that may come up when developing business software.

Lessons learned: FWPA supports the entire life cycle of an information system and is completely in line with the organisation's technological architecture. The net result is lower total ownership cost for the systems developed on FWPA, because the inherent complexity of an alternate multi-environment setting, the greater management difficulty and greater training needs are all avoided.

4.3.4. Guadalinfo

The Autonomous Government of Andalusia initiated this project in 2002 to carry broadband connections to the places operators found of little economic interest because of their limited populations. The intention was to cover what is called the "digital divide" that exists above all in rural environments, where access to technology is very limited. The Government of Andalusia's Ministry for Promoting Free Open Source Software (part of the Directorate General for Innovation and Public Administrations in the Department of Science and Business Innovation) collaborated in providing information for this case study.

The Guadalinfo project has approximately 4,500 PCs and 335,000 registered users.
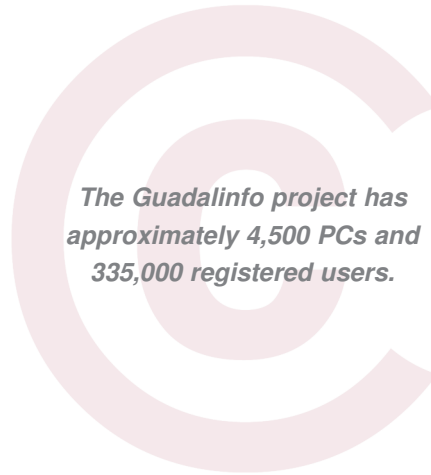
Extremadura's Technological Alphabetisation Centres served as a reference point in the background studies carried out when creating this project. Initially conceived as a project to complement private efforts to spread broadband connections, the project was extended to other ways of attacking the digital divide. The Guadalinfo project was first deployed in 25 villages; today, in its third phase, it covers the 637 localities with fewer than ten thousand inhabitants that exist in Andalusia. It is likewise being extended to priority neighbourhood activities through centres for public Internet access (CAPI in Spanish), some 19 centres that can be expanded to about 20 more. Originally part of another initiative (Red.es), these centres have been integrated into Guadalinfo using the same infrastructure

and OS. In addition to providing access to the Internet, the Guadalinfo centres currently promote technological alphabetisation activities, of which approximately 49,000 have already been carried out.

At present, the Guadalinfo project has about 4,500 PCs, 335,000 registered users as of November 2007 and 49,000 activities organised.

These activities are generally oriented towards training and leisure, always using open source software: Basic desktop management web browsers, spreadsheets and digital image editing with Gimp. There is a specific version for educational centres (installed in over 300,000 places) and another for day care centres for the elderly (166 spots). All the Andalusian public libraries (more than 650) have computers that execute Guadalinex. All these deployments are in addition to those mentioned previously for this Guadalinfo project.

The decision to use open source software was influenced by a series of factors:
· The undeniable economic advantage and the fact that the project was low risk (a possible setback would not interrupt critical services).
· An initial reduced environment with implementation from zero (having neither inertia nor changeover costs from previous technologies).
· A clear conception that a public administration should not generate purchasing needs for the general public (as would happen if proprietary software were used) when free, open source alternatives are available.@destacado estudios:

At present, there are 34 companies in the Catalogue of Standardised Goods of the Autonomous Government of Andalusia that supply hardware compatible with Guadalinex and with other GNU/Linux distributions.

The Autonomous Government of Andalusia estimates that using Guadalinex has meant a saving of 150 million euros.

As to companies that offer support services for the Guadalinfo project, each year migration of the equipment to the next Guadalinex version is opened for public bidding. However, it is true that the firm responsible for developing Guadalinex has been awarded the contract in the last few years (which seems logical, given its comprehensive knowledge of this specific OS). When the project began, the Government of Andalusia's Catalogue of Standardised Goods was used in contract calls for compatible hardware and required material. At present, there are 33 firms in this catalogue that supply hardware compatible with Guadalinex and with other GNU/Linux distributions.

There are great expectations for the new projects the Government of Andalusia plans to present in the near future, such as *"Andalusian Digital Commitment"*. This is a "digital volunteer" project that will initially train some 800 individuals to act as free-time consultants for people interested in the new technologies within their assigned area.

Lessons learned: For over 15 years, the Autonomous Government of Andalusia has been including clauses in its external development contracts stipulating that project ownership and exploitation rights belong to the Government: "It was highly imprudent to keep only the binaries, when the Government is responsible for enforcing the legislation". Currently, all their custom-made software - whether developed by or for the Government of Andalusia - is open source software.

4.3.5. gvSIG

Developed within the Autonomous Region of Valencia, gvSIG is a desktop geographic information system (GIS) client tool that manages geographic information integrating local and remote (Internet) data. As an R&D&I project of the Autonomous Government of Valencia, its funding is guaranteed for the next several years. Projects integrating new functions will be thus be appearing.

The goal is to become the gold standard GIS on a global level. The gvSIG program falls within the Region of Valencia's plan for OSS migration, called gvPONTIS, which consists of:

- gvADOC. The application is a document archive whose goal is quick and easy access to all the documents in each file (whether generated by the regional ministry or externally) from any computer involved in processing records. Likewise, the digitalised documents are easily readable in Internet consultations by any companies and/or individuals involved, as long as they comply with pre-established safety conditions.
- gvDADES. The goal of this application is to spread the use of free and open source databases, especially PostgreSQL.
- gvHIDRA. This is a work environment for developing management applications in web settings with PHP whose goal is to serve as the basis for PHP-developed applications.
- gvMETRICA. This is an adaptation of METRICA 3 to meet the needs of the Regional Ministry of Infrastructure and Transport (CIT in Spanish).
- The application goal is to manage geographic information through integrating free and open source technologies. It currently comprises over 200 entities distributed throughout different departments,

GvPONTIS: Among other initiatives, the OSS migration program of the Region of Valencia includes:
- *GvDADES: Promoting the use of free and open source databases.*
- *GvHIDRA: A work environment for developing management applications.*
- *GvMETRICA: Adapted to the needs of the Regional Ministry of Infrastructure and Transport.*
- *GvSIG: A geographic information program.*

universities and firms in the Region of Valencia and other autonomous regions: Madrid, Catalonia, Castilla-La Mancha, Andalusia, Region of Murcia, Castilla y León, Aragón, Basque Country, Canary Islands, Cantabria, Balearic Islands, Galicia and Navarra. It is used internationally as well, including in Latin America and Europe (in countries such as Germany, France and Great Britain). The program has also been tentatively introduced in Asia (China and Japan) and requested by Egypt.

The gvSIG project arose in the framework of CIT's IT projects for migrating to open source software. Towards the end of 2003, a

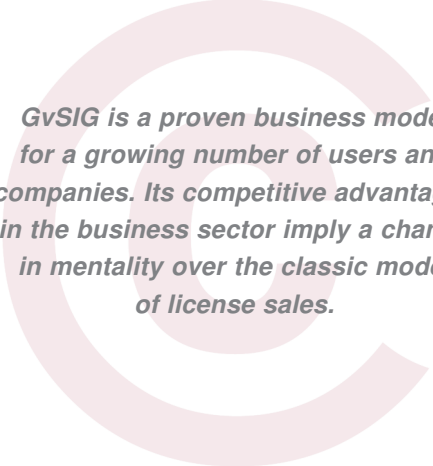*The most noteworthy characteristics of gvSIG include the following:*

- *Portable*
- *Modular*
- *Open source*
- *No payment for licenses*
- *Interoperable*
- *Subject to standards*

sufficient number of free market projects were available in the GIS field in areas such as map servers, geospatial databases and catalogue servers. However, a free open source software desktop GIS client capable of working with large scale volumes of information was needed. This application was established on that basis, drawing on different fields within the GIS world to define functions such as vector and raster GIS formats, connectivity (IDE), 3D, mobile devices, etc. As stable versions are released, they start being implemented; to strengthen such implementation, training focused on users/clients is being given in CIT main offices.

As of early 2008, there is a stable version of gvSIG 1.1 available on the official project web site[20] and a road map showing the planning through 2013.

The most significant characteristics of gvSIG include the following:

- **Portable:** It works on different hardware/software platforms (Linux, Windows and Mac). The programming language is JAVA.
- **Modular:** It can be extended with new functions once its development is complete.
- **Open source:** The original source code with which it was written is available.
- **License-free:** Once the development is complete, every installation performed is free of charge and there is no restriction on the number of installations.

GvSIG is a proven business model for a growing number of users and companies. Its competitive advantages in the business sector imply a change in mentality over the classic model of license sales.

- **Interoperable with solutions that have already been implemented:** It can access data from proprietary programs such as ArcView, AutoCAD or Microstation without having to change its format.
  - **Subject to standards:** It follows the directives set out by the Open GIS Consortium (OGC) and the European Union.

CIT promotes and directs the project. At present, there are more than 30 companies that offer services on gvSIG and are enriching the project with new developments. The university's role as a strategic technological advisor is also fundamental.

"On seeing the success of the gvSIG model, more and more companies are deciding that they want to work with open source software and, of course, release it".

There are plans to extend the project; the next steps will be to make the 3D and mobile devices (already being executed) operative and integrate other elements such as remote sensors, 4D (comparison of temporal sequences) and geostatistics.

A few legal problems have arisen due to legal teams' lack of knowledge in matters of open source software. Civil servant users have shown hardly any resistance to the project. The myth that users are reticent must be destroyed. It is just not true and, besides, handling is so similar that users sometimes do not even notice any differences.

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[20] http://www.gvsig.gva.es/index.php?id=gvsig11&L=0

Open Source Software for the Development of the Spanish Public Administration An Overview 2008.
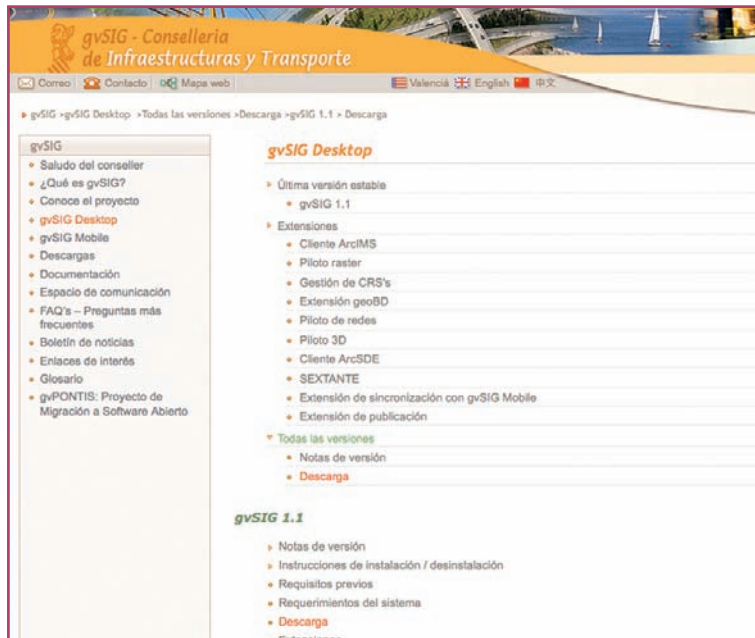
"Users of these technologies have tripled within the environment of the Department of Infrastructure and Transport, which would have been impossible before because of the cost of licenses and maintenance".

Lessons learned: The main reason for choosing open source software, aside from the purely technical aspects, is technological independence: How the information systems are going to evolve can be decided flexibly, converting an expense into an investment by shifting from buying products over and over again to the acquisition of services.

"When using solutions based on open source software, you don't have to invent the wheel over and over again. It's a more logical method of development".

4.3.6. JAVATO

The Directorate General for Information Technology (DGI) for the Autonomous Region of Murcia (CARM in Spanish) has implemented many development environments that have solved the issues for which they were designed. However, it has not had a global system architecture concept, which has complicated the reuse and integration of developed projects, since they were developed by different teams.

The JAVATO framework of the Region of Murcia includes:
- Eclipse as IDE
- Linux RedHat 3.0 as the operating system
- Apache as the web server
- Axis for web services
- Tomcat and JBoss as application servers
- Hibernate as a persistence engine (MVC model)
- JSF for implementing the view layer (MVC model)
- Spring for the business layer (MVC model)
- ANT for code transfer between environments
- CVS as the version control repository

Developed in the CARM DGI for JAVA development, JAVATO is a framework with multiple goals: Homogenise internal developments carried out by different work groups within the Regional Ministry itself, homogenise developments subcontracted to companies, and offer the framework to the other CARM directorate centres to achieve a standard of development that is useful for everyone.

The project was initiated in the second half of 2005. JAVATO is a framework that basically consists of a work method (based on METRICA3) and a development core composed of open source, self-developed software elements that offer the JAVA developer a common functional base. This allows the developer to focus on the specific business process being implemented.

In addition, having a common logical architecture makes maintaining servers and base software easier. A basic JAVATO component is thus the tool for inter-environmental transfers, which aims to simplify such transfers - previously performed "ad hoc".

In the first phase (2005):
- **The three-tier architecture was defined** on the basis of the Model-View-Controller model using Hibernate, JSF and Spring components respectively.
- **The methodology and templates to support it were defined** along with the element names (classes, packets, tables, views, etc.) and the application structure and distribution on the servers.
- **Basic functionality was incorporated** into the framework, including (among other features) access and safety control, server-side validation, call to business logic in database, error control, client audit, daemon processes, web service implementation, definition of the system for transfer between environments and creation of a print management module based on BIRT and XML+XSLT.

JAVATO functions were then completed throughout a new phase spanning 2006 and 2007, when the following features were implemented:

- Menu management
- Graphic interface for print management
- Graphic management of print queues
- Help management
- Graphic interface for transfer between environments
- Audit of JAVATO use itself: Functions used most and least often, incorrect calls, level of documentation, calls to external functions, etc.
- Examples of using JAVATO for connection to an Oracle database
- Expansion of client-side validations to check code validity for data such as client account, Spanish tax ID number (NIF), etc.
- Expansion of master-detail management models
- Parameterisation of the error levels the application should produce
- LOPD (Spanish Organic Law on Data Protection) Audit, with database register of accesses to especially protected tables and fields

The project team also advised teams developing in JAVATO, including the team carrying out the highly-strategic migration of CARM's human resources management system (the FIGESPER project), and incorporated additional required functions.

During the course of 2008, there are plans to incorporate components such as the following into the framework:
- Uploading files to servers
- Integration with Jasper Reports
- Export of data to standard interchange formats (XML)
- Connection to other CARM systems, preferably through service oriented architecture (SOA): Corporate workflow, document management, electronic administration (especially for authentication via digital certificates)
- Development of assistants for simple maintenance tasks
- Possibility of using applications developed on mobile devices

A project realised with the JAVATO framework has already been concluded, with very positive results. Development time has been reduced and additional security has been provided for both the development team and project management.

Lessons learned: The following goals were achieved with the development of the JAVATO core: To provide common, repetitive services among all the projects, isolate and/or encapsulate certain tasks or functions, guarantee safety and confidentiality systems and ensure the correct performance of certain tasks.

4.3.7. Linex PYME

Linex PYME[21] (PYME stands for small and medium-sized companies in Spanish) is an open source software initiative instigated by the Autonomous Government of Extremadura to promote business use of its Linex OS. "Linex Empresa" was born in 2004 to bring Linex to the business world.
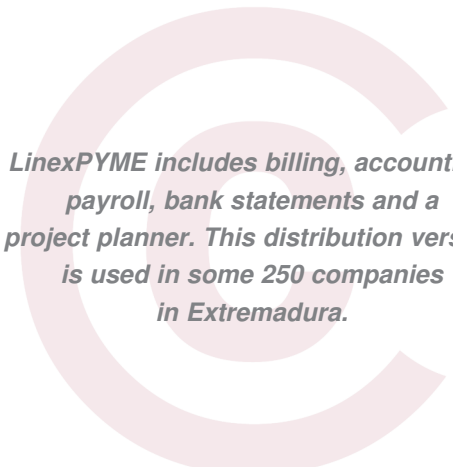
The catalyst for developing the tools used in Linex PYME (facturlinex, contalinex, etc.) was the Extremadura companies themselves, who studied the business model and launched their proposals. For the new version of Linex PYME, the Autonomous Government of Extremadura has promoted the development of five new tools to complete the

LinexPYME includes billing, accounting, payroll, bank statements and a project planner. This distribution version is used in some 250 companies in Extremadura.

new software and offer internal management of business information, project traceability, management of workplace risks and the environment, financial analysis and a business plan manager. In addition, this version will be the first one to perform electronic invoicing, through a 100% GPL program.

