

POLICY RECOMMENDATIONS FOR FREE AND OPEN SOURCE SOFTWARE USAGE BY PUBLIC ADMINISTRATORS*

Christos Bouras^{1,2}, Anestis Filopoulos³, Vasileios Kokkinos^{1,2}, Sotiris Michalopoulos¹,
Dimitris Papadopoulos³ and Georgia Tseliou^{1,2}

¹*Computer Technology Institute & Press “Diophantus”*

²*Computer Engineering and Informatics Department, University of Patras*

³*PROMEIA/Hellenic Society for the Promotion of Research and Development Methodologies
D. Maritsas Building, N. Kazantzaki str., University of Patras Campus, GR-26504 Rion, Greece*

ABSTRACT

Free and open source software, holding a strategic position in knowledge economy, reaffirms the critical role of governments and regional authorities in establishing strategies for integrating effective and sustainable Information Technology solutions in the public sector towards economic growth and social welfare. Moreover, public services, organisations and territorial administrations collectively represent a major software user with great impact on the software market. In this sense, software selection in the public sector is not a neutral process but highly political and strategic one; various collateral implications and policy aspects should be considered in order to reach the best possible decisions. Within this context, this paper provides policy recommendations on issues and challenges pertaining to the use of free and open source software by European public administrations. The recommended policy actions are mainly based on review of the current policy framework. Main goal of this paper is to contribute in providing policy orientations and proposed actions that can help governments, public administrations and European institutions fully harvest the benefits of open source.

KEYWORDS

Open source software; proprietary software; public administration; guidelines; policy recommendations;

1. INTRODUCTION

Public administrations (PAs) have the mission of best allocating available resources in a socially responsible, transparent and economically efficient manner. Free and Open Source software (FOSS) offers public stakeholders a set of cost-effective, re-usable tools and resources that can give impetus to innovation, entrepreneurship and economic growth. Despite different approaches or variations, the terms “free” and “open source” software are used interchangeably throughout this paper to refer to software that is developed as a public resource, based on non-excludable, non-rival use rights and properties. Moreover, the term “FOSS policy” is used in this work to describe policy measures, actions and implementation plans with regard to the assessment, use and adoption of FOSS by governments and PAs. A “FOSS policy” may either refer to an official policy document or to a set of actions and initiatives undertaken by various public stakeholders. Finally, the term “public procurement” refers to the process used by governmental bodies, national agencies, regional and local authorities and PAs to buy products and supplies, services and public works.

Regional authorities and PAs could valorise the FOSS potential on bottom-up approach by fully integrating FOSS solutions in their regional development planning, internal administrative processes and educational networks. On a local or regional level a faster penetration and sustainable use of FOSS can be achieved by clearly outlining needs and wants through public procurement and by directly engaging local communities in FOSS environments. National governments should support PAs in using FOSS in effective and sustainable ways providing guidance, resources and reusable software tools and components through national reference centres and repositories. They should also establish clear legal and institutional frameworks to eliminate software discrimination in public tenders and monitor the implementation of certain

*Work supported by the ERDF - EU National funded Interregional Cooperation Programme (INTERREG IVC) under contract number 0918R2 (project: OSEPA - Open Source software usage by European Public Administrations)

principles and requirements such as openness, reusability and interoperability of data, software and systems in full compliance with the European frameworks and guidelines. On a European Union (EU)-wide level, there should be more straight forward policies for the implementation of defined requirements and specifications on openness, reusability and interoperability combined with the coordination and fine-tuning of the national strategies of the member states. The European software strategy as articulated through official policy documents should be constantly updated or revised where needed in order to reflect software market realities, industry driven achievements and public stakeholder needs.

Within this context, this paper outlines the current policy framework and proposes certain policy actions that can enable policy makers to better assess FOSS as a strategic choice offering competitive advantages for the public sector. It is specifically aimed at policy makers, Information Technology (IT) managers and heads of procurement departments in governments and PAs and social economy actors and institutions.

The remainder of this paper is structured as follows: In Section 2 the main policy issues and aspects relating to the use of FOSS in the public sector are presented. Section 3 provides a review of the current policy framework relating to FOSS within the EU context; while Section 4 proposes certain policy measures and actions in assessing, adopting and further integrating FOSS in public IT infrastructures. Finally, in Section 5 our conclusions and some proposals for future work are drawn up.

