



Free and open source software

Appendixes:

1. Extensive survey
2. Assignment description
3. National market survey



STATSKONTORET

The Swedish Agency for Public Management

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1 Summary

Free and open source software gives the user the freedom to use, copy, distribute, examine, change and improve the software. These rights are stipulated in licenses. Development takes place within the form of projects, and those who participate are mostly professional software developers who either take part on paid time with the permission of their employer, or on their own time. Many large suppliers (IBM, HP, Sun, etc) use free and open source software in their own products and solutions and also contribute with their own resources in the various projects.

Free and open source software entails a new kind of competition, separated from that of traditional business in that the product generally is not owned by any single company and therefore cannot be purchased of the market. Furthermore, the software itself is not constricted by any cost or fee. It can be obtained free of charge on the Internet.

The conclusion of the working group is that free and open source software in many ways, both functionally and qualitatively, is quite equivalent to – or better than – proprietary products. Free and open source software should therefore be judged on an even par with proprietary software in a procurement process in order to establish better market competition. It is also necessary to place demands on open standards and file formats in order to achieve interoperability between different systems.

Proprietary software is mainly sold nowadays without any guarantees, and producers exclude responsibility for, more or less, all errors and bugs in the product. The producer dictates conditions for changes and corrections, and the lifetime of a product is usually short before new versions are released. If the software producer goes out of business, all development and support disappear and the user has to look for alternative solutions. With free and open source software these dependencies can be avoided.

The concept of free and open source software has existed for almost twenty years, and Linux has been around for about ten. Many of today's Internet functions are almost completely based on free and open source software, functions such as e-mail and the translation of computer names to IP addresses, i.e. DNS. More than 65% of all web servers on the Internet are based on open source software.

CONCLUSION

Open standards and formats along with free and open source software are important factors in order to be able to arrive at:

- increased competitiveness
- improved interoperability
- reduced costs

for administration in the public sector.

Free and open source software is not any makeshift phenomenon, but instead a fully adequate and dependable competitor to existing proprietary products and solutions.

It is as recent as the last two years that the public sector in Europe has become interested in free and open source software. The European Commission has released several reports and open source software has been the subject of interest in many different ways. In Europe, Germany is the country that has the highest rate of open source software usage, whereas in Sweden, the area of public administration is oftentimes called "Microsoft country". However, there are several suppliers, which enjoy a dominating position within their respective product areas.

Public administration in all Nordic countries takes an active interest in questions surrounding open source software in a number of ways. In Finland, the Ministry of Finance, together with six other federal agencies, evaluated open source office suite OpenOffice. Work in Denmark is presently being undertaken in order to develop a strategy for the use of open source software in public administration. The Danish Technology Board (*Teknologirådet*) recently presented a report, dealing with the effects of usage of open source software. The report points at a possible yearly savings of up to €500 million within a short period of time (four years). Iceland is an example of a small language area and is strongly dependent on individual suppliers. One example can be found in the leading office software on the market. This software is not localized for the Icelandic market.

The purpose of this study is to describe free and open source software and to offer suggestions for further work and measures. Is it possible to stimulate competition and counteract "locking-in" effects of vendor dependency by using free and open source software? Can open source software lead to cost-cutting, even for public administration in Sweden?

An important step in the on-going process will be to arrive at a comprehensive action plan for gaining practical experience in free and open source software. The plan should contain a detailed outline for continued work and include the following:

- Pilot scheme - pilot tests
- Procurement policy and blanket agreement
- Distribution of information
- The definition of open standards and formats, especially document formats
- Model for migrating agency-developed software to open source software
- Review of the legal aspects concerning licenses for open source software.

The Swedish Agency for Public Management (Statskontoret) has initiated the feasibility study presented here. The target group is first and foremost IT and operational management within the area of public administration in Sweden along with this agency (Statskontoret). An informative part of the report has a more general approach. Statskontoret is also the receiver of the report, partly as a procurer of ICT products and services of the public sector and partly in the supportive role in the development of 24/7 agencies within Swedish e-government.

2 Introduction

There is a great interest in open source software. Prospective purchasers all over the world find themselves in a situation much like that which we see in Swedish public administration, and developing countries cannot afford to buy software at the current price levels of the major suppliers. In many countries, priority is instead given to resources for developing an IT infrastructure and for creating electronic services for citizens.

2.1 Background and purpose

Statskontoret has initiated this assignment, which is a feasibility study. Its purpose is to provide a basis for continued discussion, information input and potential standpoints concerning how public administration should view and what position it should take relating to this type of software (see description of assignment, appendix 2).

In the background are among other things the fact that the market for IT software in Sweden is dominated by a small number of players and also the fact that there are inadequacies in market competition. One result is high costs for customers. In many cases, suppliers have created various supplier-specific functions in the software, and the possibility – at least in a short term – for a customer to change to an alternative product, is thereby made difficult.

