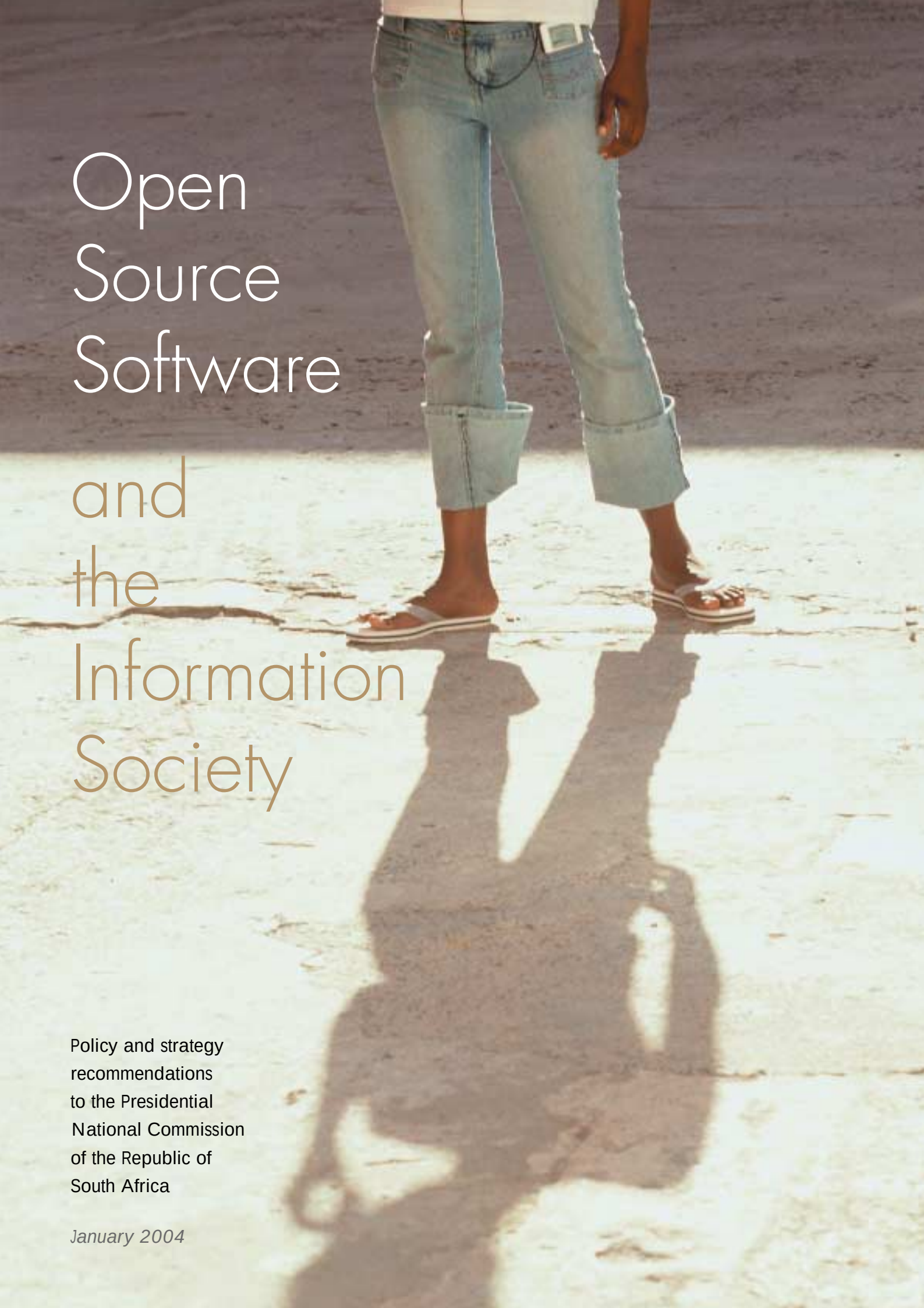

Open Source Software and the Information Society

Policy and strategy recommendations to the Presidential National Commission of the Republic of South Africa

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1 Executive Summary

Map of the Internet on 23 November 2003. Image from the Opte Project (www.opte.org). Used under Creative Commons license (creativecommons.org/licenses/by-nc-sa/1.0/).

1 Executive Summary

The South African government already has in place a policy on Open Source Software, as noted by national cabinet in August 2003. Based on further research, including case studies of early projects implemented within this policy framework, this report proposes a set of policy enhancements. These enhancements shift the overall policy posture from one that is neutral-to-enabling to one that is enabling-to-proactive. They also incorporate Open Content into the policy, and bring to the fore important issues around intellectual property rights and Open Standards.

Such a shift is consistent with international trends, particularly among developing nations, and recognises the direction of the substantial environmental changes occurring within South Africa, even in the year since the initial policy was proposed.

The recommended policy enhancements are the following:

Policy enhancement
Basic policy foundation: Government must implement Open Source Software (OSS) unless analysis shows proprietary software is significantly superior. The primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by government to its citizens. When OSS is *not* implemented, then reasons must be provided in order to justify the implementation of proprietary software.
Opting for OSS where advantage of OSS and proprietary software are comparable: OSS must be implemented when choosing a software solution for a new project if the OSS and proprietary software offering are comparable, Current proprietary software must be migrated to OSS whenever comparable software exists.
Create an environment for utilizing OSS: OSS has the potential of providing significant advantages to government. Steps must be taken to create an environment where OSS will be implemented in those areas where government and the country are correctly positioned to benefit from it by: Creating knowledge, understanding and capacity Developing *broader OSS Research and Development initiatives* *Enforcing and giving preference* to the use of OSS in procurement processes Creating opportunities for trial use, through initiatives such as the sponsorship of demonstrator projects by the CPSI.
Incorporation in e-government policy: The OSS policy must be legislated and require the use of OSS in all government departments wherever possible. (The bill should include references to open standards and open file formats.)

Policy enhancement
OSS for the citizenry: Government will seek to utilise the opportunities presented by the OSS movement to promote access to information for citizens, *driving* and *embracing* more creative procedures to enhance access to government's electronic service delivery.
Open content: Government organisations must adopt an Open Content policy. All content should be open unless analysis on specific content shows that proprietary licensing or confidentiality is required.

The implications of these enhancements are the following:

- An overall reduction in direct costs from the implementation and use of OSS but no significant variance in the associated indirect costs
- Resistance to the policy from ICT decision makers and employees and hence training, incentives and penalty programmes will need to be introduced
- Short term effects on the proprietary software vendors associated with government as they face new challenges
- Short term effects on the OSS vendors as they face new opportunities
- The realisation by government, proprietary software vendors and OSS vendors that OSS and proprietary software will not exist independent of one another
- Short term OSS skills shortages until local skills ramp up
- Pressure could be exerted from foreign governments in response to the displacement of their proprietary software vendors
- Increased local adoption of OSS goods and services due to the multiplier effect as government is the single largest ICT procurer in the country
- Each sphere of government and government department aligning its internal policies in light of the enhanced OSS policy - especially staff skills development, ICT procurement, ICT administration and the inclusion of an Open Content Policy
- Developing an integrated governance, as all proprietary software and operations will need to be assessed and the correct OSS skills developed in order to implement an OSS process of change
- Encouraging Open Standards development as OSS is built using and upon Open Standards
- The adoption of Open Content resulting in lower overall costs as a result of the avoidance of duplication of content creation, management of content, collaboration and improved access to information

- Skills development, promotion of vendor independence, security and domestic sovereignty enhancement.

The overall thrust of the enhanced policy is to shift the adoption of OSS from small groups of enthusiasts within government to overall institutionalisation of OSS within government, making OSS and Open Content the default preferences, requiring explicit justification for deviation from this policy.

The rationale for this is that OSS, already equal or superior to proprietary software in many areas when assessed on technical and financial grounds, also contributes to a broad set of social changes that help develop and uplift society over the medium to long term. These changes include the following:

1. Open Source Software supports ICT spending with local companies, keeping that money onshore and thereby encouraging a valued, employable skills base to flourish domestically, which in turn keeps educated and skilled workers at home and encourages other educated and skilled workers to immigrate, drawing in talent.
2. Open Source Software, by recognising participation in software development at the level of the individual and not the corporation, and by shifting the value capture within the ICT industries from proprietary software development or packaged software sales to customisation and integration of existing Open Source Software, also furthers the success of small, medium and micro-enterprises (SMMEs), which can create opportunities for entrepreneurial success of SMMEs, and drive job creation as well as grassroots economic empowerment.
3. Open Source Software encourages hands-on, self-directed and experimental learning of 'primary source' material (i.e., source code) with peer-based support mechanisms for guidance and feedback, an empowering way of learning that is particularly important in an Information Society.
4. Open Source Software also provides, encourages and self-regulates a set of rigorous and broadly applicable standards and mechanisms for collaboration, quality assurance and distribution of ICT product (i.e., software), an empowering and team-oriented way of producing products, particularly well suited for the products highly valued in a Knowledge Economy, and proven across a range of industry sectors.[1]
5. Existing Open Source Software can readily be adapted for local languages, reducing barriers to access and to the mastery of skills while helping eliminate the marginalisation of those from cultures not ordinarily possessing a high level of fluency in one of the world's major languages.[2]

[1] see ThinkCycle www.thinkcycle.com, Creative Commons www.creativecommons.org, Cambia (Center for the Application of Molecular Biology to International Agriculture) www.cambia.org, Wikipedia www.wikipedia.org, and Public Library of Science www.plos.org for examples.

[2] See www.translate.org.za in particular

6. Each of these five benefits above also help counter a psychology of dependence on foreign countries and corporations to provide the innovations and solutions to problems faced domestically, even as Open Source Software helps reduce that dependence in practical terms.
7. Supporting the collaborative and communal culture of Open Source Software development also helps to balance the bare-knuckled culture of market competition in the ICT industries, supporting both social and economic upliftment.
8. Participating in the open source community raises the profile of South Africa and South Africans, helps to demonstrate its capabilities and its desirability as a progressive, technologically literate and knowledge-savvy nation, and provides a greater degree of participation in and access to the global "quick response" teams addressing criminal hacker and virus threats.
9. Open Source Software shifts the competitive advantage among ICT companies to value creation for the customer, removing recurring revenue streams such as licensing upgrades and ancillary software purchases (e.g., for interoperability within a proprietary operating system or application suite) that benefit firms having longevity in an industry and that subsidise those existing firms to the disadvantage of SMMEs and start-ups who cannot compete on equal footing. The latter situation promotes a lock-in of economic winners in an industry, thereby reducing market competitiveness as well as economic transformation.
10. And the nature of open technologies can help move forward a culture of openness and transparency in government as well as society, promoting public access to government by facilitating information sharing and interoperability of ICT systems among stakeholders, and enabling government to be accountable to the people without being beholden to the proprietary software and standards of a private corporation.

These changes begin to occur once OSS has reached critical mass or a tipping point within the nation. Government, as the largest user and purchaser of ICT, can play the key role in bringing South Africa to that tipping point.

Open Source Software also brings along its own risks. Some of these are risks associated with any kind of technological change, not particularly Open Source Software, and thus need to be managed in any case, while others might lead to opportunities for proprietary software to enter or re-enter a market niche to fulfil a market need where there is sufficient demand for it to be done at a profit. OSS represents only one of the possible approaches to software, and proprietary software will continue to play a primary and crucial role for the foreseeable future.

A recommended implementation programme builds on the existing strategy for OSS policy implementation, following a similar phased approach, moving from an initial introductory phase into an enabling phase and them moving into a mature phase.

This strategy includes the following:

Strategy enhancement
Introductory phase This phase is being largely successful and sound. On the whole more commitment must be applied to this area. The Open Source Coalition (OSC) must be formalised and operationalised.
Information dissemination All government departments must be included in learning, content development, consultations and communications functions. People outside the IT and ICT environments must be included in briefings, especially communications and procurement staff. The bridge between the MIOS, open content and OSS must be established through involvements of different spheres of government, communications and human resource development components.
Trial development and use OSS awards of a significant nature must be established. SITA must be held accountable against the serious budgetary commitments (R18m for 2004) and responsibilities that they committed to.
Consultation Linux User Groups (LUGs) that are based in the major cities and the Internet Society. These organisations, especially the LUGs, must be supported and not duplicated. Academics and ICT practitioners must be convinced to become involved.
Research Whilst some progress has already occurred, this is an area of risk since resources have been diverted from the issue at hand. OSS requires participation and not just talk about participation. The longer-term research agenda must be established with priority. Research should have a focus on E-government and migration and less focus on sophisticated applications development.
Consolidate support capacity Governing bodies of key stakeholders, universities, education organisations and labour must be included in this process. Areas of responsibility must be agreed upon.
Including OSS utilisation in short and medium-term plans Resources must be assigned to managing and monitoring the ICT plans. Individuals must be trained to provide critical responses to these plans and broader community reporting of achievements against plans must be communicated.
Level playing fields The current environment shows a monopoly. Regulate software procurement in all government organisations to ensure that any proprietary software, especially Microsoft, is not favoured without proper motivation and justification. ITAC must be regulated to ensure that they meet objective criteria. Procurement reporting must demonstrate OSS growth. All procurement environments must be consulted and trained on basic principles of systems development. An external procurement oversight committee made up of individuals (from all key stakeholder groups) should be established by the key stakeholders and OSS forum.

Strategy enhancement
Communication Assign responsibility and ensure accountability through regular public reporting. Establish common communication standards through implementation of the MIOS and establishment of metadata frameworks (e-GMF) and standards (e-GMS).
Open content Initiate a process to amend the Copyright Act – or equivalent - so as to facilitate open content in government.
Enabling phase
Implementing plans compiled during the previous phase Until we have a truly open and competitive software environment, it is recommended to empower OSS by favouring it, especially in areas where it is proven. Points a-c remain, with a focus on procurement regulation. Systems and procedures must be kept as simple and open as possible.
Software selection After analysis of the tools prepared to date, we recommend a simpler approach. In order to break the stronghold of proprietary software in government, a more proactive approach is required. Token OSS projects are not sufficient to stimulate change. OSS must be favoured unless proven otherwise. The point of departure for software selection must favour OSS.
Software development For large-scale applications and systems development the MIOS must be adhered to for minimum interoperability. Proven open standards must be observed. Tenders must be audited to ensure they meet these standards.
Capacity development Formal training must be balanced with real OSS development experience. Training must be performed only if the skills developed in training can be enhanced with real experience (i.e. if users are trained on Linux, they must begin to use Linux on a day to day basis). Focus on open systems, interoperability, policy and software engineering principles. Stakeholder groups will require different types of training, governing bodies and senior managers, procurement officials, communications staff, and ICT professionals. Transversal projects that include a number of different government organisations from different spheres must be initiated. Generic principles on the appropriate use of ICT must be established. Focus on open systems, open content, interoperability, policy and software engineering principles.
Partnerships Partnerships will emerge and should not be forced. The OSC appears to be well positioned in this regard. Structures and frameworks for governing partnerships and responsibilities must be assigned. Transparency is essential to drive greater accountability.
Content gateway Ensure that government content gateways conform to agreed open standards.

Strategy enhancement
Mature phase A true competitive software environment must exist before this phase is reached.
Systems and procedures Systems and procedures will have evolved to ensure that information systems are open and that software procurement is enabling a competitive software industry. Government should not be in the business of technology or individual technical certification. Good systems must be in place to ensure appropriate management of technology infrastructure and service levels. Resources and plans must be in place to plan for the next wave of new technology in the age of convergence.
Levels of implementation A broad base of Open Source Software will be used across government, and other industries.

Responsibility for promoting the policy is recommended to be the purview of DPSA, working with existing structures such as GITOC and departmental top management. Champions will need to be identified and recognised through an awards programme, and an overall communications strategy will need to be developed.

Compliance with the policy should be reported regularly as part of the current Public Service Regulations. These reports must be audited against the OSS policy and either the reports themselves or aggregations thereof must be made publicly available. Individuals and organisations that do not comply with new policy should be held publicly accountable. Annual reports should be commissioned to third parties to perform an audit of overall progress against policy.

Subsequent to finalisation of a national e-strategy, metrics should be developed to monitor policy adoption in the medium to long term.

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3

Introduction

3 Introduction

The subject of Open Source Software and Open Content has a number of peculiarities that can make both research and reporting a challenge. It involves technical concepts and language, it can be characterised by passionate and ideological debate, and is linked to a large number of related issues including intellectual property rights, international trade, and education among others.

This report endeavours to present the topic in plain language without technical jargon, and defining technical terms when they are required.[3] It further takes cognisance of the existing Government policy that actively supports Open Source Software and does not revisit the technical and financial arguments that led to such a policy position. In its approach and recommendations, it attempts to move the focus from one characterised by support from small numbers of technologist/enthusiast proponents, to one characterised by general institutional support across Government, interlinked with a broad cross-section of other Government policies and programmes, and with a view toward substantial and lasting change.

3.1 Objectives of This Report

This report concerns the promotion of the use of Open Source Software and the adoption of Open Content standards as a means of contributing to the social and economic development of South Africa.

The objectives of this report are to make policy recommendations and to outline the strategic initiatives required to implement these. These necessarily focus on appropriate actions from Government.

This paper does this by:

- Reviewing the critical literature on the subject
- Reporting on the approach and strategies of other countries – African, developing and industrialised – and particularly those seeking to participate in the emerging Information Society and compete successfully in the Knowledge Economy
- Assessing the nature and progress of Open Source Software and Open Content projects which have already been undertaken by spheres and branches of government in South Africa
- Taking cognisance of the existing Government policy on Open Source Software

The result is:

[3] See also Section 12.1 for a glossary of terms

- A description of the broad context for Open Source Software and Open Content in terms of their power to affect economic and social change, particularly in South Africa
- A proposed set of policy enhancements to existing Government policy on Open Source Software and Open Content, and the implications of these enhancements
- A proposed programme for change in order to implement the policy enhancements
- A proposed means for tracking and measuring progress of the implementation of this programme and the achievement of its goals

This report does not:

- Review the technical and financial arguments for and against Open Source Software and Open Content, as these have been established in the literature and form part of the rationale for existing Government policy in support of Open Source Software
- Evaluate and make recommendations regarding the implementation of Open Source Software and Open Content projects *per se*, but maintains its focus on the implementation of policy. Reference is made, where appropriate, to the literature that does address project implementation good and best practice, tools and case studies

3.2 The Road So Far

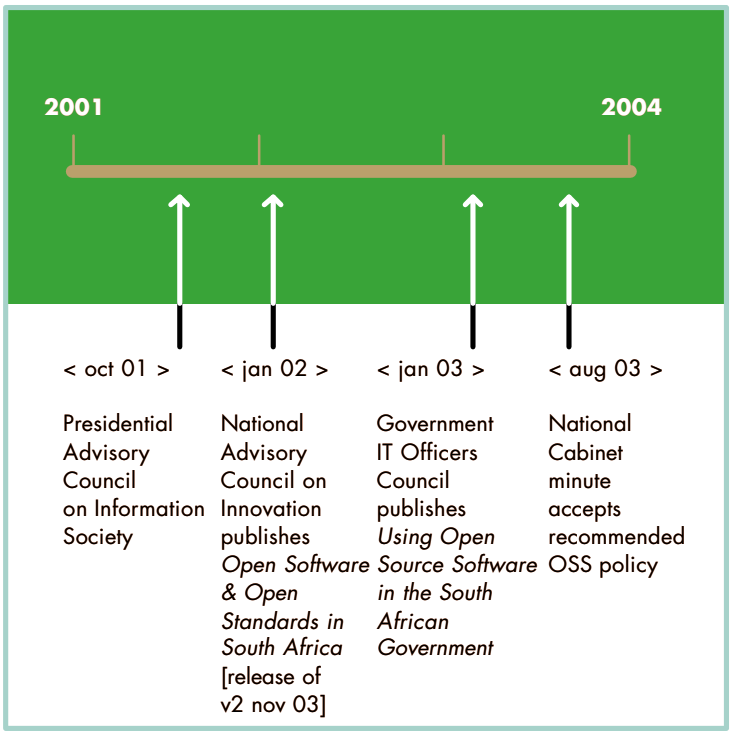

Figure 1

This section serves to briefly position this report in relation to the Open Source Software and Open Content policy developments that have taken place since 2001:

- Priority was first given to Open Standards and Open Source Software in October 2001 at the Presidential International Advisory Council on Information Society and Development. Further speeches in parliament also suggested that government should promote OSS. In response the Government IT Officers Council (GITOC) formed an Open Source Software working group to investigate further.
- In January 2002 the National Advisory Council on Innovation (NACI) produced a discussion document called "Open Standards and Open Software in SA." This document formed the basis of the GITOC discussions and a second version has subsequently been released in November 2003.
- In January 2003 GITOC released a strategy recommendation for the use of Open Source Software in government. This document was submitted to the Minister of Public Service and Administration and in August of the same year, the National Cabinet officially noted this set of policy recommendations.

This report has a targeted publication date of early 2004 by the Presidential National Commission (PNC).

3.3 Overview of Methodology

The research methodology comprised of the following:

- A review of local literature on Open Source Software and Open Content that entailed a description, review and analysis of all the documents prepared for the South African Government on the subjects. This local literature review included secondary analysis of local data.
- An international public sector situation analysis that examined Open Source Software and Open Content policies and developments from a basket of countries representing African, developing and industrialised countries.
- Primary data collection from members of the Government Information Technology Officer's Council and contacts provided by their Open Source Software working group and the GITOC Secretariat at the Office of the Government Chief Information Officer. A special feature of this primary research was the training and participation of three interns within the PNC to carry out primary interviews along with other members of the team. Two Interview Questionnaires were specifically developed for this study, which identified tangible projects in Open Source Software that were completed, underway or planned, by government departments and other statutory bodies; and once references to such projects were found, researchers carried out secondary interviews and data gathering to describe the projects. The outcomes of these interviews have been presented in the form of short case studies.[4]
- Development of appropriate enhancements to the existing OSS policy that was developed by GITOC. This included a discussion on the societal effects of Open Source (i.e., non-technical, non-financial), formulation of a policy framework, discussion of the implications of the policy, formulation of a program for change, and identification of key measurements to evaluate the implementation of the policy as well as its effects.

3.4 Key Terms and Concepts

A shared and nuanced understanding of a small number of key terms and concepts associated with Open Source Software and Open Content will be important for readers of this document. The central issues are not and should not be the exclusive purview of technical experts; the literature and research indicate clearly that the crucial aspects of Open Source Software and Open Content policy are only in part about technology and are primarily about social and economic development. And because a persistent ideological tone can colour the discussion in one direction or

[4] Time and budget constrained the depth to which the team could go in gathering primary data and detail on the projects identified.

another, a more careful approach to the definition and use of these terms and concepts is warranted.

Open (Content, Software)

A product or system is described as "open" when its workings are exposed to the public and can potentially be modified or improved by anyone. The alternative, which is a system whose workings are closed to the public, and modifiable by the owner only, is a proprietary[5] product or system.

Interoperability

With respect to software, the term interoperability is used to describe the capability of different programs to read and write the same file formats[6] and utilise the same protocols[7].

Two systems can be interoperable if the owners of those systems agree to share file formats and protocols. Those that observe *open* file formats and *open* protocols will automatically be interoperable. Note that systems can be interoperable if they do not use open file formats and protocols, provided they use the same formats and protocols (usually under license from a commercial proprietary software vendor, for example, Adobe's widely used portable document format or PDF).

Interoperability has a significant range of benefits because interoperable systems can 'talk' to one another and 'share information' with one another. Within government this is particularly pertinent as pressures for improved service delivery drive a need for collaboration between spheres of national, provincial and local government, as well as across departments.

The Handbook on Minimum Information Interoperability Standards (MIOS)[8] identifies that "information systems have the potential to transform government and the services it provides to the public. But without consistent policies and standards to underpin those systems it will not be possible to work together to deliver collaborative services". The New Zealand government[9] go further to identify three reasons for

[5] The term "proprietary" means "privately owned and controlled". Wikipedia, http://en.wikipedia.org/wiki/Proprietary

[6] A particular way to encode data for storage in a computer file. Wikipedia, http://en.wikipedia.org/wiki/File_format

[7] A convention or standard that controls or enables the connection, communication, and data transfer between two computing devices.

[8] "Handbook on Minimum Information Interoperability Standards (MIOS)", *Department of Public Service and Administration*, 16 April 2002, <http://www.dpsa.gov.za/e-gov/2002docs/MIOS-Handbook16April'02.pdf> (10 November 2003).

[9] Brendan Boyle, "New Zealand E-government Interoperability Framework (NZ e-GIF)", E-government Unit, State Services Commission, Version 2, 3 December 2003, <http://www.e-government.govt.nz/docs/e-gif-v-2/chapter4.html> (18 December 2003).

interoperability: improving the public face of government, improving agency (departmental) use of ICT and operating in a global environment.

One of the aims of e-government is to make it easier for people to deal with multiple government organisations, by making good use of information and communications technologies (ICT). When ICT systems and the processes they support interoperate, people find it easier to do business with government as a whole. This does not mean that everyone has to be online to get the benefits of interoperability. If government ICT is interoperating effectively, people dealing with public servants face-to-face or on the phone will get improved service.

The Internet, and the value that it can deliver to government and people, relies on open standards. By using open standards each government organisation contributes to the infrastructure of technologies that they increasingly rely on to deliver services and conduct the business of government. The adoption of open standards also helps in global and regional matters where governments can interoperate across national borders.

Interoperability does not, however, imply that systems are simply open to one another, without security, privacy or business rules that govern their interaction. Interoperability provides the potential for whatever level of information exchange between systems might be appropriate and desirable. The decisions as to whether, when and to what extent to do so remain strategic and management decisions.

Source code

Source code is the software program as written by the programmer. Another programmer can understand it and change it. Before it is distributed, source code is typically converted into executable code using another programme called a compiler. Executable code is not in general readable by humans and cannot be changed without access to the source code, effectively providing a 'lock' on it.

Software licensing

In general, users do not own software; rather they obtain a license to use it. The licence defines the terms and conditions for use of the software. Intellectual property rights (IPR) have ensured that in all cases the user must accept the terms and conditions of the licence before use, whether explicitly by clicking acceptance or implicitly by breaking a seal on the box.

Today there are two dominant types of software licence: commercial software (also referred to as closed source or proprietary software) which is generally licensed for a fee, whose source code is kept secret, and which is most often developed by a company; and Open Source Software [10], software whose source code is openly

[10] Brendan Boyle, "Open source software: briefing to the Minister of State Services," Minister of State Services Memorandum, 4 March 2003, <http://www.e-government.govt.nz/docs/open-source-200303/chapter1.html> (27 November 2003).

published, which is available at no charge, can freely be modified and distributed, and which is usually developed through collaborative (voluntary[11]) effort.[12]

Open Source Software[13]

Open Source Software (OSS or Open Source) is mostly written by groups of individuals cooperating through the Internet. Open source authors working on the same project have often never met each other. They are typically not paid for their efforts, although some are permitted to spend work time on their Open Source Software endeavours by their employers.[14] Rather than programming directly for money, most Open Source Software authors seek rewards of reputation among their peers. They vie with each other to produce the best software.

Whilst the commercial software industry relies primarily on software licensing fees of new applications and upgrades to generate revenue, the business model for Open Source Software is entirely different. The costs and margins in developing commercial software become part of the price the customer pays for licences, upgrades and reseller margins.

Groups of individuals and/or organisations that develop Open Source Software cannot cost-recover through software licences so revenue streams are created by:

- Packaging and distributing Open Source Software, so that users do not need to download over the Internet (often more convenient to an end user);
- Customising versions of Open Source Software for clients (e.g. IBM has reportedly spent over US$1 billion[15] improving and extending the open source Linux operating system - all this development is itself open source and available to others to use or to build on further[16]);

[11] Like the many individuals that volunteer to work on Open Source Software projects, there are also a number of non-profit and various commercial organisations that volunteer to participate.