2. FOSS POLICY ISSUES

FOSS is one of the main drivers of the software market with a remarkable growth and increasing share. This is verified by several studies, such as (Ghosh, 2006) and (Giron et al., 2009). Therefore, there is a need for coherent, up-to-date policies that address the various aspects of FOSS in the public sector. Policy making and implementation relating to FOSS in the public sector covers a wide range of areas and objectives: open access and e-inclusion requirements, fair market competition and non-discrimination in software procurement, standardisation and interoperability frameworks, research and development funding, IT security. Several national or EU policies relating to these issues have been defined in the last years and are constantly revised and updated to meet current development in the European software market and industry.

Based not only on their institutional status and mission, but also on their position in the software market environment, governments and PAs have a critical role to play in terms of software supply in general and FOSS use and penetration in particular. Depending on their scale, organisational profile and the specialised administrative and operational tasks they have to undertake, public organisations often seek custom developed IT services and software solutions that can be tailored to their specific needs and that they are often shared and identifiable between different departments and organisations. FOSS, allowing for maximum customisation and re-use, brings certain advantages that need to be assessed on a wider, IT policy level. Moreover, due to their public service orientation, public agencies and administrations have also to reinforce and themselves comply with certain principles and requirements such as open access and availability of public data, transparency in public funding and spending, fair market competition and accountability to citizens. Due to its features as a public good with non-rival use rights, FOSS directly relates to these policy objectives as a potential enabler pertaining to societal, economic and strategic aspects.

Openness and “e-Inclusion” refer to the indiscriminate, unhindered access of all citizens to public information and e-government services. Government departments and PAs are obliged to facilitate the access of citizens to public data and to support information exchange mainly through the adoption of open platforms, standards and technologies. It has been argued that the citizen’s right to information goes as far as scrutinising the procedures under which information was generated and processed. In this sense, software should also be well documented in all its technical features and adopted through open and transparent procurement and selection procedures in order to promote competition fairness, public information accessibility and accountability. Furthermore, one of the most critical aspects and a strong motivation driver for PAs when opting for FOSS is that of cost cutting in terms of software licence purchasing. FOSS, based on a free use and distribution licensing model can help PAs significantly reduce the cost of acquiring software. FOSS, however, should not be considered as cost-free and decision making for public spending should refer to all associated, direct or indirect costs (e.g. service subscriptions and licence agreements, required upgrades and extensions, technical support, training and maintenance fees). Finally, avoiding data and vendor lock-ins is a critical strategic priority for any public organisation planning to acquire IT systems and applications. Not

heavily relying on external providers for data security and not being tied up to specific software products and vendors are two key factors for national governments and PAs wishing to maintain a certain level of independence. Such independence can be achieved in more than one ways combining both open source and proprietary features. FOSS, however, provides a higher level of control and flexibility over software thus offering a potential advantage in terms of technological independence.

3. FOSS POLICY FRAMEWORK

Legal and institutional frameworks regulating software policies and practices touch upon a wide range of implementation levels and areas. Three main implementation levels are defined and used in this paper in order to describe policies and policy makers: the *Local / regional level* (municipalities, local governments and regional authorities), the *National level* (national governments, agencies and associations, parliaments, legislative bodies) and the *EU-wide level* (the European Commission, the European Council, the European Parliament, European agencies and observatories).

In the EU context, the principle of subsidiary requires that political decision making is made on the lowest possible administrative and political level. EU legislation can only occur in areas that have not been (or have been inadequately) addressed by regional or national policies implemented by Member States. Within this framework, there are several national legislative acts, EU Directives, European Commission Communications, government action plans, frameworks and guidelines that regulate software use and acquisition in the public sector. Fewer official documents address open source as a policy issue.

For the purposes of this paper five policy implementation areas that relate to FOSS have been defined, as depicted in Figure 1: *Data openness and reusability* (policies on the openness and accessibility of data and public sector information, strategies for the interoperability of e-government services and the reusability of software solutions and components in the public sector), *Licensing, procurement and software market policies* (policies for software licensing and procurement, rules and procedures for public tenders, fair market competition), *FOSS adoption, integration and sustainability* (policies on assessing, adopting and integrating FOSS as a sustainable solution), *Research and innovation* (policies for investing in open source Research and Develop (R&D) as a means to support innovation, entrepreneurship and regional development) and *Training and education* (policies for the educational use of FOSS and its integration in learning environments).