Most of the traditional companies using Linex PYME are either small shops that have only two or three people involved or small companies with some five employees.

Linex PYME is also used in other autonomous regions such as Andalusia, Asturias and the Balearic Islands. Outside Spain, countries such as Uruguay, Mexico and Colombia are already using the system.

This project had two fundamental objectives: First, bringing open source software tools to companies and second, offering Extremadura companies producing software within this market a new business model.

Linex PYME has drawn together both technological companies - which now have a series of tools on which to work and sell services - and traditional ones, which may or may not need new technologies.

Technological companies are offered advice on OSS business models and on how to earn money in this sector. Traditional companies are given information and training

21 http://www.gnulinex.net/distribucion/

on the technology available on the market and on how this technology can help them and improve business. Workshops are given to explain how the system and its tools work and how open source software can benefit companies technologically. There are also more in-depth courses to demonstrate the Linex PYME tools.

At present, there is no plan to use any type of open source license in the training courses given. The training is considered part of the business model for technological companies which, in turn, sell the training to traditional ones. However, all the software developments are 100% GPL and no legal problems at all have arisen.

Experts evaluating the tool have pointed out that "Technologically, creating the distribution has not been complicated. The biggest problem was perhaps getting sufficient means to promote the product".
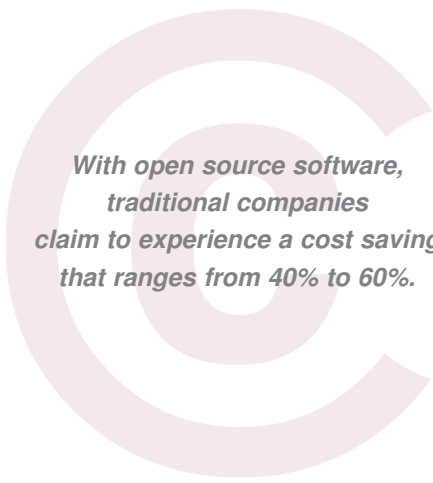
Among the main reasons given for choosing open source software when implementing this initiative was that the Autonomous Government of Extremadura had made a clear policy commitment to free open source software. Likewise, another significant reason was the conviction that applying open source software at the business level could strengthen

Business professionals quickly see that LinexPYME, because of its adaptability, gives them all the functionality they need.

With open source software, traditional companies claim to experience a cost saving that ranges from 40% to 60%.

this sector. Open source software is seen as a way of allowing technological companies to carry out their own developments and not be mere distributors of software. Currently, committing to Linex PYME is considered to be committing to safe, reliable technology. When talking about these tools, it is always necessary to collaborate with the companies that are going to provide support, to make the business professionals feel safer because they can personally see who is going to provide, develop and maintain the technology.

Another significant problem business professionals can have is covering all their technological needs with their tools. Nevertheless, it is easy to make them see that the high level of adaptability available with open source software allows them to obtain all the functions required.

As for traditional companies that use these technological tools to gain a competitive edge, they consider the cost saving involved to be very important. Other factors such as direct, personal dealings with those responsible for tool maintenance, development or modifications are also perceived as positive. Likewise, it is a help that these are Extremadura companies and, of course, that these tools adapt to or can be adapted to their needs perfectly.

A factor that can make a company resist using open source software is the great technological inheritance of proprietary software, which can cause extensive migration and adaptation costs. This process can sometimes be very complicated. Another significant problem is that technological companies that can support traditional companies do not have wide knowledge of free and open source options available; perhaps they do not yet completely trust the OSS-based business model. Linex PYME plays an important role here, given that one of its functions and goals is spreading knowledge about the free and open source alternatives available and possible business models related to them.

In no way do companies lose money when using OSS tools, not even when migrating from proprietary software to open source alternatives. This also takes training costs into account.

Based on this project, it is recommended that a traditional company thoroughly investigate the different options available before investing in technology.

4.3.8. Linkat

The Linkat project[22] was initiated in 2005 by the Department of Education in the Autonomous Government of Catalonia to provide a Catalonian educational OS based exclusively on open source software. The initiative was designed to meet the needs of different educational centres that were already working with open source software. The distribution was based on SUSE[23]. Linkat includes tool packages developed by the Government itself, such as Jclic[24].

Linkat, the Linux distribution in the Catalonian public environment, has four use modes:

- · *Workstation*
- · *Live version*
- · *Centre server*
- · *Thin client for the centre*

In addition, there are several courses and tutorials on Jclic that can be downloaded from the web site using a Creative Commons license. Software developments can be found in the forum and are available under an open source license: https://projectes.lafarga.cat

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[22] http://linkat.xtec.net/portal/
[23] http://es.opensuse.org/Bienvenidos_a_openSUSE.org/
[24] http://clic.xtec.net/es/jclic/

In September 2006, a pilot test was performed in 20 centres with Linkat version 1.0. These centres are the ones that presently use it officially, although there are a few other centres that have installed it independently. The new version, Linkat 2.0, basically comprises a version of SUSE Linux Enterprise Desktop (SLED 20); a solution based on thin clients with LTSP and computer virtualisation with XEN is also included. Thanks to the use of thin clients, many centres with obsolete computers should see an attractive solution to their problems in Linkat.

The Directorate General for Innovation is compiling a general plan for learning and knowledge technologies. This future plan may specify the role of Linkat and open source software in general in the Catalonian educational environment. In July 2008, the Secretary for Telecommunications and the Information Society (STSI in Spanish) presented a general plan for open source software deployment in Catalonia.

Even though there is no legislation stipulating that educational content be released under open source licenses such as Creative Commons - this criterion is followed as much as possible.

Lessons learned: Committing to a solid staff training program ensures a smooth transition during the period of adopting the new applications and adapting to them, as well as showing the users the alternatives available. Likewise, it allows the centres to implement the initiative gradually without imposing the use of any software.

4.3.9. Mancomun.org
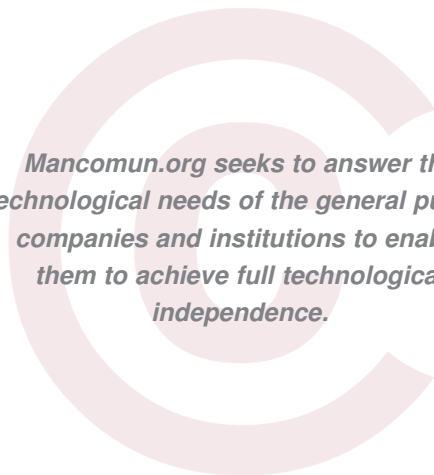
Mancomun is the Free Open Source Software Reference and Services Centre in Galicia. It provides resources and services to promote the implementation of open source software and open standards to encourage innovation and technological development in Galicia. Mancomun is an initiative of the Directorate General of Industrial Promotion and the Information Society, which answers to the Regional Ministry of Innovation and Industry (Autonomous Government of Galicia). Some significant initiatives promoted by this centre are the translation of tools such as Thunderbird, Firefox and OpenOffice.org to Galician and funding for the implementation of open source software in education, the public administration and PYMEs. A specific example is the Town Council of O Porriño, which is migrating its systems to these three programs and uses Linux in the public computers in the town library. Mancomun also has a complete listing of 62 companies, detailing the different open source software services they offer. One of the main project goals is consolidating local ICT companies that can respond to the technological needs of the general public, other companies and institutions in Galicia so they can become fully independent technologically from a comprehensive, holistic point of view. Given that initiatives have been started throughout the entire Autonomous Region of Galicia, this goal is being achieved.

The impressions of those involved in the project and their degree of satisfaction and aptitude towards the adaptation can be classified according to their relationship with the project:

Mancomun.org seeks to answer the technological needs of the general public, companies and institutions to enable them to achieve full technological independence.

- **Public administrations:** Their acceptance has been neutral, understanding that open source software promotion is part of the Galician strategic plan for an information society (2007-2010 PEGSI). The Galician government later introduced a series of complementary measures (implementing OpenOffice in Galician and introducing open source software in contracting and public funding) and a growing demand for information and advice began to be detected.
- **Companies:** From the beginning, the greatest interest in the initiative was unquestionably shown in the business environment. First of all, the companies foresaw that they would have to respond to a greater demand in public contracting based on open source software. Second, they viewed it as an opportunity to increase their competitiveness and productivity.
- **General public:** The public has received the initiative very positively. On the one hand, open source software is perceived as modernising the administrations and the economy; on the other, it is associated with positive concepts such as respect for Galician language and culture, cost saving, greater economic and technological independence from multinational companies and outside interests, solidarity, etc.
- **Associative movement:** In the Galician associative movement, the Mancomun initiative has had a significant impact on OSS user associations, funding them economically through agreements for promoting and increasing awareness of open source software.

Creative Commons licenses were used for the content and GPL for the software, although some other types of licenses were involved. Some legal problems were detected as a result of advisory work on the process of incorporating open source software in public contracting procedures. The problems were mainly based on a lack of knowledge about open source licenses.

Positive mancomun.org characteristics:
- Positive social reception
- Integration in the OSS community
- Growing demand in the business sector
- Introduction of open source software in contracting and funding processes
- Project internationalisation, including Portuguese-speaking countries, OSOR (IDABC)

"Incorporating open source software in public contracting did not require any changes in regulations".

The next steps aim to continue projects relating to translation and adaptation to local needs, strengthen the open source software community, give direct support to companies (with special attention to micro-PYMEs and the Galician public administration) and initiate internationalisation mechanisms to study outside relations in depth (particularly in the areas of the Spanish state and the European Union).

Lessons learned: Public administration projects for OSS promotion must consider the repercussions of technological options on industry. The role of the public administration should focus on promotion and dissemination, sanctioning open source software as an option that is interesting and useful for the public, and acknowledging the work of the most important individuals and groups. Likewise, the administration should provide technical and financial resources that are useful for the community and require open standards and open source software based on the criteria that govern public contracting and the actions of public institutions in general.

4.3.10. MAX

The goal of the MAX project is to provide an open source operating system for the teaching staff and educational system in the Autonomous Region of Madrid. MAX includes educational applications that allow teachers to generate educational content in open, standard formats using Jclic, HotPotatoes[25] and other applications. The current version is MAX 4.0, based on Ubuntu 8.04. The plan was to be able to adapt to successive Ubuntu versions without making a large number of changes and to focus on developing a meta-package including the specific content of MAX: Educational applications, server applications, other applications and the aesthetic and functional personalisation options of the system.

The *Thin Client Operating System* (TCOS) permits control and management of thin clients while working as a computer classroom control application in the style of Control Aula, Edebenet, Classperfect and other similar applications. The version for computer classrooms is called TCOS Standalone[26]. MAX is promoted by awareness and training campaigns that are not based on technological issues. The campaigns are more geared towards making an alternative known. The plan is to develop abilities and skills through the software, so it is not necessary to show any specific brand. The fundamental project goal is not that of replacing proprietary software, but rather of making an alternative known while not favouring any software in particular. Imposing the use of a specific OS is therefore avoided.

MAX, the Linux distribution in the Region of Madrid, offers teaching staff an open source operating system that allows them to generate formatted educational content.

A basic project goal is to release a new version of the system each school year. The purpose is to offer teaching staff and educational centres a free, open source alternative. However, reducing costs is not an objective. Instead, the intention is to provide information that can be used when deciding which OS to select - attempting to educate, demonstrate and raise awareness so that a choice can be made.

The first MAX version was released in the 2003/2004 academic year and saw a relatively slow rate of growth in the number of computers on which it was used. Many more users have been incorporated now as a result of teaching staff demand for copies and training courses, especially among teachers of subjects with close links to technology and most particularly among teachers of information technology. Installed in the 60,000 PCs that the Region of Madrid has owned since the beginnings of ITC, around a million students have access to this system.

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25 http://hotpot.uvic.ca/
26 http://www.tcosproject.org/

The first problems encountered were technological and hardware-related. Thanks to the stipulation in public contracting that hardware must be compatible with Linux, a lot of progress has been made in this matter. Responsibilities have gradually been turned over to the companies providing services and hardware.

Among the main problems indicated by project personnel, the first is the habitual fear of the unknown. A positive point to bear in mind is technological independence with a company. No legal problems have appeared, even when formulating public contract calls.
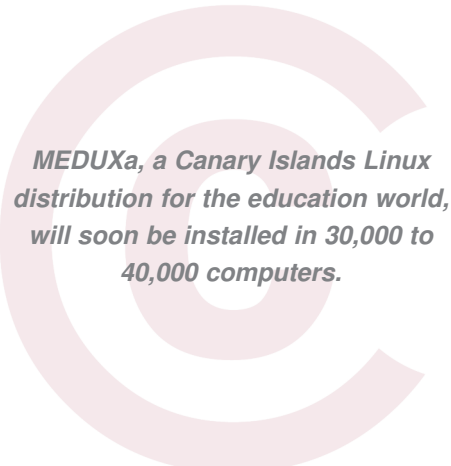
Lessons learned: Given project experience, Debian distributions or their derivatives should be chosen as the base. The majority of the work involved in creating the distributions will thus be delegated to a large community, allowing a focus on meta-packages or training matters. In addition, new users have to be encouraged, helping them to lose their fear of change and to try out new solutions. In this aspect, the efforts and hard work of the Max project in raising awareness of the need to use open source software in the Autonomous Region of Madrid are significant.

MEDUXa, a Canary Islands Linux distribution for the education world, will soon be installed in 30,000 to 40,000 computers.

One very positive result of the MEDUSA project is that the servers function on both operating systems, achieving better performance on Linux even when services are provided by proprietary software.

4.3.11. Medusa
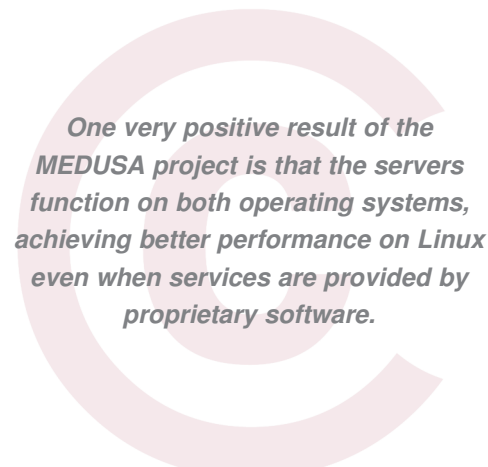
The Medusa project is a plan created by the Autonomous Government of the Canary Islands to manage their educational network, the services given to it and the classrooms themselves. It has two parts, one with the content and the other related to the technical aspects (systems, maintenance and development of staff and centre management applications). Early in 2005, a GNU/Linux system called mEDUXa was created.

Currently, this system is installed in some 600 centres in the Autonomous Region of the Canary Islands; plans are to extended this to 800 centres in the second phase and then to 1,000. Installed on about 20,000 computers at the present time, it is anticipated that some 30,000 to 40,000 computers will eventually have this system. The project is expected to continue expanding over the coming years.

One of the most significant goals achieved is that all the computers offer a dual-boot configuration that provides the same services. The difficulty lay in having Linux desktops interact in an almost completely proprietary environment. In addition, open source software is used within this

environment: Firefox and Gimp are in use now, and OpenOffice is even being considered. All the developments have been released under GPL. The code for desktop personalisation was released in Launchpad; technical documentation was also released (using a license compatible with the Debian open source licenses).