[12] Commercial mass-market software is a relatively modern phenomenon. Until about 1980 almost all software was created by hobbyists and distributed freely. With the commercialisation of software came the notion that the source code needed to be kept secret in order that the software could not easily be modified and passed off as another's work.

[13] Wikipedia, http://en.wikipedia.org/wiki/Open_source, also see the glossary in Section 12.1 for all the criteria that make up the definition for software to be deemed open source.

[14] An estimated 30% of OSS programmers are paid to write Open Source Software. See Rishab Ghosh et al, "Open Source Software in the public sector: policy within the European Union," *International Institute of Infonomics*, June 2002 <http://www.infonomics.nl/FLOSS/report/> (15 November 2003).

[15] Boyle, "Open source software: briefing to the Minister of State Services," chapter 1.

[16] IBM has partnered with Brazilian government organisations to launch two technical centres in Brazil, fully dedicated to the development of Linux technology. This is as a result of an agreement with the federal government to spread the use of the open operating system throughout the public sector. "IBM Launches Two Linux Centres in São Paulo," *IBM News*, 4 December 2003, <http://www-1.ibm.com/linux/news/linuxcenter.shtml> (20 December 2003).

- Providing software support services to users (i.e. in much the same way commercial software is supported through licensing fees);
- And providing business solutions through bundling various software with hardware.

In some instances, use of the term Open Source Software can be imprecise, in that it can refer to the Open Source Software programme itself, but can also be used in referring to operating systems (e.g., Linux), programming languages (e.g., Perl), or software components (e.g., a database such as mySQL). The term can also carry allusions to the community associated with Open Source Software or to a certain kind of licensing and intellectual property rights. It also can imply Open Standards, even though this is not necessarily the case (i.e., OSS can use a closed standard and still be OSS).[17]

Open Content[18]

Open content - coined by analogy with open source - describes any kind of creative work (e.g., text, pictures, audio, video, etc.) that is published under a non-restrictive copyright license and format that explicitly allows the copying of the information (e.g. GNU Free Documentation License[19], is used by Wikipedia where this definition was developed). A number of variations on Open Content licenses are in common use, and the term Open Content typically refers to the general principles of copying, re-use, and redistribution without charge, even though there may be other provisos (e.g., attribution of authorship).

[17] These distinctions are made more explicitly in section 5.1 Policy Framework below

[18] Wikipedia, http://en.wikipedia.org/wiki/Open_content

[19] The GNU Free Documentation License (GFDL) is a copyleft license for free content, designed by the Free Software Foundation (FSF) for the GNU project. The official text of version 1.2 of the license text can be found at http://www.gnu.org/copyleft/fdl.html

4

The Power of Open Source

4 The Power of Open Source

The greatest effects of technologies are social.[20]

The development of agriculture did not simply help farmers to become wealthy, the creation of written language did not only help Mediterranean traders to prosper, the invention of steam engines did not merely help railroad tycoons amass great fortunes. It is true that fortunes are made and lost with the help of technologies, and that various role players can prosper or suffer directly as a result. But individual winners and losers aside, large swathes of human society are changed profoundly and irrevocably by technology. Agriculture made village and urban life, and their many cultures possible. Written language laid foundations for schoolbooks, legal codes and the hypertext of the Internet. Steam powered the dynamos that electrified human societies, while railroads powered cities like Johannesburg, carrying away the heavy riches of mining and carrying in hostel-sheltered labourers from the countryside. From the earliest human inventions to the present day, each technology brings about lasting social effects, some intended and some unintended.

Technology and the triple bottom line[21]

Because the health and prosperity of a given society can be significantly affected by its adoption and use of technologies, the choices of and commitments to technologies ought to be made with great care. While most attention is typically focused on the economic costs and benefits of technologies in the short term (the proximate effects), the full costs and benefits can only be considered across economic, social and environmental dimensions over the short, medium and long terms (the ultimate effects).

Technologies are not neutral. While in particular instances they may be applied as tools to good or bad ends, they have, in and of themselves, tremendous transformative effects. Consider the social, economic and environmental changes that followed in the wake of telephones. Of transistors. Nuclear power. DNA sequencing. Indeed, a holistic view is needed.

In recent decades, greater care has been taken by many societies with regard to some technologies, particularly those that have notable effects on the environment, such as heavy industrial processing technologies, natural resource extraction and processing technologies, and most recently with technologies that make it possible to genetically modify organisms ordinarily consumed as food. So too have sensitivities to

[20] Neil Postman, *Technopoly: The Surrender of Culture to Technology*. (New York: Vintage Books, 1993), 1-20.

[21] The *triple bottom line* refers to an evaluation or summing up of costs and benefits across economic, social and environmental terms, and is one of the core concepts of sustainable development. See Wikipedia, http://en.wikipedia.org/wiki/Triple_bottom_line

social exploitation of vulnerable groups and even of entire societies started to change the dynamics associated with the introduction of new technologies to developing or disadvantaged regions. South Africa has consistently been at the forefront of such deliberations over the past decade.

Information and communications technologies

However, in the case of information and communications technologies (ICTs), decisions regarding which particular technologies are desirable or dangerous and whether or how they ought to be used have rarely reached the level of deliberation and sophistication more commonly applied in the case of industrial, environmental, agricultural or medical technologies, and South Africa is no exception. With ICT, care has typically taken the form of protecting the civil liberties of individuals or groups and the form of concern typically expressed in terms of access, as evidenced by efforts around the digital divide.

This is not to say that ICTs have been adopted blindly or willy-nilly. Rigorous analyses of financial costs and benefits or return on investment are commonly done on particular ICTs in order to support decisions within organisations. Which cellular technology to license, what telecommunications backbone to install, what licensing arrangements best support the needs of software users, and other examples abound, from the private and public sectors alike. But the other dimensions – the social and environmental – are taken into consideration far less frequently. Partly, this is because of the relatively low cost, wide proliferation, and decentralised decision-making regarding ICTs; to procure an accounting software package is on a completely different order of magnitude from procuring an iron ore smelter. This is also because the social and environmental effects of ICTs are not as easy to anticipate or measure in most cases. And while concern over the digital divide has been vigorous, access is but one of a broad and complex set of social factors.

The effects of ICTs

Information and communication technologies as a class of technologies have had and will continue to have broad and deep effects on South African society. The introduction of most of these technologies into South Africa will not be a matter of choice, or at least not a choice in the meaningful sense of the word. When commercially available optical computing comes along, or 3G cellular technology supported by a viable business model, these technologies will be adopted here, as they will be in most nations, sooner or later. To keep them out would be nearly impossible, and in all likelihood undesirable in any case. The development and proliferation of ICT is a global enterprise and phenomena that transcends national boundaries and is, on aggregate, an economic, social and environmental good in most parts of the world.

However, the process by which technologies are adopted, the extent to which contributions are made to the development, refinement, use, or support of the

technologies, and the range of applications of those technologies each can be greatly shaped within a particular country. Government policy, informed by social dynamics and economic realities, can have a significant effect on the costs and benefits – economic, social and environmental – associated with ICTs.[22]

In accepting a holistic view of the costs and benefits associated with ICTs, an appropriate set of criteria is needed to guide the related analytical and decision-making processes. These criteria should not exist in isolation as a special case for ICT, but rather should be aligned with and supportive of other policies and initiatives.[23] Further, they should be in harmony with, or minimally not in conflict with, the mores of the society in which they will be used.[24]

The Information Society and Knowledge Economy

The criteria also must take account of broader global and historical changes underway. Around the world and within South Africa, the creation, distribution and manipulation of information is becoming the most significant economic and cultural activity. Economically, information has taken its place alongside capital and labour as a fundamental factor of production.[25] But it has distinctively different characteristics from the other two: information does not add costs when it is shared. And sharing information – in the form of knowledge – directly and significantly determines the standard of living of individuals and communities.[26]

Today, the generation and exploitation of knowledge play a predominant part in the creation of wealth. The globally interconnected economy is a Knowledge Economy, and these economic activities take place within an Information Society. As a result, both economic and social upliftment are reliant on ICT.[27]

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[22] "ICT is as much part of a country's political arena as any other potential ends and means for development. ICT policy should be recognised as an area of debate and political negotiation rather than a neutral instrument for development." Chrisanthi Avgerou et al, "WITFOR Commission 1: Preparing for ICT," *WITFOR 2003 Proceedings*, 19 May 2003, <http://www.witfor.lt/?page=371> (28 November 2003).

[23] In particular they should support the objectives, principles, and priorities of NEPAD, being the vision and strategic framework for Africa's renewal.

[24] African ideas of community, identity and reciprocal communal obligations are particularly relevant. It is noteworthy that the South African resource centre for Open Source Software has taken the name 'meraka.' (See note 87 on page 77)

[25] Paul M Romer, "Increasing Returns and Long-Run Growth," *Journal of Political Economy* vol. 94 no. 5 (1986): 1002-37; Paul M Romer, "Endogenous Technological Change," *Journal of Political Economy* vol. 98 no.5 (1990): 71-102.

[26] The World Bank, *World Development Report 1999/2000*, (New York: Oxford University Press, 2000), 267.

[27] "White Paper on Science and Technology," Department of Arts, Culture, Science and Technology, November 1996, 8.

However, pervasive ICT within a society can also introduce new economic and social risks. Dependence upon imported ICTs sends money overseas. It can increase the economic costs as global markets price products to international standards, and as proprietary commercial ICTs trend toward near-monopoly circumstances the pricing power of monopolies tends to be used to serve private corporate profit motives. Dependence upon imported ICTs can also increase reliance on foreign skills, creating incentives for skilled workers to emigrate and disincentives for workers to develop the skills for which there is less of a domestic market. Because of the profit potential and in order to support a global customer base, the corporations providing ICT products are motivated to become ever larger, and with their size comes additional political and economic clout, which is typically used to further their own advantages as they enter new markets and also used to suppress new competitors.

The potential of open technologies

To help balance these risks while furthering the potential of ICT, a wide range of countries have turned to open ICT: Open Source Software, Open Hardware[28], Open Content and Open Standards. These are characterised by development through public collaboration, availability to anyone at no or little cost, no licensing fees, free redistribution, and access to the inner workings of the technology in question, which allows for subsequent modification and redistribution. The benefits of Open Source Software and Open Standards in particular have been well articulated and accepted within South African national government.[29] In a wide range of countries around the world, when technical and financial analyses are conducted to calculate total cost of ownership, return on investment, technical performance levels and other measures, Open Source Software proves highly competitive and frequently superior across many categories of ICT.

Yet the benefits of Open Source Software extend beyond these well-accepted technical and financial ones, and include important broader social benefits as well. These must be considered when evaluating the proper place of Open Source Software in South Africa.

Ten ways open source builds society

1. Open Source Software supports ICT spending with local companies, keeping that money onshore and thereby encouraging a valued, employable skills base to flourish domestically, which in turn keeps educated and skilled workers at home and encourages other educated and skilled workers to immigrate, drawing in talent.

[28] For example, the Simputer (see www.simputer.org)

[29] See particularly, Open Software Working Group, "Open Software and Open Standards in South Africa," National Advisory Council on Innovation, November 2003, 17.

2. Open Source Software, by recognising participation in software development at the level of the individual and not the corporation, and by shifting the value capture within the ICT industries from proprietary software development or packaged software sales to customisation and integration of existing Open Source Software, also furthers the success of small, medium and micro-enterprises (SMMEs), which can create opportunities for entrepreneurial success of SMMEs, and drive job creation as well as grassroots economic empowerment.
3. Open Source Software encourages hands-on, self-directed and experimental learning of 'primary source' material (i.e., source code) with peer-based support mechanisms for guidance and feedback, an empowering way of learning that is particularly important in an Information Society.
4. Open Source Software also provides, encourages and self-regulates a set of rigorous and broadly applicable standards and mechanisms for collaboration, quality assurance and distribution of ICT product (i.e., software), an empowering and team-oriented way of producing products, particularly well suited for the products highly valued in a Knowledge Economy, and proven across a range of industry sectors.[30]
5. Existing Open Source Software can readily be adapted for local languages, reducing barriers to access and to the mastery of skills while helping eliminate the marginalisation of those from cultures not ordinarily possessing a high level of fluency in one of the world's major languages.[31]
6. Each of these five benefits above also help counter a psychology of dependence on foreign countries and corporations to provide the innovations and solutions to problems faced domestically, even as Open Source Software helps reduce that dependence in practical terms.
7. Supporting the collaborative and communal culture of Open Source Software development also helps to balance the bare-knuckled culture of market competition in the ICT industries, supporting both social and economic upliftment.
8. Participating in the open source community raises the profile of South Africa and South Africans, helps to demonstrate its capabilities and its desirability as a progressive, technologically literate and knowledge-savvy nation, and provides a greater degree of participation in and access to the global "quick response" teams addressing criminal hacker and virus threats.
9. Open Source Software shifts the competitive advantage among ICT companies to value creation for the customer, removing recurring revenue streams such as licensing upgrades and ancillary software purchases (e.g., for interoperability

[30] see ThinkCycle www.thinkcycle.com, Creative Commons www.creativecommons.org, Cambia (Center for the Application of Molecular Biology to International Agriculture) www.cambia.org, Wikipedia www.wikipedia.org, and Public Library of Science www.plos.org for examples.

[31] See www.translate.org.za in particular

within a proprietary operating system or application suite) that benefit firms having longevity in an industry and that subsidise those existing firms to the disadvantage of SMMEs and start-ups who cannot compete on equal footing. The latter situation promotes a lock-in of economic winners in an industry, thereby reducing market competitiveness as well as economic transformation.

10. And the nature of open technologies can help move forward a culture of openness and transparency in government as well as society, promoting public access to government by facilitating information sharing and interoperability of ICT systems among stakeholders, and enabling government to be accountable to the people without being beholden to the proprietary software and standards of a private corporation.

A proactive policy regarding Open Source Software

All of this is not to say that Open Source Software is simply a social good and that it comes without risk. In terms of the good it is capable of providing, this will be limited by the extent to which Open Source Software meets sufficient technical and financial standards that enable it to match the needs and add value for various projects and to various stakeholders. Open Technologies represent only one of the possible approaches to technology, and proprietary technologies will continue to play primary and crucial roles for the foreseeable future in many if not most areas of technology.

Open Source Software also brings along its own risks. Among the more significant are the following:

- Greater reliance on local skills and capacity, which if second-rate or inadequate can introduce a range of problems
- Substantial financial and human costs associated with re-skilling a domestic workforce, and dislocation as some workers may not be able to acquire new skills
- Disruption of existing private sector companies having to change product and service offerings and facing the prospect of losing market share, declining revenues and employment levels while adapting to different market conditions
- Reliance on indirect motives to advance technologies, as the enhancement and distribution of software for profit is not a primary motive that drives its progress and may lead to slower innovation or even abandonment of projects

Some of these are risks associated with any kind of technological change, not particularly Open Source Software, and thus need to be managed in any case, while others might lead to opportunities for proprietary software to enter or re-enter a market niche to fulfil a market need where there is sufficient demand for it to be done at a profit.

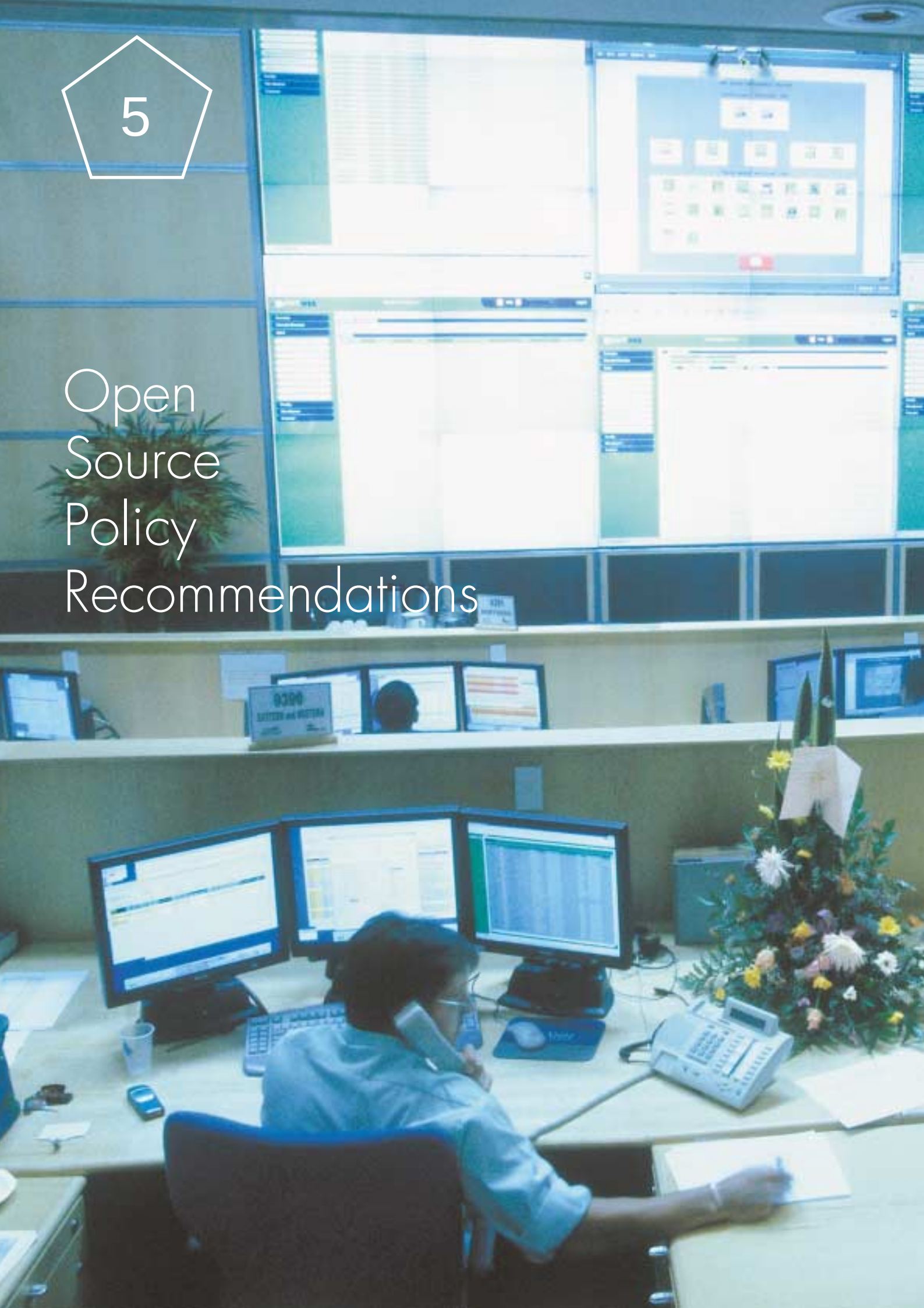
A Government policy that supports, enables and actively promotes Open Source Software will help realise the benefits to the extent possible, and help manage and

reduce risks. It will help build our society.[32] Such a proactive policy also takes a specific and practical step forward in adoption and use of ICTs in general, as decisions will be informed by a more holistic view of the costs and benefits of these technologies. Such a policy acknowledges the Information Society in which we live and the Knowledge Economy in which we work, and helps position South Africa to flourish and to exercise greater control over its own destiny, whilst acting in collaborative ways with other nations and role players.

[32] The draft declaration of principles for the World Summit on the Information Society (WSIS) provides even more far reaching and detailed statements in support of these statements. "Draft Declaration of Principles," World Summit on the Information Society Document WSIS/PC-3/DT/6 Rev 1-E, (Geneva: WSIS), 14 November 2003.

5

Open Source Policy Recommendations



5 Open Source Policy Recommendations

In August 2003, National Cabinet officially noted a set of policy recommendations proposed by GITOC. In light of the substantial research undertaken subsequent to the initial publication of these recommendations in February 2003, a set of refinements and enhancements to these policies are proposed below.

5.1 Policy Framework

In order to reflect the research findings with appropriate specificity and in order to provide a ready transition to the Programme for Change, the policy refinements have been presented within a logical framework.

This framework includes the following components: Role Players, Elements of Open Source, and Levels of Commitment.

Role Players

Five primary categories of role players:

- Government, which includes National, Provincial and Local governments in South Africa
- Private Sector, which includes for profit commercial entities operating in South Africa
- Labour, which includes organised labour unions
- Education, which includes primary, secondary and tertiary institutions as well as other training and skill development organisations, and
- Civil Society, which includes NGOs, CBOs and private individuals in South Africa

Elements of (OSS) Information systems

The framework includes nine elements of information systems – five associated with software solutions plus four associated with an enabling environment.

The following five primary elements of software solutions pertain to Open Source Software ("software solutions" as used in the current OSS policy):

- Programming Languages, and application development environments includes computer languages and associated development tools used to develop software. Open Source programming languages and application development environments are not proprietary, privately owned or controlled. An example of

a language is Python, while Zope is considered an object-oriented application development environment.

- Operating Systems are the foundation of an information system. They enable applications to interface with hardware. Operating systems are required for all hardware including mobile phones, ATMs, personal digital assistants, workstations and servers. Open Source examples include Linux, FreeBSD, knoppix, etc.
- Databases are common to many or most applications and used as a means to store complex and relational data. Examples of most commonly used open source databases include mySQL and PostgreSQL.
- Applications, Components and Systems, are Open Source Software programs themselves, their constituent components (both as part of a particular application and as separate sections of code), and integrated or interoperating Open Source applications. These will commonly be built using open source programming languages and require an operating system as well as a database. An example is a Hospital Information System or Patient Record System.
- Generic software tools are the programs used in most workstation environments. This includes word processing, spreadsheets, presentation and more recently email and web browsing. Current examples include: Open Office, Star Office and Mozilla. As the Information Society evolves more applications will become generic. With the convergence of communications and information technology, the next major generic application is expected to be telephony.

Four primary elements of an enabling environment for using OSS, creating Open Content and as a consequence of using OSS

- Community, which includes individuals and organisations participating in the use, creation, management, modification or enhancement of Open Source Software, as well as the guidelines and standards for engaging in those activities, including the channels, resources and content that make the community possible and functional; that is, the Open Source community and what makes it work effectively. Internet access and email access are pre-requisites for an OSS community.
- Legal, Intellectual property rights and Governance, which are internal and external rules by which role players manage their use of Open Source Software or participation in the Open Source community, as well as the rules that govern their relationships with one another that pertain to Open Source Software
- Information Interoperability, which includes standards and policies pertaining to interconnectivity, networking, authentication, data integration, and information access in a manner consistent with Open Standards.

- Content Structure, which includes standards and policies pertaining to data schema and information presentation in a manner consistent with Open Standards

Levels of Commitment

Four levels of commitment to Open Source Software and Open Standards:

- Use, which involves the use of any of the Open Source elements listed above
- Modify, which involves customisation or alteration of an Open Source element for the specific purposes of the user, without intention or effort to share or redistribute the element to the Open Source community
- Enhance, which involves modifying an element in a way that contributes to the enhancement of that element for the Open Source community or as part of a contribution to a registered Open Source development project
- Create, which involves initiating, registering and supporting an Open Source development project for the Open Source community

5.2 Enhancements of Existing Policy

In addition to findings from the research, the above framework has been used to better analyse and enhance current open source policy. This framework enables this improved understanding of the references to software solutions and open source environment, as well as the implementation of policy and measurement thereof.

The use of the Open Source Software policy framework to structure recommendations arising from the research resulted in the following set of tables. These show areas where each group of role players should place an emphasis, as indicated by an 'x'.

Government

OSS Elements	Use	Modify	Enhance	Create
Programming languages	x			
Operating systems	x			
Databases	x	x		
Applications, components and interoperable systems	x	x		
Generic software tools	x			
Societal: OS community	x	x	x	x
Legal, IP and governance	x	x	x	x
Information interoperability standards	x	x		
Content structure standards	x	x		

Table 1

Private Sector

OSS Elements	Use	Modify	Enhance	Create
Programming languages	x	x	x	x
Operating systems	x	x	x	
Databases	x	x	x	x
Applications, components and interoperable systems	x	x	x	x
Generic software tools	x	x	x	
Societal: OS community	x	x	x	x
Legal, IP and governance	x	x	x	x
Information interoperability standards	x	x	x	x
Content structure standards	x	x	x	x

Table 2

Labour

OSS Elements	Use	Modify	Enhance	Create
Programming languages	x			
Operating systems	x			
Databases	x			
Applications, components and interoperable systems	x	x		
Generic software tools	x			
Societal: OS community	x	x	x	x
Legal, IP and governance	x	x	x	x
Information interoperability standards	x	x		
Content structure standards	x	x		

Table 3

Education

OSS Elements	Use	Modify	Enhance	Create
Programming languages	x	x	x	x
Operating systems	x	x	x	x
Databases	x	x	x	x
Applications, components and interoperable systems	x	x	x	x
Generic software tools	x	x	x	x
Societal: OS community	x	x	x	x
Legal, IP and governance	x	x	x	x
Information interoperability standards	x	x	x	x
Content structure standards	x	x	x	x

Table 4

Civil Society

OSS Elements	Use	Modify	Enhance	Create
Programming languages	x	x	x	
Operating systems	x	x	x	
Databases	x	x	x	
Applications, components and interoperable systems	x	x	x	x
Generic software tools	x	x	x	
Societal: OS community	x	x	x	x
Legal, IP and governance	x	x	x	x
Information interoperability standards	x	x	x	x
Content structure standards	x	x	x	x

Table 5

5.3 Policy Recommendations

Whilst the preceding framework provides a model for understanding and policy enhancement, the merits of Open Source Software are so strong and appropriate for South Africa as a developing country that a move towards a proactive approach is recommended. The following table includes the current strategy and policy and the recommended policy enhancements with associated implementation actions and indicative budget. Whilst the current strategy does facilitate the entire gambit of OSS it does not address Open Content. An additional policy enhancement is included for this integrated element of the Knowledge Economy.

	GITOC Strategy[33]	**Policy enhancement**	**Implementation**
1.	Basic policy foundation: Government will implement OSS where analysis shows it to be the appropriate option. The primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by government to its citizens.	Basic policy foundation enhancement: Government must implement OSS unless analysis shows proprietary software is significantly superior. The primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by government to its citizens. When OSS is *not* implemented, then reasons must be provided in order to justify the implementation of proprietary software.	Communicate the needs and priority of this policy foundation in all areas to top management (Senior management service) Budget: R200k
2.	Opting for OSS where advantage of OSS and proprietary software are comparable: OSS offers significant indirect advantages. Where the direct advantages and disadvantages of OSS and proprietary software are equally strong and where	Opting for OSS where advantage of OSS and proprietary software are comparable: OSS must be implemented when choosing a software solution for a new project if the OSS and proprietary software offering are comparable,	Review all the current proprietary software in order to ascertain where

[33] OSS Working Group, "Using Open Source Software in the South African government," Government IT Officers Council, Version 3.3, 16 January 2003, <http://www.oss.gov.za/docs/OSS_Strategy_v3.pdf> (15 November 2003)

	GITOC Strategy[33]	Policy enhancement	Implementation
	circumstances in the specific situation do not render it inappropriate, opting for OSS will be preferable.	Current proprietary software must be migrated to OSS whenever comparable software exists.	proprietary software can be migrated to comparable OSS. Refer to migration guidelines (See the German migration guidelines in literature review) No extraordinary expected budget requirements.
3.	Create an environment for utilizing OSS: OSS has the potential of providing significant advantages to government. Steps will be taken to create an environment where OSS can be implemented in those areas where government and the country are correctly positioned to benefit from it by: Creating knowledge, understanding and capacity Promoting fair and impartial treatment of OSS in procurement processes Creating opportunities for trial use, through initiatives such as the sponsorship of demonstrator projects by the CPSI.	Create an environment for utilizing OSS: OSS has the potential of providing significant advantages to government. Steps must be taken to create an environment where OSS will be implemented in those areas where government and the country are correctly positioned to benefit from it by: Creating knowledge, understanding and capacity Developing *broader OSS Research and Development initiatives* *Enforcing and giving preference* to the use of OSS in procurement processes Creating opportunities for trial use, through initiatives such as the sponsorship of demonstrator projects by the CPSI.	Create an OSS Research and Development division within every government organisation. Appoint an OSS champion within every government organisation that promotes and oversees the development of OSS. The Education policy must actively favour OSS and Open Content training over

	GITOC Strategy[33]	Policy enhancement	Implementation
			proprietary software. Redevelop procurement policies to favour OSS above proprietary software. Budget: R800k
4.	Incorporation in e-government policy: OSS policies will be integrated smoothly with broader e-government policy and related strategies for the ICT sector in the country.	Incorporation in e-government policy: The OSS policy must be legislated and require the use of OSS in all government departments wherever possible. (The bill should include references to open standards and open file formats.)	Draft and table an OSS bill. Budget: R2m
5.	OSS for the citizenry: Government will seek to utilise the opportunities presented by the OSS movement to promote access to information for citizens, seeking more creative procedures to enhance access to government's electronic service delivery.	OSS for the citizenry: Government will seek to utilise the opportunities presented by the OSS movement to promote access to information for citizens, *driving* and *embracing* more creative procedures to enhance access to government's electronic service delivery.	In accordance with MIOS, meta data content standards must be developed by initiating a priority meta standards working group. Developing metadata standards to extend the MIOS. Mandate: DPSA Term: 1 year Budget: R1.2m

	GITOC Strategy[33]	Policy enhancement	Implementation
6.	Open content Not mentioned	Open content Government organisations must adopt an Open Content policy. All content should be open unless analysis on specific content shows that proprietary licensing or confidentiality is required.	No budget requirements.