Some of the most recent key policy initiatives that also relate to certain aspects of FOSS are the Public Sector Information Directive 2003/98/EC, the Public Procurement Directive 2004/18/EC, the European Interoperability Framework, the Commission Communication on “Interoperability for Pan-European eGovernment Services”, the Lisbon Ministerial Declaration, the i2010 initiative, the Commission Communication on the “European Interoperability Strategy” and the “European Interoperability Framework”, and the Commission Communication: a Digital Agenda for Europe (The European Commission, 2010). With the exception of EU Directives that have been transposed to national legislative acts and therefore acquired a mandatory status, most of these policy documents have an advisory status to national governments and PAs.

The same applies for the National Interoperability Frameworks (NIFs) that have been developed in most Member States as a response to the European Interoperability Framework (EIF). According to the 2009 Overview of the National Interoperability Framework Observatory (NIFO), 13 countries out of the EU27 have published their own NIFs while several more are in progress (IDABC, 2009). There are, however, cases of national strategies, government action plans and policy documents that specifically refer to open source as a policy issue. Some of the most recent examples have presented in Denmark (The National IT and Telecom Agency, 2009), UK (The Cabinet Office, 2009), Spain (Cenatic: National Observatory of Open Source Software, 2008) and Netherlands (The Ministry of Economic Affairs, 2007).



Figure 1. FOSS policy areas

4. FOSS POLICY RECOMMENDATIONS

This section provides policy recommendations on aspects and issues pertaining to the assessment, adoption and integration of FOSS by European PAs. Based on the current policy framework, review and analysis, twenty five recommendations have been proposed, grouped in five broad FOSS policy areas (Figure 2) as defined in the previous section.

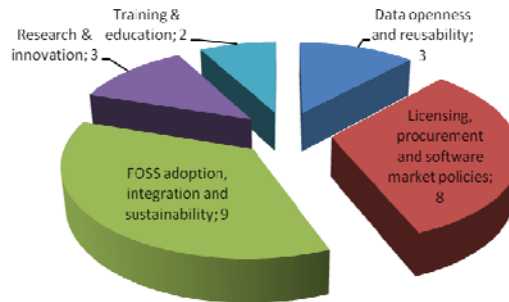


Figure 2. Proposed actions by policy area

4.1 Data Openness and Reusability

4.1.1 Using Open Standards on a “Comply or Explain” Basis

PAs are urged to opt for the highest possible level of openness whether using FOSS or proprietary systems and applications. In cases where required open standards are not available, thus opting for less open alternatives, PAs should provide sound justification for non-compliance. This approach has been adopted by the Dutch Government as the “comply or explain” policy. In any case, a compliance policy for open standards should consider all available platforms and technologies that could support the implementation of such standards also providing justification for all decisions made.

4.1.2 Fine-tuning Interoperability Strategies

The interoperability of software-based public services through the use of open standards and platforms has been defined as a high level strategic priority in the EU (ISA, The European Commission, 2010). Several NIFs have been developed and published in response to this objective. This has posed, however, a risk of fragmentation and lack of homogeneity as not all NIFs are fully aligned with the revised EIF. This risk needs to be addressed through coordination and monitoring mechanisms on an EU level (e.g. the NIFO) in order to compare, analyse and assess the national interoperability strategies. Policy initiatives should also be undertaken by national governments in order to make sure that NIFs are fully compliant with the revised EIF.

4.1.3 Defining Monitoring and Support Mechanisms for Openness and Reusability

Mechanisms that could work as support centres for the sharing and reuse of FOSS solutions should be developed or further supported on a national or regional level in order to make sure that open standard and reusability requirements are clearly defined and are fully implemented across the public sector. National or regional authorities should also provide a knowledge basis and support resources for making standards, available options and technologies clear and accessible to all stakeholders.

4.2 Licensing, Procurement and Software Market Policies

4.2.1 Defining a Clear Licensing Policy

Governments and PAs should define needs, requirements and the desired level of control over software based on which they should specify the selection criteria of software licences. A software licence adoption policy could be based on a number of criteria, such as the unlimited access to source code and unlimited usage of the software, the right to reproduce and distribute an unlimited amount of copies, the right to modify the

software and redistribute the modified software under the same license restrictions. Understanding licensing schemes should be treated as equally important as the acquisition of software itself.