Linux offers many advantageous features: Network configuration, hardware requirements for execution in less-prepared computers, web browsing speed, etc.

On OSS migration:
"A smooth transition and the encouragement of coexistence, accompanied by an appropriate awareness and a good training program, are the most recommendable options.
Rigid deadlines for achieving goals or distribution figures should not be imposed; the initiative has to advance little by little on the basis of participant and user acceptance".

As both open source and proprietary software share the same platform, it is perfect for comparing them. The platform can serve as a reference for hundreds of similar cases. All the services provided in proprietary environments also work in Linux.

Positive student evaluations on using Linux and Firefox include: - "It's super-quick", "it works really well" and "I can do the same things as in Windows".

A practical example can be found in the area of authentication. In proprietary systems, teachers could not switch from using a cable network interface to a wireless WiFi-based technology authenticated by a RADIUS server without having to reboot. However, using open source software through repositories (in Debian/APT style) is much quicker and more efficient. This showed that it is not only possible to switch to using Linux, it is even recommended in many cases as well.
In spite of this, it is obvious that Linux is used very rarely. Whether or not it is used frequently depends on the centre having individuals interested in Linux and knowing about it in order to encourage their colleagues.

However, it has become the first-choice option for computers with limited hardware resources because of the Linux execution speed.

There is no precedent for such a large proprietary software network attempting to include default Linux systems that are completely interoperable at all levels. We are talking about 35,000 computers distributed in 1,000 centres in a uniform network, that of the Canary Islands government. The environment was complex, particularly because strict security requirements existed.

The success of the initiative depends, as in other study cases, on the crucial aspect of user training (especially that of the teachers in this case). Because most members of the teaching staff are not well trained in Linux platforms, the initial penetration ratio is not expected to be high.

"The primary-school platform has the advantage of being truly simple and intuitive".

The project is planned to advance slowly but surely, without any radical changes. Over the course of 2008, it should be possible to initiate a more extensive training program due to increased system consolidation.

At present, both systems co-exist on equal terms with the aim of finding alternatives, not replacements. In the hope of a smooth transition, the plan is to reduce the number of proprietary licenses gradually if mEDUXa users increase. Likewise, if the use of OpenOffice is seen to rise later on, Microsoft Office licenses will be phased out.

This initiative by the Government of the Canary Islands joins other similar initiatives emerging throughout the autonomous region. Significant examples are the Canary Island Employment Service's migration of their entire CPD to GNU/Linux platforms and the OSS-based network of services and servers in the La Palma Island Services Group, as well as others by many town councils throughout the autonomous region.

> Lessons learned: Cost saving, stability, maturity and quality are demonstrated OSS features that have tipped the balance in its favour. Likewise, project experience has brought out the undeniable social tendency towards using OSS that exists in the public administrations, an inescapable reality that everyone should bear in mind, at least as an alternative.

4.3.12. PASCAL

The PASCAL project is financed by the Regional Ministry of Industry and the Information Society, part of the Autonomous Government of Castilla-La Mancha (JCCM in Spanish), and carried out by the Centre of Excellence for Free Open Source Software in Castilla-La Mancha (CESLCAM). The main goal of the project is to support the general objectives of the Strategic Plan for Telecommunications and the Information Society in Castilla-La Mancha (PETSI 2006-2010). PASCAL controls 95% of CESLCAM's strategic plan.

> Thanks to the PASCAL project, a series of OSS activities will be developed to spread this type of software, as well as its economic and technical advantages, to the greatest extent possible.

The following activities are planned for 2007-2008:
- FORMADos, training and spreading the OSS concept in the region. Increased training is planned both for users of free and open source applications and computer technicians. An on-line platform from which training courses for the general public are given has also been established. Examples of training include: Molinux (Linux distribution for the region) and OpenOffice. Blended-learning training is given as well, such as a upper-intermediate JAVA course.
- PORTALos, a web portal. Consisting of a repository and an OSS technological observatory. One of its most successful resources is a table comparing proprietary software and the free and open source equivalents. In addition, a group of professionals has been formed around open source software.
- COMUNIos, a program for adhesion and active participation in the main national and international OSS communities. It is linked to the Morfeo free open source software community, but will expand to participate in other communities.

- SOLIDARIos, a program for social action with OSS and reusable computers. It picks up hardware donated by different organisms, institutions and individuals, installs Molinux and all software needed and then gives the units to non-profit organisations. The necessary training is also offered free of charge. A hardware+software+training triad is thus provided.

PASCAL, conducted by the CESLCAM of the Autonomous Government of Castilla-La Mancha, is composed of the following programs:

- FORMADos, for providing training and spreading the OSS concept in the region.
- PORTALos, a web portal. It consists of a repository and an OSS technological observatory.
- COMUNIos, a program for adhesion and active participation in the main national and international OSS communities.
- SOLIDARIos, a program for social action with OSS and reusable computers.
- CERTIos, for creating a cluster of ICT companies in OSS environments.
- TICos, an activity for supporting ICT companies in the region in adopting free open source software business models.

Reasons for adopting open source software:

- Cost savings
- Security
- Adaptability
- Performance
- Freedom

- CERTIos, for creating a cluster of ICT companies in OSS environments. The main goals of this seal of quality are to offer greater confidence to companies consuming software on OSS applications and to encourage and support companies that implement them. The certification applies not only to companies, but also to applications and professionals. The seal for companies focuses on good practice in implementation, the one for applications refers to adapting defined functional requirements to real application functionality and the certification for professionals guarantees their knowledge.
- TICos, an activity for supporting ICT companies in the region in adopting free open source software business models. Two-way support is provided: First, ICT companies based 100% on proprietary software are shown the business possibilities of using free open source software. Second, ICT companies already working with OSS business models are given demos of applications not in their current product range, so they can incorporate any they consider interesting as a new client service.

The motivation underlying the PASCAL project is "setting up CESLCAM as an experimental centre whose fundamental goal is being the benchmark in the Castilla-La Mancha region in promoting the incorporation of the general public, companies and the public administration into the information society. This goal will be accomplished by taking advantage of all the OSS benefits and by using and promoting this software in innovative activities in the ICT environment".

As to difficulties involved, it has been indicated that "the main problem found with using open source software is the distrust and scepticism the concept provokes". Another difficulty that should be added is "the tremendous variety of solutions available on the market, leaving the average user overwhelmed by so many options".

In talking about the benefits obtained, it can be said that "the achievements obtained point to greater successes, although they may depend on the support the public administrations provide to open source software".

The JCCM has been seriously committed to open source software; proof of this is the Molinux distribution for Castilla-La Mancha, the Castilla-La Mancha Health Services (SESCAM) OSS project and the Castilla-La Mancha Free Open Source Software Centre itself, among others.

The project has not met with any opposition since the environment in which it was created has itself favoured its adoption. The greatest beneficiaries of the project have undoubtedly been the Castilla-La Mancha Regional Ministry of Industry and Information Society, the scientific and technology park in Albacete and the companies Sun, Telefónica and Fedeticam, through their commitment to the Castilla-La Mancha Free Open Source Software Centre of Excellence.

Lessons learned: The whole-hearted involvement of the public administrations in this model has clearly been positive. Their support may promote and multiply such models significantly within other companies and society in general.

PistaLocal+: From the beginning, the MIT&C planned to release the code, giving local institutions free access.

4.3.13. PISTALocal+

The PISTALocal+ promotion project is designed to foster technological coverage so that town councils can have a free access tool to make web pages available through a content management portal.

In addition, it offers editing and publishing functions, an agenda, activity functions, and a directory, oriented towards local government environments. The project is based on PISTALocal+, an initiative of the Ministry of Industry, Tourism and Trade (MIT&C) and the Spanish federation of municipalities and provinces (FEMP).

PISTALocal+ is the result of efforts by the Autonomous Region of Aragón and the Regional Council of Huesca to release PISTALocal modules under GPL license. Besides incorporating improvements to PISTALocal, PISTALocal+ includes modules and tools created by the autonomous region itself after its release under GPL license. The platform continues to evolve and has a level of institutional support that guarantees its future.

A community comprising different locations has been formed around PISTALocal+, sharing knowledge and experience and adding new features to the project. It has become a sustainable, constantly-evolving OSS community. Another key project factor has been the intensive training effort carried out. Training has covered various areas, including system expansion, support, dynamisation and implementation.

From the beginning, MIT&C planned to release the code so that local institutions could have free access; the general public would therefore feel they owned the platform and would be more likely to collaborate. In addition, the local institutions could still rely on local companies for the information infrastructure support, maintenance and installation provided by the project. Without open source software, it would have been impossible to create this community of relationships among local institutions. This was a crucial factor in catalysing the success of the initiative. On the other hand, there was no known proprietary alternative that offered the same service with similar advantages.

PISTALocal+ is used in Mallorca, Tenerife, Cádiz, Cáceres, Badajoz, Alicante, Castellón, Huesca, Guadalajara, Burgos, Soria, Palencia, León, Asturias, Galicia and Madrid and in 450 Castilla-La Mancha portals.

In all, over 2,000 town councils throughout Spain are participating in the initiative.

Lessons learned: The solution is to collaborate and share experience, tools and knowledge. In the words of one of the individuals involved, public administrations *"should not be afraid to share their knowledge and experience fully, as there is no danger of economic competition"*.

In Navarra, 99% of the central educational servers work on a Linux platform.

Users generally feel that the same functionality is provided at a lower cost.

4.3.14. Open Source Software in Education in Navarra

In the Government of Navarra, there are two large networks: the corporative (legal, health and economy) network and the education network. The corporative network is 90% comprised of proprietary software. In contrast, the education network (with central services for the educational centres) uses OSS extensively for e-mail, web pages, etc. Practically all (99%) the education central servers work on the Linux platform, using free open source software applications (Postfix, Apache, etc.) to provide e-mail, news feeds, web pages, Moodle and blogs.

Although RedHat was used initially, the network migrated to Centos to save on support costs. This was a huge advance because it is a much more modern system that includes significant improvements in software updating. The need for technical staff with specific knowledge in these matters was easily solved, given that the setting was an educational department where employee profiles of all types can be found.

"The cost saving was, without a doubt, again one of the fundamental motivations for increasing OSS use. According to some estimates, one additional computer could be acquired for every four or five computers acquired without OpenOffice incorporated".

The centres are using the system and have not ignored the proposal. Out of the 10,000 education computers, some 70% have already had
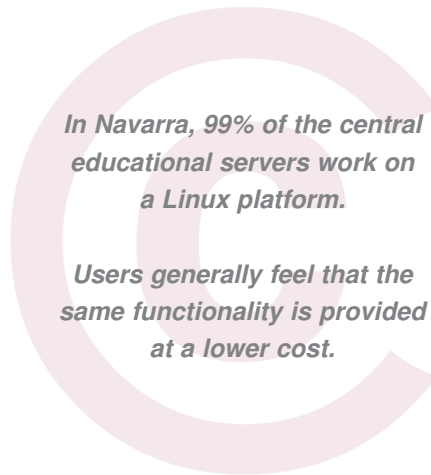
this new software installed. OpenOffice is one of the packages most frequently utilised and Firefox use grows day by day. One point about using OpenOffice is that there is no official generic position on the use of the standard OpenDocument format.

"On-line training managed to reach more than 4,000 students a year".

In some centres, although open format is indeed used, the exact degree is difficult to establish because of the high level of autonomy.

Despite initial fears and distrust, even including many arguments, in the end adaptation was easier than expected.
Adaptation courses were provided via an on-line training platform, which made mass teaching easier.

The following courses can be highlighted from among those given:
- Mozilla browser tutorial: Installation instructions, configuration and basic user manual.
- Mozilla e-mail client tutorial: Installation instructions, configuration and basic user manual.
- OpenOffice 2 installation tutorial: Installation instructions for the office automation suite and its dictionaries.
- GIMP 2 installation tutorial: Installation instructions for version 2.2.10.

Even though software and hardware updates and compatibility initially gave rise to certain problems, these issues have been overcome by Centos-type distributions which include their own packages. One of the undeniable advantages has been the cost saving.

Currently, a J2EE project with an Oracle database is underway; Oracle itself recommends a cluster using Linux, and this recommendation will be followed in the Navarra system.

Lessons learned: Linux is considered to be a stable software, capable of providing the required level of service at minimum cost. There have been no added problems detected with respect to licenses. At present, there are no problems in getting services and support from companies.

4.3.15. SOLIME and Melinux

SOLIME consists of a series of activities to promote the use of new technologies in the autonomous city of Melilla. Although the percentage of broadband access in the city of Melilla is one of the highest in Spain, the use of web services and technologies was very low at first. That is why SOLIME was initiated, to make adopting these technologies easier through open source software. First, a distribution called Melinux was created; next, activities were carried out and support was provided so all the individuals involved could learn to use it. All project contracts were awarded through the public contracting system.

A general-use OSS distribution package called Melinux was then created, as well as a more specific version for companies that included packages for company management, hiring, accounting, etc. As it was necessary to use this distribution as a POS as well, OpenBravo was chosen. In fact, funds were provided for modifying OpenBravo so that it could work with OSS-based databases.

Another SOLIME goal was creating a support team specialised in OSS and, specifically, Melinux. This support was available to the general public, who could acquire the DVD and seek advice on any doubts. The local team handled distribution, training and support. They noticed

Melinux: Technical problems with hardware are accentuated in this project, as it plans to be a distribution for all users and, therefore, the variety of hardware the computer has to handle soars.

many problems with support, given the wide hardware range to be covered because the system was designed to be installed in any home. Now, with a year and a half' s experience, the team is highly proficient in solving this issue. Melinux is also used in public Internet access points, such as those in libraries.

Approximately a hundred computers are currently using Melinux. The goal is to have it installed in all administration computers by 2008.

Migrating to Melinux has not caused any great learning problems or issues from adapting to the use of alternative tools. There is a team responsible for training, which includes level-specific courses.

The OpenSource modifications and integration with the POS virtual payment gateway have been released.

Another problem has been getting people to see that a reliable alternative exists. When a new computer is bought, the price normally covers a license for the pre-installed OS; this makes it difficult to convince owners to use other alternatives, especially if they are familiar with the pre-installed software and it covers their needs. It was difficult to act in this situation; in contrast, when a need really did exist, it was easier to convince users.

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One of the fundamental reasons for using open source software in the project was economic. One objective was massive deployments to cover technological deficiencies, not only for companies, but for the general public as well. Another positive point is the elimination of software piracy. Finally, being able to modify the software based on needs is also a highly valuable feature.

Lessons learned: Based on project experience, the recommendation is to recognise that continuing efforts are necessary in a project of this type, without expecting quick results. It is also important to have consultants who know this business model well, so they can provide in-depth advice on the steps to be taken.

Guadalinfo has distributed more than 400,000 copies of its distribution by various means.

4.4. Other Autonomous Public Administration Experience

4.4.1. Andalusia

Mainly, Andalusia has increased OSS use by creating its own version of GNU/Linux, called Guadalinex (based on Ubuntu since version 3.0). As mentioned previously when presenting the Guadalinfo case study in this chapter, there are over 300,000 computers (in schools, Guadalinfo centres and other centres promoting autonomous administration initiatives) that use Guadalinex. The Guadalinfo project alone has some 335,000 registered users. In addition, more than 400,000 copies of Guadalinfo have been distributed by various means.

Guadalinex undeniably represents a clear case of success in using open source software in this region. However, the Autonomous Government of Andalusia plans to go even further, explicitly requiring any software provided by companies that supply its administration to be Guadalinex compatible.

This measure will be formalised through a new decree describing the "Digital Interoperability Framework" proposed for managing its information systems. This could be a pioneering legislative initiative among Spanish autonomous regions and would be the first example of implementing the directives of *"Proposed Recommendations for the Spanish Government on Using Free and Open Source Open Source Software"* in autonomous environments.