Table 6

5.4 Policy Implications

Because there already exists an enabling policy on Open Source Software, the recommended policy enhancements imply a more proactive policy posture and add Open Content to the overall policy. While the implications internal to government will be minor and incremental when compared to the existing policy, the implications for broader society will be more substantial, even though they will take shape over the longer term and indirectly. With a shift from an enabling to a proactive posture, from use of OSS by enthusiasts to the institutionalisation of OSS across government, from emphasis on software to emphasis on systems and content, critical mass will be reached and the broader social effects will start to materialise.

Within government, the primary implications of the recommended OSS policy are transversal. Whilst improved education, skills development and awareness of OSS versus proprietary software are critical environmental enablers, OSS must be used in every field of work where government is involved in order to realise the benefits. Use of OSS in environments from libraries to farms, hospitals to road works is required to influence the Information Society (stakeholders) and Knowledge Economy (markets) in which government operates.

"In providing government information to its users, no one player can fully succeed without in this without the other players succeeding too. This truly needs to be a joint venture between all governments in South Africa."[34]

OSS reinforces open standards and open systems, "That's why it remains an unstoppable force, and why enterprise has embraced it for mainstream systems work. …we're going to continue to see *OSS* go out and make a difference in the real world."[35]

Costs

The cost implications identified here are those resulting from compliance with the policy, and not those associated with communication and monitoring of the policy.

DIRECT COSTS

On the whole, findings across the areas of research indicate that implementation and use of OSS results in an overall reduction in direct costs in the short, medium and long term. In some areas of software implementation and administration, the direct costs may rise, particularly where customisation and training are required, owing to the relative short-term scarcity of skills in the local market. However, the private sector will rapidly re-align its skill base and product/service offerings to meet Government requirements and demand, resulting in a normalisation of cost. Research indicates that other savings in direct costs, primarily in licensing fees, more than offset the

[34] Chris Higgo, Cape Gateway development team. See case study 8 in section 8.4.

[35] Chris Preimesberger, "Behlendorf: Open source at a 'tipping point'" *Linux.com*, 17 December 2003, <http://community.linux.com/article.pl?sid=03/12/17/1722217> (17 December 2003). Emphasis added.

increases, resulting in the overall reduction in direct costs. Other noteworthy direct cost implications are discussed further in each of the policy areas below.

Proponents of proprietary software have sponsored the argument that total cost of ownership of proprietary software is comparable to that of OSS[36], but in practice this has not been the experience in South Africa or globally to date[37].

Further, significant costs will be reduced by adopting open standards and open content. Estimates show that on average 70% of ICT budgets are dedicated to solving integration issues[38]. These are substantially reduced or avoided by using and providing open standards based interfaces, thereby avoiding complex or expensive custom integration approaches.

The empirical research shows that, at present, lower direct cost is the primary motivator for adopting OSS solutions in Government[39]. However, care must be taken that the lower direct purchase cost of OSS does not drive a practice where price is the primary driver of software selection, exclusive of value.

Government should expect lower direct costs of software implementation and operation from OSS versus proprietary software.

Appropriate holistic evaluation criteria for software should be developed and distributed to ensure that lower direct cost *alone* does not exclude proprietary software that is otherwise superior and delivers better value.

INDIRECT COSTS

The largest component of overall cost is that of managing change and related human factors, which are indirect costs that frequently are difficult to measure accurately[40]. Models for estimating these costs will have a substantial margin of error, as every environment will be different and dependent on the particular factors that enable

[36] August 2003, Cabinet approved an OSS strategy document which states a concern over total cost of ownership, "There are however still divergent views regarding the total cost of ownership". OSS Working Group, "Using Open Source Software in the South African Government," p 16.

[37] Fitzgerald and Kenny show a cost savings of 95% (out of a total 8.713m euros) over five years. The empirical research (see section 8.3) identified that OSS was always adopted – or is currently being tested – in order to save costs. This may not always be the case in practice, and hence a requirement for development of a business case for any specific project is highly recommended. Brian Fitzgerald and Tony Kenny, "Open Source Software can Improve the Health of the Bank Balance - The Beaumont Hospital Experience", MIT Sloan, (May 2003), <http://opensource.mit.edu/papers/fitzgeraldkenny.pdf> (8 December 2003).

[38] "Providing Tangible Business Benefits White Paper", Zapthink, August 2003, <http://www.ws-i.org/docs/WhitePapers/200308zapthink-ws-i.pdf> (29 November 2003).

[39] As discussed in the local primary research (see section 8.3).

[40] "IT staff rapidly adapted to the new OSS environment acted as leaders in the overall adoption of OSS. It also helped that the hospital already had a strong experience of UNIX applications to draw on. So the transition was not as radical as it would have been if the operation experience was simply based on GUI-enabled systems administration." See Fitzgerald and Kenny, "The Beaumont Hospital Experience," p13.

change.[41] Empirical research on OSS projects in South African government will need to be completed in order to develop a more accurate and locally grounded understanding of these costs, and to support predictive models for future OSS implementation projects.[42]

It is important to note that such indirect costs will be borne with any kind of change, proprietary software or OSS, and is more closely correlated to the degree of change than whether the software is proprietary software or OSS (e.g., a change from proprietary software Novell GroupWise to proprietary software Microsoft Outlook may carry greater indirect costs than a change from proprietary software Microsoft Outlook to OSS Ximian Evolution). Hence, the incremental indirect costs (if any) owing to OSS implementation *per se* must be isolated before definitive statements can be made comparing the indirect costs of OSS versus proprietary software.

Government should expect no significant variance in the indirect cost of software implementation and operation between OSS and proprietary software, that is, there should be no significant net change in indirect costs.

Create an environment for utilizing OSS

The basic policy foundation is the premise that OSS must be used. Government has a role to break – and effectively regulate - the monopoly controlled software environment, in a manner similar to other forms of economic empowerment. The need to favour OSS as opposed to treating it equally to proprietary software is important, in order to tilt the ICT environment so as to initiate change. Existing structures and ways of thinking have been developed within a largely proprietary software-only environment, which inherently favours proprietary software. The resources and structures in all organisations are built to manage proprietary software environments. The education and certifications of individuals and teams are built around proprietary software (e.g., Microsoft's MCSE certification, Novell's CNNE certifications, Oracle DBAs, etc.), and job descriptions as well as performance measures are often built around particular proprietary software skill sets, certifications and experiences.

As in any environment faced with the option to change, feelings of organisational fear and anxiety are associated, and change will be resisted. By changing the basic premise so that OSS becomes the default and special justification must be made to use proprietary software, extra energy must be expended to resist change, which lowers barriers to OSS in systems development environments. Both the stick and carrot approaches are required to make change happen and implementation ought to begin with the carrot as the dominant tool, and transition over a period of time to the stick in cases of non-compliance with the policy.

[41] In the US, at least one analysis of some examples of government use of OSS indicates that additional expenditures for maintenance and support of OSS may negate the direct savings from licensing cost in some cases. How closely the US public sector environment correlates with that in South Africa is unclear, suggesting caution in basing decisions primarily from such research. Nikos Drakos, Andrea Di Maio, and Robin Simpson, "Open source software running for public office," Gartner, 24 April 2003.

[42] Some work has been commissioned by SITA regarding these costs, see Roy Blume et al, "Designing and managing a framework for assessing results of use to OSS in South Africa: Phase 1," *BMI TechKnowledge Group*, May 2003.

Resistance ought to be expected among ICT decision makers and employees, requiring time, planning and understanding to help them adapt to the new policy.

Incentives and penalties must be put in place to help people make a good faith effort to implement the policy.

The ICT industry and the broader South African economy

The ICT industry will respond rapidly to the OSS policy, including some with alarm, as they will feel threatened by the shift towards OSS, and some with joy, as they will possess a new competitive advantage. Much of this response would happen in any case, as the existing policy is communicated more broadly.

Companies entirely reliant on proprietary software and who derive a substantial proportion of their turnover from government tenders will face the greatest challenges in the short term. Companies providing OSS-related services will face the greatest opportunities in the short term. Training companies and the broader education sector will be under significant pressure to modify their offerings to meet the growing demand for OSS-related skills and knowledge, but this pressure reflects demand for their offerings and hence opportunities to increase turnover.

Because OSS and proprietary software do not exist independent of one another, and because OSS will not displace proprietary software in terms of overall Government software expenditure in the foreseeable future, it is highly unlikely that the proprietary software industry will be substantially harmed, and may, in fact, benefit.[43]

ICT companies engaged in research and development (R&D) on proprietary software may reassess the potential of some of their areas of focus. Some have already begun to incorporate OSS into their product and service offering, in which case OSS is a driver of innovation and opportunity[44]. Some may abandon areas of research in which OSS is or is projected to be strong and refocus their R&D on other areas. This short-term transition period may cause some R&D dislocation, but given the overall small level of domestic software R&D and the positive R&D possibilities, the net effect for South African ICT industry should be minimal if not negligible.[45]

Some early OSS projects may involve a greater proportion of foreign companies or contractors because of an initial domestic skills shortage. This will stabilise as local skills ramp up. A secondary effect of this should be the attraction of OSS skills to South Africa as demand for OSS grows over the long term.

Some foreign providers of proprietary software may lobby their governments to express displeasure with the change in perspective on proprietary software by using

[43] For example, the proprietary Enterprise Resource Planning (ERP) system SAP can run on an OSS operating system and can use OSS databases, which gives it a new set of competitive advantages over proprietary software and thereby may open new opportunities for increased sales.

[44] The Jam Warehouse is but one example of a South African SMME ICT firm using OSS for R&D purposes. Read more about their OSS knowledge management system at: http://www.jamwarehouse.com/ktdownload_new/kthome.htm

[45] For a rehearsal of some of the arguments regarding the effects of OSS on an economy, see Joe Brockmeier, "Nuclear winter, more like global warming," *Newsfactor Network*, 19 November 2002, <http://www.newsfactor.com/perl/story/20032.html> (9 December 2003).

international trade channels and pressures. Arguments have been made that adopting OSS-friendly policies within a government amount to a reduction of free trade practices between nations.[46] While such arguments are difficult to sustain under scrutiny[47], they could be raised as trade issues between nations.[48,49]

As more companies gain experience with OSS and as more Government employees do as well, growth of OSS use among consumers is anticipated. General communication regarding OSS will also add to such growth. This will drive demand for OSS-related consumer products and services, such as PCs with OSS pre-installed and consumer-friendly 'shrink-wrapped' OSS applications. These represent opportunities for a range of consumer-oriented companies.

Strong Government support for Open Source Software has in the US and will locally result in strengthening and empowering a sustainable local software industry,[50] at the same time caution must be exercised regarding the power of proprietary software companies, who may trigger a backlash[51].

Incorporation in e-government policy

Every sphere and branch of Government will need to review its particular policies and strategies in light of the policy[52]. To minimise disruption, this could be done as

[46] Thomas C Greene, "MS in Peruvian open-source nightmare", *The Register*, 5 May 2002, <http://www.theregister.co.uk/content/archive/25157.html> (1 December 2003).

[47] In fact, it can be argued that the viability of OSS to meet government criteria in a given case shows that the market is working, as proprietary software in such cases would be adding insufficient overall value to support its overall cost.

[48] Agustin d'Empaire, "Microsoft's Big Stick in Peru," *Wired News*, 27 July 2002, <http://www.wired.com/news/business/0,1367,54141,00.html > (17 December 2003); Russell Pavlicek, "From Peru, with love," *Infoworld*, 2003, <http://archive.infoworld.com/articles/op/xml/02/06/03/020603opsource.xml> (29 November 2003).

[49] Concern over this issue has encouraged some governments to move more proactively toward adoption of OSS: "Faced with serious issues of software piracy and security—Asians, Latin Americans, Africans, and mid-Easterners all worry that they cannot pay intellectual property dues to developed countries (primarily the US) and [could] be held hostage at trade treaty negotiations." See Sharma Alolita, "Tracking the Open Source Front," *Linux for you*, July 2003, <http://linuxforu.com> (27 November 2003).

[50] See section 8.5 Research Discussion for more on the link between OSS and a sustainable South African software industry, as highlighted by the Minister of Science and Technology, Ben Ngubane, at the World Summit on Information Society (December 2003).

[51] The government of Peru was confronted by the United States during bilateral trade negotiations for engaging in unfair trade practices in ICT after Peru passed its OSS legislation. See Greene, "MS in Peruvian open-source nightmare."

[52] In the UK, Australia, New Zealand and other countries, Governments have created a single department or agency to be responsible for E-Government policy. In South Africa while E-government is handled by the Department for Public Services and Administration, use of ICTs are a distributed policy function and seen as an enabler for better practice. The following policies and legislation are a non exhaustive list of those impacted: The Electronic Communications and Transactions Act [No. 25 of 2002], the Promotion of Access to Information Amendment Act [No. 54 of 2002], the Copyright Amendment Act [No. 9 of 2002], Public Service Regulations, The State Information Technology Agency

part of standard, regular (annual) review, strategy and planning processes, and also as part of the required master systems planning (MSP) processes[53]. Primary areas affected by OSS will be staff skills development, ICT procurement, and ICT administration. More significant will be the effects of Open Content policy, requiring substantial evaluation of current management of content, followed by development of strategies and plans to implement the Open Content provision of the policy. Nearly all employees and many vendors, consultants and contractors will be affected by this provision. While the cost and complexity of adapting to the change will be minor, it will be a substantial shift in the psychology of producing and working with content, and may require rethinking of business processes, contracts and communications with stakeholders. Note that part of this latter change is already underway as Government adapts to the requirements of MIOS.[54]

Introducing OSS legislation will also provide an opportunity for stakeholders to engage with Government on the policy and to provide their inputs in the process. The legislation could be construed to have implications for international trade, and will need to be crafted in a way that does not imply the creation of barriers to trade in proprietary software.[55] Because the goal is not to disadvantage proprietary software, but to utilise different criteria for understanding the costs and benefits of proprietary software and OSS and thus for making decisions regarding which would be more appropriate and advantageous, drafting such language should not be a challenge.

As can be seen in the creation of the well-regarded DPSA policy, "Handbook on Minimum Information Interoperability Standards", creating policy is insufficient on its own. Policy implementation requires committed resources, efforts and energy.

Citizens in general

South Africans working in companies that use or will use ICT will be affected to the extent that OSS is introduced in their place of work, with Government employees and employees of OSS vendors as specific instances. Employees of organisations active in the ICT industry will be affected in similar ways.

Consumers using or purchasing ICTs, particularly personal computers, may be affected by OSS directly as they select or learn to use OSS. They will also be affected indirectly, as OSS is more reliable, secure, robust and drives the overall cost of ICT and access to ICT down over the medium to long term. With OSS more

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Amendment Act [No. 38 of 2002], Electronic Communications Security (Pty) Ltd Act [No. 68 of 2002], National Council for Library and Information Services Act [No. 6 of 2001], etc.

[53] Public Service regulations were amended with effect January 1, 2003 to ensure that all departments submit an information plan - to support the business of that department - that includes both infrastructure and operational components. Government Notice no. R. 1346 http://www.dpsa.gov.za/docs/regulations99/2002/E-GovRegulationsRevised%20Nov2002.doc

[54] "Handbook on Minimum Information Interoperability Standards (MIOS)", and "MIOS Implementation Initiative."

[55] The government of Peru was confronted by the United States during bilateral trade negotiations for engaging in unfair trade practices in ICT after Peru passed its OSS legislation. Declan McCullagh, "The politics of open-source software", *News.com*, July 14, 2003, <http://news.com.com/2010-1071_3-1025268.html?tag=fd_nc_1> (1 December 2003).

readily adapted to local languages, barriers to skill acquisition and use of ICT will be reduced, aiding the adoption of ICT among a broader range of consumers.

Other citizens and residents will be affected indirectly through improved government service delivery, domestic job creation, retention of skilled labour, and access to government content that is Open Content.

Most of the benefits of OSS to average citizens are indirect. The reliability, scalability and robustness of OSS will only be realised after change occurs.

Create an environment for utilizing OSS

Regulating the environment in which OSS operates is a core government function. The tendency towards transversal operations, developments, and integrated governance is clear, although in practice difficult to implement. However, every government organisation that has an information technology component currently has proprietary software-specific developments and operations. As such, each of these components will need to research and develop capacity, skills and knowledge regarding OSS and Open Content in order to initiate the process of change and hence reduce the friction of change. Each of these components must utilise all the resources that they have currently available – without requiring additional budgetary allocations – to enable this change. This is done through mobilizing and redirecting/reprioritising all resources allocated to training, recruitment, organisational development, business process engineering, research and development, travel and any other development resources in the current budget mix.

Outside of Government as an institution, an environment for using OSS will require an appropriate legislative and regulatory framework for intellectual property rights (IPR). OSS and Open Content include fundamentally, approaches to various aspects of ownership. With most IPR having been developed in a proprietary software and proprietary content environment, it will need to be reviewed in order to understand the extent to which existing IPR is supportive, neutral or obstructive to the implementation of OSS and Open Content policy. In particular, the rights regarding authorship, publication, modification, use, purchase and sale will need to be examined. Where these rights can be unbundled and respected where appropriate, more effective realisation of the [56]potential of OSS and Open Content will be possible.

Government is a significant procurer of ICTs but remains largely unsophisticated by comparison to the private sector. Improved knowledge, skills and processes are generally required irrespective of any decision to select OSS or proprietary software.

Open content

Similar to findings on OSS, experience with appropriately regulated Open Content has consistently resulted in lower overall costs and greater efficiencies. Reasons for this include the reduction in duplication of content creation and management,

[56] Meta data standards are a prerequisite for effectively implementing Open Content. This is addressed in the MIOS implementation initiative and current policy documents. "Handbook on Minimum Information Interoperability Standards (MIOS)", and "MIOS Implementation Initiative"

improved quality of content through collaboration, improved access to information and increased knowledge as a result.

> *"The real danger now is that we (the national, provincial and local governments in South Africa) become islands of information. Each government may do an excellent job in providing their information in solo, but the best-case scenario here for the user of government information would be an island of excellence, forming an incomplete picture of the government-information-sphere.*
>
> *The tragedy of this scenario is not just for the citizenry, but for government, because government would be one of the biggest users of its own information (once it exists in a useful and accessible format).*
>
> *To link these islands of information together, into a web of information, and thereby realise the additional and enormous value of the complete picture, requires a set of agreed government content structure standards."*[57]

Whilst the Access to Information Act has opened up channels for access to information it does not deal with the issues of copyright, copyleft[58] or Open Content. The Act begins with the presumption that stakeholders are aware of what information exists and are willing to engage in identifying the owners of content in order to access the information. The principles of Open Content extend the principles of access to information by enabling all stakeholders to not only identify what content exists, in what language, but also to eliminate the heavy costs and processes required to access government information and knowledge.

In the media sector Open Content is most often associated with direct losses, predicted losses or reduced profits. This is not necessarily the case, and the provision of Open Content from Government will create new market opportunities and provide material for writers, artists and other creators to use. However, since government is not in the business of selling content, an Open Content policy does not have any direct cost requirements.[59]

Adopting an open content policy empowers access to information and results in more transparent, efficient and effective governance.

Software engineering principles

As identified and globally recognised, the issues of security, sovereignty, skills development and vendor independence are each value-added benefits of using OSS.

[57] Chris Higgo, Cape Gateway development team. See case study 8 in Section 8.4.

[58] Copyleft is a general method for making a program as free software and requiring all modified and extended versions of the program to be free software as well. See http://www.gnu.org/copyleft/copyleft.html

[59] Private media are not necessarily dictating the way forward on this matter. In recognition of the benefits associated with Open Content, the British Broadcasting Corporation (BBC) will begin putting its entire archive of content across all media online under Open Content licensing in 2004. Another major example of government-provided Open Content is the US National Air and Space Administration (NASA). Danny O'Brien, "Something Completely Different," *Wired Magazine*, November 2003<http://www.wired.com/wired/archive/11.11/start.html?pg=1> (1 December 2003).

The common system elements - being operating systems and databases - are key areas of concern for information security specialists. Due to the collaboration and open approach, OSS has proved itself to be more secure, stable and robust than proprietary software, especially in these elements. On the fringes of OSS collaborative projects, where less collaboration has occurred, the software is less robust reliable and secure, but because it is open, it has a greater propensity to be developed accordingly.

Governments have expressed direct concern over other government involvements in proprietary software developments, and because the source is not available in proprietary software, there are opportunities for foul play[60]. By using OSS, one has a view of the source of the software and hence the ability to identify any particular concerns. Thus OSS provides sovereignty and direct control over systems developments.

Open source enables vendor independence as its inherent principle. Proprietary software - by definition - requires proprietary support, maintenance and enhancement. However, OSS alone does not ensure vendor independence, and successful implementation of the policy will require adherence to open and transparent processes in the design, development and implementation of all software, according to good and best practice, for OSS as well as proprietary software.

Due to the inherent nature of OSS, its adoption drives better general understanding of software. An outcome of a proactive OSS policy will be generally improved software engineering in government.

Software Engineering Management[61]

Whilst government has a long history of managing the social and economic areas of national responsibility, use of ICT as a business enabler in government, is relatively new. Just as people who are responsible for the building and maintenance of roads need to have a good understanding of civil engineering, in order to build roads, bridges and tunnels, and those responsible to provide healthcare services need to have a good understanding of medicine, so do those responsible for the development and maintenance of systems[62], require a good understanding of software engineering. Issues such as the software life cycle, configuration management, people management and team organization, managing software quality, cost estimation and project planning and control all need to be well understood by business managers responsible for systems development.

[60] See in particular the comments of Brendan Boyle, Director, E-government Unit, New Zealand Minister of State Services. Boyle, "Open Source Software briefing to the Minister of State Services."

[61] Hans van Vliet, *Software Engineering: Principles and Practice, 2nd Edition*, (London: Wiley, August 2000), p 3.

[62] Although Public Service Regulations now insist on the submission of annual departmental IT plans and reports (Government Notice, Department of Public Service and Administration, No. R.1346, 1 November 2002), there is no departmental requirement for a specific post with the responsibility for systems development and maintenance. This usually falls part of the responsibility of the Government IT Officer (GITO), whom may have nothing to do with the business or systems in various departments.

This requires interacting with the ICT department or SITA who are deemed responsible for the development and maintenance of application software[63]. In order to manage these areas of responsibility, those managers involved with the development of new systems should be familiar with requirements engineering, software architecture, software design, object-oriented analysis and design, software testing and software maintenance. Software development tenders should include formal specifications, user interface design, and elements of software reusability, software reliability and software tools. Currently, many of these skills and processes are inadequate, inconsistent or absent within government. With the implementation of OSS policy, the opportunity arises to explicitly focus on addressing these shortcomings. This will benefit not only OSS-based systems, but will lead to better proprietary software systems as well.

Good systems bring important business benefits[64]. In the business of government, good systems bring economic and social developments.

A clearly defined structure of systems results in: reduced complexity in ICT infrastructure, best return on investment in existing ICT infrastructure, flexibility to make, buy, or outsource system solutions, overall reduced risk in new investment, and the costs of ICT ownership, and hence faster, simpler, and cheaper procurement.

A clear strategy for procurement and system migration leads to simpler buying decisions, a faster procurement process and flexibility for business growth and restructuring.

Improved defined software structure and modularity lead to a more efficient overall ICT operation: reduced software development, support, and maintenance costs, more application portability, improved interoperability and easier system and network management, improved capability to address critical enterprise-wide issues like security, easier upgrade and exchange of system components and improved return on existing investment, reduced risk for future investment.

These factors relating to systems and software also relate to content. That is, a clearly defined content structure[65] results in reduced complexity in government information, best return on investment in communications content delivery, flexibility to create, buy or outsource content development, more efficient communications, reduced content development, support and maintenance costs, more content portability and reduced risk for future investment.

By ensuring access to integrated information across multiple organisations, government realises maximum flexibility for service delivery and restructuring, real

[63] State Information Technology Agency Act [No. 88 of 1998], http://www.gov.za/acts/1998/a88-98.pdf

[64] "The Business Executive's Guide to IT Architecture - Why IT Architecture is Crucial to the Success of Your Business", The Open Group, undated, <http://www.opengroup.org/public/arch/p1/oview/> (4 December 2003), Overview.

[65] Tony Gill and Paul Miller, "Re-inventing the Wheel? Standards, Interoperability and Digital Cultural Content", *D-Lib Magazine*, January 2002, <http://www.dlib.org/dlib/january02/gill/01gill.html> (November 23 2003).

savings (especially when re-engineering business processes following structural or socio-political changes) and faster development periods.

These issues all show that open systems and open content built on open standards may be considered more important to good systems practice than Open Source Software.[66] Nonetheless, since Open Source Software is built using - and upon - open standards, it is an enabler of open standards and hence – in addition to all the other benefits OSS offers - it is an effective means to drive greater adoption of open standards and open content.

A focus on open standards is as important as OSS itself. Effective software engineering principles and management are critical to success in this area.

[66] Adi Attar of the CSIR Open Source Centre (which is also known by its unofficial name of 'Meraka') states, "I would even go as far as to argue that a proprietary implementation of an open standard is more useful than an open version of a non-standard." Adi Attar, "re: Early draft", 10 December 2003, personal email, (10 December 2003). Attar is with Meraka - the CSIR Open Source Centre.

6 Programme for Change

6 Programme for Change

Whilst the preceding table shows current policy and provides policy enhancement recommendations, the following table shows the current strategy, and provides recommendations for strategy enhancements.

On the whole we find the current phased strategy most appropriate especially with regards to the development of value, capacity and support. This strategic approach is widely used within the larger ICT environment, will be well understood and acceptable to most role players, and reflects good practice internationally.

One of the potential risks – or opportunities - in this strategy, stems from its decentralised nature. A main challenge is to co-ordinate and facilitate the strategy in a cohesive manner. The current strategy is transparent and regular reports - such as this – must be produced to monitor progress and drive accountability.

The Shuttleworth Foundation (TSF) has put forward a strong proposal to establish the Open Source Coalition (OSC). Its goals are focused and strongly supportive of a number of different elements of this strategy. Most importantly the OSC has obtained committed funds of over R10m from private sector organisations, TSF, Hewlett-Packard and Sun Microsystems to be spent on accelerating OSS awareness in South Africa over the next two years. Further, CSIR has committed R2m towards the Meraka project (officially the CSIR Open Source Centre), SITA has a committed budget of R18m to be spent on OSS R&D over the next financial year. We suggest that more resource is committed towards OSS procurement and policy developments from GCIS, DOC, DST and DPSA and other national departments.