Competing products, available with similar conditions, do not suffice to break this supplier dependency. Instead there is a need for other ways of attacking the problem. One such way is to promote products, which are built on open standards and formats along with open source software. In this way we can create conditions for a greater freedom of choice.

Important aspects are the availability of open formats, standards and open source code, but also portability and the ability to be able to use products on different platforms.

2.2 Outline of the report

The report consists of a main document – whose purpose is to give a concise view of the area of free and open source software and a summary of proposed recommendations, appendix 1 which contains an extensive survey, appendix 2 which contains the report assignment description and appendix 3, which contains a national overview of the market for free and open source software.

In order to make it easier to find information in appendix 1, it has been compiled with more or less the same headings and disposition as chapter 3 in the main document.

Appendix 1 begins with a short retrospective view along with an introduction to the area of free and open source software together with information surrounding terminology and licenses. Also there are examples of products and vendors.

The chapter on business intelligence offers information on activities with the European Union, the Nordic countries and other countries in Europe and the rest of the world. The chapter is intended to give a perspective on how open source software is viewed in different parts of the world and also as a source of ideas for both the use and usefulness of open source software. This following section after this is about the current situation within public administration in Sweden.

The central issue on why one should use open source software including both its strong and weak points, examples of successful open software products and a short summary of security aspects are included in section 4 in Appendix 1. Views on the use of open source software, the current market situation and how to find the right product, along with a discussion on the need for support and other services can be found in section 7.

The areas most probably important to focus on, i.e. open formats and standards along with the effects of "locking-in" are to be found in sections 5 and 6.

In section 8 the financial and legal aspects of open source software are discussed. An example given here is from a Danish report on the effects of migration to open source software. Also included is information on business models and legal aspects of licenses.

Section 9 in Appendix 1 is a digest of suggestions for further work. The last part of the appendix includes a bibliography.

2.3 Working group

The work has been carried out in a working group with representatives from the following agencies and authorities:

Swedish National Labour Market Administration: Lennart Ignell, Hakan Roslund, Mats Lindfors
Swedish Armed Forces: Allan Hedin
University of Linköping: Joakim Bjorklund
Swedish Environmental Protection Agency: Ebbe Kvist
Region of Western Gotaland,: Carl-Eric Jonsson
National Police Board: Roland Røhdén
Swedish National Tax Board: Torbjorn Lundmark, Arvid Welin
National Veterinary Institute of Sweden: Staffan Tamm
Stockholm County Council: Torsten Rehn
Swedish National Road Administration: Sten Erik Svensson

Furthermore:

Statskontoret: Irene Andersson, project manager
Sentensia Q: Tommy Laurell, project administrator and editor

2.3.1 Working methods

The gathering of information and materials has taken place through the study of reports, government commission inquiries and other types of information (see bibliography), meetings, and discussions with various participants at conferences and seminars.

During the course of this study we have met with representatives from:

- Free Software Foundation Europe: Jonas Oberg.
- HP: Nicklas Carlsson, enterprise account manager, Magnus Wetterberg, sales specialist, & Jakob Odman, category manager (all formerly from Compaq).
- IBM: Peter Lindborg, marketing manager, Kent Laitinen, partner manager, Torbjorn Johansson, CTO.
- Microsoft: Karin Johansson, sales manager, Thorbjorn Wennerstrom, sales, Jonas Torstendahl, software evangelist.
- MetaMatrix: Johan Groth & Claudio Aguirre-Bianchi. MetaMatrix has contributed with contents in section 8, appendix 1, "The locking-in effects of vendor dependence".
- Mikael Pawlo, cofounder of Gnuheter¹, employed by Advokatfirman Lindahl, a law firm specialising in Swedish and international business law.
- MySQL: David Axmark och Erik Granstrom.
- OpenUse: Peter Lantz och Robert Enberg.
- Sun Microsystems: Herve Bernard, business development desktop solution EMEA, Dieter Loeschky, StarOffice development manager, Tony Siress, desktop solution marketing manager, Hakan Svensson, desktop business manager Sweden, Peter Lovgren, country manager Sweden.
- Södertälje hospital: Bjorn Broman, IT-manager.
- Representatives for public administration in Denmark, Finland, Iceland, Norway och Germany.

We have taken part in the following conferences and seminars:

- Stockholm Challenge: "Open Source – a possible way to create digital democracy?"
- Debate with Simon Brown, CEO Microsoft AB, Marten Mickos, CEO MySQL, Zaheed Haque, CEO Zeed AB och Ylva Hambraeus Bjorling, CEO IT-Företagen.
- Stockholm Challenge: Seminar on the legal aspects of open source code/free software, with Mikael Pawlo from Advokatbyran Lindahl.
- "Open Source for E-Government" in Washington, Oct 16-18 2002.
- "Open Source Revolution", Stockholm Kista, Oct 16-17 2002.
- "Open Source Seminar for Nordic Public Sector" Sky City Arlanda Nov 11 2002.
- Several meetings within IDA, regarding free and open source.