4.4.2 Aragón

Among the capabilities attributed to the Department of Science, Technology and University of the Government of Aragón is competence for promoting, stimulating and implementing technologies for the information society.

Since 2006, competitive grants have been awarded to promote the creation and implementation of OSS developments through the use of some of the different types of OSS licenses available. Up to now, the source code of 22 projects has been made available publicly and openly.

Likewise, to support open source platforms, new funding is announced every year for adapting and integrating the digital business ecosystem (DBE) platform.

Another activity carried out has been the implementation of an open architecture platform to develop and maintain the portal for Aragón provinces and the Government of Aragón-Provinces Intranet, as well as to generate portals for Aragón provinces.

In order to spread the use of OSS, day events and other activities aimed at encouraging the use of open source software have been funded. OSS CDs were also distributed in 2004 and 2006, the latter year's activities falling within the "Teruel Digital" project, with 15,000 CDs and 15,000 DVDs. The project content was presented in an Ubuntu development seminar in California (5 November 2006) that attracted Linux professionals from all over the world.

With respect to the autonomous region's own administration, "Aragonesa de Servicios Telemáticos" (AST) - a public on-line services company - is developing activities in the OSS environment. AST includes among its goals covering the region's needs in services, systems and applications for computer systems and telecommunications.

4.4.3. Asturias

In 2004, the Government of the Principality of Asturias decided to start implementing OSS in its computer systems. Major points in the activity program presented by the government are progressive Linux installation and the obligation for all developments for the autonomous administration to be OSS-based.

The autonomous government has indicated that the initiative is worthwhile because of the cost saving involved in IT tool development. The government also views the possibility of stimulating the development of companies associated with the new technologies in Asturias as very positive.

With this in mind, pilot programs and later implementations have been realised for OSS-based computer systems (on Linux) for file servers, printing, domain name services (DNS), and proxy Internet connections to replace previous proprietary solutions. This migration is estimated to have reduced costs by around 35%.

Likewise, many applications (over a hundred) have been migrated from proprietary OS to Linux, which has thus been converted into the default OS option when setting up new applications. Among the advantages identified, the following can be highlighted:
- Excellent scalability, adaptability and strength.
- Total ownership cost less than proprietary alternatives.
- Features equivalent to those offered by proprietary software.

Advantage has been taken of the excellent features offered by OSS systems in the areas of content management and on-line portal creation, based on the open source content management system OpenCMS.

The main characteristics of the OpenCMS content management system are the following:

- Based on JAVA/XML
- Versioned content
- Integrated user management
- Workflow and task management
- Dynamic/static content publication
- Content type definition through an XML schema

4.4.4. Cantabria

Among the initiatives carried out by the Government of Cantabria to implement the 2004-2007 Governance Program, those focused on promoting open source ICTs are significant.

The public administration framework architecture project (AMAP), which is based on Java technology, should be highlighted. Its main goal is to simplify the development of e-administration applications. The project was co-financed by the Ministry of Industry, Tourism and Trade as part of the 2004-2007 National Plan for Scientific Investigation, Development and Technological Innovation.

In addition to the definition of the framework, other projects designed to stimulate OSS use have been developed.

The first significant project is Linux GLOBAL, a GNU/Linux distribution based on Debian and Guadalinex. A local company has been given responsibility for its development; 7,000 platform CDs that can work in real-time mode have been distributed to date. Among other services, telephone web support, help and documentation forums and tutorials have been offered. There are over 200 registered users and the distribution has been downloaded from the web more than 1,000 times.

The first project developed in Cantabria was Linux GLOBAL; 7,000 CDs have been distributed and over 1,000 network downloads have been performed.

Initiated in 2005, the second highlighted project is Power Line Communications (PLC). This was a pilot program carried out by the town council of Torrelavega, consisting of creating 200 access points (based on the Linux GLOBAL OS) in homes, sports centres, day centres for the elderly, schools and associations.

Within the framework of the training program *"Digital Cities in Cantabria" (2003-2006)"*, an on-line training platform on the GNU/Linux OS has been initiated. At present, the municipalities of El Astillero, Torrelavega and Comarca de Liébana have participated in the project. Project expansion to the Advanced Communication Services Centres (CSAC in Spanish) is planned, so they can function as telecentres.

As a future objective, the Government of Cantabria wishes to set up an electronical administration project to allow the general public to nteract with the public administrations on-line, preferably via open source means.

4.4.5. Castilla-La Mancha

There are two significant priorities in the Autonomous Government of Castilla-La Mancha in the OSS area: first, giving the administration the possibility of freely choosing any software to be used and, second, promoting company initiatives focused on spreading business models and using technology. To achieve this, an agreement has been signed with FEDETICAM for the spread and promotion of OSS use.

Molinux is the Ubuntu-based distribution developed by Castilla-La Mancha. In the Internet access centres present throughout the region, the general public can use computers with this operating system. Likewise, this OS and its educational module are being set up in the computerised classrooms of the secondary school educational centres.

The Centre of Excellence for Free Open Source Software in Castilla-La Mancha (CESLCAM) is another important initiatives. Its main goals are guaranteeing software quality and creating a cluster of companies to cover the needs of those who use this type of platforms. One of their outstanding advances has been creating the tool Gesticam, an integrated computer management system aimed at the self-employed and PYMEs.

Significant experimental projects include the following: Implementing the Molinux OS as a desktop in some administration civil servant computers, preparing training courses on this OS for public employees and using the application gvSIG for geographic information systems in the Castilla-La Mancha Statistics Institute (IES).

4.4.6. Castilla y León

The document *"Free Open Source Software: A Development Source for the Knowledge Society"*, published by the Autonomous Government of Castilla y León in 2007, shows how this regional government is involved in the OSS movement. The document indicates that over 15% of the town councils in Castilla y León (particularly those of Ávila and Zamora) use some type of open source software (data from the "eEspaña 2005" report).

Most of the application servers used by the Autonomous Government of Castilla y León have migrated to open source software; the government is initiating migration to database and web servers, such as the server for the region's official gazette, which operates on Linux software. The majority of OSS implementation in the autonomous administration here has been carried out in more technical environments: Application development and exploitation.

Published by the official Development and Maintenance Area, the standards for creating applications are based on a J2EE programming framework. The project

In the educational sphere in Castilla y León, 100% of the computers installed in schools in the region incorporate a Windows/Linux dual-boot system.

repository GForge, with source code control in both CVS and Subversion, uses the PostgreSQL database. In exploitation and systems, JBoss is being used as an application server in the electronic signature platform. Likewise, Apache and Tomcat are used as web application servers. MySQL and WStats are used as internal tools in the exploitation area. Finally, most of the servers use the Linux OS.

In the educational sphere, it is significant that 100% of the computers installed in schools within the region between 2003 and 2005 incorporated a Windows/Linux dual-boot system. In the latest updates, Ubuntu has been used as a GNU/Linux distribution.

Open source software is also being used in pilot projects for the administrative management of educational centres in the region, utilising tools like RedHat, Fedora and OpenOffice. Five secondary school institutes have installed server terminal systems so outdated computers can be reused as thin clients on an application server. ILEX, a system specially designed for secondary education, is used on this thin client configuration. A single ILEX server can handle hundred of computers that do not need to be updated.

The overall migration of the IT systems in the Autonomous Government of Catalonia will benefit 150,000 employees in the public sector.

4.4.7. Catalonia

The Government of Catalonia has a general policy of promoting OSS use which was based on a study to detect the best opportunities for applying open source software. The analysis has been complemented by a roadmap defining guidelines and the rhythm in which open source software will be incorporated in Catalonia.

In 2005, the government's Secretary for Telecommunications and the Information Society (STSI), together with the Centre for Telecommunications and IT (CTTI), planned the general migration of their computer systems to OSS use. This was a positive step for the over 150,000 individuals who work for the government in Catalonia. The Department of Justice has also computerised the magistrate courts, using OpenOffice.org.

Another significant project is "e-Catalunya", managed by the region's Public Services Department and the Catalonia Polytechnic University; the project consists of creating a set of OSS applications united in a single common network platform for its development.

Initiated by the Government in April 2006, another important initiative involves installing or migrating (as

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applicable) computers that work exclusively with open source software in 40 of the 500 telecentres making up the Catalonian Network of Telecentres (XTC is the Catalan acronym).

Within the PIMESTIC program, developed by the STSI for ICT promotion and use in Catalonian PYMEs, another initiative should be highlighted: The February 2008 bid contract for developing an office automation suite based on standard OSS tools with applications such as contact, billing and expense management, document preparation, e-mail management, etc.

Turning to linguistic applications, a significant program is the 100%-financed development of SisCoTTerm, a system of scientific-technical text correction.

4.4.8. Region of Valencia

The first noteworthy initiative in the Region of Valencia to be highlighted is LliureX, a project by the Ministry of Education in the Autonomous Government of Valencia. Its main goal is introducing OSS-based ICT in the region's educational system.
To do so, the department created LliureX, a GNU/Linux distribution aimed at the region's educational system (Ubuntu-based since May
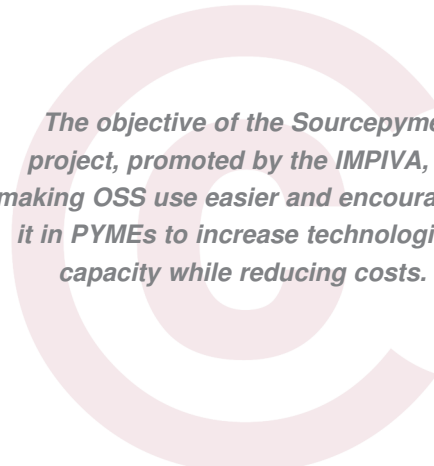
The objective of the Sourcepyme project, promoted by the IMPIVA, is making OSS use easier and encouraging it in PYMEs to increase technological capacity while reducing costs.

2008). Completely OSS-based and free of charge, it is being further developed by IT teachers in the region and specialists through the Directorate General of Educational Technology Innovation.

Another significant project is Sourcepyme. This project is promoted by the Institute of Small and Medium-Sized Industry in the Government of Valencia and supported by its Ministry of Industry, Commerce and Innovation. Its goal is promoting OSS use in PYMEs and making it easier to use in order to increase technological capacity and reduce costs. Sourcepyme coordinates the development and adaptation of OSS-based applications for company use at regional level and within the metal and plastic sectors.

To achieve its objectives, the project includes a consortium or cooperation group formed by "Sistemas Distribuídos" of the Valencia Polytechnic University, the Information Technology Institute (ITI) and the Technological Institute for Plastic (AIMPLAS), all coordinated by the Mechanical Metal Technological Institute (AIMME).

4.4.9. Extremadura

Extremadura has been one of the most active autonomous regions in promoting OSS use, especially within its own autonomous administration. Since the appearance of gnuLinEx in 2002, the Autonomous Government of Extremadura has promoted the development of up to six different versions of this operating system, adapted to the specific needs of each application area.

The latest initiative (March 2008) is the creation of GUIA-LinEx, which stands for unified information management for town councils and provincial councils in Spanish. It is the sixth version of the gnuLinEx OS. The guide project falls within the framework of a larger initiative by the Autonomous Government of Extremadura called "Extremadura Ciudadaní a Digital"[27]. This initiative, a result of the collaboration agreement between the MIT&C and the Government of Extremadura, plans to promote and stimulate information society implementation in the "Mancomunidades Integrales" (comprehensive consortiums) of Tajo-Salor and La Serena. The main objectives set for this version of the distribution are to offer maximum security, simplicity and ease of management. To aid the final objective, an effort has been made to keep the learning curve for this desktop environment (the Gnome-based Guí a Desktop) particularly short.

GnuLinEx versions:

- Education: LinEX-Edu/Linex-Cole
- PYMEs: LinEx-PYME
- Health: SES-LinEx
- Administrative system of the Autonomous Government of Extremadura: LinEx-SP
- Town councils and provincial councils: GUIA-LinEx

4.4.10. Galicia

In March 2008, mancomun.org (a Galician open source software reference and services centre) published a report on the state of free open source software in the organisations of Galicia. The results show a very positive OSS growth rate in this region.

According to document data, Galician PYMEs have doubled their OSS use, going from 10% to 23% in only a year. This usage increase has been even more significant in schools, with centres using open source software jumping from 20% to 65% in comparison with 2006 surveys. OSS use has also grown in Galician town councils, from 32% to 49%. Among the most significant OSS applications with respect to usage, office automation, web browser, e-mail management and content management tools can be highlighted. The different Galician organisations surveyed were extremely satisfied with these tools.

27 http://www.excd.es

Use of open source software
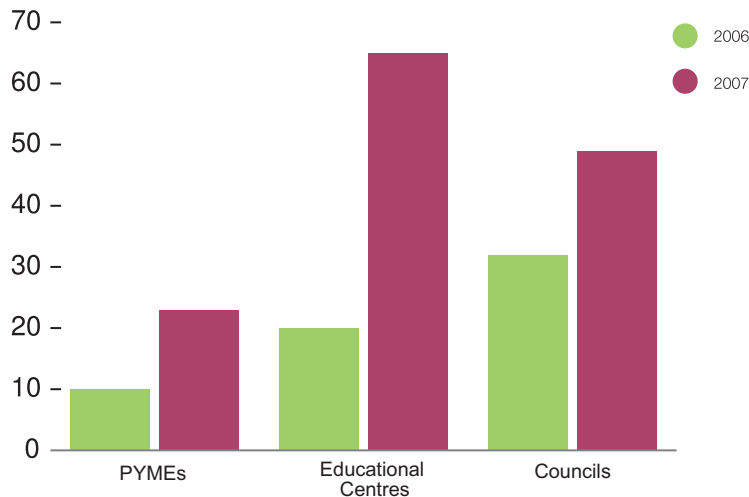
As for the future, almost all of the organisations surveyed indicated that they were willing to increase their OSS use. Half of them forecast that the OSS market would grow in this region, while the remaining participants did not expect any significant changes.

Another fact to highlight is that the Ministry of Labour in the Autonomous Government of Galicia chose the content management software Plone for their web design, as it promotes the integration of the different information subsystems already in use.

4.4.11. Balearic Islands

Through the Directorate General of Technology and Communications, the Autonomous Government of the Balearic Islands encourages OSS development, promotion and implementation in this region.

The first significant initiatives involved carrying out two studies: "Feasibility Analysis on Using Free Open Source Software in the Balearic Government" and "Level of Free Open Source Software Use in the Balearic Islands" (in both private and public sectors).

Among other conclusions, the latter document revealed that 24% of the private companies in this region used or planned to use open source software.

As to the level of OSS use, 28.4% of the companies that are aware of this type of software have already adapted OSS technology to meet the requirements of their work. The spread of open source software is high in the private sector, 3.7 points above the average for all of Spain (24.7%). The percentage rises to 66.67% when referring to OSS knowledge in private companies.

Among the main advantages of incorporating open source software for both private companies and the public sector is the lower cost involved. Other advantages indicated are independence from providers, quality, personalisation possibilities, and freedom from viruses.

PYMEs using or planning to use free open source software

(24%)

(76%)

● Yes

● No

Public administrations
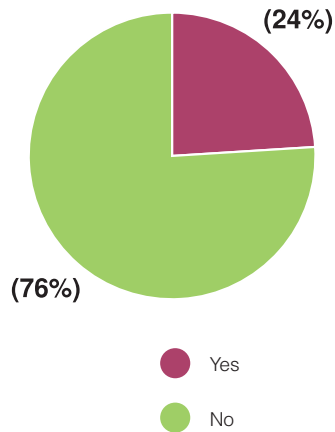
In the public corporative sphere, 55% of the institutions surveyed reported that they used open source software and 100% of them knew of its applications.