Whilst the environment for building Open Source Software and open content has matured well over the past year, not all the planned actions in the current strategy have been completed, and some are not yet initiated.

The following recommendations offer options to build on the strong foundations already established. Any deviations come from the new policy recommendations regarding a more integrated proactive approach towards OSS.

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Introductory phase The purpose during this phase is to create knowledge, understanding and an environment where OSS can be implemented in areas in Government where conditions favour it. This phase is already in progress. Activities are described below.	**Introductory phase** This phase is being largely successful and sound. On the whole more commitment must be applied to this area. The Open Source Coalition (OSC) must be formalised and operationalised.	High	High	High	Low	High
Information dissemination Because the level of knowledge and understanding of OSS within Government is still relatively low, information dissemination is an important feature of the initial phase. This includes briefing sessions, publishing information through appropriate media, maintaining the OSS website and presentations to relevant interest groups.	Information dissemination All government departments must be included in learning, content development, consultations and communications functions. People outside the IT and ICT environments must be included in briefings, especially communications and procurement staff. The bridge between the MIOS, open content and OSS must be established through involvements of different spheres of government, communications and human resource development components.	High	High	Medium	Low	Medium

[67] OSS Working Group, "Using Open Source Software in the South African government." As adopted by Cabinet (August 2003).

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Trial development and use Encourage use of OSS on a trial basis. Developing enhancements to software by using the OSS model will be promoted. This includes continuation of the sponsorship of OSS projects that the CPSI has embarked on.	Trial development and use OSS awards of a significant nature must be established. SITA must be held accountable against the serious budgetary commitments (R18m for 2004) and responsibilities that they committed to.	High	High	High	Medium	Medium
Consultation: Create opportunities to consult with users, developers and researchers. An OSS forum is to be established to involve all stakeholders.	Consultation Linux User Groups (LUGs) that are based in the major cities and the Internet Society. These organisations, especially the LUGs, must be supported and not duplicated. Academics and ICT practitioners must be convinced to become involved.	High	High	High	High	High

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Research: The research agenda will be based on the following objectives: a. Develop a consistent picture of the needs and expectations of Government with regard to OSS. b. Develop policies and legislation relevant to the use of OSS in Government. c. Develop research and evaluation instruments to assist decision makers in the identification and evaluation of opportunities and areas for the appropriate use of OSS. d. Develop a definition of the roles of the various sections of Government in the area of OSS, including the roles of SITA and ITAC. e. Identify opportunities and identify pilot applications for the use of OSS in Government. f. Define a clear longer-term research agenda to support the OSS strategy.	Research Whilst some progress has already occurred, this is an area of risk since resources have been diverted from the issue at hand. OSS requires participation and not just talk about participation. The longer-term research agenda must be established with priority. Research should have a focus on E-government and migration and less focus on sophisticated applications development.	High	High	High	Medium	Medium
Consolidate support capacity Ensure proper mobilising of existing capacity, plan further expansion and build the necessary capacity where successful trial implementations can be replicated.	Consolidate support capacity Governing bodies of key stakeholders, universities, education organisations and labour must be included in this process. Areas of responsibility must be agreed upon.	Medium	High	High	Medium	High

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Including OSS utilisation in short and medium-term plans Planning to convert to OSS should be clearly indicated in IT plans of national and provincial Government departments.	Including OSS utilisation in short and medium-term plans Resources must be assigned to managing and monitoring the ICT plans. Individuals must be trained to provide critical responses to these plans and broader community reporting of achievements against plans must be communicated.	High	High	Medium	Medium	Low

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Level playing fields Avoid any bias against OSS solutions in Government procurement procedures. Wherever possible, avoid acquisition of hardware that does not support OSS. ITAC will ensure that tenders and contracts are free of any specifications that unjustifiably discriminate against OSS. The Procurement Standing Committee of GITOC will work with SITA to find the best practical ways of implementing this principle. The Communication Strategy mentioned below will, among others things, aim to remove any biased mindset that may exist among relevant users and decision makers. Tender evaluation teams will be equipped to deal with the relevant options fairly.	Level playing fields The current environment shows a monopoly. Regulate software procurement in all government organisations to ensure that any proprietary software, especially Microsoft, is not favoured without proper motivation and justification. ITAC must be regulated to ensure that they meet objective criteria. Procurement reporting must demonstrate OSS growth. All procurement environments must be consulted and trained on basic principles of systems development. An external procurement oversight committee made up of individuals (from all key stakeholder groups) should be established by the key stakeholders and OSS forum.	High	High	High	Medium	High
Communication Develop a comprehensive OSS communication strategy that will ensure optimal knowledge and understanding of, and commitment to OSS. The strategy is to target the political level, departmental management, IT professionals and computer users in general.	Communication Assign responsibility and ensure accountability through regular public reporting. Establish common communication standards through implementation of the MIOS and establishment of metadata frameworks (e-GMF) and standards (e-GMS).	High	Medium	Medium	High	Medium

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
	Open content Initiate a process to amend the Copyright Act – or equivalent - so as to facilitate open content in government.	High	High	High	Medium	Medium
Enabling phase	**Enabling phase**	High	High	High	Medium	High
Implementing plans compiled during the previous phase Put in motion the plans developed during the introductory phase in order to: a. Improve the availability of expert guidance; b. Make training more accessible; c. Strengthen software development assistance; and d. Uphold non-discriminatory procurement criteria. Develop systems and procedures needed during the mature phase described below.	Implementing plans compiled during the previous phase Until we have a truly open and competitive software environment, it is recommended to empower OSS by favouring it, especially in areas where it is proven. Points a-c remain, with a focus on procurement regulation. Systems and procedures must be kept as simple and open as possible.	High	Medium	High	Medium	Medium

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Software selection The aim of promoting OSS will not infringe on the existing authority of specific groups or individuals with regard to software selection. Such selections will continue to be based on existing guidelines, such as the e-Government House of Values. With the assistance of SITA and others, guidance will be given to users regarding appropriate tools to: a. Compare different software solutions, OSS and otherwise, objectively before making a choice; b. Compile decision support analyses to confirm that OSS implementation will have advantages. The guiding principle of using open standards will apply for all Government software procurement, development and maintenance.	Software selection After analysis of the tools prepared to date, we recommend a simpler approach. In order to break the stronghold of proprietary software in government, a more proactive approach is required. Token OSS projects are not sufficient to stimulate change. OSS must be favoured unless proven otherwise. The point of departure for software selection must favour OSS.	High	Medium	High	Low	Low
Software development When planning software development, all government institutions will consider the advantages of using the OSS model and using OSS platforms.	Software development For large-scale applications and systems development the MIOS must be adhered to for minimum interoperability. Proven open standards must be observed. Tenders must be audited to ensure they meet these standards.	High	Low	Medium	Low	Medium

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Capacity development Capacity will be developed to enable the following: a. A certain minimum level of training for all prospective users. b. More in-depth training for champion users, from say between 1 out of every 5 to 1 out of every 10 users, enabling them to render immediate assistance to other users around them. c. Expert training for application managers, say approximately 1 for every 100 users. Such individuals will typically be part of the IT section of the organisation, or if it is a small organisation in the organisation of a service provider. d. Availability of highly expert specialists in service provider organisations such as SITA, able to deal with complex problems as well as development needs. Skills development to facilitate joining up with some existing OSS projects will be investigated. Government contributions could be valuable, especially with respect to security and robustness of existing projects.	Capacity development Formal training must be balanced with real OSS development experience. Training must be performed only if the skills developed in training can be enhanced with real experience (i.e. if users are trained on Linux, they must begin to use Linux on a day to day basis). Focus on open systems, interoperability, policy and software engineering principles. Stakeholder groups will require different types of training, governing bodies and senior managers, procurement officials, communications staff, and ICT professionals. Transversal projects that include a number of different government organisations from different spheres must be initiated. Generic principles on the appropriate use of ICT must be established. Focus on open systems, open content, interoperability, policy and software engineering principles.	High	High	High	Medium	High

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Partnerships Government will seek partnerships with all sectors in South Africa, with the rest of Africa and the world, for promoting development, implementation and support of OSS.	Partnerships Partnerships will emerge and should not be forced. The OSC appears to be well positioned in this regard. Structures and frameworks for governing partnerships and responsibilities must be assigned. Transparency is essential to drive greater accountability.	High	High	High	High	Medium
	Content gateway Ensure that government content gateways conform to agreed open standards.	High	High	High	Medium	Medium
Mature phase	**Mature phase** A true competitive software environment must exist before this phase is reached.	Medium	High	High	High	Medium

GITOC Strategy[67]	Strategy enhancement	Level of involvement from other stakeholders				
		Govt	Civil Society	Education	Labour	Private sector
Systems and procedures Have systems and procedures in operation so as to: a. Persist with communication to maintain general confidence in the viability of OSS solutions; b. Provide Certification for OSS developers; c. Undertake assessment and certification of software; d. Maintain clusters and networks of support; e. Promote OSS development and use on the continent.	Systems and procedures Systems and procedures will have evolved to ensure that information systems are open and that software procurement is enabling a competitive software industry. Government should not be in the business of technology or individual technical certification. Good systems must be in place to ensure appropriate management of technology infrastructure and service levels. Resources and plans must be in place to plan for the next wave of new technology in the age of convergence.	Medium	High	High	Medium	High
Levels of implementation Depending on circumstances, implement OSS at different levels, i.e.: a. Using existing OSS; b. Procuring OSS software; c. Modifying existing OSS for internal use; d. Modifying OSS software and contributing the modifications to a collective development effort; e. Managing and supporting own OSS projects.	Levels of implementation A broad base of Open Source Software will be used across government, and other industries.	Medium	High	High	High	Medium

7

Promoting and Measuring Progress

7 Promoting and Measuring Progress

Policy implementation is noted as a challenge in government and an area that is resource intensive. While the majority of resources should not be diverted from the implementation of the policy, some appropriate allocation of resources[68] must be contributed towards the promotion and measurement of progress of the policy.

7.1 Policy promotion

Current means of communicating ICT related policy operate through various channels.

- Firstly, the GITOC must be used, yet due to the transversal nature (i.e., the communications and training implications) of OSS and Open Content, as well as because of anticipated resistance to OSS, these communications in the past have often gone little further than the GITOs themselves[69].
- Secondly, the heads of Government Departments meet regularly, as do Ministers at the national level and Members of Provincial Executive Councils (MECs) who meet at regular MINMEC meetings. With most new policy implementations the Department of Public Services and Administration also send a small team to communicate directly with senior top management at their departmental meetings. These channels must be used in a coordinated fashion.

OSS policy should be championed at every level and champions must be recognised through an OSS award process to be determined.

The current policy includes an action to create a communications plan[70]. Although there is some progress apparent in this regard[71], it has not been a priority for the

[68] Budget allocations to promotion and measurements of new products vary across industry and sector. Three (3%) to nine (9%) percent of total resource should be allocated to this area.

[69] The following cited reasons for resistance to e-government apply: fear that the technology will make them obsolete, that they will lose their jobs; fear that they will lose power and "turf" that they have created in the current system; unfamiliarity with technology and fear that they will look stupid in front of others if they do not use it correctly. Some call this phenomenon "technical shock"; fear that technology will mean more work for them such as, for example, having to answer constituent e-mail; belief that they have nothing to gain professionally from adapting to new technology, and nothing to lose if they refuse; or concern that new, automated processes will mean fewer opportunities to receive unofficial payments or bribes in return for using their discretion to help certain parties. The Working Group on E-Government in the Developing World, Pacific Council on International Policy, "Roadmap for E-Government in the Developing World", (April 2002), http://www.pacificcouncil.org/pdfs/e-gov.paper.f.pdf

[70] "*Action*: Develop the Communication Strategy, *by* GCIS, *by* End Feb *2003*," OSS Working Group, p.28.

[71] Nhlanhla Mabaso, *personal telephone discussion*, (8 December); Aslam Raffee, *personal telephone discussion*, 2 January 2004. Rafee is a senior manager at the Department GCIS.

department currently responsible. The development and management of a communications strategy must be assigned to a responsible entity, and made into a priority.

7.2 Measuring progress

Transparency drives greater accountability, which in turn drives progress.

Adoption of the policy will be reported regularly as part of the current Public Service Regulations[72]. These reports must be audited against the OSS policy and either the reports themselves or aggregations thereof must be made publicly available.

Individuals and organisations that do not comply with new policy should be held publicly accountable. At minimum the DPSA must regularly, promptly and openly publish which departments are not submitting bi-monthly ICT plan reports and which are OSS policy compliant.

Annual reports should be commissioned to third parties to perform an audit of overall progress against policy. These reports should similarly be published.

Subsequent to finalisation of a national e-strategy, metrics should be developed to monitor policy adoption in the medium to long term.

[72] Public Service regulations were amended with effect January 1, 2003 to ensure that all departments must submit a bi-monthly report against their information plan - to support the business of that department - that includes both infrastructure and operational components. See Government Notice no. R. 1346 http://www.dpsa.gov.za/docs/regulations99/2002/E-GovRegulationsRevised%20Nov2002.doc

8

Supporting Research

8 Supporting Research

8.1 International Public Sector Situation Analysis

Both vendors and OSS groups have been lobbying governments all over the world to take a position on the OSS versus proprietary software debate. This has forced many governments to formulate policies for dealing with these issues. This debate and resulting policy proposals will be explored in more detail below.

The following section is a "snap shot" of the current drivers and usage of OSS throughout the public sector in Asia, Europe, North America, Australasia and South America. Countries were examined that demonstrated an active awareness or usage of OSS within the public sector. The information was primarily gathered via desk research, by searching various OSS user groups and government websites, and through various online news sources.

The full analysis is located in the appendices at the end of the report and illustrates that governments are supporting OSS initiatives by:

- Using OSS to fulfil public sector functions
- Mandating the use of OSS in government departments
- Channelling funds into OSS development

What is driving OSS choice in the public sector?

The following section examines several broad factors that drive the development of OSS policies within the public sector. However before proceeding it is important to understand that within public sector OSS development there appears to be a clear division between the server and workstation market. From our research it appears that many of the governments use OSS on the infrastructure side, such as Apache for web servers, but the use of OSS, such as Open Office, on workstations is very limited.

Main factors driving the development of OSS policies within the public sector include:

Main drivers of OSS policies in the public sector: International	
• Total cost of ownership • Security • Intellectual property rights	• Increase in competition and vendor independence • National interests

Table 7: International drivers of OSS public sector policy development

Total cost of ownership

The OSS debate has been fuelled to a large extent by the rising cost of proprietary software. Hence most countries surveyed, especially developed nations, indicated that their primary rationale for moving towards adopting OSS was financial. Governments have however realised that even though there are no upfront licensing costs associated with the OSS, there are still costs associated in terms of ongoing maintenance, configuration, integration and transition costs including training. A major consideration being taken into account by government is the cost of changing systems including the interoperation with other government systems and the existing base of hardware and software.

Security

The fear that proprietary software is not as secure as OSS as the source code is not available for perusal has driven many countries to consider OSS. This is also driven by the belief that the United States government is affiliated with Microsoft and the recent spate of virus attacks that targeted Microsoft operating systems.

Hence security is stated as one of the most important rationales for OSS policy implementation. The foundation of this issue is that in order for the state to perform its obligations it must store and process information related to its citizens. The state has an obligation to protect the privacy and integrity of the data and many governments believe that OSS can provide these solutions through OSS enabling the user to inspect the mechanisms used in processing the data. These reasons have been especially prevalent in countries like China, South Korea and Japan.

Intellectual property rights

The Asians and South Americans are faced with software piracy and security issues and are concerned that they will not be able to pay the fees due for intellectual property usage to the vendors in developed countries like the United States. These countries fear that they might be pressurised at trade treaty negotiations. Nevertheless, all software including OSS comes with a license, which states what the software can be used for and how it can be distributed. Most of these countries appear to be more concerned with the availability of the source code and how it can be made to suit their needs.

Increase in competition and vendor independence

By recognising that OSS exists within a policy document, governments are sending out a signal to proprietary vendors that competition does exist. The governments appear to be hoping that this will help reduce the price of proprietary software and by using OSS avoid expensive lock in effects from vendor dependence. Germany is an example of a country that has been switching to OSS wherever possible to avoid vendor lock in and is encouraging open standards and file formats to overcome the problem of OSS formats not being interoperable with the desktop proprietary formats.

Governments have listed the fact that OSS allows them the freedom of control to correct and modify the application to better suit their needs, which is not an option with proprietary software and results in vendor dependence.

National interests

Countries such as Argentina, Peru and Brazil have proposed or passed OSS preferential legislation and mandated it wherever possible. Certain national interests such as skills development drive the rationale for this. Having the ability to view and amend the code enables local developers to learn from other programmers and to share ideas with them. They are also able to export these skills to other countries in order to help other organisations and public bodies use OSS. This also ensures that the technology expenditure by government benefits the local industry rather than foreign vendors.

Other national interests that drive the policy adoption include the development of OSS skills in order to narrow the digital divide, protect national security issues and the ability for OSS to be customised into local languages and cultures.

Policy overview from developed and developing countries

The study has shown that from Asia to Europe to Latin America, governments are adopting OSS to some extent or another. Within developed countries such as within Europe the two initial leading adopters of OSS have been Germany and France but other countries such as Finland and the UK have now also formulated policies. Many other European countries have policies pending or have drafted bills that are yet to be passed. Interestingly, but as can be expected, there is no national OSS policy in the USA as there are powerful lobbying groups for and against OSS. (The majority of the lobbying groups against OSS are supported by proprietary vendors such as Microsoft.) Thus the United States actually lags behind other major governments in terms of OSS policy development.

Interestingly the developing countries such as Brazil, Argentina and Peru in South America have some of the most progressive policies with respect to OSS development and adoption within government. The Peruvian Bill, if passed, will ban the use of all proprietary software in the Peruvian government. Much of this development has been spurred on by rising software fees, which has led to a spate of reactionary legislative bills. In many respects these countries have overtaken the developed nations such as the United States in promoting OSS and open standards. In China for example, the Ministry of Information Industry has been financing the largest free software start-up, Red Flag Linux, as the way to stimulate the nation's domestic software industry.

With the exception of South Africa, Africa is considerably behind the other continents in terms of OSS development at a *government* level. South Africa is the most progressive, with various OSS initiatives and an OSS policy approved by Cabinet.

There are however various ad hoc African initiatives such as FOSSFA[73] which is trying to develop local capacity and create jobs in Africa by developing an OSS market that initially will target the public sector in government, health and education. In May 2003 in Addis Ababa, the FOSSFA African member states adopted a draft report that recommended that Open Source Software be made available as a platform to engineer solutions that meet the needs of Africans at affordable costs. Ultimately FOSSFA "envisions a future in which governments and the private sector embrace Open Source Software and enlist local experts in adapting and developing appropriate tools, applications and infrastructures for an African technology renaissance."[74]

By the far the majority of OSS development in Africa is through OSS projects at the private and NGO level. Many of these OSS projects are infrastructure or educational related and aimed at bridging the digital divide.

The following table categorises the countries surveyed into those who have formulated a policy, those that have policies pending and those that have ad hoc OSS initiatives[75]:

Policies formulated	**Policies pending**	**Ad hoc OSS initiatives**
National policy:	Argentina	Denmark[1,2,3,4]
• European Commission	Peru	Japan
• United Kingdom	Australia	Malaysia[5,6]
• France	Belgium	Russia[7,8]
• Germany	China	Singapore
• Finland	India	Ghana[9]
• South Korea	Israel	Namibia[10]
• South Africa	Spain	Uganda[11]
	Sweden	Kenya[12]
Local policy:	Thailand	Rwanda[13]
• Brazil		Mozambique[14]
• Belgium – Brussels Government		
• Italy		
• USA		

Table 8: Degree of formalisation of OSS policy worldwide

[73] Free and Open Source Foundation for Africa (FOSSFA). See www.osfa.allafrica.com

[74] Victor van Reijswould and Corrado Topi, "Alternative routes in the digital world: open source software in Africa," VIA Group, 2003, <http://www.viagroep.nl> (19 December 2003).

[75] The numbered notes for Table 8 and Table 9 correspond to end notes included in the appendix on International Research Supporting Information

The following table attempts to categorise the nature of the policies of the governments that were surveyed in order to evaluate the extent of OSS commitment. Policy neutral refers to those countries that adopt an approach that supports the freedom of choice in choosing OSS and is captured in the first column. If the "policy enables the use of OSS" i.e. facilitates the development and implementation of OSS then the country is classified in the second column. Finally if the country's policy encourages and forces the use and development of OSS through legislation etc then it is captured in the third column and is regarded as a pro-active policy. (Policies already in existence are classified below and where enough information exists about policies to be determined they are also included in the analysis)

Country	Policy neutral	Policy enables the use of OSS	Pro active policy for pursuing the use of OSS	References
Argentina			XX	15,16,17
Australia	X			18,19,20,21,22
Belgium		X		23,24,25,26,27
Brazil			XX	28,29,30,31,32,33
China			X	34,35,36,37
European Commission		X		38,39,40,41
Finland	X			42,43
France			XX	44,45,46
Germany			X	47,48,49,50,51
India		X		52,53,54
Israel			XX	55,56
Italy			X	57,58,59
New Zealand		X		60
Peru			XX	61,62,63
South Korea		X		64,65
South Africa		X		66,67,68,69,70
Spain		X		71,72
Sweden		X		73
Thailand		X		74,75
UK	X			76,77,78,79,80
USA	X			81,82,83,84

Table 9: Policy posture toward OSS worldwide

Note:

South Africa is considered to have a neutral bordering on an enabling policy. Other African countries are not included in the above table as they have not formulated a government OSS policy and hence cannot be classified.

XX = most pro active policy

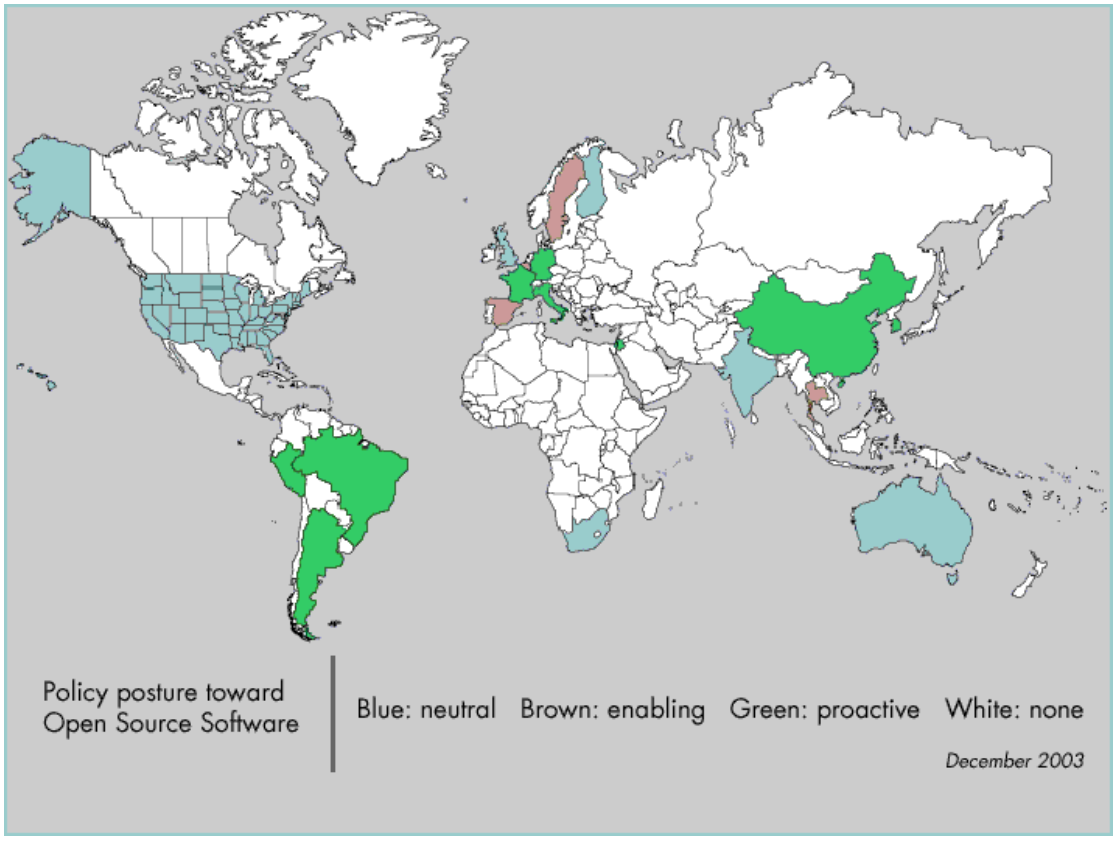

Figure 2: Policy Posture Toward OSS Worldwide

The figure below summarises the countries surveyed above by plotting their adoption of OSS against the level of policy formulation (i.e. neutral, enabler or pro active):

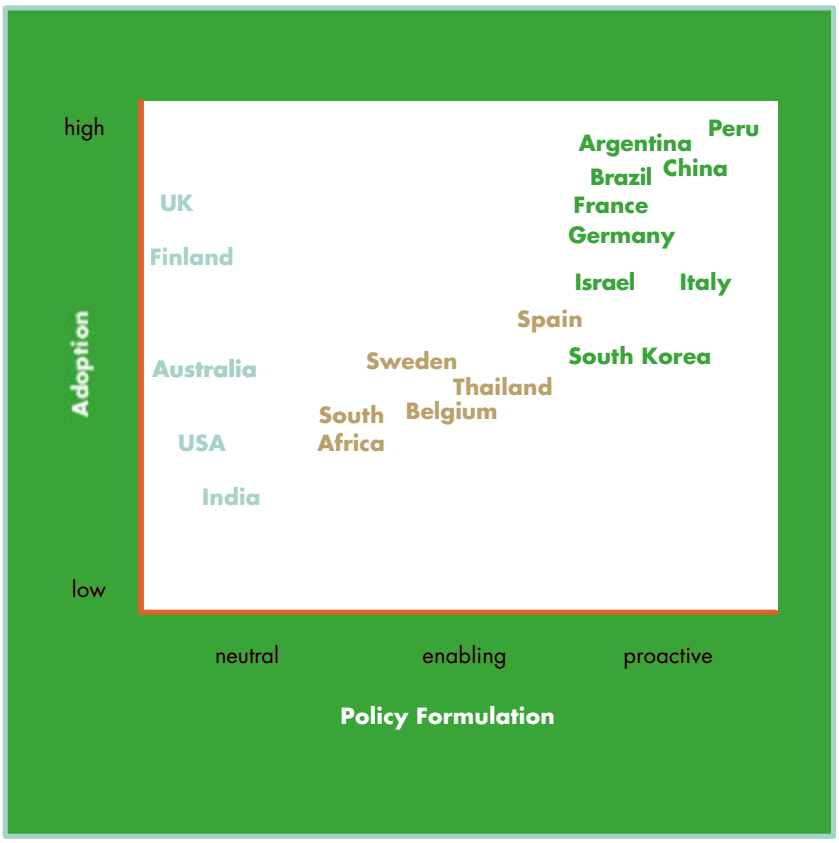

Figure 3:International Activity in OSS

This figure shows that most countries surveyed have medium to high adoption of OSS. Further most countries with a high adoption of OSS are characterized by having pro-active OSS policies - Peru being the most progressive country with respect to OSS policy development. On the other hand the UK has one of the most prominent neutral OSS policies. Like the UK, the USA is also characterized as neutral as there are powerful lobbying groups both for and against OSS that prevents adoption of OSS beyond the individual states. In comparison, South Africa is characterized with a low to medium level of adoption to OSS and a policy that straddles the neutral and enabler categories.