Besides the above, the working group has had a large number of spontaneous contacts with interested individuals both within and outside the area of public administration and management.

¹ www.gnuheter.com

3 Free and Open Source Software (FOSS)

The following is a summary of information found in Appendix 1. The purpose of this section is to present a comprehensive and easily accessible rendition of an area that is otherwise extremely extensive. Those looking for more detailed information are directed in the first place to Appendix 1 and secondly to the bibliography found at the end of the appendix.

In order to simplify reading, the summary follows the section structure of Appendix 1.

3.1 What is Free and Open Source Software

One could illustrate the idea of free and open source software compared to proprietary software with a situation where a person buys a house. Upon purchasing the house he also receives technical drawings and blueprints so that he can make changes himself to the structure. One alternative would be for the seller to retain ownership. All drawings would remain in his possession and therefore all changes to the house would have to be made by the same vendor or seller.

Another case could be the purchase of a car, where only the dealer's repair shop retains all car manuals and repair guides for exclusive rights to repair or make any changes in the performance of the car.

Richard M Stallman, founder of Free Software Foundation, uses the illustration of cookery and food. How would we experience the world around us if recipes were not freely available or free to change and modify? What would it be like if we committed a crime every time we made a copy of the recipe or gave it to someone else?

Free and open source software means that source code is freely accessible, that the software can be freely used, changed, improved, copied and distributed by all who wish to do so.

Free and open source software does not have to be free of charge. Besides being able to construct business models around the software based on commercial aspects, a company can receive direct payment by the use of a large number of licensing schemes and models. These models can also be included in the overall definition of what we mean by free and open source software. What is important here is that the source code is available to the customer.

3.1.1 Background in a nutshell

When Unix was introduced it was free of charge for use in university and academic context. Since much of the development of Internet technologies took place within the walls of universities and research facilities, Unix became the operating system that was

used for this development. It was commonplace for application developers to share and distribute source code between each other.

At the beginning of the eighties, licensing conditions were changed for Unix. Prices increased and the possibilities for sharing source code were restricted substantially.

In 1984 Richard M. Stallman started a project called GNU with an idea of recreating the open environment, which he had experienced as a member of the application development team at the Massachusetts Institute of Technology (MIT). But this time his ambition was greater. He wanted to create an operating system, which was completely open and free. He also created a special type of software license called the GNU license (GNU GPL – General Public License) in order to guarantee that software developed within the GNU project would continue to be open and free for all to use.

GNU GPL became the object of wide attention, but not everyone was attracted to the puristic and ideological spirit in which Stallman worked. Bruce Perens, together with Eric S. Raymond, started therefore the Open Source Initiative (OSI) in 1997. They came with their own definition of open source code, "The Open Source Definition". All licenses that hold themselves to the guidelines set forth in the definition can be called "Open Source Software". The main difference between GNU GPL and OSI is that OSI allows commercial use and sales of the software.

3.1.2 Introduction

Proprietary software is sold without any access to source code and is therefore not possible to change, improve or further distribute. A license for proprietary software entitles a user only to use the software under certain conditions.

Free and open source software gives the user the right to use, copy, distribute, examine, change and improve the software. These rights are stipulated in the licenses, which apply to free and open source software. GNU GPL is the most widespread license, but also the one which places the most demands on openness and lack of restrictions.

The licensing model in GPL is very much different than other software licenses, mainly due to the intentions of the licensing agreement and its protective clauses. GNU GPL is based on the freedom to make an agreement or contract and that the originator has the right to make the software available on his own conditions. Copyleft is a mechanism, in among others GPL licenses, which stipulates that free software remains free, even when modified or changed. Copyleft does not allow someone who further distributes the software, in original or modified form, to add any restrictions to the license. This means that all copies of the software, even modified, continue to be free.

It is this mechanism, which precludes reuse of GPL licensed software in proprietary software that Microsoft has heatedly opposed.

Besides GPL there are 42 other OSI approved licenses for open and free software.

3.1.3 Driving forces

There are several studies about how free and open source software is developed, who takes part in the development and their motives for developing this kind of software. One observation made is the high level of creativity in development projects for free and open source software. Another observation is that most of those taking part in projects are themselves professional developers who either take part on their own time or with the permission of their employer on paid, company time.