The Balearic School of Public Administration has included OSS tools in its training program. The region's autonomous government will allow the use of OSS office automation tools in civil servant employment access tests. It is also committed to releasing the IT application software it owns. The region's government is currently defining the model for the telecentres in the region, to be based technologically on OSS use.
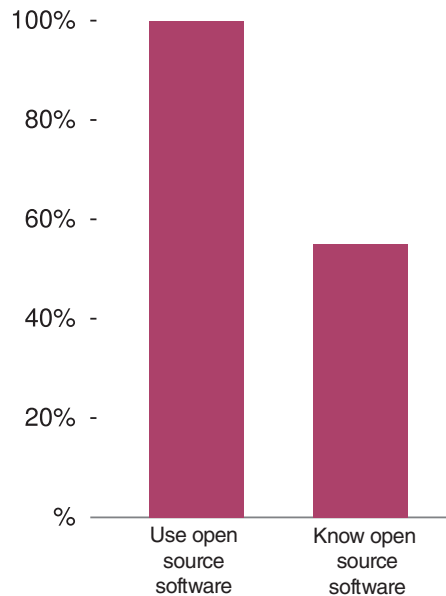
During the 2002-2003 school year, it was decided to incorporate Linux in the public centres. Mandrake/Mandriva was chosen as the base distribution of Linux.

Another significant initiative is the decision approved by the Government Council (28 March 2008) to release the code of a few IT programs belonging to the regional administration itself. These programs are: Sistra, an electronic processing system; Rolsac, a corporative content manager; Gdaforms, an administrative document generator; and Gusite, a microsite generator which is a web page creation tool for staff who are not necessarily technicians and which makes homogenous page design and easier and makes multiple services automatic.

4.4.12. Canary Islands

The Government of the Canary Islands and the two universities on the chain of islands have signed a specific agreement for carrying out activities to promote and spread free open source software. The agreement is part of a joint project on free open source software being developed in the universities of La Laguna and Las Palmas de Gran Canaria.
In accordance with this agreement, the Regional Ministry of Industry, Commerce and New Technology has committed itself to financing projects arising in the university environment.

Within its activities, the autonomous government has been promoting and supporting free open source software for quite a while, both in its use by the regional administration itself and in spreading it to the general public in the Canary Islands. The official gazette of the Parliament of the Canary Islands thus published a non-legislative motion (July 2001) on spreading free open source operating systems.

The universities on the Canary Islands, having recognised the significance and implications of free open source software years ago, have considered it necessary to channel its institutional policies through bodies created for this. The Free Open Source Software Office (OSL-
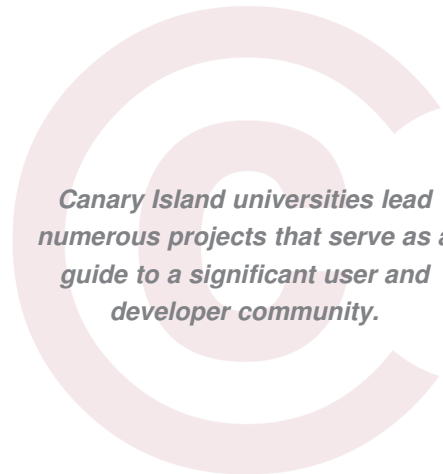
Canary Island universities lead numerous projects that serve as a guide to a significant user and developer community.

ULPGC) and the Free Open Source Software Secretariat (SSL-ULL), in the University of Las Palmas de Gran Canaria and the University of La Laguna, respectively, are the bodies responsible for promoting and spreading free open source software use.

In the Canary Islands, the OSS office of the University of La Laguna has been designated to promote and spread the use of free software and open standards. This office has developed Bardinux, a Linux "kubuntu" distribution adapted to the software needs of this university community. The most important software for carrying out laboratory sessions, research and general use has been compiled into easily installed packages. In addition to Bardinux, numerous projects have been created, such as student e-mail, virtual hard disk and others designed for training (such as the ISLA courses for the teaching staff and the PAS).

The Canary Islands association of OSS companies (ESLIC) also collaborates in promoting OSS use.

Since it was set up, back in 2004, the association has been promoting and stimulating free open source software use in the Islands among the general public and particularly among companies.

4.4.13. La Rioja

The Autonomous Region of La Rioja has a mixed model in which OSS and proprietary software coexist. Apart from functional and economic criteria, there are two especially significant factors involved in choosing a tool: Technological neutrality and interoperability.

In view of all this and when considering new projects, the Autonomous Government of La Rioja - through the Agency for Knowledge and Technology - has various OSS alternatives. The level of OSS spread can be seen in the following:

- **Infrastructure of La Rioja government and generic services:** The central servers of the Autonomous Government of La Rioja support the base infrastructure on which the applications serving the government's needs and the services for the general public offered through e-administration are constructed and implemented.

- **Vertical services and applications of the La Rioja government:** In 2001, the Agency for Knowledge and Technology decided to migrate client/server applications to those based on the J2EE environment, which were accessible from a simple browser. The creation of portals was also based on a mixed scenario.

- **Desktop environments and civil servant workstations:** The desktop OS is proprietary, even though a free, open source browser is installed in the configuration of all the computers. System users can also choose between acquiring proprietary office automation tools or requesting the installation of a free, open source office automation distribution (the latter is installed in all the region's cybraries).

- **General public's access to e-administration public services:** The vast majority of the e-administration services in La Rioja can be accessed from free, open source browsers.

Some of the applications, such as file management, are custom-developed and reside on OSS platforms.

When choosing a tool, the Autonomous Region of La Rioja looks for technological neutrality and interoperability.

4.4.14. Madrid

A significant initiative in the Autonomous Region of Madrid is a scheme that is run by the Madrid administration and that can be considered to be a pioneering project at global level.It is a GNU/Linux client based system for the real-time location of city buses in the new transport interchanges in the Autonomous Region of Madrid[28].

This mobile locating solution allows the regional transport consortium to administer and coordinate the entry of buses into the subterranean interchanges. The technology is also of great use for maintenance services, as it provides location information for mechanics so that they can find the relevant bus and solve the problem quickly.

The Spanish company Neomedia, a national leader in advanced telecommunications infrastructure (IAT) based on wireless technology, has been responsible for the project implementation in collaboration with the Ekahau, a world specialist in real-time wireless location systems.

The regional transport consortium in the Region of Madrid uses a real-time location system based on GNU/Linux to manage the buses inside the interchanges; this tool is considered a world pioneer.

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28 http://www.salvadorbiedma.com/blog/2007/11/18/wifi-y-linux-de-la-mano-mejoran-el-sistema-de-transporte-publico-madrileno/

4.4.15. Murcia

The following important initiatives are in place in the Region of Murcia:

- **SOFTLA is a strategic plan** for OSS development and use at the University of Murcia. It is designed to implement and support OSS use in various areas of ITC-related activity within the university: Teaching, research and administration.
- **CenTIC is a non-profit business association** created in August 2004 under the sponsorship of the Regional Ministry of Economy, Industry and Innovation, the Institute for Promotion of the Region of Murcia, and the Murcia association of ITC companies (TIMUR). CenTIC promotes open source software in telecommunications companies in the Murcia region.

CenTIC, a non-profit company, is promoting open source software among the telecommunications companies in the Murcia region.

The Directorate General of Information Technology is considering a pilot project to try the OpenOffice.org suite and to evaluate the impact its installation would have on users.

The project goals are:

- Try out OpenOffice functionality.
- Study which user type the suite may be designed for.
- See how Microsoft Office coexists with OpenOffice.
- Analyse the problems of integration with other applications.
- Evaluate the costs involved in a possible implementation.

4.4.16. Navarra

The following initiatives can be highlighted:

- The ATANA association is a non-profit institution whose mission is promoting ICT development. It promotes open source software through press releases and work breakfasts.
- Promotion and sensitisation initiative (day sessions, publications and dissemination): Navactiva and CEIN. INVESTIC, CEIN's incubator company, has published a guide for creating companies based on free open source software services and developments, called "Active Guide for Creating Free Open Source Software Companies".
- In 2004, the Autonomous Government of Navarra and Sun signed an agreement on a technological excellence centre for Linux and open source solutions. In 2006, they created the Centre of Excellence in Software[29].

The Dédalo Foundation has set up a project called "Open Source", whose main objective is encouraging initiatives that favour OSS use among the general public and the companies in the province.

- Within the framework of the European project Cyberstrategy, the Dédalo foundation has set up a project called "Open Source". It has also encouraged the creation of a work group in Ribera de Navarra. Its main goal is driving initiatives favouring open source software use among the general public and companies in the province. The Dédalo Foundation for the Information Society is a non-profit institution whose main objectives are promoting, stimulating and developing the information society within the geographic area of Ribera. To this end, it carries out activities for the general public, companies, entrepreneurs and organisations.

4.4.17. Basque Country

The first activity to be highlighted in the Basque Country is the "Konekta Zaitez Lankidetza" program, promoted by the Regional Ministry of Industry in the Basque Country. This program establishes support measures for promoting the incorporation of new ICT in cutting-edge

associations and companies and their suppliers in this region. It is significant that the program funds 100% of management software costs (to a maximum of €33,000) if it is implemented with open source software[30]. The Regional Ministry of Industry has also sponsored the creation of a forum through the Basque association of free open source software companies (ESLE). Likewise, it sponsors OSS courses and promotion through its centres.

The framework conditions of the project are:

- Totally based on free open source software
- Oriented towards process management (BPMS)
- Committed to standards and an SOA architecture which guarantees interoperability
- Modularity, creation and management of web user interface components via PORTLETS
- Multilingual
- Multi-platform and multi-channel
- User-centred developments

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29 http://www.cesnavarra.net
30 https://www.spri.es/kzlankidetza/home.asp

The Regional Ministry of Education (in the professional training branch) is supporting a project called Kaioa, whose goal is to provide a corporative portal for the professional training centres in the

network under the subdepartment of professional training and permanent learning of the Basque Government (the project being promoted by the subdepartment itself). At present, its extension to the rest of the educational system is being planned. The basic components of this system are a Liferay-based portal, user authentication and user/group synchronisation via LDAP, Zimbra (a set of collaborative tools) and Alfresco (a potent document manager).

Among the most significant aspects of this project is its Zimbra-based integration with telephone IP and Asterisk. With regard to implementing business process management (BPM) tools, using BPM/RAD (rapid analysis and design) is turning out to be fundamental for generating new processes and modelling them, with a high-level business process layer that permits quick adaptation to organisational changes. The entire project development process has basically been carried out with JAVA technologies.

Finally, the efforts of the Department of Linguistic Policy have also been important, and the department is still working its work on the translation of OpenOffice into Basque.

4.5. Conclusions on the Initiatives of the Autonomous Public Administrations

One of the first positive conclusions that can be extracted from the study cases in this chapter is the variety of public administration environments in which it has been decided to adopt open source software. There are internal information system management projects, educational projects, schemes that include the business world directly as the main objective, and even health projects.

Almost all of these projects share a series of common factors to be highlighted as fundamental advantages of using open source software. Another significant point is how strongly training is emphasised in many initiatives. Training turns out to be crucial in guaranteeing an initiative's success, along with the satisfaction of technicians, development staff and users of the programs.

A final significant factor is the generalised wish to be able to share experience and results from the different study cases covered here, to enable the identification of the positive and negative aspects of each initiative, strategies to help other future projects, and tools, packages and developments that can be reused.

The great importance given to training in many public administration initiatives is noteworthy.

Main advantages:
- Significant cost savings, above all on licenses
- Flexibility to adapt or custom develop applications for specific problems or sectors that arise
- Creation of project-based communities
- Independence from providers
- Possibility for smaller companies to compete with greater opportunities to offer services that fulfil public administration demands.

05.

05. **Strategic** analysis

This chapter includes a strategic analysis, following the SWOT model (Strengths, Weaknesses, Opportunities and Threats), of open source software in the Spanish public administration. This analysis describes the use and usefulness of open source software, and identifies the principal opportunities for development that open source software offers public administrations, and the barriers against its implementation.

Weaknesses

Lack of training

Support and maintenance

Lack of publicity

Product-focused contracting

Closed formats and protocols

Binding sale

Need for specific hardware

Strengths

Savings in set-up costs

Source code audit

Open standards and protocols

Availability of a large number of programmes

Reuse

Availability of knowledge

Fast development

Possibilities for adaptation

Threats

Software patents

Ignorance of licensing model

Dependence on suppliers

Discriminatory regulations

Opportunities

Independence from suppliers

Creation of a favourable universal environment

Release of formats and protocols

Interoperability

Technology transfer

Industrial development

Good image amongst young professionals

Involvement of developing countries

table 5.1.

Main points considered in this analysis

5.1. Weaknesses

· **Lack of training.** A significant shortfall exists in open source software training amongst those responsible for its configuration, administration and the management of information systems in public administrations.

· **Support and maintenance.** When the choice and selection of an open source software programme has not been made specifically through a contract with a company that is responsible for it, its support and/or maintenance cannot be guaranteed once installed by the usual means.

· **Lack of publicity.** Many open source software development groups lack the capacity to market and publicise their products, a fact that does not occur in large companies that develop proprietary software.

· **Product-focused contracting.** Contracting procedures in the public administration are highly product-focused. However, the majority of business models that revolve around open source software are very service-focused, often making it more difficult to comply with the required conditions.

· **Closed formats and protocols.** The pre-existence of infrastructures that use the exclusive and closed-format protocols of specific proprietary software manufacturers represents a certain element of commitment for the client and a barrier for open source software and alternative providers that is very difficult to overcome.

· **Pre-installation of software.** The purchase of a new computer is associated with the obligatory purchase of certain software (for example, a specific operating system) which means that the replacement of these programmes with open source software is difficult to justify and carry out.

· **Need for specific hardware.** The expenses incurred both in the purchase of hardware that is compatible with free and open source software and also in the training of inexperienced personnel in this type of solutions is usually a decisive factor when it comes to evaluating the costs of the different alternatives that may be adopted. These additional costs, known as Total Cost Ownership (TCO), can be an obstacle in settling on the open source software option.
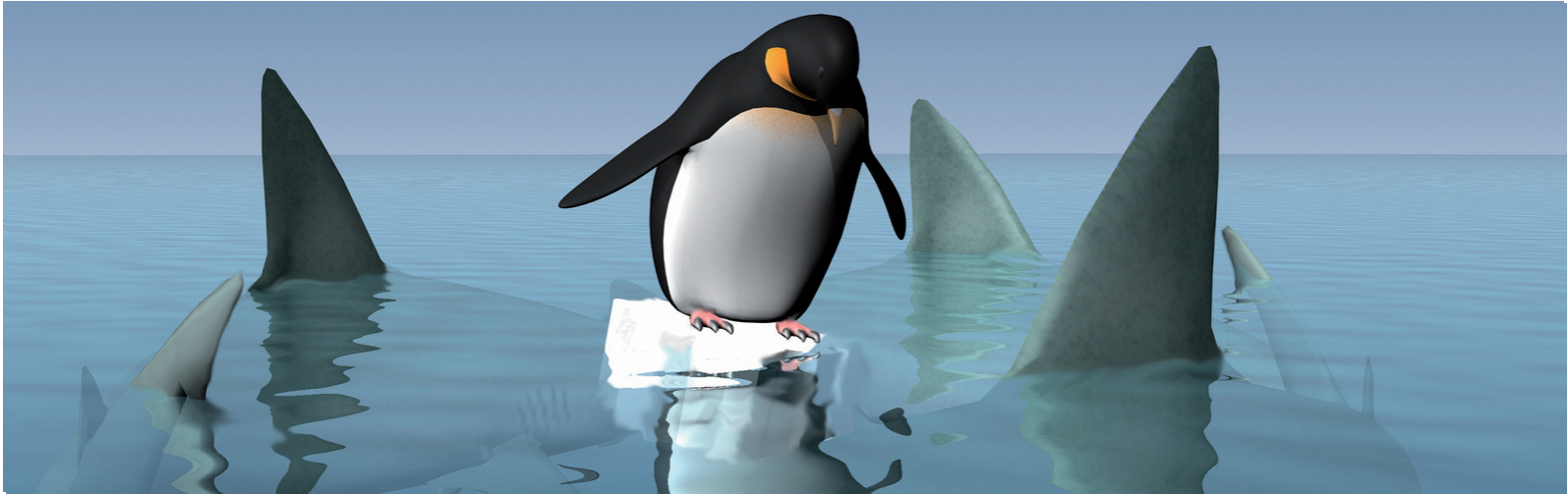
5.2. Threats

- **Software patents.** Attempts to legalise the patentability of software in the European Union and other countries represent the greatest threat to open source software and its model of development and distribution.