4.2.2 Developing Common Licensing Policies across the Public Sector

PAs with shared objectives and similar organisational needs should jointly develop “one to serve all” licensing policies for software. In this way they could strongly put forward common wants and needs on software and develop a shared knowledge basis on licensing issues as a firm, common ground for selecting best value-for-money solutions.

4.2.3 Monitoring Tenders for Software Discrimination Practices

According to the last Open Forum Europe procurement monitoring report (Open Forum Europe, 2011), a 13% out of the monitored public tenders made an explicit reference to a proprietary software trademark, thus excluding FOSS or proprietary alternatives. In order to ensure fair market competition and transparency, public tenders should be monitored for discrimination factors and practices. Public procurement officials and decision-makers have to take a series of measures in opening up procurement procedures to all providers.

4.2.4 Updating Procurement Frameworks and Procedures

Governments and PAs should update or adjust, where needed, foreseen requirements and procedures for software procurement and public tenders, in order to both meet changing organisational needs and reflect the dynamics of the rapidly growing software market. By keeping software procurement frameworks and procedures up-to-date, PAs can make sure that their current needs and wants are properly reflected and possible entry barriers for emergent technologies or innovative software products would be removed.

4.2.5 An “Equal Consideration” Policy: Balancing Needs and Options

Governments and PAs should balance between serving their own wants and needs and discriminating against specific products and alternatives when opting for a specific solution. The needs, requirements or specifications should be reflected and defined in the form of technical requirements, desired functionalities or additional services. Therefore, PAs should consider both FOSS and proprietary solutions on an “equal footing”, based on competitive advantages and desired features. An “equal consideration” policy based on a fair treatment is likely to increase market offerings and available options.

4.2.6 Requiring Compliance with Interoperability Frameworks in Public Tenders

PAs should include open standards and interoperability requirements in tenders in a clear and justified way. They should specify, for example, that standards, interfaces, protocols or file formats implemented must meet the open standard requirements. Some basic open standard properties that can be defined are standards that can be delivered by all suppliers and equivalent technologies, standards that are developed and documented following open, transparent procedures and standards without restrictions regarding their re-use.

4.2.7 Setting a “Re-Use Instead of Re-Build” Priority in Public Tenders

According to the EIF, PAs “*are encouraged to reuse and share solutions and to cooperate on the development of joint solutions when implementing European public services*” (ISA, The European Commission, 2010). They are also urged to “*develop a component-based service model, allowing the establishment of European public services by reusing, as much as possible, existing service components*”. Following the requirement for sharing and reusing software solutions, PAs should include clear specifications and criteria for the reusability of software components in public tenders.

4.2.8 Developing Joint Procurement Policies in Fulfillment of Shared Priorities

PAs are strongly urged to form stakeholder networks and develop common procurement policies to fulfill joint needs and to benefit from fair and increased market competition. PAs with similar organisation needs should work together in defining shared procurement requirements and software selection criteria that could increase offering of FOSS solutions. PAs have a lot to gain from joining forces with peers in procuring FOSS. FOSS has not yet reached its full potential in public procurement and therefore public organisations should keep providing guidelines and information resources on open source procurement policies through dedicated stakeholder networks, groups and consortia.

4.3 FOSS Adoption, Integration and Sustainability

4.3.1 Developing FOSS Adoption Plans as Part of Wider IT Strategies

Planning a wider strategy for FOSS adoption and sustainability should include estimated risks and clearly set objectives, foreseen costs and expected benefits. A FOSS adoption plan should also be adjusted to the scale, IT architecture and organisational profile of the public organisation it is developed for. Offered solutions should be reviewed in the light of available human and technical resources, existing software systems and applications, targeted end-users and overall organisational needs.

4.3.2 Allowing for Diversity in Open-Standard Software Environments

In order to ensure IT sustainability and flexibility, PAs should allow for diversity in open standard-based software environments in which they can fulfill their needs in terms of operational tasks, software functionalities and interoperable services. PA managers and staff should be able to serve internal needs and processes through different software components or environments under a common open standard principle.