Characteristic for those taking part is a strong feeling of solidarity with the developer community. Intellectual stimulation and the chance to develop one's own competency is also an important impetus. Participating members of the community want to learn from each other by contributing themselves and being able to learn from the knowledge of other developers. Professional developers, who create both proprietary and free and open software, often prefer the latter model because of more room for creativity. There are also not the same time restraints with scheduled deadlines. One often receives quick feedback on one's contributions. It is also important to "be seen". This also contributes to the wish to arrive at a good result. In a closed environment, where an individual programmer's work is not noticed in the same way, commitment on the part of the programmer can slack and can even contribute to mediocre program code.

A typical community consists of a core group of dedicated and knowledgeable individuals, sometimes taking part on their own initiative and sometimes through an elective process. This group structures the on-going work and chooses the best contributions. Anyone can submit a contribution, both companies and individuals, but it is the core group which decides the design of, for example, system architecture and also which contributions are to be used. Linus Torvalds is an example of a very successful "leader" for such a community – the development of Linux.

Thus, the community is responsible for both development, further development and maintenance of the product. Almost all development projects put up their own portal on the Internet, a web site for the project, where others outside the community can follow ongoing development, read documentation, download new versions (both stable versions for use and beta versions for testing), comment on ongoing work and contribute themselves to the project.

3.1.4 Examples of products

There are a large number of products based on free and open software. At Sourceforge, one of the most popular portals for the publication of free and open source software, there are over 60,000 different projects of which 7,000 are adapted to Windows95/98/2000.

The most popular and successful projects also have their own web sites.

Linux is probably the most well-known example of open source software, but there are also a large number of other successful software products. A few examples:

- **Apache** is one of the world's most utilized web servers. Apache is used in more than 65% of all web servers on the Internet today.
- **Bind** is, without question, the most widely used name server (DNS) on the Internet. A name server's foremost task is to translate computer names (e.g. www.statskontoret.se) to IP addresses and vice versa.
- **DHCP** is software for automatic configuration of nodes on an IP-based network
- **FreeS/WAN** is a popular open source application for building VPNs (Virtual Private Networks). It uses IPsec and common encryption algorithm such as 3DES and AES along with the option to compress data in traffic.
- **GIMP** is used for picture editing. It can be used for editing and touching up of pictures from digital cameras, but also as a general purpose drawing program and for converting graphics files between different formats.
- **Mozilla** is a web browser which has some program code identical to that within Netscape Communicator 6. Mozilla is a complete suite of programs with support for both Linux and Windows.
- **MySQL** is an SQL based database server with accompanying applications for administration, control and clients. MySQL is the most frequently used open source database on the Internet. Support for almost all platforms including Linux and Microsoft Windows is available.
- **OpenOffice.org** is a complete office suite for word processing, presentations and spreadsheet. Representatives from Sun administer the project and Sun contributes to a large part of the development. The project has developed their own XML-based file format and also support for MS Office file formats, although not 100%. Works on both Linux and Windows platforms.
- **Samba** is a product which emulates an NT 4-server on a Unix-based platform. Samba works as both a file and a print server for both Windows and Linux clients.
- **Sendmail** is the most common of all mail servers on the Internet. Sendmail includes functions such as mail routing, mail relay, anti-spam and also supports protocols such as SMTP, POP and IMAP. Sendmail can also function as a client e-mail server.

3.2 The current situation

3.2.1 The surrounding world

Free and open source software enjoyed a strong upswing during the year 2002 in Europe. A number of initiatives are currently underway, both on a national level as well as on an EU level, in order to contribute to the spreading and use of free and open software in public administration and management.

IDA, Interchange of Data between Administrations, a program under the auspices of the European Commission, arranged during the latter part of February 2001, under the guidance of Erkki Liikanen, a symposium in Brussels on the topic of free and open software in the public sector. The symposium came to the following conclusions:

- There is extensive experience in the use of free and open software in the public sector in Europe
- Current projects include both server installations (back office) and client computers in the workplace
- Free and open source software is used because of adaptable functionality, lower overall costs, vendor independence and adherence to open standards, interoperability and security.

A number of measures were suggested:

- Upon procuring IT services, more importance should be placed on the use of open standards, including standards for document formats and exchange.
- Authorities should supply information on possible solutions based on free and open software.
- A forum for the exchange of best practice in the use of free and open source software should be established
- A software pool, i.e. a model for enabling exchange of software developed by members, should be established.

Furthermore, it was established that there is a need for efforts to outline both cost and benefits of free and open source software. Also the legal aspects need to be covered.

A number of reports have been produced under the endorsement of the European Commission. In June 2002, the project called FLOSS (Free/Libre Open Source Software) presented an interesting report on free and open source software. FLOSS has been financed by IST, Information Society Technology, and the aim of the project is to provide for the demand for information on free and open source software. The project has developed indicators for measuring value-enhancing effects of free and open source software along with the spreading of the software itself. Furthermore, the project has studied business models along with the effects that recommendations for the use of free and open source software can bring about. Finally, the socio-economic effects of these recommendations are assessed.