- **Ignorance of the licensing model.** The general ignorance that exists regarding the type of licenses used in implemented or used free and open source software can cause conflicting scenarios, as when, for example, this is run alongside programmes with incompatible licenses, or when assessing under which license certain software should be released.

- **Dependence on suppliers.** The strengthening of the ASP (Application Service Provider) model by providers in the public sector can lead to the creation of major dependence on certain proprietary providers, restricting the adoption of other alternatives based on open source software.

- **Discriminatory regulations.** There are instances where international and de jure standards are adopted which discriminate against free and open source software. In this regard, the work carried out in the IDABC Programme is a good step forward in attempting to curb this potential threat which could harm the implementation of free and open source software in European public administrations.

5.3. Strengths

· **Savings in setup costs.** Considerable savings in setup costs upon not having to pay a fee per license on the copies installed or the number of programme users.

· **Open standards and protocols.** Open source software is normally based on open standards and protocols, which are defined and publicly available.

· **Source code audit.** In the event of using open source software, this requisite is easier to meet by means of a full audit through an independent third party.

· **Availability of a large number of programmes.** Commercial companies would need more than 12 billion euros and more than 160,000 people a year to produce the equivalent of what is currently available in open source software.

· **Reuse.** One of the great advantages of open source software is that, as a general rule, a substantial amount of pre-existing work can be used when developing a new solution.

· **Availability of knowledge.** Any development team or company can easily access a minimum range of means, development platforms and knowledge that is necessary to begin developing advanced open source software.

· **Fast development.** Technical ability combined with significant personal involvement by the developers (a key feature in all major open source software projects), guarantees a high degree of upgrading and improvement in functions.

· **Possibilities for adaptation.** The ability to access source code provided by open source software allows a high level of software adaptation to the specific needs of public administrations.

5.4. Opportunities

- **Independence from suppliers.** Given that open source software is based on open standards and guidelines, users can change the service provider at any moment, choosing the solution that is most satisfactory in terms of cost and available features.

- **Interoperability.** Given that open source software uses open standards and has public code, it offers the chance to generate an interoperability framework between the different public administrations within a country, or between different countries within the European Union, thereby guaranteeing the exchange of information between the different public bodies of each state.

- **Technology transfer.** Articles 45 and 46 of the Spanish Law 11/2007 establish the reuse of applications and technology transfer in the public sector. The use of open source software in this sector facilitates the application of this law.

- **Industrial development.** Open source software provides a great opportunity to develop a technologically innovative and economically powerful software industry in Europe.

- **Creation of a favourable universal environment.** It is possible to consolidate and coordinate the different agents in the free and open source software industry so that they form a pressure group that will enable the creation of a universal environment that is less hostile and that favours a greater and faster expansion of free and open source software.

- **Release of formats and protocols.** It is possible that exclusive and closed formats which have, until now, blocked the adoption of open source software in many environments may be replaced through the release of public specifications or open source software.

- **Involvement of developing countries.** Engineers in these countries can begin to develop open source software, increasing the number of developments which are now almost exclusively reserved to European, Japanese and North American citizens.

- **Good image amongst young professionals.** Open source software enjoys a highly favourable image, which has been created spontaneously, amongst a large number of engineers and professionals from the technology industry, especially amongst the youngest professionals, indicating good prospects for its expansion.

BLOCK I

06.

software freedom day

Software free

06. Conclusions and **recommendations**

This chapter presents the main conclusions drawn from the report, as well as a series of recommendations that will facilitate public administrations in dealing with both the migration of their information systems to open source software, as well as the adoption of this type of solution.

6.1. Conclusions

The most relevant conclusions drawn on the current situation of open source software in Spanish public administrations are presented here, along with a comparison of them with other environments (with special reference to the situation in other states of the European Union).

1. **Around 500,000 computers and servers are running with open source software in systems maintained by Spanish public administrations.** This means that more than 1.5 million users use or have access to open source software in administration systems.

2. **Spain is one of the most active countries within the EU in terms of adopting open source software** in its different public administrations.

3. **Spain is at the forefront of European countries in terms of legislation that promotes the use of open source software,** assisting interoperability between computer systems: Spanish Law 56/2007 of 28th December on Means to Promote the Information Society[33].

4. **The education sector is one of the most active** sectors amongst those to adopt open source software in Spanish public administrations.

Figure 6.1.

No. desktop posts with OSS in public administrations (Data from projects included in this report)
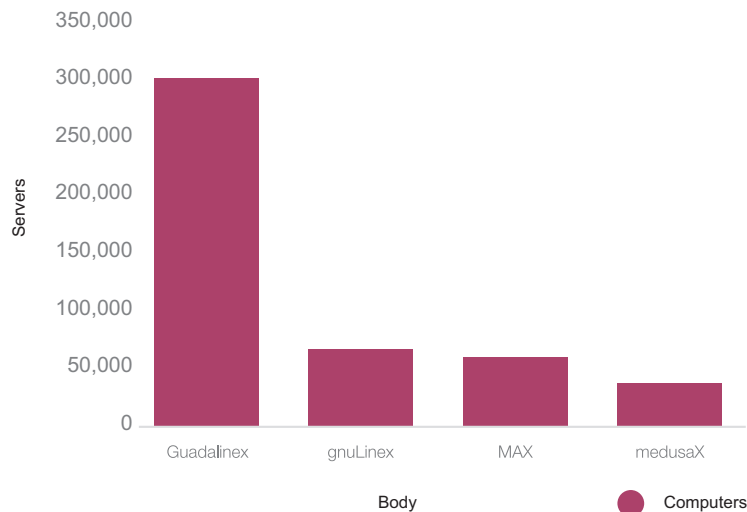
[33] http://www.boe.es/g/es/bases_datos/doc.php?coleccion=iberlex&id=2007/22440

Open Source Software for the Development of the Spanish Public Administration An Overview. 2008.

5. **The savings in the cost of purchasing licenses, the independence of providers, the possibility of creating a community around the project and the ease with which programmes can be adapted to specific requirements are the main advantages observed** by those responsible for the cases studied in the use of open source software.

6. **The implementation level of open source software varies greatly** across the different levels of the administration, between autonomous regions, and within the various sectors of the Spanish public administration.

7. **The setting up of a training scheme for users and technical personnel** contributes to the success of programmes and initiatives that introduce open source software.

8. **The public administrations are satisfied with the companies that provide services and equipment** to cover their needs for open source software or computers that use it.

9. **Open source software manifests itself as being one of the principal tools for reducing the digital gap,** making technological training programmes viable to members of the public.

10. **The generalised use of open source software permits a reduction in costs** thanks to economies of scale and code reuse.

6.2. Recommendations

Bearing in mind the results presented in the rest of the report, here are several proposals and recommendations for actions to be taken with relation to open source software in Spanish public administrations.
Table 6.1 summarises the main recommendations.

General recommendations
Promotion of specific training programmes
Technical day events
Creation of meeting points of initiatives and experiences
Drawing up a communication plan
Creation and publication of a directory of experiences
Support for development
Assisting free competition
Stimulating collaboration between public administrations

Specific recommendations for the development of projects
Certification of services programme
Training in project implementation
Continuous planning
Importance of the community
Contribution to development projects
Full, multifactorial assessment
Appropriate transition planning
Reference for other sectors
Stimulating confidence
Monitoring other initiatives
Local development
Consolidation of ICT companies

Table 6.1.

Recommendations

6.2.1. General recommendations

From the analysis, which has been carried out using real situations and interviews with experts, and in accordance with the main conclusions of the study, a series of general recommendations are proposed that will contribute to making better use of the advantages that open source software can offer public administrations in their endeavour to offer a better service to the general public.

- **Promoting specific training programmes.** Comprehensive training within public administrations in OSS-related issues is, without doubt, one of the decisive factors of success when outlining strategies for the implementation and migration to these technologies.

  Training programmes should embrace the following aspects, amongst others:
  - Legal. How to release one's own code and how to use code belonging to other administrations.
  - Economic. Sustainability of these technologies and benefits for local companies.
  - Sociological. Involvement of companies and the public in development communities.

- **Technical day events.** Holding specific technical day events in public administrations on open source software would be highly beneficial, enabling and promoting an exchange of experiences on projects undertaken within them. These day events should include public administration professionals, developers of potentially interesting projects and companies that can provide services and support for these projects. The day events should be permanent and regular, their content

made available through information directories, the publication of periodical thematic bulletins or similar resources.

- **Meeting points.** The establishment of meeting points, through the creation of forums and stable communication structures, in which public administration professionals and experts from the business world and open source software developer communities would participate, would make best use of synergies and boost information flow.

- **Communication plan.** It would be advisable to define and execute a communication plan that would explain the special characteristics of open source software and provide information on the impact, benefits and difficulties in its adoption - directed at public administrations and political and legislative decision-making environments, as well as the general public.

- **Experience repository.** The creation of coordinated repositories of open source software projects that have been implemented in public administrations would permit access to highly valuable information, which would illustrate successful experiences and the not so successful ones. Administration professionals would have a wide range of cases at their disposal, which would serve as a precedent when putting new initiatives into action. This would help tackle one of the problems detected in this report: the lack of expansion and exchange of information obtained through experiences.

- **Support for development.** The creation of support sites for the development of open source software for public administrations could be carried out by encouraging the creation of repositories and forges to store project developments and their results, and would

serve to coordinate existing initiatives at the regional, national and international level, in both the public and private sector. Similarly, it is important that all these forges are connected and that they share information with the existing national and international forge networks, through aggregation and forge syndication mechanisms, for example.

· **Free competition.** Open source software can be used very effectively to promote free competition amongst public administration suppliers. It would be advisable to carry out an in-depth analysis into which mechanisms can boost competition, and use it in decisions regarding technical solutions to be adopted in the different scenarios. In this way, public administrations would stimulate the creation and maintenance of a local, regional and national technology body and the creation of richer productive ecosystems in the field of software.

· **Collaboration between public administrations.** Open source software may become a model for collaboration between public administrations on any scale (local, regional, national and international). The open source software model offers new collaboration methods: for example, the coordination of resources to improve an open source product that several public administrations may need, or the joint adaptation of a product to the specific needs of a large number of administrations, which is particularly interesting on a municipal level.

6.2.2. Recommendations for the implementation of projects

The case studies give rise to the following recommendations, whose objective is to provide practical orientation for the set-up and implementation of specific projects. These are a series of lessons that have been drawn from specific experiences in the implementation of open source software in public administrations, which will undoubtedly help administrations in their implementation or migration process to open source software.

· **Certification of services.** The creation of neutral centres that provide quality seals or certifications for open source software which endorse companies that offer these services. This would mean that any company, large or small, could be endorsed by a neutral and independent centre that would guarantee that it has the necessary experience and an acceptable quality record to be able to undertake projects in certain areas of open source software with a satisfactory guarantee of success.

· **Training.** We have already mentioned the importance of training for the success of the implementation of open source software. Some specific proposals that would make this training process more effective include: accompanying it with technical advice before, during and after the training activity; maintaining contact with the developers and continuing to work together with them to implement improvements, updates and migrations; and making a call centre available to users to record incidents, manned with staff who are specialised in open source software.

· **Continuous planning.** It is advisable to plan projects in a reasonable manner, providing for adaptations whenever necessary and without trying to set deadlines that are too ambitious. This is

particularly important in projects that involve adapting open source software to certain requirements, or when trying to guarantee the interoperability of open source software with other existing platforms that are based on proprietary solutions.

· **Importance of the community.** When selecting the open source software to be introduced, it is advisable to give preference to packages or distributions that are supported by a large community, which will ensure the necessary development and support. Wherever possible, it is advisable to collaborate on the development of the chosen programmes, thereby increasing the possibilities of their optimal adaptation to specific needs.

· **Contribution to development projects.** It is important that the public administrations put the adaptations, contributions and improvements that they have made directly or through contracted work back into the development projects of the products that they use. This improves the quality of the used product, enhances its sustainability as a project, and helps the adoption of changes that have been made by the main producers, being made available in future versions, with the consequent reduction in costs to integrate and adapt these new versions.

· **Full, multifactorial assessment.** The decision to implement an open source application ought to be based on a series of objective criteria, thereby avoiding any biased or impartial comparisons with regard to proprietary software applications. Through its very characteristics (technical, legal and economic), open source software is on many occasions better positioned to be adapted to the requirements established in any administration.

· **Transition planning.** It is advisable to plan all open source software transitions properly and in full detail. These should be carried out progressively so that users can gradually become familiar with the new solutions. Carrying out a transition too hastily and without the support of an information and training plan may cause negative reactions towards the open source software.

· **Reference for other sectors.** The development of one or several open source software projects by a public administration can act as a catalyst which will help demonstrate its potential advantages for other sectors, primarily the business sector. In this way, the public administrations involved in the adoption of open source software can become agents of change for the entire ICT sector, making it easier for open source software options to be compared according to their value, reducing prejudices, the lack of information and other barriers, which often means that the best solution to solve a specific problem is overlooked. The availability of databases of success stories would help in this matter.

· **Stimulating confidence.** To facilitate the successful implementation of open source software, it is advisable to generate confidence with objective reasoning, providing information for users and those in charge, with the aim of dispelling uncertainties; and communicating all the aspects that have been taken into account to make the decision. This includes detecting proven advantages and possible problems that the use of open source software may generate and explaining them to the public organisations involved.

· **Monitoring other initiatives.** It is advisable to pay attention to other open source software projects and initiatives that are related to what

is being developed. Any information generated by the communities themselves, which maintain open source software, will also be highly useful, given that it may serve to indicate to others how to avoid errors or solve problems that other projects have already experienced, collaborating and sharing tools, experience and knowledge.

- **Local development.** Open source software developed by the administrations can stimulate the development of a productive local ICT collective. The promotion of the local ICT industry is considered to be one of the greatest benefits of open source software, as neighbourhood SMEs can generate business models based on open source software without having to depend on international software suppliers. This model permits local companies from the ICT sector to survive and grow, offering differentiated products and services of their own. In short, wealth is created and remains in the region where it is produced.

- **Consolidation of ICT companies.** There are various initiatives aimed at diminishing the fears and reluctance shown by service and equipment-provider companies when faced with needs concerning OSS-based projects and systems, contributing to the consolidation of local ICT companies. The Autonomous Government of Andalusia Catalogue of Goods[34], with 33 companies in the sector, and the Autonomous Government of Galicia Company Directory[35], with 63 companies, are examples of this consolidation initiative. Another means is the impetus of associations, such as the creation of ASOLIF[36], the Federation of Associations of Open Source Software Companies in Spain, set up on 29th February 2008, to amalgamate all business associations whose aim or strategy is to expand or promote the use of open source software.

[34] http://www.juntadeandalucia.es/economiayhacienda/contratacion/catalogo/pagina_ppal.htm
[35] http://www.mancomun.org/busca-avanzada-36.html
[36] http://www.cenatic.es/index.php?Itemid=128&id=169&option=com_content&task=view

The Spanish National Competency Centre for the Application of Open Source Technologies (CENATIC) is strategically positioned to develop the recommendations made. On a general level, by coordinating or cooperating in initiatives that create a favourable environment for the emergence of OSS-based projects in the different administrations; and at a more specific level, by providing legal, technical and guidance advice to finance initiatives to implement OSS-based solutions that contribute to the development of the Spanish public administration, and, by extension, society in general.