4.3.3 Adapting Internal Processes to Open Source Environments

The integration of FOSS systems and application in public IT infrastructures often fails due to the fact that PAs are unable to cope with the features and requirements of FOSS operating environments. Lack of training and awareness and the incompatibility of internal processes and operational tasks with adopted solutions significantly raise failure risks. PAs should be able to integrate not just proprietary but also FOSS systems in their IT architectures and organisational structure. Internal processes and operational tasks should be adjustable both to the proprietary and FOSS models for software development and support.

4.3.4 Clarifying the Legal and Institutional Framework

When adopting or migrating to FOSS solutions, PAs are often involved in time consuming and burdensome bureaucratic processes that can hinder or delay implementation. A large scale FOSS migration project may involve several units, departments or agencies in terms of jurisdiction. This raises a need for policies that can simplify processes for integrating FOSS. Therefore, national or local governments should provide coherent and updated legal and institutional frameworks for FOSS development licensing and adoption in the public sector. Moreover, the legal requirements and the responsibilities of all organisations involved in IT policy planning and software procurement should be clearly defined and known to all stakeholders.

4.3.5 Providing Guidance and Support to Small and Medium Size Organisations

National governments, central agencies and regional administrative centres should provide guidance and support to small and medium organisations considering FOSS adoption plans and migration projects. Such a support should not restrict to funding but it should also include the specification of standards and requirements, guidelines, documentation and knowledge resources, consensus building and stakeholder motivation. Joint initiatives and collaborations under an “umbrella” agency can attract more potential adopters and increase the transferability of best practices between small scale organisations.

4.3.6 Involving Staff through FOSS Training and Awareness

FOSS migration projects often fail due to limited involvement of staff and users. Motivating and involving a large number of staff or even an entire organisation in integrating a FOSS solution is the best way to ensure that end-users are going to actively participate and keep on using the systems or applications introduced. Therefore, PAs are urged to plan actions and initiatives for raising awareness and training their staff in FOSS systems and applications as a critical aspect for the effectiveness of their open source policies.

4.3.7 Beyond Cost Analysis: Defining a FOSS Assessment Policy

Governments and PAs should develop a full assessment policy for adopted FOSS solutions considering both costs and long-term benefits. Evaluating a FOSS project through predefined standards and criteria (e.g. technological maturity and reliability, total amount of cost savings) and by getting both internal feedback and -if possible- external expert opinions is the best way to make sure that all identified risks and weaknesses will be addressed and benefits will have a long-term impact within the organisation.

4.3.8 Integrating FOSS as a Vehicle for Regional Development

A well planned, large scale migration of public services and IT infrastructures to FOSS, if combined with motivation drivers for staff, citizens and businesses can be a key factor for regional growth and development. Therefore, local governments and regional authorities should assess FOSS as an enabling factor that can open up opportunities and valorise local strengths as part of wider Information and Communications Technology (ICT) based strategies for regional development.

4.3.9 Supporting Public Organisations as Potential FOSS Producers

As clearly stated in the EIF, European PAs are strongly encouraged to develop component-based service models, and to share and re-use software solutions as much as possible. Based on this recommendation, PAs should be given support, not only on a policy level but also in terms of legal guidance, funding, resources and practical guidelines in order to be able to become themselves FOSS producers and providers, and therefore contribute to open source code quality and supply of reliable FOSS solutions.

4.4 Research and Innovation

4.4.1 Investing in FOSS Research and Development

Europe has a wide and active base of FOSS knowledge centres. Nevertheless, it still fails, to a great extent, to turn this advantage to large scale, commercialised FOSS projects and successful FOSS-based business strategies. The EU, in close collaboration with Member States and regional stakeholders should orientate R&D policies towards promoting FOSS development and entrepreneurship by investing in public-private partnerships, regional research clusters and innovation hubs. This can not only boost regional economy but also help improve Europe's strategic position in the software industry.

4.4.2 Revising the EU Software Standardisation Strategy

As stated in a report for "European Software Strategy" (The European Commission, 2009), the Commission should: "*recognise the prominent role of industry fora and consortia in developing standards within the software market and take appropriate action*". Based on the above, the EU policy on software standardisation should be revised based on: a clear and detailed mapping of the standardisation needs of public stakeholders, the need for openness of standards in the public sector and an acknowledgement of standards developed by standardisation consortia and the industry. Moreover, it should be revised combined with initiatives for widening the European FOSS development base as a way to improve and speed up standard adoption mechanisms.