Public management and administration in all Nordic countries are involved in the subject of free and open source software in many different ways. In Finland, the Ministry of Finance along with various agencies, have evaluated OpenOffice. In Denmark, work is at present being carried out with the aim of producing a strategy for how free and open source software should be used in public administration. The Danish Technology Board has recently presented a report on the effects of use of free and open source software. The report points at possible cost-cutting solutions to the amount of € 500 yearly, in the short time span of four years.

The report states that free and open source software should be looked upon as a serious alternative to proprietary software for Danish public administration. The report recommends the Danish federal government and other authorities and agencies to take a joint stand on principles and objectives for the obtaining of software. One of the principles should be the introduction of open standards which is an important pre-

condition for achieving a better competitive situation and where products based on free and open source software can be a viable alternative.

Work is at present being done in both Denmark and Norway to use Linux in the IT systems of public school administration. Iceland is an example of a small language area and is strongly dependent on individual suppliers. One example can be found in the leading office software on the market. This software is not localized for the Icelandic market.

At this time there at least twenty countries all over the world where governments have taken a position in favour of free and open source software. A number of these countries, in South America with Peru at the forefront, have chosen to make new laws on the use of free and open source software, while other countries, such as Great Britain and South Africa, have taken a more pragmatic approach concerning recommendations and policies for free and open source software.

Germany is perhaps the most active country in Europe with a number of pilot projects for the introduction and use of free and open source software. The Netherlands has recently put forward a three/year plan of action for open standards and free and open source software in public administration. In the United States, the Department of Defense is a long-standing proponent of free and open source software.

The most interesting countries at the present time are India and China, countries with large populations, which can influence the future course of events on the software arena. Both of these countries have a considerably positive attitude towards the use of free and open source software, first and foremost in order to stimulate local business initiatives and to minimize the outflow of currency from the countries, but also national independence plays a vital part. In 2003, the strongest growth for free and open source software will probably take place in Asia.

3.2.2 Sweden

Public administration in Sweden is not an extensive user of free and open source software, but there are some examples worth mentioning:

- Universities and institutions of higher education, the largest user, have a long-standing tradition of the use of free and open source software. Many of Sweden's universities depend on free and open source software for operation of servers, web sites, e-mail systems, etc. At the University of Linköping most of the software mentioned in this report is used.
- SMHI, Swedish Meteorological and Hydrological Institute, has chosen OpenOffice/StarOffice as its office software.
- PPM, Premium Pension Authority, uses Linux as their operating system.

Many agencies and authorities have noted an interest in free and open source software in connection with needs for upgrading or renewing office software environment. AMS, Swedish Labour Market Board, has carried out an evaluation of StarOffice as office

software and come to the conclusion that there is a great potential for cost cutting by changing to this software.

3.3 Why free and open source software?

One of the strongest arguments for using free and open source software is the opportunity to arrive at a higher degree of independence regarding price and licensing conditions. In a situation with economic restraint, new and more rigorous licensing conditions, and with software that becomes replaced by newer versions more often than before, the software environment becomes increasingly more expensive.

Free and open source software enjoys a significant market share in many areas. Notably, Apache is used for more than 65% of all Internet web servers, often with Linux as operating system. Free and open source software often has higher dependability, and in many cases better performance when directly compared to its proprietary counterpart. Scalability and flexibility within the model for the development of free and open source software enables it to be developed for a large number of platforms and environments. An area difficult to measure and compare is security, but it has been found that it is just as good, if not better, than proprietary alternatives. Free and open source software is less prone to attacks and virus over the Internet. As far as costs are concerned, it is to the advantage of free and open source software, especially if one looks exclusively at direct costs.

One point that is mentioned in different studies is the risk of becoming dependent on one vendor who in turn can control the whole infrastructure. In Germany, the use of free and open source software is motivated among other things by the need for security. The German minister of the interior has expressed that "monoculture is not good for security".

3.3.1 Pros and cons

The following advantages of free and open source software were mentioned in the FLOSS report:

- higher stability
- high level of security
- none or low licensing fees
- possibility to modify source code
- ample access to IT specialists
- independence from major software vendors

One considerable advantage of free and open source software is of course that one can customize and modify a product for a certain target group of users, i.e. make the software simple and functional. For example, a specific development environment can be created, an application for electronic services aimed at the general public can be developed or a desktop computer with adapted functionality can be set up. The products

are extremely dependable in production and easy to administrate and maintain. There is an initial cost of development, but running costs are very low and the total cost is considerably lower than comparable proprietary alternatives.

The working group for this project has identified a number of positive and negative effects surrounding the introduction of free and open source software within public administration in Sweden.