8.2 Local Literature Review

Introduction

As a consequence of broader policy on a number of issues, such as improved service delivery, promoting local innovation, NEPAD and others, the South African government has given serious consideration to the appropriate use of Open Source

Software[76]. These deliberations are reflected in a number of key documents, which have been prepared by or on behalf of the South African Government.

The purpose of this section is to critically describe and review these documents, and to provide an analysis of them. The objective is to summarise the current policy position, and to provide the basis for the identification of options for improving policy and furthering implementation.

Documents under review

The critical documents, which have contributed to or define the current policy of the South African government toward Open Source Software and the adoption of Open Content are:

- Open Software and Open Standards in South Africa .[77] This document was prepared by the National Advisory Council Open Software Group, and has gone through several iterations. The first version (January 2002) provided some of the basis for the GITO OSS policy document; the most recent version reviewed here has had broad input and provides an introduction to OSS and motivations for its adoption.
- Using Open Source Software in the South African Government .[78] This document was prepared by GITOC, and contains policy recommendations and implementation targets. It represents the current accepted policy of the South African government, having been first submitted for approval by the directors general before being submitted to the Minister of Public Service & Administration, and later adopted in terms of a cabinet minute.
- Handbook on Minimum Information Interoperability Standards (MIOS) [79]. Prepared by the Department of the Public Service, and based on the United Kingdom Minimum Information Interoperability Standards, this document represents a part of the OSS implementation process, and deals with the technical standards that – when adopted – allow information to flow seamlessly between public sector institutions.
- Designing and managing a framework for assessing results of use to OSS in South Africa: Phase I[80]. Also a component of OSS implementation, this State Information Technology Agency (SITA) document sets out to provide a framework for assessing the suitability of OSS applications, and for monitoring

[76] Blume et al.

[77] Pogue et al.

[78] OSS Working Group (GITOC).

[79] "Handbook on Minimum Information Interoperability Standards (MIOS)" and "MIOS Implementation Initiative"

[80] Blume et al.

the results. It also contains a background to the use of OSS in South Africa. Particular strengths are a comprehensive glossary of terms and a representative international bibliography.

In May 2003 the Minister of Public Service & Administration, Geraldine Fraser-Moleketi, made a statement in Parliament that described her department's support for Open Source Software, and its potential value in the delivery of public services. She said OSS was already "widely used" by government and was "part of a deliberate strategy aimed at generating widespread knowledge and understanding (of ICT)"[81].

Since then, the Council for Scientific & Industrial Research (CSIR) has launched an Open Source Software resource centre, unofficially referred to as 'Meraka', with a mission to "stimulate the awareness, understanding and optimisation of OSS benefits in Southern Africa while contributing to similar efforts on the continent and the rest of the world"[82].

Other important role players include GITOC (author of the current policy document), and the State Information Technology Agency (SITA).

Framework for description

The documentation supporting a policy – especially in regard to a new policy issues – can be expected collectively to cover the following:

- The motivation for the policy, and kinds of impacts expected. This should encompass as exposition of the issues, the reasons why a policy is needed, and the nature and extent that the policy is expected to have, when implemented, on the situation in question expressed in terms of benefits for the stakeholders
- The policy position itself
- Actions required to implement the policy, including responsibilities, timelines and financial implications
- Supporting documents to enable those responsible for implementation to do so an in informed, consistent and effective manner
- Tools and metrics to enable the implementation to be initiated and monitored, and the success (or otherwise) of the policy to be established. On this basis the policy can later be expanded, modified, or even reversed

Taking the OSS policy documentation together we should thus expect it to have three logical 'layers':

[81] http://www.tectonic.co.za/default.php?action+view&id=139

[82] http://www.meraka.org.za

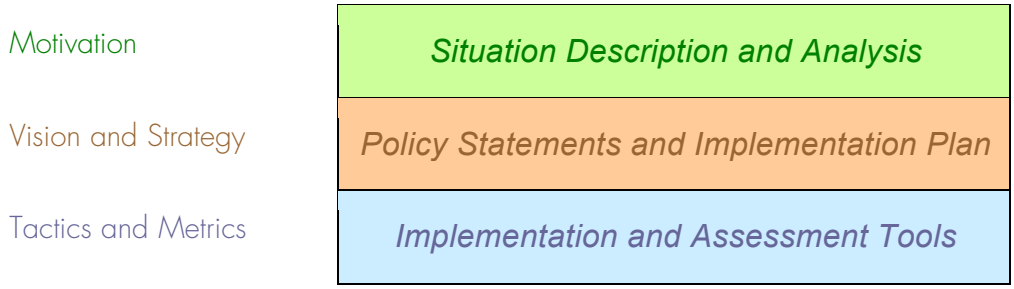

Figure 4: Logical layers

This review will examine the extent to which these elements are in place, and adequately support each other.

Summary of OSS benefits

All the documents under review find it necessary to begin by describing what OSS is[83] and the relative benefits of its adoption. Overall these are held to be:

Benefits of OSS from South African literature
Freedom to probe, modify, learn from and customise software to suit particular needs. From a government perspective, this is considered to have four consequent benefits: • Ensuing free access to public data by citizens (who are not forced to first invest in a proprietary software application in order to do so). This can only be guaranteed through the use of Open Content standards, which is best done through the use of compatible Open Source Software • Guaranteeing the permanence of public data, by ensuring that the usability and maintenance of the software does not depend on the goodwill of suppliers, or the monopoly conditions imposed by them. To do this the State needs to use systems whose development can be guaranteed due to the availability of the source code • Security of public and state information, by virtue of the fact that source code of the applications which allow public and state information to be stored and exchanged can be inspected by citizens, the state and independent experts. This transparency gives confidence that the code is free of critical bugs or potential security flaws. Several documents liken this to the benefits in the academic and research world of peer review • The ability to customise OSS makes it particularly appropriate in countries – such as South Africa – with a large number of local languages and dialects, into which applications can be translated
The facilitation of interoperability between systems, allowing them to readily exchange data. OSS generally conforms to and respects existing standards, and through its use reinforces them
Improved reliability, and less vulnerability to viruses (this is related to the security issue described under the third sub-bullet above)
The absence of a requirement to pay license fees to the originators, as is almost always the case with proprietary software – usually to foreign corporations. This reduces cost (not least by

[83] For a complete definition see Pogue et al, Appendix One.

Benefits of OSS from South African literature
removing the need for policing), and decreases dependency on imported technology and skills
The ability to make productive use of older – yet still functionally adequate - hardware, without the continual pressure to upgrade, with associated capital, licensing and training costs. This is also referred to as the benefit of "non-obsolescence"
The potential for a local ICT development industry to flourish, with associated societal benefits.

Table 10: Benefits of OSS from South African Literature

Each of these benefits is discussed in further detail below.

CUSTOMISATION AND MODIFICATION AND RESULTING INDEPENDENCE

The ability to customise or modify OSS software lies at the heart of how it is created and how it differs from proprietary software[84]. This is intimately related to the OSS development model, which is based on collaboration, sharing and access[85].

Whilst the fact that OSS can be customised and modified results in much of its value, this does not mean that government should itself be intimately involved in modifying OSS. The GITOC policy document identifies a number of different levels of involvement in OSS, ranging from merely making use of software that is available and potentially integrating it into existing or new systems (customisation); to procuring OSS software (i.e. purchasing systems built of integrated OSS components); modifying existing OSS for internal use; contributing to further software development by an OSS community; to making the source code of one's own software freely available[86]. Such activities by government are likely to follow a natural progression as experience and confidence of OSS grows. The NACI document considers the collaborative development model to be culturally well suited to South Africa, which has a long history of collective action in technological development.[87]

INTEROPERABILITY

NACI considers open standards to be critical to allowing interoperability[88]. Interoperability does not require the use of OSS, but since OSS is built to open

[84] Pogue et al, p15.

[85] OSS Working Group, p8.

[86] OSS Working Group, p9.

[87] This philosophical commonality with traditional African concepts of 'common ownership' has been recognised by the CSIR, which has borrowed the term 'Meraka' for its open source initiative. "This is a Sotho term used in Lesotho, South Africa and Botswana for common grazing land. People may engage in private or communal productive activity on this land, but the land itself is kept for the common good." <http://www.meraka.org.za/postnukell/modules.php?op=modload&name=News&file=article&sid=3> (28 November 2003)

[88] Pogue et al, p1.

standards, then it generally lends itself well to the implementation of interoperable systems.

The importance of the Internet in both facilitating OSS development (allowing the geographically disparate developer community to cooperate) and in spurring adoption of open standards is recognised. Particularly, as web based services develop, then it "becomes all the more important that associated protocols and tools remain freely accessible"[89]. The irony is that access to the Internet by the citizens of South Africa is limited, not least due to the legislative environment. The success of the adoption of OSS and the use of OSS to deliver government related information and other services can be expected to be closely linked to the extent to which the digital divide is tackled.

The NACI paper describes open standards as being of a similar nature to OSS as they are essentially non-proprietary nature, and argues that they are particularly necessary to ensure access to public information, and long term survival of information that might otherwise be lost if their system dependent instructions about retrieval are not maintained. This is akin to the situation that the owner of an aging but still functional car may find himself when the original manufacturer decides to no longer provide parts. The argument depends on the reasonable assumption that broadly adopted Open Content standards will continue to be maintained, enforced and expanded by the community of users.

Interoperability is also recognised as an important aspect of the broader e-government policy[90].

RELIABILITY AND STABILITY

All commentators note that, because it has been developed by a large number of disparate individuals working to a common accepted framework, then OSS tends to be more elegant and robust in its design, and less likely to 'crash' due to bugs in the source code as a result of attacks by malicious virulent programs. And if failings are uncovered, then the nature of the failure becomes quickly and widely known and solutions invariably crafted and distributed quickly. Such rapid fixes are only possible because of the availability of the source code and the large number of people in a user community with an interest in maintaining it. Anecdotal evidence of the consequent stability of OSS is given by NACI[91].

[89] Pogue et al, p13.

[90] "E-Government Policy", Department of Public Administration, Second Draft 2001 version 3.2, < http://www.dpsa.gov.za/e-gov/2001docs/e-govpolicyFramework.htm> (December 2, 2003)

[91] Pogue et al, p26.

REDUCED COSTS

An obvious appeal of OSS is that its use does not incur licensing costs, which often constitute a large proportion of government ICT spending.

There is, of course, still a cost involved in implementing OSS applications to meet specific needs, but these costs are for the time and skills of local ICT technicians rather than for licences. The balance of these costs is frequently the target of attacks on OSS by proprietary software vendors, who question if their license costs are really any greater than the lifetime implementation, maintenance and support costs associated with OSS. This narrow focus on the direct economic costs ('total cost of ownership') has allowed proprietary software vendors to avoid the broader social implications of choosing OSS, and forced considerable effort to be channelled into meeting these arguments with a battery of cost/benefit tools for measuring total cost of ownership, return on investment, and other financial metrics. The SITA document is effectively a detailed guide to undertaking such financially based analysis[92].

How OSS comes to be free is of course of interest to government as this impacts its sustainability. The NACI document critically notes that historically the free exchange of software in the public sector was facilitated by the fact that programmers were paid for the act of programming and not for the programs themselves.[93]

ESCAPE FROM LOCK-IN

Commitment to a proprietary software vendor inevitably entails a consequent commitment to upgrade to each new version, in order to continue to receive support. Backwards compatibility may even be curtailed to add to the pressure. In contrast, many OSS applications run early versions, which often only require low levels of processing power; and new versions are in any case available free of charge.

This is encapsulated in the frequently heard mantra of the OSS community, "OSS is free as in freedom of choice".

INDUSTRY AND SOCIETAL BENEFITS

The GITOC document considers OSS to represent a "powerful new way of generating knowledge and economic value"[94]. Its non-proprietary status has implications for the affordability of ICT solutions, which can empower people by offering access, choice and a route to participation in the Knowledge Economy.

The broader economic value of OSS is listed by GITOC as:

- Reduction of imports of software and payment for licences

[92] Blume et al.

[93] Pogue et al, p11.

[94] OSS Working Group, p8.

- Creation of opportunities for investment in the ICT industry
- Stimulation of local businesses, especially SMMEs, by allowing them to procure affordable software and thus encouraging their overall use of ICTs
- Being one way of promoting the use of locally produced goods and services

The value for society on general is found to be:

- Enhancing education
- Enhancing public access to information

Together these have the potential to encourage skills development, increase the likelihood of skills retention, and maybe even attract skills and with it foreign investment. South Africa could reasonably become a net exporter of software-related products and services.

The NACI paper also places the issues surrounding the use of OSS in a social context by observing that proprietary standards – typically held by foreign enterprises, - have effectively relegated domestic engagement in the ICT industry to a level of franchisee. This has importance for the development of the ICT industry itself, which can be engaged at a number of levels. These can be summarised as being:

- ICT and OSS literacy, being computer and information literacy skills needed by everyone to participate in the Knowledge Economy and benefit from being a part of the Information Society[95]. These skills are learned more as a result of the way in which other subjects are taught – including the supportive use of ICTs where appropriate – than by specific lessons.
- ICT and OSS benefits and awareness, being a knowledge of how to put OSS to appropriate use, and how to manage the process, the technology, and the people responsible for designing, implementing and maintaining it
- ICT and OSS technologists and professionals, who have the skills to design, implement and manage OSS applications and systems

Identified risks

The NACI document notes that together with the strengths of the volunteer-driven OSS development model there are also associated weaknesses. Wearisome tasks such as the provision of documentation and on-line support are less likely to be performed.

[95] Today's most technologically advanced countries are knowledge based. These knowledge-based economies are as a result of the balance between knowledge and resources shifting towards knowledge and as a result it has become the most important factor in determining the standard of living. Essentially these knowledge based economies encourage organisations and people to acquire, create, distribute and use existing and new knowledge more effectively for greater economic and social benefit. (See www.jklee.com)
"Information Society" describes a society in which the creation, distribution, and manipulation of information has become the most significant economic and cultural activity.

This may increase implementation times, and result in faults being rectified less quickly, thus adding to the total or lifetime cost of ownership. The provision of documentation and support are often touted by proprietary software vendors as benefits. However, in response a number of commercial distributors of popular Open Source Software programs – notably Linux – have recently emerged; the software is packaged for easy installation, documented and directly supported, for which there is a charge (not for the program itself)[96].

Secondly, the volunteer model of software development emerged in the more economically developed nations, where there is an implicit subsidy by wealthy institutions, well-funded universities and corporations[97]. An economic model that effectively pays developers from developing counties to contribute to OSS development projects has not yet emerged. However, this does not in any way prevent South African or other developing country ICT technicians from making use of OSS. The NACI document suggests supporting a hybrid development model involving distributed volunteers anywhere in the world and explicit financial support for South Africans with the enthusiasm and aptitude to be involved in chosen development projects[98] – principally those that support current e-government efforts.

Intellectual property rights issues are raised in all of the documents[99]. Intellectual property rights were conceived in an era when technological advances were primarily embodied in physical goods. ICTs now not only constitute a form of intellectual property, but also affect knowledge creation throughout society by facilitating interactions within and among technologies, developers and users. For this reason, science and technology policy must strike a balance between granting too strong protection of intellectual property rights (IPRs) and ensuring that new ideas are created and diffused. In an increasingly intangible world, this challenge is greater since the technological know-how disclosed to the public domain is not just an input for further innovation, but also a major part of the final good. This challenge, posed by the need to diffuse technologies without losing incentives to suppliers - while bearing in mind the economic interests of the end users of that data and information – is a central challenge resulting from the digitisation of increasing quantities of data and information.

[96] One of the best known of these is Red Hat – see www.redhat.com. Another is the SuSE version of Linux (www.suse.com), this German company was recently bought by Novel (Reference: The Economist, November, 2003)

[97] Pogue *et al*, p16.

[98] Pogue *et al*, p16.

[99] Pogue *et al*, p19.

At a more basic level, OSS can have a number of more practical disadvantages[100]:

Disadvantages of OSS from South African literature
Proliferation of versions. As the can be a large number of development initiatives underway at any one time, there is a tendency for OSS to have numerous versions. Choices must therefore be made to select one version over another, with associated risk
Ease of use (or rather, not so easy to use). Ease of use features can be less important to technically inclined developers, who often rather focus on reliability. This failing is likely to be addressed as use becomes more widespread, but is something of a chicken-and-egg conundrum
Marketing and support. No single organisation is responsible for supporting a given OSS product. However, all established OSS projects do have a community of co-developers and users who respond to queries promptly and specifically
Training. Limited current competence resulting from career paths dictated by proprietary platforms can only be addressed through training and re-skilling, often at relatively high expense

Table 11: Disadvantages of OSS from South African Literature

Policy statements and implementation plan

Significantly, the policy related papers under review do not attempt to make a case for government intervention, other than in relation to its own use. Given the apparent benefits of OSS, then market forces could be expected to create a groundswell of support for OSS – both within government and in the private sector - and an expansion in the number of projects and involved ICT professionals in the country.

The intent of the GITOC policy is that:

- Discrimination and prejudice against OSS will be avoided in software procurement procedures, with choices being made on merit, thus giving OSS and proprietary software equal opportunities to be selected
- Since OSS offers significant indirect advantages, then it is preferable to opt for OSS where the direct advantages and disadvantages of OSS are equally strong
- Open standards will be a prerequisite for all software development, thus contributing to the ease with which OSS can be implemented and adapted
- Government will encourage partnerships within the wider public sector, the private sector, civil society, the rest of Africa and globally to foster the utilisation of OSS
- SITA will provide leadership and support for Government institutions wishing to implement OSS

[100] Extracted from Pogue *et al*, and Blume *et al*, p 32.

- Where no inhibiting factors exist, then the OSS model will be adopted for the development of Government systems, and such systems will be developed to run on OSS platforms

The GITOC policy document sees the key role of government as being promotion of "OSS development"[101]. It is not clear if this means making use of OSS itself; encouraging the private sector to make use of OSS, or supporting OSS development projects itself or by educational establishments and the private sector.

The possible positions that government could adopt can be described[102] – as is common internationally – as either:

- Neutral – ensuring that choice is supported and discrimination eliminated
- Enabling – policies are geared towards the creation of capacity to implement and maintain OSS
- Aggressive[103] – active encouragement of the use and development of OSS under appropriate conditions through legislation and policy

Whilst the rest of the GITOC policy document implicitly follows the enabling approach[104], the SITA document is less so. By proposing narrow and complex criteria for even adoption – let alone migration – the SITA approach is to only use OSS where it can be directly demonstrated to be superior to proprietary software (not just as good).

At the level of strategy, policy can effectively fall into three areas:

- Those things that need to be done to ensure that the government enjoys the benefits of using Open Source Software, including steps to minimise potential risks
- Those things that can be done to promote the use of OSS in education and innovation systems
- Those things that can be done to encouraging the wider adoption and use of OSS by the private sector

The GITOC policy document explicitly focuses on the strategy for government wide use[105], whilst suggesting that its approach might also assist the third tier of government and the public sector also. Other possible areas of impact are mentioned only in

[101] OSS Working Group, p10.

[102] OSS Working Group, p11.

[103] The less pejorative and more appropriate term 'proactive' was chosen for the enhanced policy.

[104] The GITOC policy document states, "Pressure to opt for OSS may be inappropriate". OSS Working Group, p15.

[105] OSS Working Group, p12.

passing. This implies intent to promote OSS outside of government by becoming a 'model user'.

OSS use by government

The GITOC policy in part bases its legitimacy on the growing maturity of OSS and the increasing experience that government and its agencies have of it.

NACI is also aware of this, and suggests that the benefits of OSS need to be seen in the context of the "groundswell the world over of adoption of OSS … (which) reflects a growing acceptance of and confidence in OSS and open standards"[106]. Many countries are recommending or legislating that OSS be used by the public sector and its associated agencies, unless proprietary software is the only available option.

GITOC recommends:

- The recognition by government of OSS as a viable alternative to proprietary software to be used in information systems in Government. Though not stated, this recognition at anything other than a technical level can only mean that OSS adoption has indirect societal benefits of which the government should take advantage
- Government should avoid any "unfair discrimination"[107] against implementing OSS in government
- GITOC itself should establish criteria for software selection, promote knowledge about and understanding of OSS, promote trial use, provide guidelines for migration, integration and ensuring interoperability of systems (operational processes), find ways to support OSS users, and consider recommendation for a subsequent more aggressive approach - possibly through procurement incentives

The NACI document identifies three distinct roles for OSS in the public sector. These are categorised as administrative, accessibility and domestic capacity building. These seem less useful than the concept of OSS being appropriate for providing the common elements of information systems, as described elsewhere in this document. These categories should rather be seen as areas of application flowing from the benefits and strengths of OSS. For example, the need for accessibility to public information is a given, but it is the adoption of OSS that makes this more readily achievable. Domestic capacity to make use of ICTs is enhanced by the availability of desktop applications in local indigenous languages.

The policy proposes the consideration of three success factors for implementation[108]. These are:

[106] Pogue *et al*, p12.

[107] OSS Working Group, p15.

[108] OSS Working Group, p17.

- Implementation should produce additional value
- Capacity to implement and maintain has to adequate
- Sufficient support for the initiative must exist

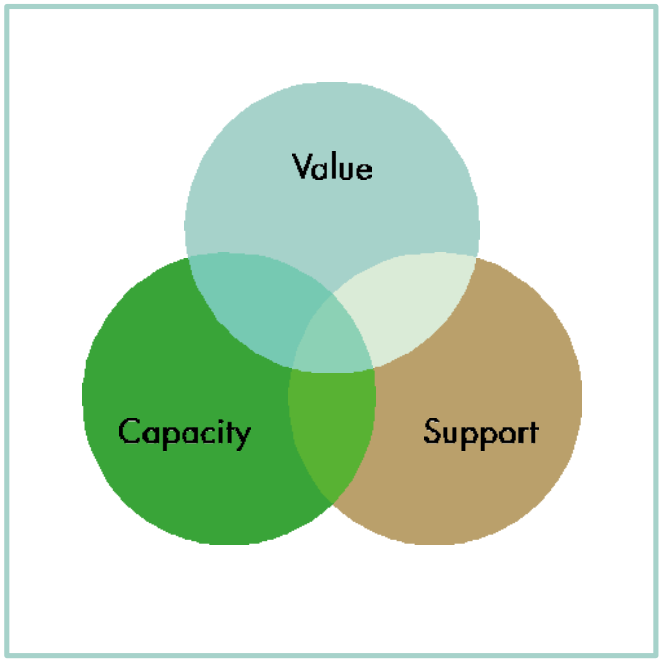

Figure 5: The policy-approved VSC model

The GITOC policy document uses these parameters to demonstrate that OSS can offer value to the South African government and its citizens; that capacity development is needed if these benefits are to be realised; and surmises that support will be needed – in the form of communication and promotion – to get this message across and overcome institutional inertia. (Overcoming such inertia by making the use of OSS mandatory under certain predefined circumstances is implicitly excluded.)

The SITA document adopts the same model, but instead tends to present its three elements as hurdles which a proposed OSS implementation must meet if it is to be seriously considered.[109]

Whilst entirely reasonable, these elements are not exceptional and should be considered in relation to any ICT project. OSS applications may in fact be disadvantaged as a software choice if they are required to provide value in ways that proprietary software alternatives are not. Balanced decisions can only be made if the same criteria are applied to all software options. If this is done and the value criteria outlined in the policy fairly applied, then OSS applications, which meet the functional requirements, are likely to be seen to be superior.

[109] Blume *et al*, p56.

The issue of capacity should also be considered in a balanced manner. The skills to define required functionality, describe the technical operating environment, and assess software options are a necessary precursor to any ICT project. If OSS applications are to be considered on an equal basis, then it is necessary for people with the necessary experience and skills to be on hand. For OSS to meet this criterion, capacity-building programs must first be put in place, to ensure that the appropriate skills are attracted, developed and retained. Fortunately the policy recognises this, at least in principle.

Lastly, it also makes sense for the public sector to co-operate with other nations and international agencies to build software components and systems that are of common interest[110]. Governments could share experiences, such as OSS desktop deployment projects.

Promoting use in education

The NACI document considered the use of OSS to be the only development route likely to enable the provision of "a decent education for all", as a consequence of its cost benefits – especially where systems are being introduced for the first time rather than migrated from proprietary platforms[111].

OSS should be both a medium for education, and the subject of education, especially at tertiary institutions. This touches on the whole area of ICT education in general. The three levels of expertise already listed under industry benefits of OSS adoption are relevant.

The NACI document recommends that software R&D funded by the public sector and conducted by its universities and research councils should use OSS as the "default exploitation route", as has been recommended in the UK[112]. This would not only encourage such institutions to enjoy the benefits of OSS, but also critically build the skills base, and ensure that every degree-qualified ICT professional is fluent in the OSS environment.

NACI also recommends formation of a co-ordinating agency to evaluate proficiency in OSS and provide certification. This could be done on behalf of the State Information Technology Agency, and presumably in collaboration with the ISETT SITA. It could reasonably be expected that "the training and support role would be partially satisfied by a groundswell of companies that a government commitment to Open Source Software would undoubtedly give rise to"[113].

[110] Pogue *et al*, p18.

[111] Pogue *et al*, p27.

[112] Pogue *et al*, p16.

[113] Pogue *et al*, p17.

Encouraging use by the private sector

THE ICT INDUSTRY

The ICT industry in South Africa is currently dominated by the provision of services, with very little original development taking place. Most companies are effectively franchised resellers of applications owned by overseas corporations and developed elsewhere. A progressive adoption of OSS could allow the industry to build on these strengths – needed for the customisation of OSS applications for implementation - whilst developing a broader base of skills capable of modifying OSS applications (thus contributing to the wider development effort), and eventually even initiating OSS projects.

Companies providing OSS related services (as distinct from OSS distribution) can fulfil a number of needs in an environment where OSS is demanded. These include customisation, systems integration, support and training.

OTHER INDUSTRY SECTORS

The SITA document points out that SMMEs in South Africa face many challenges, not least the high cost of proprietary technology required to become operationally efficient. OSS could alleviate some of these barriers[114].

The SITA document also expects increasing pressure from customers for the software vendors to ensure the interoperability of their solutions with those of customers, suppliers and their own legacy systems. This will result is wider interest in and support for open standards, especially if web based services become a reality.[115]

Implementation and assessment tools

IMPLEMENTATION

GITOC approaches implementation in two phases[116].

- Introductory phase : create knowledge and understanding through information dissemination, trial use and development, consultation, research based on providing implementation and assessment tools, consolidation of support, and a general 'levelling of the playing fields by avoiding bias and doing nothing to preclude the use of OSS.
- Enabling phase : implement plan developed in the introductory phase, guiding software selection, undertaking software development, building further capacity, and seeking partnerships in South Africa, Africa and the world.

[114] Blume *et al*, p9

[115] Blume, *et al*, p12

[116] OSS Working Group, p26 ff.

After this a mature phase can be expected, characterised by engagement with the OSS development community through the contribution of modifications to the collective development effort, providing certification for OSS developers, and maintaining well established clusters and networks of support.

The NACI document suggests broadening these objectives[117] to include, for example:

- South Africa as a model for OSS development
- Guarantees of software as 'post-industrial intellectual property'
- The stimulation of an indigenous OSS industry

A table of targets is presented, covering:

- Strategy formulation
- Funding
- Implementation activities, including establishing an OSS unit and OSS resource centre
- Communication and consultation
- R&D – specifically identifying OSS products suitable for use by government
- Capacity building
- Developing guidelines for eventual procurement

ASSESSMENT TOOLS FOR NEW IMPLEMENTATIONS

In evaluating the costs and benefits of OSS, attempts have been made to define tools for analysing these. These can be seen as resulting from the need to address arguments that insist that OSS must justify itself as a real alternative to proprietary software by employing objective fact-based tools that have no subjective bias. That OSS can usually hold its own in such analysis speaks of its growing maturity from a functional perspective, but is also potentially dangerous in that it can result in the wider social implications being ignored, even though it is here that OSS is likely to display its real advantages.