4.4.3 Investing in Innovative Software Products and Solutions

FOSS is expected to have an increased market penetration in the following years based on its features and on emerging technologies and new software delivery models such as Software-as-a-Service. This trend raises a need of adapting open source policies to the changing software environment. PAs, national governments and the EU should meet the challenges raised by this new environment by investing in FOSS as a key enabler of internet based software services. In this way, they could reap the benefits of the further growth and penetration of FOSS in the software market and develop innovative, cost effective software solutions.

4.5 Training and Education

4.5.1 Integrating FOSS as a Means to Increase ICT Skills and e-Inclusion

FOSS based itself on skill developing, learning and experimentation has a great potential as a training toolset. The skill setting value of FOSS has been acknowledged long ago by employers that are willing to recruit developers with an open source "exposure" background. Such a training value comes at significantly low cost and therefore it can be capitalised to increase digital literacy and professional IT skills for both staff and citizens (Ghosh et al., 2002). Governments and PAs are urged to develop programmes and initiatives on FOSS training for staff and citizens through their capacities and infrastructures. The EU should also fund and actively support FOSS training as means to address its deficit in ICT skills and digital literacy.

4.5.2 Integrating FOSS in the Educational System on a Regional / National Level

Apart from providing itself a training tool for ICT skills, FOSS can offer low cost, stimulating learning environments through educational platforms and applications. On certain occasions FOSS penetration is faster and higher within the IT infrastructures of educational units and departments compared to other public sector sections. Governments and PAs are urged to introduce or further integrate FOSS-based learning tools and environments in their educational systems and infrastructures.

5. CONCLUSIONS AND FUTURE WORK

The use, adoption and integration of FOSS in the IT infrastructures of European governments and PAs has not always moved towards the same direction. Legal and institutional frameworks, social and economic and technological aspects are some of the differentiating factors that explain gaps on the awareness and penetration level of FOSS. FOSS can provide new business opportunities, save costs, and contribute to the development of ICT skills and e-inclusion in Europe if reaching its full potential. Europe should shape a software strategy that could best capitalise on the FOSS capacities of its businesses, knowledge institutions and developer communities. Such a strategy cannot be effective if not reflecting the needs and experiences of European regions, local communities and PAs. To this direction, this paper provided policy recommendations on issues and challenges pertaining to the use and adoption of FOSS by European PAs.

Motivated by the fact that procurement procedures take up a great part of a public organisation's budget, operational activities and administrative processes (and they also have to be conducted under certain rules and specifications) our intention as a future work is to provide a concise guide on FOSS procurement for PAs to be used in addition to any existing national or EU guidelines and regulations. This work will outline the legal context of software procurement and highlight good practices and recommended actions for PAs.

REFERENCES

- Ghosh, R. A., 2006. "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", Final report (European Commission, November 20, 2006). UNU-MERIT.
- Giron F. et al., 2009. "Economic and Social Impact of Software & Software-Based Services. D2. The European Software Industry". Pierre Audoin Consultants (PAC).
- The European Commission, 2010. "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: "A Digital Agenda for Europe"".
- IDABC, National Interoperability Framework Observatory, 2009. "Overview of the National Interoperability Frameworks".
- The National IT and Telecom Agency, 2009. "Open Source Software and the Public Sector", Denmark.
- The Cabinet Office, 2009. "Open Source, Open Standards and ReUse: Government Action Plan", UK.
- Cenatic: National Observatory of Open Source Software, 2008. "Open Source Software for the Development of the Spanish Public Administration. An overview", Spain.
- The Ministry of Economic Affairs, 2007. "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", The Netherlands.
- ISA, The European Commission, 2010. "European Interoperability Framework for European public services. Annex 2 to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions "Towards interoperability for European public services"".
- Open Forum Europe, 2011. "OFE Procurement Monitoring Report: EU Member States practice of referring to specific trademarks when procuring for Computer Software Packages and Information Systems between the months of February and April 2010".
- The European Commission, 2009. "Playing to win in the new software market. Software 2.0: winning for Europe. Report of an industry expert group on a European Software Strategy".
- Ghosh, R. A. et al., 2002. "Free/Libre and Open Source Software: Survey and Study. Part 2B: Open Source Software in the Public Sector: Policy within the European Union", International Institute of Infonomics University of Maastricht, The Netherlands.