Through this document, the CENATIC Foundation calls for the participation of all agents involved in the development of OSS-based models and strategies with the aim of multiplying synergies and facilitating the launch of cross-cutting projects that are of strategic interest to society.

07.

07. Methodology, Execution **Team** and **Panel of Experts**

The main methodological lines followed in preparing this document are presented here, as well as the individuals who have participated in its preparation.

7.1. Introduction

This report on open source software in the public administration has been created by:

- GsyC/LibreSoft Group (Rey Juan Carlos University)
- Telefónica Investigación y Desarrollo
- CENATIC

The main lines of the report concerning open source software in the Spanish public administration are:

- The history of open source software in the administration environment.
- The current situation, including the main projects embarked upon.
- Modifications in the legal and tender framework related to open source software.
- The impact that the implementation of open source software has had in public administrations.

Finally, a series of conclusions and recommendations are provided with the intention of improving the use, development and running of open source software.

The remainder of this appendix comprises details of the work plan to undertake this study, the individuals responsible for its execution, the methodology used and the results expected.

7.2. Methodology, documentation used and work plan

The methodology used to create this report has been fundamentally based on the critical analysis of available reports, in-depth interviews with foremost experts in the area, and subsequently writing it up, with various phases of feedback.

The information that has been gathered to complete the report is based, in essence, on two different sources of data:

- **The study of existing studies pertinent to the topic.** In particular, reports published on experiences related to open source software in various environments of the Spanish public administration have been taken into consideration, in addition to reports that describe the situation in other countries, especially within the European Union. This data has been used fundamentally to identify experiences that are interesting for this study, to appraise parameters and read across general situations, and to compare experiences between them.

- **The result of in-depth interviews with experts, including staff of the Ministry of Industry, Tourism and Trade and the Ministry of Public Administrations, experts from autonomous regions, councils and other public bodies that are the target of the study.** These interviews have been especially focused on specific cases that can serve to illustrate the position of open source software in Spanish public administrations, and to locate documentation that may be relevant to the study.

As is to be expected, these two sources are interrelated. On the one hand, the reports have resulted in being able to identify experts to be interviewed, and on the other, the interviews have also been used to discover relevant reports. The reports that have been used as a source of original information for the final report include:

· Reports published by the Ministry of Public Administrations on Information and Communication Technologies in Public Administrations.
  - *"IRIA 2006 Report: Information and Communication Technologies in Public Administrations"[18].*
  - *"REINA 2007 Report: Information and Communication Technologies in Public Administrations"[19].*

· Reports that contain various recommendations on the adoption of open source software in public administrations.
  - *"Proposed Recommendations for the Spanish Government on Using Free and Open Source Software",* carried out by the Higher Council for Information Technology of the Ministry of Public Administrations[20]*.*
  - *Applications used for the exercise of powers. Security, Normalisation and Conservation Criteria[21].*

-   *"IDA Open Source Migration Guidelines",* published by the European Commission, and the Ministry of Public Administrations, Spanish version[22].

· Various studies on the current position of open source software in Spain, carried out by different autonomous regions.
  - *"The Spread of Free and Open Source Software in the Extremaduran Public Administration"[23],* published by the Chair of Telefónica at Extremadura University in 2007.
  - *"Free and Open Source Software: Source of Development for the Knowledge-based Society"[24],* published by the Regional Ministry of Public Works of the Governing Body of Castilla y León in 2007.
  - *"Free and Open Source Software in Catalonia and Spain",* Internet Interdisciplinary Institute, UOC, 2006[25].
  - Different studies on the open source software available in Mancomun.org[26]

· Presentations regarding the situation of open source software in Europe.
  - *"Situation of free and open source software in European public administrations",* Rey Juan Carlos University, 2004[27].
  - *"Situation of free and open source software in Europe"[28].* The Higher Council for Electronic Administration, 2006.

18 http://www.csi.map.es/csi/iria2006/index.html
19 http://www.csi.map.es/csi/reina2007/index.html
20 http://www.csi.map.es/csi/pg5s44.htm
21 http://www.csi.map.es/csi/criterios/pdf/presentacion.pdf
22 http://www.csi.map.es/csi/pg5s43.htm
23 http://www.cenatic.es/observatorio/images/stories/documentos_externos/administraciones_publicas/12_Penetracion_FLOSS_AAPP_Extremadura.pdf
24 http://www.jcyl.es/scsiau/Satellite/pr/ds/ORSI/pdf/684/780/Estudio%20Software%20Libre.pdf/_?asm=jcyl
25 http://www.uoc.edu/in3/softwarelibre/
26 http://www.mancomun.org/raquo-descargas/documentos.html
27 http://curso-sobre.berlios.de/curso/presentaciones-invitadas/miguel.amutio/urjc_20040618.pdf
28 http://malaga06.opensourceworldconference.com/malaga06/es/uploads/ponencias/jueves/tematicas/MIGUEL%20ANGEL_AMUTIO.pdf

- Various studies carried out on a European level in public administrations, available at OSSWatch[29].

- Relevant studies on an international level.
  - *"Study on the Economic impact of open source software on innovation and the competitiveness of the Information and Communication Technologies (ICT) sector in the EU"*[30], carried out by UNU-MERIT.

- OSOR study cases. To study the need for the implementation of a European open source software repository, various analyses have been carried out, both on a European level as well as several specific versions in Spain[31].

- The European Commission, and particularly the IDABC Programme financed by it, has carried out various studies that elaborate on those mentioned in the previous point, amongst which studies related to patents, licenses to be used within the open source software projects framework and a guide on how public administrations can join forces with open source software communities are particularly interesting.[32-33].

- Studies and documents published in other countries on open source software adoption processes and programmes in public administrations.
  - *"A Guide to Open Source Software for Australian Government Agencies"*[34], created by the Australian Government Information Office.
  - *"The Netherlands in Open Connection: An action plan for the use of Open Standards and Open Source Software in the public and semi-public sector"*[35], published by the Ministry of Economic Affairs of the Dutch Government.

- The Association of Spanish Users of GNU/Linux and Hispalinux keep a catalogue of reports and studies which include several available documents concerning public administrations[36].

- Andago reports on the use of Linux and free and open source software in the Spanish corporate environment[37].

- White Paper on free and open source software in Spain (editions I[38], II[39] and III[40])

- La pastilla roja[41].

29 http://www.oss-watch.ac.uk/studies/
30 http://ec.europa.eu/enterprise/ict/policy/ict/2006-11-20-flossimpact.pdf
31 http://ec.europa.eu/idabc/en/chapter/470
32 http://ec.europa.eu/idabc/en/chapter/471
33 http://ec.europa.eu/idabc/en/document/2623/5585
34 http://www.finance.gov.au/publications/guide-to-open source-software/index.html
35 http://www.scribd.com/doc/3345990/The-Netherlands-in-Open-Connection-an-action-plan-for-the-use-of-open-standards-and-open source-software-in-the-public-and-semipublic-sector
36 http://www.hispalinux.es/informes/index.html
37 http://www.libroblanco.com/joomla/document/Informe_Andago_II_2004.pdf
38 http://www.libroblanco.com/document/1000-2003.pdf
39 http://www.libroblanco.com/document/II_libroblanco_del_software_libre.pdf
40 http://libroblanco.com/document/III_libro_blanco_del_software_libre.pdf
41 http://www.lapastillaroja.net/

Below are listed various details on the methodology that has been used to create this report:

- To begin with, existing reports were checked over thoroughly to assess the position of open source software in different environments of the Spanish public administrations. Using this information, a first draft of the report was drawn up whilst simultaneously identifying experts who could provide an overview of the situation.

- These experts were then interviewed and their recommendations were included in the first draft of the report. In line with their observations and existing reports, notable cases were identified to be analysed in detail, as were documents that contained information about them and experts able to contribute data on their development.

- The experts who were able to contribute information on the cases identified in the previous section were interviewed in depth. On this point, descriptions and detailed analyses were obtained from the most outstanding cases.

- The information gathered up to this point was shown to all the experts who had participated in the previous stages, taking note of their comments, observations and suggestions. With this new information, and the incorporation of the analysis and comparisons by the execution team, the first public version of this report was written, already covering all the topics to be included in the final report.

- Finally, with all the feedback obtained from the previous part, the final report was written.

The report includes detailed studies on some of the most noteworthy cases that have been detected, organised by autonomous regions. For each one of these cases, all the available information on the project or initiative to be analysed has been compiled, and below, the information has been completed with data obtained first hand through personal interviews carried out with those in charge of the public administrations related to each project. The plan for compiling information included the creation of documents such as the following:

| Autonomous Region |
| Reference page |
| Relevant projects |
| Project number |
| Project type / objective: public administration, education, health, etc. |
| Degree |
| Summary |
| Link |
| Province |
| Useful links |
| Contacts |
| Summary |
| Current situation of open source software |

7.3. Execution team and panel of experts

Coordination by CENATIC

Formed by the following experts from Cenatic

- Carolina Grau.
- Pop Ramsamy.

GSyC/LibreSoft (URJC) execution team

Formed by the following experts in GSyC/LibreSoft of the Rey Juan Carlos University:

- Jesús M. González Barahona, Coordinator.
- Álvaro del Castillo San Félix.
- José Felipe Ortega Soto.
- José Gato Luis.
- Roberto Santos Santos.

TID execution team (Telefónica Investigación y Desarrollo)

Formed by the following experts from Telefónica Investigación y Desarrollo:

- Juan José Hierro.
- Juan Antonio Cáceres.
- Andrés Leonardo Martínez.

Panel of experts

Formed by the following experts, acting in an unofficial capacity:

- Miguel Ángel Amutio, MAP.
- Luis Samper, MITyC.
- Domingo Laborda, Red.es
- Jaime Albert Albert, Red.es

- Juan Conde, Autonomous Government of Andalusia.
- Patricia Márquez, Autonomous Government of Andalusia.
- Francesc Rambla, Autonomous Government of Catalonia.
- Jesús Rubio, Autonomous Government of Extremadura.
- Julio Yuste, Autonomous Government of Extremadura.
- Francisco Huertas, Autonomous Government of Extremadura.
- Juan Carlos Rodríguez Rodríguez, Government of the Principality of Asturias.
- Santiago García Blanco, Autonomous Government of Cantabria.
- Martín García, Autonomous Region of Valencia.
- Sofía Bellés, Autonomous Region of Valencia.
- Silvia Caballer, Autonomous Region of Valencia.
- Juan Carlos Cantó Martínez-Falero, Autonomous Government of Castilla La Mancha.
- José Illescas, Autonomous Government of Castilla La Mancha.
- José Marichal, Autonomous Government of the Canary Islands.
- Miguel Ríos Martín, Autonomous Government of Navarre.
- Ismail Ali Gago, Autonomous Region of Madrid.
- Diego García Carrera, Autonomous Government of Castilla y León.
- Pedro Olivares Sánchez, Autonomous Region of Murcia.
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- Celestino Avilés Pérez, Autonomous Region of Murcia.
- Óscar Alonso Hernández, Autonomous Region of La Rioja.
- Enrique Martínez Muro, Autonomous Region of La Rioja.
- David Fernández de la Pradilla Alegría, Autonomous Region of La Rioja.
- Juan Jesús Muñoz, Madrid Council.
- Rafael Ariza Fernández, Autonomous Government of Castilla La Mancha.
- Juan José Pol Mera, Autonomous Government of the Balearic Islands.

08. Data sheets of **relevant cases** in the Spanish Public Administration

The following sheets outline the main characteristics of the success stories identified in the Spanish public administration.

8.1.1. Table A.1. Ministry of Public Administrations case study data sheet

General data	
Project name	Open source software in the Ministry of Public Administrations (MAP)
Public administration	Ministry of Public Administrations
Prior experience with open source software	Have gradually introduced open source software since before 2001.
Specific project data	
Application environment	Two main Nagios servers, departmental and corporate. The departmental one has more than 200 servers, with their statistics and alarms. The corporate one also has a considerable number of servers (131), alerts and services (1,044), and controls solutions when different problems arise.
Advantages of adopting open source software	Savings in license costs; flexibility when adapting software to specific system requirements; improvement in the degree of interoperability; and total freedom of access to source code to solve potential problems.
Concerns in adopting open source software	None. The official recommendations issued with respect to this have been followed.
Is there a need to use open source software?	Yes, to be able to guarantee an acceptable level of service and also to ensure the exercising of freedoms that open source software provides the public administration to comply with their responsibilities. Finally, it is an essential requirement to stimulate interoperability by contributing to the use of open standards.´
Legal problems	None identified.
Willingness of participants to engage in its use	Very good, following the guidelines issued in the "Proposed Recommendations for the Spanish Government on Using Free and Open Source Software" document.
Companies' attitude	No problems have arisen. Development has been carried out mainly by staff within the same department.
Legal knowledge of open source software in companies and administrations	Very extensive in this case, as it is a pioneering environment in the implementation of open source software in AGE information systems.

8.1.2. Table A.2. Guadalinfo case study data sheet

General data	
Project name	Guadalinfo.
Autonomous region	Andalusia.
Public administration	Autonomous Government of Andalusia.
Prior experience with open source software	Guadalinex project (2003): Linux distribution to stimulate the development of the knowledge-based society in Andalusia.
Specific project data	
Application environment	637 towns or villages with less than 10,000 inhabitants: 335,000 registered users by November 2007: 49,000 organised activities.
Advantages of adopting open source software	Primarily, a saving in costs. Also the guarantee for the Autonomous Government of Andalusia to exercise the four freedoms.
Concerns in adopting open source software	Very few, due to previous positive experiences with the Guadalinex project.
Is there a need to use open source software?	Yes, in accordance with the progress policies of the Autonomous Government of Andalusia.
Legal problems	None. The MAP reports and the previously mentioned Decree advocate the adoption of open source software and standards wherever possible.
Willingness of participants to engage in its use	Very good. Helped largely by the management's knowledge of open source software and its advantages, helping them to make decisions.
Companies' attitude	Reluctant to change at first, Later, they adapted without problem and continue taking part in the offers and public tenders issued by the Autonomous Government.
Legal knowledge of open source software in companies and administrations	Very extensive and in line with the aim of the Autonomous Government of Andalusia to encourage its adoption. The companies are also given information on the new legal framework, and respond satisfactorily to the new requirements.

8.1.3. Table A.3. PISTALocal+ case study data sheet

General data	
Project name	PISTALocal+
Autonomous region	Aragon.
Public administration	Autonomous Government of Aragon.
Prior experience with open source software	PISTALocal and GeoPISTA projects of the Autonomous Government of Aragon to remove the digital gap.

Specific project data	
Application environment	Majorca, Tenerife, Cádiz, Badajoz, Alicante, Castellón, Huesca, Guadalajara, Burgos, Soria, Palencia, León, Asturias, Galicia, Madrid, 450 portals in Castilla La Mancha. More than 2,000 councils.
Advantages of adopting open source software	Primarily savings in the costs of licenses and the creation of communities that will help each other mutually to achieve the successful execution of initiatives.
Concerns in adopting open source software	Very few, as one of the objectives was specifically to improve the accessibility of town councils and administrations involved in these types of technologies.
Is there a need to use open source software?	Yes, in principle, given that it was the only viable way to eliminate the barrier caused by the cost of license purchase which was slowing down the implementation of this type of solution.
Legal problems	None identified.
Willingness of participants to engage in its use	Very good. Feedback indicated that more positive experiences were appearing from new project participants.
Companies' attitude	Some companies complained about the change in business model which meant payment for services instead of for a product.
Legal knowledge of open source software in companies and administrations	Scarce. No position has been explicitly outlined with respect to this.