The SITA sponsored framework for assessing OSS document[118] should be seen from the perspective of recommending the use of OSS using objective metrics. The document is careful to state that in describing such assessment tools, this "in no way implied in any way that either OSS or proprietary source in generically 'better'[119]." It carefully describes the possible decision process that could be adopted by corporates, small businesses and government, and the role that assessment tools can

[117] Pogue *et al*, p39.

[118] Blume *et al*.

[119] Blume *et al*, p1.

play. The complexity of this approach is illustrated by the need to promote a software taxonomy[120] so that comparable OSS and proprietary applications and system infrastructure components can be compared.

Cost-benefit tools include both total cost of ownership (TCO) measures and return on investment metrics. TCO tries to capture all of the attributable costs, both direct (typically licensing, installation, training and support) and indirect (necessary hardware, ensuring backwards compatibility, likely costs of expected downtime). The overemphasis on costs is balanced by return on investment methodologies that also look at the wider benefits gained.

Return on investment (ROI) compares the net investment relative to the incremental benefits over some period. Though conceptually straight forward, ROI in analytically complex and can ultimately be presumptive and even subjective.

Additionally, SWOT analysis has a role to play. This involves reviewing a proposed OSS technology and its application environment across the familiar four dimensions.

Interoperability standards

Since an important attribute of OSS is its ready compatibility with Open Content standards, the agreement and promulgation of technical standards to allow information to flow seamlessly across government systems is a critical building block. These have been put in place in the form of the Minimum Information Interoperability Standards (MIOS)[121]. This document has three components: policies, standards, and XML schemas. These in turn cover three areas of technical policy each essential for interoperability: interconnectivity, data interoperability and information access.

These technical standards form an important foundation for the adoption of open standards and the creation of Open Content. They demonstrate the government's in principle commitment to OSS and Open Content standards. The critical issue remaining is for these standards to actually be used and enforced. As noted elsewhere in this paper, there are presently very few open standards projects actually underway within government.

Migration from proprietary platforms

A further useful building block of OSS implementation comprises appropriate guidelines to assess if and how to undertake the migration of existing proprietary applications to OSS based applications. This is likely to be a far more common issue facing government departments that the initiation of entirely new systems. Guidelines to ensure that OSS is used whenever applications need to be upgraded or replaced go a long way to bring about the more rapid uptake and experience of OSS within government. At present, there is comprehensive international documentation available

[120] Blume *et al*, p28.

[121] "E-Government Policy."

that provides guidelines for the migration from proprietary to OSS platforms.[122] As an aside these documents are explored in more detail below.

REVIEW OF MIGRATION GUIDELINES

There are two documents that provide comprehensive migration guidelines, namely:

The IDA Open Source Migration Guidelines – this set of guidelines was prepared for the European Commission and intended for use by ICT managers and public administrators within Europe in order to assist them in deciding whether a migration to OSS should be undertaken and how it should be implemented. This document provides practical and detailed recommendations on how to migrate to OSS based office applications, calendaring, e-mail and other standard applications.

This document further provides a thorough overview of the main points that are applicable to an OSS migration. A summary of these main points follows for the sake of completeness:[123]

1. Ensure that the team has the correct skills and management support. This support must allow the building of pilots.
2. Understand the target environment, both OSS software and the base architecture together, along with the various options and the choices available.
3. Review the base architecture as well as the application software.
4. An understanding of OSS must be developed before any decisions are made and this must include the implications of OSS licenses, advantages and disadvantages of OSS, the differences between OSS products and the level of support required.
5. Audit the existing systems and construct a cost of ownership model for a detailed business case. This step includes thoroughly understanding each application, the data and security requirements.
6. Formulate a migration business case including the cost of the existing and alternative environments, the strengths and weaknesses of the current environment and the various alternatives.
7. Educate the users and deal with their concerns, which includes creating a help desk and intranet site.
8. After the business case has been accepted start with small-scale pilot projects.

[122] Ganten Gamerdinger et al, "Migration Guide - A guide to migrating the basic software components on server and workstation computers", *KBSt Publications Service*, July 2003, <www.kbst.bund.de/Anlage303807/pdf_datei.pdf> (1 December 2003). See also "The IDA Open Source Migration Guidelines," *Netproject*, 8 November 2003, http://www.netproject.com (10 November 2003).

[123] "The IDA Open Source Migration Guidelines," p 17.

9. Choose the speed of migration – "BIG Bang Migration", phased approach or user by user transition.
10. Roll out the migration to the whole Administration. This will involve further training of users and technical staff.
11. Ensure that sufficient resources are available to deal with any problems after the transition.

Migration guide : A guide to migrating the basic software components on server and workst ation computers - this set of guidelines was prepared by the KBSt unit at the Federal Ministry of the Interior and is designed for decision makers in charge of planning and implementing ICT strategies and projects in public administration.

This document is very comprehensive and addresses not only the technical issues of a potential migration to new OSS infrastructures and systems but also the commercial analysis associated with a change of software.

Two areas of this document deserve particular reference, namely the *Evaluation of Economic Efficiency* and the *Migration Recommendations* sections. The Evaluation of Economic Efficiency section discusses the manner in which the change in software can be dealt with in the most economical method. Further, this section of the guide provides useful migration recommendations based on the evaluation of economic efficiency for complete, continuing and partial migration. The Migration Recommendation's section on the other hand sets out a path for public organisations of differing sizes and discusses the pros and cons of the various migration paths. Finally this section concludes with the critical success factors for a successful implementation that include:

1. Identification of clear aims for the project
2. Involvement of key management
3. Involvement of target groups
4. Creation of user acceptance
5. Competent and planned project management
6. Establishment of a qualified project team and organisational measures to prepare the migration process
7. Detailed as is analysis including a definition of functional requirements
8. Optimum project and service selection
9. Comprehensive training
10. Quality management and documentation.

Critical assessment

Hahn[124] identifies six issues to be considered when assessing government policy towards Open Source Software:

1. Has a case for significant market failure in the development or production of Open Source Software been made?
2. Can a case be made for direct government subsidies for Open Source Software development and/ or use?
3. To what extent do both OSS and proprietary software have important roles to play?
4. To what extent should government base software development procurement on benefit-cost frameworks similar to a profit-maximising firm?
5. Should one permit GPL or 'viral' licensing to be used in government funded research and development, on the basis that this may discourage commercial research and development?
6. Should government seek to change patent policy to allow Open Source Software to be more competitive?

As has already been noted, the local policy documents do not attempt to make a case for policy on the basis of market failure. Policy is restricted to the use of OSS by government.

However, the potential wider societal and economic benefits of more widespread OSS use are such that it could be argued that the use of OSS needs to be more aggressively mandated by government, and that – in the face of the entrenched position of proprietary software vendors – steps to support the nascent local OSS development community should be taken so as to ensure that there are the skills available in the ICT industry to deliver against government's OSS project requirements.

Current policy is at pains to promote adoption of OSS only if it can be objectively demonstrated to be superior to proprietary alternatives. Whilst the intent is to level the playing fields, the entrenched position of many proprietary software vendors and the unquestioning support of some staff as a consequence of their career experience with a particular proprietary set of applications may require tilting the playing field in favour of OSS. If this is not done then there is a danger that OSS projects will never gather sufficient momentum to allow OSS to become widely experienced and understood, and to allow the development of a professional work force skilled in OSS applications development, implementation and support. Doing so could be considered to be no more that applying the principles of affirmative action to software procurement.

[124]Robert W (Hahn Ed), "Government Policy Towards Open Source Software", AEI Brookings Joint Centre For Regulatory Studies, 2002.

The policy literature is in no doubt that OSS has an important role to play; the unanswered issue is rather how to make sure that South Africa is exposed to the wider social and economic benefits. In considering this, OSS policy must move beyond the realm of technical considerations to also embrace the impact that technology choices have on society and on economic development. OSS technical policy needs to be placed within a context of broader developmental goals, and take account of the country's aspirations within the global economy and the society of nations. Proprietary software will always be with us; OSS may not unless it is nurtured and championed.

This section has already noted the dangers of an over reliance on narrow financially based assessment tools. Whilst these are important and have their place in generating a business case for any new system or proposed migration, these should not be the only consideration. In this respect, government should emphatically not act in the same manner as a profit-maximising firm.

The current policies do not touch on issues of licensing or patent policy as – at least at the technical level at which the policy resides – government policy cannot realistically have any expectation of impact on a world-wide legal system, dominated as it is by governments with a vested interest in the success of their ICT companies. For this reason again, the issue of OSS policy must be taken to a higher economic and developmental level, so that amendment of the relevant legal conditions which are to the determent of developing economies such as South Africa can be raised in appropriate multilateral forums.

8.3 Local Primary Research Findings

Background

In addition to literature based research, the scope and goals of this project include an empirical research component. The literature review identified a number of OSS projects and initiatives started in South Africa as well as abroad. These were included in ad hoc fashion and the research team as well as stakeholders agreed that there was a requirement to perform a broader OSS project audit amongst all government organisations in the National and Provincial spheres.

The GITOC, made up of representatives from every organisation in this group were identified as the ideal channel. The newly appointed chairperson of the OSS working group embraced the opportunity to perform an OSS audit as part of the empirical research component of this project. The intention to perform such an audit was strongly supported by the Minister of Public Services and Administration.

Methodology

The empirical research methodology comprised primary data collection from members of the GITOC and contacts provided by the OSS working group and GITOC secretariat at the Office of The Government Chief Information Officer.

A special feature of this research was the training and use of three interns within the PNC to carry out primary interviews along with other members of the team.

Section 12.2 comprises the Primary Survey Questionnaire and Section 12.3 the Secondary Survey Questionnaire developed specifically for this study. The intention of the primary survey was to identify all tangible projects in Open Source Software and Open Content completed, underway or planned by government and other statutory bodies. Once references to such projects were found, researchers carried out secondary interviews and data gathering to describe the projects. The outcomes of these interviews are presented in the form of short case studies.

Time and resources were severe constraints in this project and limited the depth to which the team could go in gathering primary data and detail on the projects identified.

Responses

40 responses representing the Government IT Officers (GITOs) of all the organisations making up the South African government at the national and provincial spheres of influence were obtained (see Appendix).[125]

Awareness

There is a high awareness of the OSS policy amongst Information Technology related staff in the government domain, although a low awareness amongst senior management outside of the ICT area.

97% of the respondents were aware of the Open Source Software strategy compiled by the GITOC for using Open Source Software in the South African government. At the time of developing the questionnaire we were not aware that cabinet had accepted this strategy and hence we did not ask the question. We suspect that the percentage that is aware that the strategy is now government policy is much lower.

With exception of those departments directly involved with the responsibility for Information Technology in government, the average expected awareness of this policy was 2/10. Since the interviewees are ICT personnel, we expect that this is exaggerated and that less than 5% of top management executives are aware of the policy.

92% responded that they were aware of the Handbook on Minimum Information Interoperability Standards (MIOS). We expect that this is also somewhat exaggerated as there is an expectation of awareness of ICT related policy from all government employees. The expected awareness of the MIOS in the organisation was 3/10, higher than that of the OSS policy.

[125] This excludes local governments, which in the Western Cape alone, make up 400 separate entities.

OSS activity

Whilst 32% of respondents cited that their organisation has initiated or implemented one or more Open Source Software / Open Content projects, 68% were aware of some South African government organisation that had. 32% were not aware of any OSS / Open Content initiatives and a further 5% could not cite an example. Of those that were aware of other OSS government projects, the most cited example of an OSS project was the Meraka initiative, followed by SITA OSS project and Western Cape Gateway. Two mentioned the Alexandria project and one mention each of the health and Land Affairs projects.

Proprietary software activity

The 40 responses indicated a total of 151,715 workstations[126] across their government organisations. At an estimated cost of R659 per workstation[127], an indication of R100m illustrates a very conservative current investment in proprietary software on the workstation. Any Office suite of tools, server and database costs are in addition.

[126] A significant number of workstations are not included, such as those found in the Departments of Agriculture, Communications, Justice, Minerals and Energy, Intelligence, Public Works, Science and Technology, Social Development, and the Provincial Governments of Mpumalanga, Limpopo, Free State and Eastern Cape, hence we can assume this is a low figure.

[127] Cost for MS Windows ranges widely so a very low estimate was used to ensure a conservative total cost was illustrated.

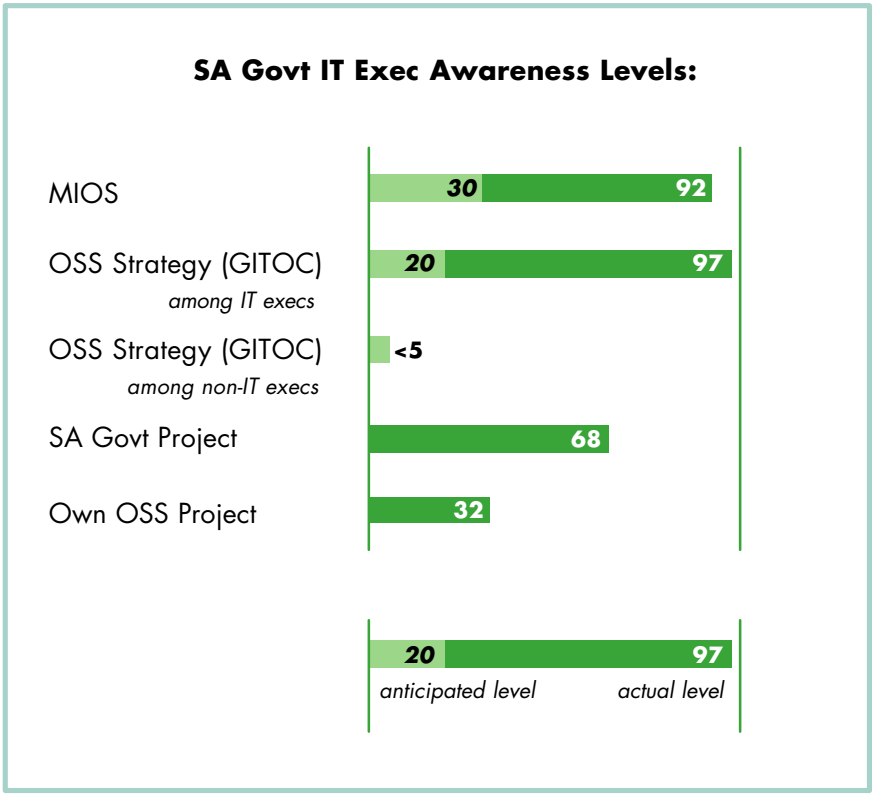

Figure 6: SA Government IT Exec Awareness Levels

8.4 Local Case Studies

The following table represents the audit of OSS projects and initiatives identified by the empirical research. Following the table is more detail on several OSS projects where the team was able to carry out interviews with responsible personnel. Where possible the feedback was gathered in the structured format of the Secondary Interview Guide shown in the Appendix.

Policy recommendations identify that certain OSS elements (as defined in section 5.1) are more useful in early stages of OSS adoption. As such we have ordered Table 12 below, by OSS element as per priority of adoption.

OSS element	Normalised[128] priority of adoption	Abbreviation for table 9
Information interoperability standards	1	Interop
Operating systems	2	O/S
Databases	3	D/B
Content structure standards	4	UML
Generic software tools	5	Tools
Programming languages	6	Program
Applications, components and interoperable systems	7	Apps
Societal: OS community	8	Society
Legal, IPR and governance	9	IPR

Project/Initiative	Element/s	Area	Status
Digital doorway		CSIR	
Coefficient		CSIR	
Alexandria – proof of concept.	1. Interop, 2. O/S, 3. D/B, 4.UML, 6. Program, 7. Apps, 8. Society, 9. IPR	Centre for Public Service Innovation, CSIR.	Stalled.
Corruption management system	1. Interop, 2. O/S, 3. D/B, 4.UML, 6.	Centre for Public Service Innovation	Planned.

[128] Based on the policy recommendations put forward in section 5, these projects are ordered by the priority of the element of OSS that is used in each project. This required establishing a sequence of priority (a normalised view) that is specific to project, and required for the analysis of a group of projects.

Project/Initiative	Element/s	Area	Status
	Program, 7. Apps, 8. Society, 9. IPR		
Bee - Content management system	1. Interop, 3. D/B, 4.UML, 6. Program, 7. Apps, 8. Society, 9. IPR	Provincial Government of the Western Cape http://bee.gov.za	Completed and currently being implemented
Cape Gateway - Portal publishing system	1. Interop, 2. O/S, 3. D/B, 4.UML, 6. Program, 7. Apps, 8. Society, 9. IPR	Provincial Government of the Western Cape	Under development
Internet and Intranet web servers - Apache	1. Interop, 2. O/S, 3. D/B, 6. Program, 7. Apps, 8. Society, 9. IPR	Human Sciences Research Council, Department of Communication and Information systems, Department of Health, National and Provincial Government of the Northern Cape and Provincial Government of the Western Cape	Completed and operational
Schools IT	1. Interop, 2. O/S, 3. D/B, 6. Program, 7. Apps, 8. Society, 9. IPR	Provincial Government of the Western Cape, Department of Education	Operational
OpenSchool	1. Interop, 2. O/S, 3. D/B, 6. Program, 7. Apps, 8. Society, 9. IPR	CSIR	Under development
Rural clinic desktops – Red Hat & Open Office	1. Interop, 2. O/S, 5. Tools, 8. Society, 9. IPR	Dept of Health, Provincial Government of the Northern Cape	Planned
CSIR Migration To OSS	1. Interop, 2. O/S, 5. Tools, 8. Society, 9. IPR	CSIR	Initial investigation
Novell server infrastructure and Groupwise client testing	1. Interop, 2. O/S, 7. Apps	Provincial Government of the Western Cape	Proof of concept demonstrated.
Red Hat Linux based firewall	1. Interop, 2. O/S, 7. Apps	Department of Health	Operational
open ssh, openssl, rsync and samba	1. Interop, 2. O/S, 7. Apps	Department of Health	Operational
Mainframe proof of concept	2. O/S	South African Revenue Services (SARS)	Complete
OSS evaluation and	2. O/S, 3. D/B, 5.	SARS	Planned

Project/Initiative	Element/s	Area	Status
planning	Tools, 7. Apps		
Web based discussion	2. O/S, 3. D/B, 6. Program, 7. Apps, 8. Society	Department of Health	Operational
Content Management System	2. O/S, 3. D/B, 6. Program, 7. Apps, 8. Society, 9. IPR	Dept of Health, Strategic Planning Unit	Operational
Patient Admin and Billing System	2. O/S, 3. D/B, 6. Program, 7. Apps, 9. IPR	Dept of Health, Provincial Government of the Northern Cape	On hold due to other similar proprietary software national project
Web statistics analysis	2. O/S, 7. Apps	Department of Health	Operational
Persal operators – Open Office	5. Tools	Kimberley Hospital, Dept of Health, Provincial Government of the Northern Cape	Completed and operational
OpenOffice	5. Tools	Department of Health	Operational
GNU Make and Autoconf utilities	6. Program	Department of Health	Operational
Investigation system	7. Apps	South African Police Services	Unknown.
IDS, detection system	7. Apps	Department of Trade and Industry	Unknown.
Integrated Document Management System	7. Apps	Department of Public Services and Administration	Complete, also known as Alexandria.
Hospital Information System	7. Apps	Dept of Health, Provincial Government of the Northern Cape	Under development
Document Management System	7. Apps	Medical research Council	Completed and operational – further developments planned
Patient Administration And Billing (PAAB) system	7. Apps	Department of Health	Operational
Open Biblio paper tracking system	7. Apps	Medicine Control Council	Operational
Visitor Tracking System	7. Apps	Dept of Health, Security Division	Operational

Project/Initiative	Element/s	Area	Status
Anti-Retro-viral Drug Program Information System	7. Apps	Department of Health	Under development
District Health Information System	7. Apps	Dept of Health, Provincial Government of the Northern Cape	Completed, not operational
Open Computer Driving Licence	8. Society, 9. IPR	CSIR	Planned
GOSSIP	8. Society, 9. IPR	CSIR	Planned
Open Source Coalition	8. Society, 9. IPR	CSIR	Planned

Table 12 Cited Current OSS & Open Content Projects in South African Government

From the table above we can deduce that although there are at least forty OSS projects currently underway across all components of government, this is insignificant in comparison to the total number of systems currently under development. Further, the majority of OSS projects are in the area of application developments, and the minority are projects to migrate or adopt proven OSS in the areas of interoperability, operating systems, and databases. Noticeably there is only one attempt at creating a metadata framework.

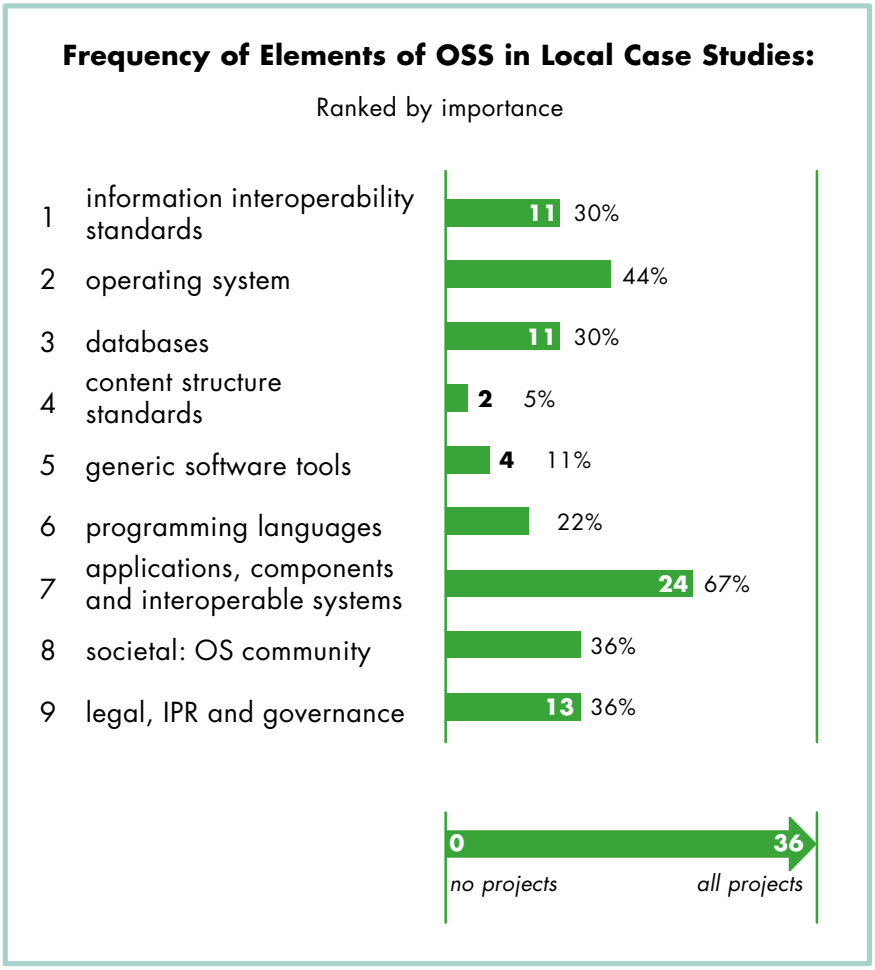

Figure 7: Elements of OSS in Local Case Studies

Case 1: Document Management System (DMS) for the Medical Research Council of South Africa (MRC)

Headquartered in Cape Town, the MRC is a very prominent statutory research body in sub-Saharan Africa. Its task is to improve the health and quality of life of the population of SA through scientific research. The MRC's researchers include 350 core scientists and technologists as well as many students and associates, all of whom have unique skills and specific training. While the MRC makes extensive use of information and communication technologies, it has relied primarily on unstructured personal disk drives, shared drives and e-mail as the main storage and collaborative technologies. According to MRC personnel, this has resulted substantial duplication, flimsy security and poor version control, as well as minimal workflow management, no indexing, and poor general access to information assets. Existing and emerging requirements showed a strong need for information sharing, consolidation and collaboration. There was a growing realisation that the main assets of the organisation, which are the creation and use of knowledge and innovation, could be better maintained and serviced by the implementation of a technology-enabled system. This provided the impetus for the DMS project, called Knowledge Tree, which aims to improve the management of MRC's corporate documentation, research output and Web content.

Intended to be inline with the South African government's OSS policy and to achieve significant savings in license fees, the DMS was built using open source technologies (Linux, Free BSD, PHP, Linux, Apache, Solaris and SunOne). Where there was only programming at stake MRC went full Open Source Software, but where a potential risk existed they used I-Planet.

This first phase of the project has focused on document management and sharing, as well as piloting the new system in five of the MRC research units. This pilot phase has been important for both technical and business reasons. Says MRC knowledge management division manager Gill Staniland, "The problem of network security and sign-on, as well as the challenges involved in porting the system from free BSD to Linux and Sun Solaris were dealt with, while system performance over the Internet was also addressed." The current system is reported to be working well and tangible savings are anticipated from no license fees.

Following phases will add sophisticated collaboration, workflow, archiving and reporting features, and integrate the Knowledge Tree with other MRC systems. The system will gradually be implemented in all of the MRC's 70 business units, and will be extended to appropriate associate communities.

Case 2: Workflow Solution for the Department of Land Affairs District Screening Committee (DSC) Approval Process

In 2001 the Department of Land Affairs (DLA) bought a COTS workflow development tool to manage the workflow and communications processes involved in processing applications for redistribution of land for agricultural development. Via the project

reported here, the application will be expanded to include a workflow approval engine based on OSS.

The User Requirement Specification states that the new process will be used to facilitate the District Screening Committee (DSC) approval cycle for various Land Reform products. The DSC is a committee that may consist of role players from Department of Land Affairs, National Department of Agriculture, Land Bank, local municipalities, Department of Housing and other NGO's.

Mindful of government policy on Open Source Software and serious about exploring new ways to lessen the burden of software licensing, the ICT group in DLA specifically required that that the solution be based on open standards and be implemented using Open Source Software components, whilst adhering to the principles of scalability, reliability and security.

The project proposal is currently in final stages of approval, and includes the following elements:

- Security: The system will provide secure access to the Groupware portal for members of the Screening Committees through LDAP authentication.
- Scalability: The proposed architecture is platform independent through the use of Java.
- Based on open standards (BPML & WfMC, OpenGroupware, XML Schema, SOAP with Attachments)
- Using Open Source Software components (Apache web server, Tomcat application server (JSP/Servlet), AXIS web services framework (SOAP/RPC), BIE – Business Integration Engine, Werkflow, Janus OpenGroupware, mySQL.)

The system must deliver an electronic folder consisting of project information needs to be routed to individual members of the committee. They need to be advised of its existence, need to be able to open the folder electronically, read all of its content and then indicate approval or raise an issue electronically.

Accordingly the process needs to contain information about all the recipients of a folder (representing a project) to indicate whether they have opened it, what action they have taken, who still need to action it, etc. An administrative function must also be supplied that will allow someone in DLA to administer the process, e.g. withdraw or re-route a folder.

The requirement indicates three functional areas:

Collaboration – the process for evaluation and approval of an application is handled by members of a District Screening Committees (DSC), representing Land Affairs, Agriculture, Land Bank, Local Government and NGO's. The communication amongst such a diverse set of role players is complicated by geographic distribution and disparate technological capabilities.

Integration – efficiency and speed requirements along with the need for traceability and transparency necessitates seamless integration into back-end systems.

Workflow and control – the speedy processing of LRAD applications depends greatly on the ability to manage the workflow between the DSC participants. Monitoring of the workflow implies a problem escalation mechanism, which is complicated by the need for a chain-of-command structure, which is not always clear in multi-party collaborations.

Case 3: Open Source Solutions in the Provincial Health Sector

The Northern Cape Government Health Department is actively engaged in several Open Source Software projects.