Positive effects:

- simpler license management
- reduced dependence on a product, less risk for "locking in" effects
- lower costs overall
- increased competition
- increased quality and stability
- increased activity on part of local/domestic businesses
- increased security
- open formats simplify communication with general public

Negative effects:

- possible need for extensive migration
- could lead to higher demands for in-house competence and maintenance within the agency or authority itself
- could be difficult finding the right product
- possible interoperability problems with proprietary software
- fewer available consultant and support services on the market at present time
- psychological resistance among decision makers

Several of the negative effects could take place at an initial stage and are dependent on both volume of use and the number of services offered.

3.4 Open standards

Free and open source software preferably makes use of open standards, but there is nothing explicitly said about this in the various types of licenses for the software. The standards that are of interest in this context are definitions of file formats and standards for the exchange of information, i.e. protocols and formats for communication between different applications and systems.

The term standard means an accepted norm for a certain activity, event or occurrence, or a variation thereof, which is commonly used or accepted. There is, on the other hand, no clear definition of the term open standard, but generally a standard is considered open if:

- Anyone can use it or take part in work on creating the standard.
- It is arrived at in generally accepted and open environment.
- Development takes place according to a model of consensus, and not led by one single player.

- The specification is published freely and is available without cost or only at prime production cost.
- Documentation is published freely and is available without cost or only at prime production cost.

There should also be some guarantee that the standard will be supported and maintained.

Examples of open standards are HTML and TCP/IP. HTML is published by World Wide Web Consortium (W3C), an independent body of companies and organizations and TCP/IP is published by Internet Engineering Task Force (IETF). These organizations also accept the responsibility for the further development of their standards. Both W3C and IETF fulfil the requirements listed above.

It is important to check to what degree a product is really based on open standards. If the product does not follow the open standards one is at a risk of having in time to change over to another solution, with increased costs as a result.

3.4.1 Interoperability

Proprietary office applications create a type of document file, which can only be completely recreated by an office application that can recognize the original file format.

It is these proprietary document formats, which tend to be an obstacle for companies and government agencies. Many different applications need to be able to use what is contained in the document files, and it results in serious problems if these are not compatible with the document formats of other applications. Another aspect concerns the legal requirements for archiving, where information should be kept for as long as possible, preferably for "a limitless time". This, in principle, demanded that an open, standardized document format be used in order to avoid readability problems in the future.

There is, therefore, a great need of a standardized and open document format for storage, document exchange, archiving, etc., rendering possible an exchange of information between applications and systems.

Inadequate interoperability between applications and systems are one of the main reasons for why businesses and organizations hesitate to change over to free and open source applications in the computers in their working environment.

Today, Microsoft, with a market share within certain product areas of around 85-90%, enjoys a distinctly dominating position and the document formats in MS Office have become something of a de facto standard.

3.4.2 The locking-in effects of vendor dependence

Becoming dependent on a leading vendor can result in adverse effects of upgrading, where new versions of the product are not always initiated by the actual needs of the user, but rather by the product cycle of the vendor or supplier. A software upgrade also often leads to a need to buy new hardware, resulting in even higher costs.

Any attempt at breaking out of this vicious circle entails considerable endeavour, resulting in a state of affairs where many users just accept the situation as it is. The more dependent a user becomes, the more difficult it is for him to break away and a situation arises where a vendor can dictate his own conditions.

The IT sector is no different than most other business sectors: Suppliers and vendors attempt to arrive at a deliberate degree of locking in with the purpose of keeping a customer and securing his continued business. As a customer, it is impossible not to be affected in some way or the other, but increased awareness also means increased possibilities of containing and limiting possible damage.

Locking in is a serious problem in situations concerning the procurement, operations, and maintenance of complex IT based systems. The problems are caused by costs for upgrading and system changes, the choices made in one's surrounding environment along with how one deals with previously made decisions.

A careful review of the costs for locking in together with relevant requirement specifications when procuring new systems – before the effects of locking in can take place – constitutes an efficient way of lessening the negative effects of locking in. Furthermore, open standards offer a possibility of minimizing vendor or product dependence, given that the implementation of the standard does not include one's own additions. Free and open source software can decrease the risks of locking in by using open standards and interfaces.

More and more users seem to have taken notice of the situation, and a sharp and distinct protest, focused on increased costs, worsened terms of contract and increased locking in, have resulted in many users during the last six months starting to look for an open file format for office applications and also becoming interested in alternative products based on free and open source software.

3.5 Using free and open source software

Several different studies show that Linux is becoming more and more common as an operating system within companies and government agencies all over the world. In the first place, Linux replaces proprietary Unix and Windows platforms on servers. Studies show that Linux is the fastest growing operating system on the market today.