8.1.4. Table A.4. Open Source Software Framework case study data sheet

General data	
Project name	FW – Asturias
Autonomous region	Asturias.
Public administration	Government of the Principality of Asturias.
Prior experience with open source software	None.

Specific project data	
Application environment	E-government strategy. All developments specifically for the organisation are based on this technology.
Advantages of adopting open source software	Savings in license costs, technological independence, availability of source code, redistribution.
Concerns in adopting open source software	Few. It is seen as another opportunity rather than a source of problems, although it is essential to select the right products.
Is there a need to use open source software?	No, but it provides significant advantages.
Legal problems	None.
Willingness of participants to engage in its use	Very good. Endorsed by the subsequent success achieved by the initiative.
Companies' attitude	Very positive.
Legal knowledge of open source software in companies and administrations	Reasonable. It has increased with time.

8.1.5. Table A.5. PASCAL (Castilla La Mancha Free and Open Source Software Action Plan) case study data sheet

General data	
Project name	PASCAL
Autonomous region	Castilla La Mancha.
Public administration	CESLCAM (Ministry of Industry and Information Society of the Autonomous Region of Castilla La Mancha).
Prior experience with open source software	Molinex, Linux distribution by the Autonomous Region of Castilla La Mancha.

Specific project data	
Application environment	The project is in its initial phase. Its ultimate objective is to support the activities of the regional and national government to improve productivity and create added value, and also to increase social welfare and cohesion by using OSS-based technologies. 102 courses have been provided in which 1,164 users have been trained, held at Internet centres by the Insula Barataria Foundation.
Advantages of adopting open source software	Savings in license costs, facilitating public access to ICTs.
Concerns in adopting open source software	Adaptation of end users who are accustomed to other proprietary software environments.
Is there a need to use open source software?	Yes, due to the project model which aims to contribute to making access to knowledge-based society services possible for the general public.
Legal problems	None noted.
Willingness of participants to engage in its use	Very good. Numerous training day events have been given with a high degree of success.
Companies' attitude	Positive, although there was some reluctance by contracting parties with regards to the viability guarantee of companies providing OSS services.
Legal knowledge of open source software in companies and administrations	Not very extensive. No known specific studies on the subject.

8.1.6. Table A.6. CISOS group case study data sheet

General data	
Project name	Higeia and La Forja
Autonomous region	Castilla La Mancha.
Public administration	SESCAM (Castilla La Mancha Health Service).
Prior experience with open source software	None in the health environment.

Specific project data	
Application environment	Standard research engine for SESCAM, applied across the entire health service of the Autonomous Region of Castilla La Mancha.
Advantages of adopting open source software	Savings in license costs, possibility of creating communities around the development of a project (via the parallel forge initiative).
Concerns in adopting open source software	None identified.
Is there a need to use open source software?	It was highly recommended, both due to the savings in costs and the advantages that would result from a development that is specifically adapted to this particular case, in contrast to the open source software solutions available at that time.
Legal problems	None identified.
Willingness of participants to engage in its use	Very good. It is considered a paradigmatic success story in the application of open source software in a health environment.
Companies' attitude	They have adapted to provide services for the new platform.
Legal knowledge of open source software in companies and administrations	A specific policy has not been identified as to the selection of the type of license to release developed software.

8.1.7. Table A.7. COR-EDUX case study data sheet

General data	
Project name	COR-EDUX
Autonomous region	Castilla y León
Public administration	Corazón de María State-Assisted Infants School in Palencia.
Prior experience with open source software	None in the educational environment.

Specific project data	
Application environment	Adaptation of the ATNAG package for the organisation and control of academic activities in the school.
Advantages of adopting open source software	Savings in license costs, adaptation of the software package to the specific requirements of the school.
Concerns in adopting open source software	None identified.
Is there a need to use open source software?	It was highly recommended both due to the savings in costs and the ability to adapt the software package to the requirements of the school.
Legal problems	None identified.
Willingness of participants to engage in its use	Very good. The initiative came from some parents who proposed the introduction of open source software. The ATNAG developer went to the school himself to help in the tasks of adaptation.
Companies' attitude	No company has participated in the development, only the ATNAG package developer.
Legal knowledge of open source software in companies and administrations	No specific policy has been identified with respect to this.

8.1.8. Table A.8. Linkat case study data sheet

General data	
Project name	LINKAT
Autonomous region	Catalonia.
Public administration	Autonomous Government of Catalonia Education Department.
Prior experience with open source software	None in this educational environment.
Specific project data	
Application environment	Development of a distribution based on GNU/Linux to remove the dependence on proprietary software in schools.
Advantages of adopting open source software	Savings in license costs, possibility of adapting the distribution to the specific requirements of the environment.
Concerns in adopting open source software	Adaptation by users to the new work environment. Contracting of companies that were able to provide services. Convincing those in charge of the need to migrate to open source software when a platform based on proprietary software was already set up.
Is there a need to use open source software?	Yes, to remove the dependence by the schools on proprietary software.
Legal problems	Whenever these are identified, legal services take care of resolving the problems in a short period of time.
Willingness of participants to engage in its use	The users are well-adapted and satisfied. There was a certain reluctance at first regarding the need to use open source software in environments where proprietary software was already operational.
Companies' attitude	See previous section.
Legal knowledge of open source software in companies and administrations	The legal department currently takes care of any queries or problems that may arise when they receive specifications of GPL or Creative Commons licenses.

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8.1.9. Table A.9. Linex PYME case study data sheet

General data	
Project name	Linex PYME
Autonomous region	Extremadura.
Public administration	Autonomous Government of Extremadura.
Prior experience with open source software	Extensive experience in the distribution of Linex and in the introduction of open source software in governmental information systems. It is the first Spanish Autonomous Region to resolutely commit itself to the introduction of open source software in its IT platforms.
Specific project data	
Application environment	Adaptation and application of Linex distribution to cover the specific requirements of SMEs in Extremadura.
Advantages of adopting open source software	Significant savings on license costs and also the perfect adaptation of the new programme functions to the requirements demanded by SMEs. A new business channel has also been created for companies providing technology and development services in the region.
Concerns in adopting open source software	None, given that the Autonomous Government has been resolute in its commitment to the use of open source software.
Is there a need to use open source software?	Yes, in the sense of offering greater flexibility when fulfilling the functional requirements demanded by companies.
Legal problems	None identified to date.
Willingness of participants to engage in its use	At first, reluctance by the companies providing business supplies. After observing the success achieved by the first companies who decided to adopt it, they have not indicated further problems. Furthermore, SMEs feel secure by meeting those in charge of providing them platform maintenance in person at the distribution presentation.
Companies' attitude	See previous section.
Legal knowledge of open source software in companies and administrations	More than sufficient, thanks to the guidelines given to the participants by the Autonomous Government through the Linux SME project.

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8.1.10. Table A.10. Mancomun.org case study data sheet

General data	
Project name	Mancomun.org
Autonomous region	Galicia.
Public administration	Dirección Xeral de Promoción Industrial e da Sociedade da Información (Ministry of Innovation and Industry of the Autonomous Government of Galicia).
Prior experience with open source software	There were previously no centres with similar competence.

Specific project data	
Application environment	Free and Open Source Software Reference and Services Centre of Galicia.
Advantages of adopting open source software	A very interesting aspect is the facility to adapt the application to other languages, making it easier for volunteers to carry out the translation tasks.
Concerns in adopting open source software	None identified.
Is there a need to use open source software?	The centre is specifically focussed on the promotion of open source software. Many of the projects and initiatives that are implemented by the centre benefit from the specific advantages of open source software.
Legal problems	None identified up to this moment.
Willingness of participants to engage in its use	Neutral reception in public administrations. Companies were very interested right from the start and it had a significant impact with a good reception both by the general public and the associative movement.
Companies' attitude	Very positive reception. Companies requested training and legal security.
Legal knowledge of open source software in companies and administrations	The centre provides legal advice to the companies who adopt open source software.

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8.1.11. Table A.11. Medusa project case study data sheet

General data	
Project name	Medusa project.
Autonomous region	Canary Islands.
Public administration	Ministry of Education of the Autonomous Government of the Canary Islands.
Prior experience with open source software	None. Furthermore, no previous cases have been found with such an extensive network based on proprietary software that aims to integrate Linux systems on desktops to such a degree.
Specific project data	
Application environment	Project to improve administration systems and education IT systems in primary and secondary schools in the entire region. The creation, within one of the project areas, of a distribution based on GNU/Linux called MedusaX.
Advantages of adopting open source software	Considerable savings in costs on numerous aspects such as licenses, training and documentation.
Concerns in adopting open source software	The level of functionality that it would be able to provide in an environment almost completely based on proprietary software.
Is there a need to use open source software?	In many schools it is the only alternative as the computers are not compatible with the requirements of other non-free and non-open source operating system hardware. In the remainder of cases, it aims to offer an alternative to proprietary systems.
Legal problems	None identified.
Willingness of participants to engage in its use	Neutral reception in public administrations which has improved with the functions and reliability that the distribution has subsequently demonstrated.
Companies' attitude	Very good, above all in small companies that now have the possibility of competing with other larger companies by offering the same products, services and support.
Legal knowledge of open source software in companies and administrations	Advice is available from a firm of lawyers specialising in licensing matters.

8.1.12. Table A.12. MAX project case study data sheet

General data	
Project name	MAX project
Autonomous region	Madrid.
Public administration	Ministry of Education of the Autonomous Region of Madrid.
Prior experience with open source software	No existing Linux distributions focussed on education.

Specific project data	
Application environment	Creation of a free open source operating system aimed at teaching staff and the educational system of the Autonomous Region.
Advantages of adopting open source software	Based on a GNU/Linux distribution like Debian, with the support of a large community, means that focus can be solely aimed at the tasks of adaptation, customisation and training.
Concerns in adopting open source software	Need to overcome some reluctance by users and experts who are already accustomed to working in a proprietary software environment.
Is there a need to use open source software?	Yes, given that its intention was to offer an open source alternative to other proprietary environments for educational centres in the region.
Legal problems	None identified.
Willingness of participants to engage in its use	After overcoming initial reluctance in some sectors, the reception has been favourable as has the degree of satisfaction by the participants.
Companies' attitude	They have responded very well to the offers made through public tenders.
Legal knowledge of open source software in companies and administrations	Advice is available from a firm of lawyers specialising in licensing matters.

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8.1.13. Table A.13. SOLIME and Melinux projects case study data sheet

General data	
Project name	SOLIME and Melinux projects
Autonomous region	Melilla.
Public administration	Government of the Autonomous City of Melilla.
Prior experience with open source software	No previous initiative in Melilla.
Specific project data	
Application environment	Line of activity to promote the use of new technologies within the Autonomous City of Melilla, for both the general public and companies.
Advantages of adopting open source software	Peace of mind that there will be no license problems with the use of software and also the possibility of modifying the programmes and changes made in OpenBravo and Claroline.
Concerns in adopting open source software	Solving possible hardware compatibility problems, given the high heterogeneity of the target terminal group, as distribution was aimed at the general public. Also, great efforts involved to offer an attractive alternative to users who, on purchasing their computer, had already paid for a proprietary operating system license.
Is there a need to use open source software?	Yes, given that the aim was to offer an open source alternative to other operating systems.
Legal problems	None identified.
Willingness of participants to engage in its use	To be able to show how it is a more attractive option for the public.
Companies' attitude	No data has been provided on the reception by companies.
Legal knowledge of open source software in companies and administrations	No specific activities have been indicated with regards to legal and licensing matters.

8.1.14. Table A.14. GvSIG case study data sheet

General data	
Project name	gvSIG
Autonomous region	Region of Valencia.
Public administration	Organisation and IT Service of the Autonomous Government of Valencia.
Prior experience with open source software	This is the region's first trial of open source software in the SIG applications environment. Other projects such as Lliurex have previously existed.

Specific project data	
Application environment	Project to develop a tool (SIG desktop client) focussed on the management of Geographical Information integrating local and remote (Internet) data.
Advantages of adopting open source software	Technological independence, as well as economic reasons, optimisation of the investment and greater security and integrity in their IT Systems. Also having independence when deciding on how to develop their IT systems.
Concerns in adopting open source software	Few: use of this model was very clear from the start.
Is there a need to use open source software?	Yes, given that the intention was to specifically create a free, open source solution in this sector.
Legal problems	None identified.
Willingness of participants to engage in its use	Sometimes reluctance was rooted in the IT staff, for fear of change. This was the only problem that had to be suitably dealt with. Resistance by civil service users has been practically non-existent.
Companies' attitude	Some companies and universities were very reluctant to release their software in the first months. Now the advantages of this model are clear, and the companies have no problem in releasing their code.
Legal knowledge of open source software in companies and administrations	Everything developed under GNU GPL license has been released.

8.1.15. Table A.15. JAVATO case study data sheet

General data	
Project name	JAVATO
Autonomous region	Autonomous Region of Murcia.
Public administration	Directorate-General of IT of the Autonomous Region.
Prior experience with open source software	This is the first corporate initiative in the environment of applications development.

Specific project data	
Application environment	Software development teams for the Autonomous Administration (in both corporate projects as well as departmental).
Advantages of adopting open source software	Knowledge of the technologies used by any possible licensor.
Concerns in adopting open source software	To provide companies in the sector with stable technology and sufficient knowledge.
Is there a need to use open source software?	More than a need, it is an opportunity to improve by contributing to competence between providers, as there is no dependence on a proprietary development tool.
Legal problems	Necessity to publish the development made for the framework under open source license (possibly GPL or LGPL).
Willingness of participants to engage in its use	High, because of the technological innovation that underlies the project.
Companies' attitude	No formal study has been made, but it is perceived as good.
Legal knowledge of open source software in companies and administrations	All those developed under GNU GPL have been released.

8.1.16. Table A.16. Free and Open Source Software in Education in Navarre case study data sheet

General data	
Project name	Free and Open Source Software in Education in Navarre
Autonomous region	Navarre.
Public administration	Infrastructure service
Prior experience with open source software	No previous experiences.

Specific project data	
Application environment	Educational network in the Autonomous Region of Navarre.
Advantages of adopting open source software	The main advantage has been the savings in implementation costs.
Concerns in adopting open source software	To be able to use the same tools and features as with proprietary software packages.
Is there a need to use open source software?	Not especially, but it is a highly attractive option for this environment, not only due to cost-related advantages, but also due to the promotion of Free and Open Source Software in the educational environment.
Legal problems	None detected.
Willingness of participants to engage in its use	Very good. A high level of participation has been noticed from both technical staff in charge of setup and maintenance as well as end-users in educational centres.
Companies' attitude	No problem in providing the necessary computer packages, or quickly adapting the computers to make them compatible with the software and operating system requirements.
Legal knowledge of open source software in companies and administrations	All those developed have been released under GNU GPL license.

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In the specific environment of public administrations, **open source software** is one of the technologies that is undergoing the greatest development, as is demonstrated by the fact that currently the larger part of the autonomous regional governments in Spain have technology strategies based on this type of software and they are developing their own applications and distributions based on open standards.

For this reason, together with CENATIC (National Competency Centre for the Application of Open Source Technologies) and all the institutions and organisations that form part of its board of management, we have taken the decision to create the **National Observatory for Open Source Software**.

Its main mission is the monitoring, capture, synthesis and systemisation of all the data from the open source software sector in Spain and to convert this into knowledge, through institutional cooperation and collaboration with all public administrations, universities and R+D+i centres, companies, educational groups, communities of developers, private users and the public in general.

As a public presentation of its work, the National Observatory for Open Source Software offers this open report to all those interested, under the title **"Open Source Software for the Development of the Spanish Public Administration. An Overview"**. To date, no study exists that fully shows the degree of implementation of such software in the public administration, and which offers, from the knowledge gained, a series of support recommendations to help establish directives and decision-making with respect to the adoption of open source software in a public environment.

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