CASE 3A: PILOT IMPLEMENTATION OF OPEN OFFICE ON THE DESKTOP

Kimberley Hospital has a small number of users of Open Office. This came about because in mid-2003 PCs were provided to run the PERSAL transversal systems[129]. At the same time there was a need for basic word-processing by the same people in the Personnel Department, but there was no budget for MS Office. So Open Office was provided as an effective way to use the same computers at no extra cost.

Open Office is installed on ten machines and is in use by six people for word processing and spreadsheets. Files are transmitted between these machines and others via email, without any problems. No other compatibility problems are evident.

The head of ICT reports that initially there was some resistance and discomfort with "something new," but within a couple of weeks users were quite happy. He conducted an informal survey of current users of Open Office and reports that the six users rate Open Office at 6/7 on a scale of 1-10. Two users prefer MS Office, but that has not been provided on the machines.

CASE 3B: OTHER PROJECTS

The Northern Cape Health Department has also launched several other OSS projects.

- A Hospital Information System under development for Kimberley Hospital and five other nodal hospitals. The system uses Oracle 9i and runs under Linux Redhat. Ideally there should be a migration to mySQL or PostgreSQL but there is some resistance due to lack of information and support for these products, and there is a perception that such a route is riskier.
- Northern Cape began a pilot of the Open Source SQL-based Patient Admin and Billing System (PAAB) at smaller hospitals in the province, but has put it on hold

[129] National human resource management systems.

because there are three different versions of the application that National Department of Health is currently merging.

- There is a District Health Information System (DHIS) to manage aggregated health performance data. It is Open Source Software using the proprietary MS Access. It was developed by a team at the University of the Western Cape and is called HISP. There is some talk about writing the DHIS on an open source database like PostgreSQL, but this has not happened yet. This software could be used to manage patient information in small rural clinics.
- The Northern Cape Health Department plans to pilot the use of Redhat 7.3 with OpenOffice, an email application and an Internet browser as the standard package installed on PC's in rural clinics. This project will begin in January 2004. Also in use is a bulletin board based on a modified version of an available Linux Bulletin Board.

Case 4: Usage of Open Source Software in the National Department of Health

The National Department of Health (DOH) has been engaged in Open Source Software activities for several years and has many Open Source Software projects underway.[130]

The first "pure" Open Source Software implementation was completed in 1996 although the Health Department had made extensive use of free software before that. At the time there was pressure on the ICT group to provide an intranet web server to the department. They set up a Slacware Linux operating system on a Pentium 75 MHZ machine with 16 megabytes of RAM and a one-gigabyte IDE hard disk. On top of that, they ran the CERN web server and a free Perl script from another source for an internal web-search engine.

In June 2001 DOH replaced a proprietary firewall product with a Red Hat Linux-based firewall. The support and stability problems experienced with the proprietary product went away with the Linux firewall. At the same time and on the same machine, they also implemented the squid proxy/caching server and an internal DNS server. DOH made use of an external company to do the initial set-up, which took only three days and cost R5000. The Department has maintained it in-house since then. It is worth noting that maintenance on the server is very low, consisting mainly of changing firewall rules when a new application in the department is implemented and updating some components of the core software when security holes become known. Because of the minimal configuration on this box, only one security update has been needed to date.

With regard to website hosting and development, DOH runs Red Hat Linux with the Apache web server and a web based discussion board package called Discus.

[130] Several of these are listed in the table at the beginning of this section.

Discus comes in a free open source version and a commercial open source version; the source may be changed for own use but may not be redistributed. DOH uses the commercial version as it offers private discussion groups. As a search engine for the Web site the department has looked at a number of free open-source options and chose a program called "search". The use of this program is free for government departments once registered. A search can index one or multiple sites in different domains. The software is well documented and set-up from scratch takes 2-3 hours. The Department is using it on its Intranet to index and search its Intranet as well as the externally hosted Internet site. For development of the website the Department uses Quanta Plus, which recognises HTML as well as PHP, Perl, C++ etc. They use PHP for doing dynamic web development where the systems need to scale from very small platforms to big ones.

For database activities, DOH runs Oracle on a Dell server running Linux in Radiation control. They had compatibility problems that were not supported by Oracle, who informed them that they only give support on certified systems running RedHat Linux Advanced Server and Oracle 9i. The RedHat Advanced Server must be bought from RedHat for +- R13 000 and thereafter Oracle becomes a one-stop shop regarding support. DOH has sent people on training to become Red Hat Certified Engineers and to date one staff member has become a RedHat Certified Technician (RHCT). Database independence will be achieved by using the open-source ADODB PHP class library.

DOH also has officers using Linux workstations for day-to-day tasks, using OpenOffice. These officers do not report problems in sharing and creating documents with the rest of the Department.

The district health information system (DHIS) mentioned above is being used by various health institutions in both South Africa and southern African countries. The source code of the Visual Basic/Access system is available, but due to the development platform the rest is proprietary.

Other open source applications within DOH include a content management system in use by the Strategic Planning Unit, Open Biblio to track the movement of paper files in the Medicine Control Council's administration office, and a visitor tracking system, used by the Security division. A system to gather information about the Anti-Retro-viral Drug Program of the Department is currently under development.

In summary Mr Willem van der Walt, head of DOH IT says: "Where we have implemented Open Source Software, our costs for maintenance dropped and the stability increased dramatically. Once you have decided to use the open source option it is very important to test the solution. Most OSS is very well documented. Read the documentation. Although hardware support is much improved in the last few years, one should not accept that your hardware will be supported. Should you decide to use older PCs and servers to extend their lifetime it is advisable to consult the hardware compatibility lists should you encounter any problems. When using servers and computers from the RT222 contract this department has been fortunate

that it has not had any problems. It is making extensive use of the IBM P300 Pentium II PC to run some of its system on. This PC has proven to be very reliable and stable running Linux."

Case 5: Open Source Corruption Management Information System

The recent Country Corruption Assessment Report has revealed that there are still major gaps in the government's knowledge of the incidence and perceptions of corruption. It is the intention to produce a system to be known as the Open Source Corruption Management Information System (OSCMIS) that will allow identified stakeholders to capture and maintain information through a web-based interface, and will also be used to audit Government's anti-corruption capacity, conduct risk assessments and track the process of data collection. The proposed Corruption Management Information System will not only address this situation, but will also contribute greatly to the rollout of the Public Service Anti-Corruption Strategy.

At present Government is seeking partners with software development expertise to help establish the OSCMIS. The project is spearheaded by four public institutions – the Department of Public Service and Administration (DPSA), the Centre for Public Service Innovation (CPSI), the State Information Technology Agency (SITA) and the CSIR, which will play a lead role in the development and implementation of the system. This project is being undertaken as one of a number of CPSI demonstrator projects in which the Open Source collaboration model is being showcased for its potential benefits to the country and the continent.

Case 6: Open Source Initiatives in the Western Cape Department of Education.

While at an early stage, there are several important Open Source Software projects underway within the Western Cape Department of Education (WCED).

Case 6a: The first project described here is a sub-project of the well-known Khanya project, which is intended to wire all schools in the Western Cape and integrate ICT into the overall learning process. So far the project has concentrated on providing computer laboratories to schools (in some instances moving computers into class rooms), using proprietary software.

While the option of Open Source Software was recognised, it was not pursued given the perceived lack of available Open Source Software expertise. Recently, however, discussions between Khanya and The Shuttleworth Foundation (TSF) focused on ways whereby the WCED could utilise the expertise as well as the computer technology that TSF was willing to provide, specifically open source. This has yielded a plan for a pilot project whereby ten schools will be used to establish computer centres using open source technology, allowing the WCED to properly evaluate the feasibility of curriculum delivery within this alternative environment. The next phase looks to implementation in eighty schools.

The stated project goals and objectives are:

- Investigate Open Source Software as a suitable technology platform for schools
- Find an acceptable approach to curriculum delivery in an open source environment
- Identify suitable educational content for curriculum delivery support of the National Curriculum Statements in an open source environment
- Develop suitable educational content for curriculum delivery support of the NCS in an open source environment
- Encourage the adaptation of locally developed software (e.g. MasterMaths and Cami) to run in an open source environment
- Determine the total cost of ownership of using open source technology (including both capital expenditure and ongoing support cost) in accordance with internationally accepted best practice
- Determine technical support resource requirements
- Identify impact of the introduction of open source technology on future roll-out plans of Khanya
- Determine how best to achieve the objectives of TSF, i.e. the promotion of Open Source Software, as well as those of Khanya, i.e. curriculum delivery
- Effect a transfer of open source skills to WCED staff
- Investigate TSF's methodology for installing computer laboratories and determine of aspects of it can be adopted by the WCED

By now it had been intended that some of the ten pilot schools would be up and running. Practical issues have slowed progress however, and, while Linux network support training is underway, the first school has yet to install its open source lab.

Case 6b : Migrating EMDCs to open source.

The Western Cape Education Department is structured via several Education Management and Development Centres (EDMCs) throughout the region that carry out control and support functions. There is a plan in place to migrate the desktop environment in the Mitchell's Plain EMDC from proprietary application software to Open Office early in 2004. This will involve removing MS Office from some 100 machines and replacing it with Open Office, still running under Windows. Once this process has been successfully completed, the intention is to migrate all EMDCs and eventually the whole Education Department. IT manager for the Education Department, Augi de Freitas notes that proprietary software is becoming unaffordable for the department but that careful total cost of ownership calculations are needed to weigh up the costs and benefits of Open Source Software solutions, refurbished versus new machines etc. He also notes the lack of support for Open Source Software.

Case 6c : The WCED has established a Maths, Science and Technology Academy in Constantia. Bright students from all areas and socio-economic status will be selected to receive advanced training and education in these subject areas. Central to the academy is an open source computer lab equipped with leading edge technology, due to launch in 2004.

General comments: WCED are on a strong track to migrate to Open Source Software, mindful of government policy and cost considerations. Management, however, stress the importance of user buy-in to the proposed migration. It is vital that open source solutions offer equivalent functionality to proprietary solutions. While this is in sight for administrative applications, there is little in the educational software arena at the moment.

It is also envisaged that all departmental legacy systems will be web-enabled, allowing a fast track migration to Linux on the desktop. Ultimately it is hoped that a formal policy document will flow from the current projects, addressing migration from Windows client servers and replacing development platforms with Open Source Software equivalents.

Case 7: Open Source Software Demonstrator Project

Commenced in 2002, the Open Source Software Demonstrator Project is a joint initiative between the Centre for Public Service and Administration (CPSI), the Department of Public Service and Administration (DPSA) and the School of Computer Science at the University of the Witwatersrand (WitsCS). This project involves the use of an OSS development model to develop an enterprise-level Document and Workflow Management system.

The two main aims of this project are:[131]

- To improve public service delivery by fulfilling a real need: Document and workflow management systems are essential for the efficient operation of any government organisation. Some have opted for proprietary solutions, but it is not uncommon to have to wait for months for some specific customisation to be implemented. The cost of licenses is particularly pertinent in a developing country like South Africa.
- To demonstrate the applicability of an OSS development model in the South African public sector: The development model being used is a hybrid model, which makes explicit funding available initially to develop the base product as well as the structures necessary to support the open source development model. After an initial funded development phase, the project will be "open sourced", and will call for contributions from the open source community.

The project phases include:

[131] See the project website at http://www.cs.wits.ac.za/~adi/oss/CPSI-DPSA-proj.html

Phase One: Initial System Development. The first phase is intended to follow the form of a standard software development project, with requirements analysis, followed by design and implementation. This will deliver a functional, but limited, document and workflow management system, as well as the corresponding system and user documentation. In addition, this phase includes the development of the framework necessary to support the OSS development process in subsequent phases. This framework will support the management of source code and document contributions, mailing lists and discussion forums, concurrent version control and bug tracking. The first release of the product will be made available through this framework via the Internet, and was due for completion at the end of October 2002.

Phase Two: Public Sector Research. The second phase will concern itself with the usage of the OSS product by the public sector. Public sector employees will be encouraged to download and use the software, and post comments, suggestions and criticisms to the project website. Questions that this phase will try to answer relate to the usage and acceptance of OSS in the public sector.

Phase Three: Open Source. Finally, the project will be opened up to the open source community and members of the community will be encouraged to contribute and support this project. A close analysis of the process will try to give insight as to the profiles of the contributors (age, profession, work sector, etc.) as well as the factors contributing to a successful Open Source Software project.

According to the project leader, the project is somewhere in phase 2, heading towards phase 3. The DPSA was meant to pilot the project, but this did not come about. The department had already bought a document management system, so there was no real need to pilot another one. It was then arranged for the system to be piloted at CSIR Icomtek where it is now installed. The development team is receiving feedback, which is being incorporated into the system. What is lacking, however, is government user feedback.

Currently the system remains at the CSIR. The intention is to document the experiences around developing and implementing the system, the outcome of the project, what the system does (and doesn't do) and installation instructions, and to release the documents and the source on oss.gov.za. The project leader notes that the system was always intended to be only a "proof-of-concept" system, and is thus limited in functionality. The main aim of the system was not to produce software, but to show how government can support an OSS project by championing it. This has not happened as yet.

Case 8: Cape Gateway Information product

The following are cited aims for the Provincial Government of the Western Cape (PGWC), Cape Gateway project:

- Give easy access to government information and services in the Western Cape
- Ensure consistent branding across all digital communications

- Create a compelling, friendly and accessible user experience
- Provide engaging and useful functionality
- Provide and service feedback mechanisms
- Improve navigability of a large information resource
- Implement sufficient web standards, and ensure multi-platform compatibility
- Develop management utilities to source content from existing government information systems.
- Facilitate seamless, multi-platform data exchange
- Implement a comprehensive search facility

Although the project was initiated without any direct aims to create OSS, the proposed OSS strategy guidelines – as provided by the GITOC OSS working group - were followed in the development process. As such a number of useful lessons are derived.

The development of the overall information product was separated into two distinct systems. The content management system – named Bee – and the portal publishing system. The process for each system followed a rigorous software development process and detailed system specifications were completed against the business needs, neutral of any specific technology choices[132].

Whilst investment in certain web technologies needed to be considered, the tender allowed for OSS principles to be tested. The outcome was particularly positive in favour of OSS in both cases.

In the case of the content management system, a three-tier client server application was chosen for usability reasons. The successful tenderer also included an OSS license constrained to the government domain. Even though the language used is proprietary (Visual Basic), the source code is openly provided to any government entity, locally and internationally.

Similarly, in the case of the portal publishing system, the tender was kept open to OSS developers. Interestingly, since significant investment was already made in proprietary systems, these systems were kept open as an option as one of the technology platform[133] options. Even though there was no associated cost to utilising the high-end hardware and costly proprietary MS and Oracle software, the successful tenderer – chosen as the best price, and to specification – included both the hardware and OSS in their costs.

[132] Tender documentation is available online for the content management system at: http://capeonline.org/cmstender/ and the portal publishing system at http://capeonline.org/portal/development_tender/

[133] Detailed technical specifications for Cape Gateway portal can be seen at URL: http://capeonline.org/portal/development_tender/portal_spec/Portal_TPS_v1.doc

Cape Gateway also provides experience in the area of content standards and intellectual property rights. In addition to new content management principles two efforts in this project may contribute to accelerate two of the areas this report acknowledges as high priority areas of developments.

A data model (using the prescribed Uniform Modeling Language [UML] standard) of all government information has been created and proposed as a (XML) metadata definition by the PGWC. This is following and in accordance with the MIOS, and lays down a critical point of departure for the establishment of metadata definitions for the SA government. The Cape Gateway development team have stated "We hope that this will be taken up by the DPSA and built upon to ensure that we don't end up with multiple standards such has plagued so many technology environments in the past, for example, with VHS and Betamax."

Further, the Cape Gateway team have explored new content standards and guidelines, leading to the conclusion that, "the emphasis needs to be on distribution, not protection. A move away from a mentality of being *guards* of the information to *guardians* of the information." Their work has included a useful analysis of the Copyright Act and other areas of related legislation.

Copyright and the Cape Gateway Project

A review and analysis of copyright[134] was conducted as part of the Cape Gateway project, and is particularly significant in that it pertains to all new media projects and programmes countrywide.

The issue motivating the analysis was whether the material that is published on the Cape Gateway site – or any other government website – is openly licensed for public consumption and/or reuse.

The Copyright Act of 1978 governs the material published on Cape Gateway and other SA government websites. In terms of this act, copyright in the material published on Cape Gateway therefore vests in "the state", as the material is made by or under the direction or control of the state.[135] For administrative purposes, the government printer is the officer in the public service in which copyright is deemed to vest.[136]

However, the definition of "administrative purposes" is unclear and the ambit of the government printer's ownership of the copyright and associated responsibilities requires clarity. It was submitted that it is unlikely the legislature would have circumscribed the deemed vesting with the words "for administrative purposes" if the

[134] See Jean Redpath, "Discussion on the narrow issue of copyright vesting in material published on Cape Gateway", Branch Knowledge Economy E-Government, 3 December 2003 <http://capeonline.org/docs/copyrightactdiscussion.pdf> (3 December 2003).

[135] See s5(2) of the Copyright Act 1978

[136] Proclamation R24 of 1979, Regulation Gazette No. 2740, 9 February 1979, which is proclaimed in terms of s5(6) of the Copyright Act.

intention had been that all rights of ownership would vest in the government printer. If the legislature had meant all ownership rights to vest in the government printer, it would have left out those qualifying words. Hence, it was submitted, the government printer does not own all the copyright rights in the material on Cape Gateway, in terms of the deemed vesting provision but rather the "state" has ownership of the material.

The question then followed as to whether KEEG (the branch Knowledge Economy and E-Government of the Department of Economic Development and Tourism, PGWC), which is a body of the state, can be considered the owner of the material on Cape Gateway.

This discussion submits that the copyright vests in the organ of the state (such as KEEG), which directed the production of the material and the government printer's ownership of the copyright does not include the right to waive, assign or license the copyright.

In the opinion of Chris Higgo of the Cape Gateway development team, "Any government information (which is not justifiably secret) should be seen as a national resource. To make this resource commercially exploitable, clarity around the state's copyright is required. An activist Open Content license for the information would allow entrepreneurs to make money, but require them to share any improvements."

The Cape Gateway portal is currently in its final stages of development and after two years is due for launch in March 2004.

Case 9: OSS: R&D and migration in the Western Cape

In addition to the Cape Gateway project (Department of Economic Development and Tourism, PGWC) and the Education projects (Department of Education, PGWC) the transversal ICT infrastructure team have been testing and using innovative ways of reducing costs through use of OSS across all 13 departments in the Western Cape province.

The R&D has included close involvement with Novell – a major proprietary software vendor – and the beta trials of their OSS compatible software on the server and on the client. This was undertaken to find a way of reducing the 'seat costs' for all workstations in the environment. They have tested the OSS office and groupware packages as well as the [Java based] Groupwise client for Linux. They are planning on operating a full Linux laboratory to test the options for workstation migration in the near future.

Further – and more excitingly – the ICT infrastructure support leader for the Economic Cluster has been using a Linux based file server (Samba) in a production environment for the past 18 months. When asked at what the reasons for this were, Olav Wiehmann responded, "it was simply a licensing thing". Whilst a number of Microsoft Windows 2000 licenses were available, Microsoft has constrained this software to allow a maximum of 10 connections. "As soon as this limit was reached

either we had to procure a file server license – which we know must be tendered for and as such is expensive - or we didn't have to procure anything by using Linux." Wiehmann further justified that "From all that we had read, we were already convinced that Linux was something that we had/have to learn about. Now we're convinced that this is a direction that we need and plan to move to in the next few years". Wiehmann has taken the initiative to play and learn with Linux at home and states that Open office also satisfies 99% of our users requirements for an office software package. We expect that a number of new workstation installations will include Open Office instead of MS Office in the future.

8.5 Discussion

The previous subsections to this research section include both literature and empirical elements. In the following discussion the two are merged into a logical framework for the consideration of OSS and related issues of open content and open systems. The areas that were not covered in previous subsections but are important to consider in discussion, have been included here. The outcome of this discussion is the policy recommendations, associated implications and programme for change.

The Internet is such a vast repository of valuable publications on the subject of OSS that the challenge in this research was to identify the most relevant material for analysis to add value to this specific report. A special effort was made to identify benefits of proprietary software over OSS, as well as any of the negatives and concerns around OSS. As a consequence, this section also motivates for a strong policy for competition in the software industry.

In South Africa particularly, we must take into account that Microsoft dominates software for computing and Internet access, and the strongest competitor to its dominance is not commercial software but is a collection of free software tools and operating systems collectively defined as OSS.

OSS includes a broad range of tens of thousands of programs - from the Linux operating system to a web server named Apache[137], these programs are emerging not just as inexpensive but as more robust and dynamic alternatives to commercial software.

Background to OSS

The OSS phenomenon is not a surprise to those with a sense of history of the ICT environment. In the 1950's the US government funded the early (open source) software projects initiated in academic environments. This (open source) software together with open standards became the foundation of the whole computer industry and remains the critical enabler Internet functionality and new developments.

[137] Apache was put together as literally "a patchy" set of software objects by a group of volunteer programmers.

Most of the conceptual computing breakthroughs and initial implementations were achieved with OSS in the 60's by a team of individuals at the Augmentation Research Center[138] (ARC) at the Stanford Research Institute. Some of these include:

- Distributed electronic mail (five years before ARPAnet) and e-mail lists (seven years before ARPAnet)[139]
- Word processing (implemented a decade before it began to appear in offices)
- Designing the mouse as an input device (sixteen years before Apple introduced it to the world).
- Creating a windowing environment twenty years before Microsoft.
- Envisioning hypertext-linked documents in a distributed environment a quarter-century before the World Wide Web.

Through a combination of funding agencies, oversight of software standards and government procurement regulations, the US government helped stimulate OSS and open standards for decades. It was largely because of the retraction of US government funding in the early 90's, subsequent privatisation of the Internet and the commercialisation of areas of software, that OSS was undermined.[140]

One of the main reasons that OSS is re-emerging is in reaction to Microsoft itself. Commercial organisations that have seen their own products steamrollered by Microsoft are suddenly creating alliances with OSS as a chance to break the Windows monopoly.

In order to break this monopoly, researchers agree that new government public policy that supports open source computing and strong standards, are required. These must support the promise of Open Source Software innovation in the same way that initial US government funding and policy shaped the global computing environment, and the foundations of the nascent information society.

Private and Public Advantages of OSS

In general terms, OSS has numerous distinct advantages over proprietary software. In mature OSS environments the peer review process has lead to software that is more error-free and resource-efficient. Further, software and systems security and stability cannot be achieved through efforts to conceal any software defects, but by enabling

[138] The Mouse site, Stanford University, http://sloan.stanford.edu/mousesite/1968Demo.html

[139] Advanced Research Projects Agency (ARPA), a US government agency created in the 1950's that established a network in the 60's, which evolved into the Internet.

[140] Nathan Newman, "The Origins and Future of Open Source Software: Why the Government Withdrew from Defense of Open Standards," *Netaction*, 1999 <http://www.netaction.org/opensrc/future/nogov.html> (19 November 2003).

individuals to seek out software and security flaws – such as in OSS - they are far easier to eliminate.[141,142]

Within the government domain, the economic losses derived from duplication are widely recognised. This remains an equal challenge in the private sector where large fragmented organisations openly strive toward collaborative team based transversal projects. Within the context of the information society we have observed that only within Open Source communities has this goal been realised. Reduction in duplication is only one of the economic benefits, obviously the largely free models of OSS lead to massive reductions of cost in the licensing of software used by governments and the private sector.[143]

The other benefits of using OSS discussed in detail in the local literature review include reduction in 'lock-in' by system vendors, increased competition that - through embedded open standards in OSS - leads to greater interoperability,

Research shows the many advantages of OSS over proprietary software and although multiple risks and costs are identified in migrating from proprietary software to OSS, little or no real public advantages have been identified in promoting proprietary software over OSS. The only advantages of proprietary software are those realised by the companies that develop proprietary software. Even in the US where the majority of these proprietary software companies thrive, public support for proprietary software is all financed – directly or indirectly[144] - by Microsoft[145] and other proprietary software corporate multinationals.

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[141]Niels Ferguson and Bruce Schneier, "Practical Cryptography", (New York: John Wiley & Sons, 2003), p.9.

[142] Government may negotiate with proprietary software vendors to obtain access to source code but this is a time consuming and expensive process that is common for proprietary software companies but certainly not a core to government operations.

[143]Mitch Stoltz, "The Case for Government Promotion of Open Source Software," Netaction, 1999, <http://www.netaction.org/opensrc/oss-report.html> (20 December 2003)

[144] The Initiative for Software Choice - a major public critic of government use of open-source software - was established through Microsoft backing, as reported by Matthew Broersma, "MS leads lobby against Open Source", *ZDNet (UK),* 13August 2002 <http://zdnet.com.com/2100-1104-949527.html> (10 December 2003). Further reporting by Bruce Perens states "Microsoft has responded with a clever Software Choice campaign that, read quickly, appears to fight discrimination and call for choice, while actually promoting policies that would lock out Free Software." [Bruce Perens, "MS Software Choice," *The Register*, 8 September 2002 <http://www.theregister.co.uk/content/4/26616.html> (1 December 2003).] It was taken to the extreme when Microsoft were been reported by the Seattle Times for faking letters in their own support (by writing them using the names of deceased persons) "http://archives.seattletimes.nwsource.com/cgi-bin/texis.cgi/web/vortex/display?slug=microlob23&date=20010823, (August 23, 2001).

[145] Gartner – who has been criticised for being in Microsoft's pocket (see "Gartner customers still struggle to find Gartner material on Linux" at CNN news http://edition.cnn.com/TECH/computing/9910/22/gartner.linux.idg/) - have acknowledged the Microsoft initiated anti-Linux marketing campaigns. G Weiss, Gartner Group, IGG-01292003-2 "CIO

Economic viability of OSS

There is an assumption that in order for OSS to succeed it requires a sustainable business model. Many argue that OSS must progress from existing as a technical product to generating profits or it will result in commercial failure that only serves to discourage the suppliers of OSS.[146]

This argument however, only relies on supply side factors, but does not take into account the demand side factors,[147] such as consumers ensuring the continued existence of OSS in order to benefit from the pecuniary savings of reduced licensing fees.[148] It is however debatable whether relying on pull factors will ensure the sustainability of OSS in the long term as the demand side pressure will force down the price of certain proprietary software and as the market adjusts it will result in the vendors having their margins reduced and proprietary software becoming more affordable.

Nevertheless OSS will always coexist with proprietary software as OSS is essentially a software-licensing model and not any particular software vendor. OSS services companies sharing the ICT market place with proprietary software, compete on the value delivered and assuming that no individual proprietary software company is monopolising this marketplace, those companies delivering best value will win.

OSS in economic context

Like most OSS, the danger of Linux to Microsoft's market share remains overstated. Reality is that Microsoft software sales grow faster than the overall market growth, increasing Microsoft's market share. Linux is growing, but largely against various commercial versions of UNIX. At this point neither Linux nor the rejuvenated Apple is – in any way - undermining Microsoft's complete domination of the desktop workstation market.[149]

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update: Gartner Survey reveals growing interest in Linux as an alternative to Windows", (29 January 2003).

[146] There is however a business model where OSS bundled together with a service offering. e.g. Red Hat, Open Office, Thawte, Yahoo, others.

[147] Ganesh Prasad, "Open source economics," *Linuxtoday*, 12 April 2001, <http://linuxtoday.com/infrastructure/2001041200620OPBZC> (9 December 2003).

[148] Note that the most successful Internet companies – such as Yahoo, Amazon and Hotmail - are built using OSS. These companies have realised a net gain, but also continue to contribute the pool of OSS using a profitable business model.