Major systems suppliers and integrators, such as Hewlett-Packard and IBM, put Linux on an even par with earlier traditional operating systems and offers support and consultancy services at the same level. IBM goes as far as choosing Linux as a Unix

based operating system for certain system solutions instead of its own AIX. Most often a sort of partnership is established with one of the leading Linux distributors such as RedHat or MandrakeSoft and tests are carried out to ensure that applications and hardware are compatible and work together without any glitches. Both IBM and HP dedicate considerable resources in the development of Linux.

Even other application providers develop Linux based versions of their own software. Oracle is one such example. At Oracle it is considered just as important to make available software versions for Linux as well as any other operating system.

In some areas, Linux dominates the market for Internet servers: Web servers and large server clusters with stringent requirements for calculation capabilities.

Recent developments in better user interfaces and office programs such as OpenOffice have made Linux a viable alternative even for desktop computers in the workplace.

The following areas of use are of interest, partly because they represent a considerable portion of software already used within government agencies and partly because there already are competitive free and open source software alternatives or they could easily be set up and effectuated within these areas.

- Infrastructural applications – name servers, catalogue servers, network servers, mail servers, etc.
- Server operating systems
- Workplace computers (PC)
- Office applications incl. e-mail
- Web servers and browsers
- Development environments
- Databases
- Business-specific systems
- Security software

3.5.1 The current market

One common motive for not using free and open source software on a broad front is the fact that there is not the same range of vendors supplying services such as software and operational support. Even if the number of such vendors is steadily increasing, the scope is still limited when compared to the leading proprietary software vendors. However, the fact that suppliers such as IBM, Sun, HP, Dell, etc. have clearly voiced their full support for Linux and other free and open source software products, has made a noticeable impression on the market and created an increase in confidence of open alternatives.

In order to arrive at a more detailed and comprehensive view of what is offered on a national perspective, Statskontoret carried out a market survey in December, 2002 with the intention of publishing the results in a separate supplement to this study and also to present the same material on Statskontoret's website – www.statskontoret.se.

3.6 Financial and legal aspects

3.6.1 Business models

An interesting question is whether or not it is possible to make a profit on free and open source software. Since access to the workings of the software itself, the source code, is free of charge, any business model must be geared towards value-added services and products.

Successful business models based on free and open source software emanate from one or more of the following areas:

- Software distributions – the sale of a packaged product based on free and open source software.
- Development and sales of in-house developed product.
- Added-value sales – free and open source software is used in order to support the sale of one's own supplementary products, such as other applications and hardware.
- Services – support, training, consulting, etc.
- Accessories – literature, etc.

Both HP and IBM reported revenues of billions of dollars for Linux-related solutions in 2002.

3.6.2 Cost comparisons

It is relatively easy to compare the costs for obtaining and upgrading licenses between free and open source software and commercial software. When considering other factors, a comparison becomes more complicated because each installation is generally the result of special conditions. If one has a well-working and stable environment – whether it is based on open source or commercial products – it is generally cheaper to remain in that environment. But as soon as changes are made, for example when upgrading an existing product to a new version, various costs arise.

Producers of proprietary software have an interest in releasing new versions of a product, even though there may or may not be a real demand or need on the part the customer. In the report from the Danish Technology Board (see below) it is stated, "the greatest competition comes from a vendor's earlier version of the same product". More often than not, a software upgrade results in a situation where even the hardware has to be replaced due to higher capacity demands on the part of the newer software. Costs due to changeover to a new product can arise when a product is taken off the market. Proprietary products oftentimes demand a steady and on-going learning curve, because every new version has new qualities, functions and characteristics.

The Danish Technology Board has released a report: "Open Source Software – in digital public administration".² The report contains a financial analysis of software with open source code. The report also includes a series of recommendations. One conclusion is that a changeover to electronic public administration in Denmark will demand considerable investments, and in connection with this it is natural to establish which technology is to be used and who and what should direct the course of future development. Can free and open source software completely or partly replace proprietary software.

The report states that Danish public administration can save up to €500 million a year within as short a time as four years by changing from proprietary to free and open source software. Savings can be made first and foremost by cutting major costs on workplace computers, office applications, operating systems and business-specific systems together with the cost-cutting effects of an extended lifespan for workplace computers and servers. Conditions in Sweden should be similar to those in Denmark. Theoretically, the cost-cutting potential of a changeover to free and open source software should be as large in Sweden as it could be for Denmark.

Few cost comparisons between free and open source software and commercial software have been carried out in Sweden.

3.6.3 Legal aspects

This area is complicated and a more in-depth study of the legal aspects, copyright, immaterial rights, intellectual property rights, etc. for certain types of licenses in light of Swedish legislation is recommended.

One misunderstanding concerning free and open source software is that the software is not protected by copyright. Free and open source software is regulated by licensing conditions whereof GPL is one of a number of types of licenses based on copyright protection. Mixing commercial use and distribution of free and open source software together with proprietary products is fully possible – with certain exceptions for GPL.

The IT Law Observatory of the Swedish ICT Commission plans to carry out a deeper study of the legal aspects of free and open source software during the course of 2003. The study will cover, among other things, how licenses for free and open source software relates to Swedish legislation in this area and will also look at questions concerning copyright and patentability issues.

² "Open source software – i den digitale forvaltning"

4 Recommendations

The working group suggests that a forum be created in order to facilitate and accelerate the use of free and open source software. The target group could be IT and information strategists within the public sector, responsible for spreading and collecting information. This forum, also usable as an informal personal network, could have its own website (compare e.g. Swedish XML Academy³ containing information, ideas and recommendations).

The goal should be that no one should be forced to use a vendor-specific product in order to communicate with the public sector. In order to achieve this ambition, it is imperative to use open standards and formats, both in a development stage and when procuring one's own systems. That is why there is also a need for a procurement policy concerning, and in certain case, placing demands on open source software and open standards.

This means, however, that in a procurement process, where focus is usually on the purchase of the software product itself, attention – in the case of free and open source software - must be given to surrounding services such as support, service, introduction and migration. This entails a more function-oriented procurement process for software. Public administrations should strive to find the most cost-efficient alternative, whether or not the software is proprietary or open source. The requirements in the procurement process also should not discriminate or favour any specific type of product.

One way of facilitating access to and furthering knowledge about free and open source software could be to commission a packaged set of programs for the general public based on free and open source software according to the model used in the Spanish region of Extremadura.

One channel in future work might be to appraise the concept and ramifications of free and open source software together with decision-makers, and to discuss the cost-cutting effects which have already been ascertained long with discussing the importance of open standards and formats in the light of a more favourable foundation for competition.

The recommendations below have been divided into two parts – firstly that which applies to Statskontoret and secondly recommendations of a general nature.

³ www.xmlakademin.nu

4.1 Statskontoret

The following recommendations are not listed in any special order. It is essential that continued work be initiated as soon as possible.

Together with other users in public administration, Statskontoret should draw up a comprehensive action plan for free and open source software. The plan should contain a detailed outline for continued work and among other things include the following points:

- The working group has come to the conclusion that it is important to gain experience in Sweden concerning the use of free and open source software and also migration to open environments. Pilot projects and installations which among other things include migration to an open environment along with an evaluation of free and open source software for computers in the workplace and for websites should be carried out.
- Since it is of considerable importance to carry out the above-named pilot activities, Statskontoret should coordinate the gathering of data and experience from them. The process of migration, experience and effects must be documented and made available for others within public administration. Each agency or authority has the responsibility for starting and carrying through their own pilot installation.
- The working group suggests also that Statskontoret work out a policy for procurement of software and other information supportive products such as those for workflow/information management, document management, etc. The policy should include requirements on open standards and open file formats for procurement. Which open standards are to be used, and which areas they are to be used in, must also be defined.
- Statskontoret should also follow and if possible support work that takes place in OASIS, Organization for the Advancement of Structured Information Standards, an organization which works for the establishment of an open and XML-based file format for office applications. An open file format for office software is of great importance for increased interoperability.
- Statskontoret should carry out procurement of free and open source software including supporting services, etc.
- Statskontoret should distribute its own publications, reports and procurement documents and information in an open format. Until that time when an open file format for office software becomes available to the general public, PDF-format should be used.
- Furthermore, Statskontoret should work with the spreading of information and covering of the area for free and open source software. Measures can include among other things website information, seminars and general support to other authorities and agencies.

- Finally, there is a proposal that Statskontoret should investigate how the software developed by various agencies and authorities can be made open and available for other authorities or users. Examples of questions to be answered are: Which license should be used, who should have access to the software itself, management of a software pooling etc.

4.2 General recommendations

General recommendations are, in the first place, directed towards other parts of Swedish public administration and other players and interested parties.

- In order to avoid locking-in effects and to attain interoperability, an administration must define and place demands on open standards when procuring and developing systems. This pertains especially to file formats for office software and systems, which include communication with the general public.
- When communication with the general public via websites, an administration should work for website compliance with open standards (according to W3C) and avoid discriminating against individual products.
- Work should be carried out for the inclusion of the most common open office applications in those covered by ECDL, the European Computer Driving License. For example, software such as Linux, OpenOffice and MySQL should be included in the ECDL.
- A web-based software catalogue with information on free and open source software should be available within Swedish public administration.
- A project should be started for defining standard solutions based on free and open source software, aimed at school and educational systems, preferably also in cooperation with corresponding projects in Denmark, Finland and Norway.