[149] Accurate market share figures showing the differences between Linux and Microsoft are difficult to obtain due to the differences in business model (no one needs to buy a Linux CD to use the operating system, it can just be downloaded or one CD can be used for hundreds or thousands of machines). James Maguire, "Heavyweights Join in Linux Desktop Push", *NewsFactor Network*, 12 November 2003 < http://www.enterprise-linux-it.com/story.xhtml?story_id=22675> (22 December 2003), states that, "Microsoft, which enjoys a greater than 90 percent desktop market share, concedes that Linux is a competitive challenge." And furthermore "In 2002, shipments of Linux desktops totalled 2.8 percent of

Similarly, our empirical research audit of all OSS projects in the SA government shows that the number and impact of current projects are insignificant in the broader context of software used or developed.[150]

As the largest consumer of computer software, the S.A. Government has the ability to promote the widespread use and continued development of Open Source Software through its various economic, procurement, ICT related and public service policies.

OSS is just another kind of competitor in the ICT marketplace. If OSS is given a chance, but proprietary software does it better and has value worth paying for, proprietary software will win. That OSS can compete is a signal that the market is working – proprietary software isn't adding enough value to justify its cost!

ICT skills development

"The open-source culture will triumph not because cooperation is morally right or software "hoarding" is morally wrong, …but simply because the closed-source world cannot win an evolutionary arms race with open-source communities that can put orders of magnitude more skilled time into a problem."[151]

The research did not identify any real differences between OSS and proprietary software regarding skills development requirements. Although the content may be different, the concepts remain the same. The area of concern that has been identified is the perceived shortage or restricted availability of OSS skills.[152] Already we have observed how the market forces have changed in the regard and due to greater demand for OSS skills, more people are re-skilling and starting with OSS in favour of proprietary software skills development. The shortage of ICT skills amongst previously disadvantaged groups is directly targeted by the Shuttleworth Foundation Hip2B^2 campaign to address the basic shortage of demand for maths and science education at the school level.

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the market, up from 1.7 percent in 2000, according to IDC." The latest news shows that since Microsoft have taken notice, they are learning from Linux just as any company operating in healthy competitive environment would. Jason Lopez, "Microsoft: How Do You Like Your Linux?," *NewsFactor Network*, 23 December 2003 <http://www.enterprise-linux-it.com/story.xhtml?story_id=22915> (December 23, 2003).

[150] A total of fewer than 35 OSS projects were identified across the Provincial and National spheres of government. Considering that there are 400 systems within one of the 13 departments (Health) in only one of the 9 provincial departments, the figure of 35 is paled into total insignificance.

[151] Eric Steven Raymond, "The Cathedral and the Bazaar", *Thyrsus Enterprises*, http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/ (2000), Chapter 10.

[152] OSS Working Group.

The issue highlighted by Ben Ngubane[153] – current Minister of Science and Technology – is that OSS can and will foster sustainable development and significant in human capital formation for the Information Society and our science system.

SITA's head of research and development, Mckay Motshabi, further supported the concept and stated that the main reason for SITA strong support of OSS is because SITA believe it to be "a critical factor contributing to the establishment of a sustainable local ICT industry". Other reasons for SITAs commitment to OSS include the ability to: avoid the vendor 'lock-in' associated with proprietary software, both on the support and maintenance of software as well as training, and to realise the economic benefits of free software.[154]

Organised Labour perspective

Whilst it is recognised that software developers are not [yet] noted for their devotion to the carrying of union cards,[155] the question begs "Is there such a thing as politically-correct computer software?". Eric Lee[156] supposes that in terms of the day-to-day lives of the workers in the companies that produce all OSS and proprietary software, the differences aren't great. But, "still… there is that intangible element that makes us want to give our support to David and not to Goliath".

The Union Network International (UNI) most current perspective is supportive of initiatives that help in the development of OSS as an alternative to proprietary software. UNI's main concerns are that powerful private commercial interests will overly control the information society. It is argued that the Internet has benefited enormously from its origins as a US government sponsored research initiative rather than a commercial venture, and from the fact that the protocols on which Internet file transfer and communication are based are open protocols in the public domain.

"The open source community, with its strong commitment to the principles of collaborative research and shared endeavour, is a good example of the positive role civil society can play in the development of the information society. UNI believes that more attention should be given to the future role of open source computing, particularly in the context of developing countries."[157]

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[153] Extract from Minister of Science and Technology, Ben Ngubane's presentation at the World Summit for Information Society, Geneva (2003). Ben Ngubane, "RSIS Speech 2003-12-08v7", Address at the Role of Science in the Information Society Conference, 8 December 2003.

[154] Mckay Motshabi, *telephonic interview*, 18 December 2003. Head of Research and Development, State IT Agency (SITA).

[155] Charley Lewis, *email interview*, 9 December 2003. Lecturer, LINK Centre, Graduate School of Public & Development Management, University of the Witwatersrand,

[156] Eric Lee, "The software we use", *Labour Start*, April 2001 <http://www.labourstart.org/art200104.shtml> (9 December 2003).

[157] "A Connected World - People first in the information society", Submission by Union Network International (UNI - is the largest international grouping of individual trade unions. It brings together over

Programmers and the development of new OSS

There is an assumption that the programmers will cease to provide OSS as they do not directly benefit from their contributions and only the consumer is benefited by being able to use the OSS without paying for it. Most programmers write the software in order to solve a problem that they are facing or in order to "scratch a personal itch."[158] Prasad believes that the process of developing such software is actually quite pleasurable and energizing to most good programmers. Once the software has been written, giving away copies of it does not deprive the programmer of the ability to continue to use it, and it costs them nothing extra to do so. It is a win-neutral transaction, and therefore there is no economic reason to prevent it from taking place. (He further states that economics purists would point out that there is indeed a cost to giving away the software - the opportunity cost of not selling the software instead. However, for many programmers, the process of selling their software is more trouble than it is worth, so the effective opportunity cost is actually zero.)

Further, open source programmers also tend to work with others who share their interest and contribute code. They enjoy a multiplier effect from such cooperation i.e. the contribution made by each programmer helps to build something much bigger than what they could do by themselves.

Even in light of these arguments there is no guarantee that a project will even reach a usable stage and even if it does, there is no guarantee that there will be interest from a user's perspective. This is also the case for proprietary software but not as evident for proprietary projects that are not usually started without strong backing from a company.

One must keep in mind that programmers do need income to survive and in general it is not an itch that makes programmers program. The need for software comes from organisations. The economics are based on the cost of development versus the cost of acquisition. For most companies that see technology as an enabler and not as a business, the OSS model works well. They can employ programmers to customise and enhance software for their requirements [and when contributing the enhancements back into the system, the multiplier effect is realised].

Proprietary software advocates have raised a concept that if OSS succeeds, then there will be no work for programmers. People who worry about this so called "Open Source Doomsday" have lost sight of one fundamental fact: If having a program written is a net economic gain for a customer over not having it written, a

900 unions representing over 15 million members) at the World Summit on the Information Society, 12 December 2003.

[158] Prasad.

programmer will get paid whether or not the program is going to be free after it's done.[159]

Software responsibility

There is no body to be held responsible if a problem occurs with OSS. Thus an argument follows that there is no owner of the software to ensure that is reliable and that problems are dealt with timeously. There are also opinions[160] that state that it is doubtful that a commercial company can guarantee support for software that the customers have modified for themselves as the company will have to scan through thousands of lines of code to ascertain what changes have been made to the software.

Any system is made up of numerous elements that may either enable the system to work or not. In reality it can only be the responsibility of the owner of the system to make it work. Proprietary software ties the owner (lock-in) to the proprietary software vendor, and as an outcome the proprietary software vendor is the only body that can be responsible for any software problem. OSS empowers the owner of the system to choose the best body to take responsibility if any problem (software or other) occurs.

Further what must be borne in mind is that proprietary software can also be discontinued, experience price fluctuations and changes in support policies or the vendor can go out of business. Evidence has shown that proprietary software vendors are not inherently more reliable in the long term than OSS.

Compatibility problems

There has been significant OSS penetration into the software infrastructure environment. It has however not made significant in roads into the generic desktop applications category which is dominated my proprietary software vendors such as Microsoft. Unfortunately there are compatibility issues between the OSS desktop applications and Microsoft applications, which have not been resolved and will continue with the release of regular proprietary software updates.

Further Microsoft and other proprietary software vendors intentionally build in obstacles to compatibility with OSS. An example of this is demonstrated in the recent anti trust cases that Microsoft has been involved with in the USA.

[159] Open Source International (OSI is a non-profit corporation dedicated to managing and promoting the Open Source Definition for the good of the community), "Jobs for hackers" http://www.opensource.org/advocacy/jobs.php, undated.

[160] See the argument proposed by Microsoft's .Net Marketing Manager Richard Hamblen in Sarah Arnott, "Open source arguments for and against," *VNUNET.com*, 26 July 2001, <http://www.vnunet.com/Features/1124256> (10 December 2003).

Security

There is an argument that advocates that the use of OSS poses a security risk because so many people have touched the software that security holes can be slipped into the code.[161] Whilst this may be a reality for small OSS projects where collaboration is low, it is not the case in any of the mainstream operating systems, databases or generic tools. In every significant OSS project, there are a number of levels of authority, and both reviewing as well as rigorous testing of code must be performed before any code is committed to production software versions.

On the other hand proprietary software is a "black" box, which has to be trusted and it has to be assumed that there are no backdoors in the source code. This is clearly not the case as has been demonstrated by the numerous Microsoft vulnerabilities identified on a daily and weekly basis.[162]

It's not only the serious security vulnerabilities that effect users of proprietary software. In one case the British Government of Tony Blair learned this lesson the hard way. Private information - hidden in the proprietary software file header of a document published on the British government web site - was exposed to show some plagiarism was involved.[163]

Further, PS vendors argue that no OSS developer guarantees the security of the product. These concerns may be valid in some cases, although we have found that in the majority of instances where this is required, OSS developers will provide the greatest level of security. If one examines End User License Agreements provided by proprietary software companies, they clearly exclude any liability – not only security compromise - arising from the use of the software.

Number of applications and user friendliness

There are fewer desktop OSS applications available compared to proprietary software but this is improving as more OSS is being developed and released. OSS users also admit that OSS often lacks usability and the user-orientated documentation, usually only released much later than commercial software.

In the past, most OSS was technically challenging and required considerable expertise. Today, some Open Source Software is just as easy to deploy as proprietary alternatives. Solutions like Red Hat Linux or Open Office are designed for entry or mid-level user expertise, offering installers with graphical interfaces and

[161] See Shawn P. McCarthy, "Internaut: Open source isn't always best," *Government Computer News*, 22 September 2003, < http://www.gcn.com/22_28/tech-report/23567-1.html> (10 December 2003).

[162] See, for example, the published advisories for Microsoft at http://www.secunia.com/vendor/1/

[163] For further detail on this aspect of Blair's Iraq dossier, see http://www.computerbytesman.com/privacy/blair.htm

suggested configurations. Once installed, Open Source Software may not offer certain features, but it is not necessarily more difficult to deploy.

Migration

Whilst careful analysis shows that the arguments vastly support the use of OSS, the most challenging aspect of implementing an OSS policy is the migration of proprietary software to OSS. Big bang and phased approaches are discussed[164]; Hnizdur at al recommend a 'make life easy' approach. They map out the software landscape, and detailed technical instructions are included. Server based applications are commonly identified as the 'low fruit' together with workstation applications that run in both a MS Windows and Linux environment. These areas represent the least amount of change from a user point of view, whilst significant economic benefits are still realised.

The areas for consideration[165] and planning include enforcement of the MIOS.[166] The MIOS must be adhered to, good practice must be encouraged and the use of macro's and scripts in spreadsheets and documents strongly discouraged, lowest common denominator formats should be used and open standard file formats must be insisted upon, systems developed using a three-tier model and proprietary mailstore formats should be converted into standard formats as identified in the MIOS (e.g. IMAP).

Whilst some programmers and users will naturally champion OSS, the issue of consultation and planning with all stakeholders before entering into any migration from proprietary software to OSS, is well documented.[167] Training must be made accessible (and generally optional). Migration frameworks detail all the issues of migration that have been carefully laid out both by the EC and German government.[168] These documents as well as others make up a plethora of materials to assist and guide with both the strategic planning as well as technical aspects of migration.

Legal framework for software and Intellectual Property rights

Although not yet fully documented in South Africa, the operating system for the workstation environment is monopolised by Microsoft. OSS proponents argue that the legal framework – or lack thereof - has a bias towards Microsoft. At present there is

[164] Steve Hnizdur et al, "The IDA Open Source Migration Guidelines," *Netproject*, 8 November 2003, <http://europa.eu.int/ISPO/ida/export/files/en/1618.pdf> (1 December 2003), p.19. A publication coming from the Interchange of Data between Administrations (IDA) - European Communities.

[165] Hnizdur et al, p. 17-24.

[166] "Handbook on Minimum Information Interoperability Standards (MIOS)" and "MIOS Implementation Initiative"

[167] Hnizdur et al, p. 21.

[168] See especially Hnizdur et al as well as Gamerdinger et al.

no regulatory framework for software in South Africa. The current OSS policy is effectively focused at advocacy and as discussed by Redpath, the copyright act shows a number of weaknesses.

A major barrier to the deployment of OSS is the Microsoft secured position on almost all new PC's.[169] With exception of special circumstances where a dealer may order a machine from a distributor without Windows, the default configuration for any PC includes Microsoft Windows. In most retail outlets one may only procure a PC with Windows already installed. In most corporate environments, staff may only procure a PC with Windows preinstalled. Once new PC's may be delivered with OSS preinstalled then the need for regulation for competition will be greatly diminished.

Software is but one of the areas of intellectual property (IP) rights that relates to open information society. IP protection is important to encourage the innovation and creativity both in the private and public sectors as well as civil society and education. Striking a fair balance between protection of intellectual property rights, on the one hand, and its use, and knowledge sharing, on the other, is also important to the Information Society. This balance is [to be] pursued by protection and flexibilities in Intellectual Property agreements and this pursuit of the balance should be maintained. Facilitating meaningful participation by all in intellectual property issues through awareness and capacity building is a fundamental part of an inclusive Information Society.[170]

The area of content and IP rights is directly connected to the principles of OSS, the affects impact a far greater range of stakeholders in a more tangible manner, including all facets of government as well as other public and private sector organisations. The various intellectual property rights vested in each include authorship, publication, modification, use, buying and selling. Redpath[171] acknowledges the weaknesses in the copyright act relating to the definition of 'the state' as well as the need for upgrading this legislation – and any open content principles - to take into account new media.

An example in case is that of Butterworths, a private company - based in Kwazulu Natal - who compile national and provincial government legislation in its complete form. They are a comprehensive supplier of South African government legislation to the public. They have compiled the Acts so as to include all the amendments, and users require their software, which enables costly licensed access to all the data. Open content advocates argue that this content should be made available freely to the public. Whilst the access to information act does enable citizens to request this type of content, it's usually a drawn out unfriendly process to obtain legislation directly from government.

[169] Confirmed by an ad hoc scan of 8 retail and distribution vendors in Cape Town, as well as the telephonic research interviews (see section 12.4 for list of interviewees).

[170] "Draft Declaration of Principles," WSIS.

[171] Redpath, p. 2-4.

We believe that the key elements to provide open access to information are:

- The catalogue (list of all documents produced by government, current legislation is an example of one category),
- And the ability to read each of these documents – in their current version - requires a physical presence of the document
- In the appropriate language (electronic or print).

The issues of providing a copy for the individual and the time to deliver are separate and differ depending on the specific case.

Most government officials appear to support the concept of open content with one concern being that vendors tend to resell open content – commissioned by one department and published by them – onto another department that is unaware of the fact that the content is open.

The Minister for Science and Technology – Ben Ngubane - has taken a stance that affects the Intellectual Property debate. For instance, *he* would like all software produced in the course of publicly funded research to be open sourced. *He* would also like the research to utilize OSS where possible. This stance follows the recommendations published by the National Advisory Council on Innovation in January 2002" (emphasis added). An additional statement can thus be made along the following lines:[172] "We would like to see a regime where intellectual property rights - as mentioned above – are unbundled into authorship, publication, modification, use, buying and selling". As can be seen from the NASA and BBC models[173], an open approach to government owned content is recommended.[174]

Innovation and OSS

The indications all show that greater government driven usage of OSS, strongly correlates with innovation in ICTs. Whilst it is agreed that OSS and open systems are not a panacea to software problems, they are a critical requirement to breaking the well-entrenched Microsoft monopoly. In addition to innovation, technology supply will be diversified through the promotion of Open Source Software. The life of investment and user training will be extended, but at the same time, new investment must be made in order to make use and obtain benefit from OSS.

As the Internet becomes more ubiquitous so does Open Source Software. All common Internet software is available in Open Source Software variations. Enhanced software

[172] Nhlanhla Mabaso, *email interview*, 8 December 2003. Head of the CSIR Meraka centre and the GITOC OSS working group.

[173] See note 59 on page 47

[174] Creative Commons is a recently established NGO with the goal to build a layer of reasonable, flexible copyright in the face of increasingly restrictive default rules. Their website is recommended reading on this topic: http://creativecommons.org/

is often proprietary software. As programs become more mainstream they become more readily available as OSS and so newer proprietary software programs are released at the leading edge of market demand and innovation.

9 Conclusion

9 Conclusion

The research conducted for this report has demonstrated that OSS has matured into a legitimate technological option and in so doing has fuelled much ideological and sometimes over zealous debate. This is driven, not by the technical differences between proprietary software and OSS, but rather by their different business models and economic motivations.

The research has shown that both proprietary software vendors and OSS groups have been lobbying governments all over the world to take a position on the OSS versus proprietary software debate. Thus many governments have been forced to formulate a policy on how to deal with OSS and in so doing these governments have promoted a paradigm shift in thinking about the process of software development.

After examining countries that demonstrated an active awareness or usage of OSS in the public sector it became apparent that these governments are supporting and promoting OSS by using OSS to fulfil public sector functions, mandating the use of OSS in government departments or channelling funds directly into OSS development. The research shows that the main factors that have driven this support within the public sector of OSS include the rising cost of proprietary software, the fear that proprietary software is not as secure as OSS, governments desire to be vendor independent, avoidance of intellectual property infringements and the promotion of national interests such as domestic skills development.

From a developed country perspective many countries have developed cautious OSS policies but on examination of many of the developing countries such as Brazil, Argentina and Peru, it has been shown that these countries have some of the most progressive and proactive policies with respect to OSS development within government.

The research has shown that except for South Africa, Africa is considerably behind the other continents in terms of OSS development at a government level. There are various ad hoc OSS African initiatives but it appears that only South Africa has an official OSS policy approved by the Cabinet. Even though this policy actively supports OSS, this report suggests various enhancements to the existing policy.

These enhancements recommend that South Africa take a more proactive approach to OSS by building on the existing GITOC strategy and also by including and addressing Open Content.

The effects of the OSS policy are transversal and will touch all the markets in which it operates. More specifically there will be certain policy implications, which include:

- An overall reduction in direct costs from the implementation and use of OSS but no significant variance in the associated indirect costs

- Resistance to the policy from ICT decision makers and employees and hence training, incentives and penalty programmes will need to be introduced
- Short term effects on the proprietary software vendors associated with government as they face new challenges
- Short term effects on the OSS vendors as they face new opportunities
- The realisation by government, proprietary software vendors and OSS vendors that OSS and proprietary software will not exist independent of one another
- Short term OSS skills shortages until local skills ramp up
- Pressure could be exerted from foreign governments in response to the displacement of their proprietary software vendors
- Increased local adoption of OSS goods and services due to the multiplier effect as government is the single largest ICT procurer in the country
- Each sphere of government and government department aligning its internal policies in light of the enhanced OSS policy - especially staff skills development, ICT procurement, ICT administration and the inclusion of an Open Content Policy
- Developing an integrated governance, as all proprietary software and operations will need to be assessed and the correct OSS skills developed in order to implement an OSS process of change
- Encouraging Open Standards development as OSS is built using and upon Open Standards
- The adoption of Open Content resulting in lower overall costs as a result of the avoidance of duplication of content creation, management of content, collaboration and improved access to information
- Skills development, promotion of vendor independence, security and domestic sovereignty enhancement.

There is no doubt that the implications of the OSS policy are positive and that even though the OSS initiatives in Africa are limited, South Africa has the opportunity to spearhead the OSS drive by implementing this enhanced policy. Further, the adoption of a proactive policy regarding OSS will ensure that the software and development is owned by the citizens rather than the proprietary software companies and this will guarantee that the knowledge and skills remain firmly entrenched in South Africa rather than abroad. This will also help the government in assisting its citizens to move a step closer to bridging the digital divide.

10 About the Researchers

10 About the Researchers

Alan Levin BSc MBA

(Project Leader – based in Cape Town)

Alan Levin is a specialist in change and governance. In addition to actively participating in global information society policy-making activities, he leads information society research and development projects. He has actively built communities of interest at a global, regional, national and local level and continues to focus on creating new information society jobs and economic and social developments.

Alan currently serves on a number of governing bodies including the Board of the .za Domain Name Authority, the Internet Society, South African chapter, the Bandwidth Barn (a co-operative incubator) and various other public sector organisations. Alan is the founding treasurer of the US based Public Interest registry.

Alan created the e-government strategy for the Provincial Government Western Cape and recently led a team responsible for implementing the first root name server in Africa. He continues to work on various e-government projects including the nascent Cape Gateway, Cape Net, Cape Change and Cape Access projects. In the private sector Alan provides research and development support for a leading healthcare information company, as well as e-commerce strategy for a medium size US retailer.

Previously Alan was responsible for Information Technology and ICT product development at Sunesi Clinical Systems. Alan co-founded Intekom (Telkom's first ISP) and established the Cape Town regional office, and first worked at Andersen Consulting as a change management consultant.

He participates in ICANN, the African Network Operators Group (AFNOG) and AfriNIC (the nascent African Network Operators Centre responsible for allocation of Internet address space) and operates AfriDNS, providing information about African country code domain names.

Alan was elected IT Person of the Year by the Computer Society, Western Cape in 2001/2002.

Alan has a BSc in Computer Science and Industrial Psychology, and an MBA from UCT. He is widely experienced in the appropriate use and management of Open Source Software and applications.

Dr Jonathan Miller BSc MCom PhD

(Consultant – based in Cape Town)

Jonathan has thirty years experience in the ICT sector, first in research and management positions in IT and Operations Research in the manufacturing and oil industries, and then for many years on the faculty of the UCT Graduate School of Business, teaching and conducting research in the ICT sector. He is author of 40-50 refereed and professional publications. With Philip Esselaar formed Miller, Esselaar and Associates in 1998. Recent assignments include work on the South African Electronic Commerce Green Paper, a study into research support for the ICT policy process in the SADC region, drafting an ICT Policy for Namibia, ICT surveys in Rwanda, Tanzania and Mozambique, contributing to the ECA Post-ADF99 process and working with the Medical Research Council on design an development of an HIV/AIDS web portal. Jonathan played a volunteer role in major national projects, including the Foresight long range scenario planning study for information and communications technologies and the development of a national policy for the IT industry (SAITIS). After being conference facilitator for the British Council sponsored international conference on Building Information Community in Africa in 1999, Jonathan was contracted to take on a major BICA outcome and founded CentraTEL an NGO committed to supporting the worldwide multi-purpose telecentre community. This in turn led to the production and wide distribution of a CD with information for operators, government agencies etc. He chairs the Board of the International Computer Driving License (ICDL) Foundation, an NGO delivering international certification of basic computer skills to South African learners and is on the Board of the Cape IT Initiative (CITI), an NGO committed to building an ICT cluster in the Western Cape. Jonathan gained his PhD on the subject of Information Systems Effectiveness. He is the immediate past President of the Computer Society of South Africa (CSSA) and a Past President of the Operations Research Society of SA. Jonathan was elected Computer Person of the Year by the CSSA, Western Cape, in 1994 and became a Fellow of the CSSA in 1999.

Mark Neville BSc MBA

(Consultant and Project Manager – based in Cape Town)

Mark has worked in a project based or consulting environment since 1986, initially in Zimbabwe, and since 1994 in South Africa. He has a marketing background, developed whilst working for publicly listed international companies in both Africa and the UK. He has a strong process orientation, and is experienced in the management of technology and application of technology to deliver against marketing goals.

His spread of industry experience encompasses adhesives and sealants, advertising, aviation, beer & wine, beverages, catering and consumer foods, confectionary, conference management, e-business, e-commerce, education, environmental management, fashion, fast food, financial services, hospitality, healthcare, IT, industrial chemicals, import/export, jewellery, knowledge management, local government, manufacturing, medical diagnostics, music, NGOs, office furniture, out-of home entertainment, packaging, pharmaceuticals, public policy, publishing, retail,

safety equipment and clothing, software development, supply chain management, retail distribution, technical fabrics, telecommunications, tourism and training.

Recent project include the research and specification of the City of Town's Smart Cape public access project; the development of a small business support policy for the municipal government; the design of training for local government officials in local economic development (LED) techniques; leading a study into ICT diffusion in the multimedia industry (as a part of a wider study led by Miller Esselaar & Associates); the design of an MIS strategy for the City of Cape Town Department of Heath, and the definition of business models for the operational components of the Western Cape destination marketing organization.

Mark has an MBA from UCT, as well as a first degree in Physiology & Biochemistry. He has had a number of articles published, including his MBA thesis on Organisational Design for Service Excellence in the Journal of Human Resource Management. He is Professional Member of the Institute of Marketing Management, an occasional public speaker, and a regular guest lecturer at the UCT Graduate School of Business. Mark acts as the general manager of Radian.

Tina James

(Consultant – based in Pretoria)

Tina is an information and communications technology (ICT) specialist with 20 years experience in Southern Africa, particularly in underdeveloped areas. She has managed several large, multidisciplinary projects in both the ICT and environmental management arena. These include the editing of the recently-published Information Policy Handbook for Southern Africa, e-readiness survey for Mozambique, development of a strategy for SchoolNet South Africa, the baseline studies for the South African IT industry strategy, preparatory papers on ICTs for youth and education in Africa for the Economic Commission for Africa; and a study on regional and national ICT policy support for Southern African countries. Additional expertise includes research on gender and ICTs, community telecentres, universal access, and the use of ICTs to support entrepreneurs in developing countries. As Senior Advisor to the Canadian International Development Research Centre's Acacia Programme, which addressed the use of ICTs by disadvantaged, rural communities in sub-Saharan Africa, she was responsible for project development and implementation as well as support for strategic planning activities. Tina was appointed by the South African Department of Arts, Culture, Science and Technology to serve on the ICT working group for the national Foresight initiative, which developed a technology strategy for ICTs (1999) – served as the ICT sector expert to produce a technology scan for the proposed ICT roadmapping initiative (2002). Tina serves on the ECA's African Technical Advisory Committee for the African Information Society Initiative (AISI). Tina has operated as an independent consultant since 1997, before which she was involved for 12 years in various management positions at the South African Council

for Scientific and Industrial Research (CSIR), an R&D organisation focusing on contract research.

Ryan Dingley BA LLB MBA

(Research Assistant – based in Cape Town)

Ryan is an admitted attorney and has worked as a strategic management and credit risk consultant before recently joining Radian.

In his previous position as a credit risk consultant, he was responsible for applying best practice credit management solutions throughout the credit life cycle. His work included conducting a feasibility study for the implementation of a consumer credit bureau in Egypt and the feasibility study for the implementation of a predictive dialler system at Nedcor.

In his role as a strategic management consultant he was involved with the analysis of the JD Group's debtors process value chain to secure alignment with the Business Intelligence (BI) solution and to identify opportunities for improvement. Other projects of this nature have included a Business Process Value Chain micro lending enterprise optimisation, integration and IT Architecture Alignment for UniFer. This included the assessment, improvement, mapping and design of operational processes and the concomitant IT associated with these processes for ABSA. This also included an analysis of the debtors process value chain against best practice and the design of a future debtors To-be process.

He also has project experience at the South African Mint, where he conducted a strategic review and made recommendations as to the most appropriate strategic options that should be considered in the future. Further, he has extensive Business Intelligence experience after being contracted to test the BI User, Support and Change processes at Santam.

Most recently Ryan has research and prepared position papers on Open Source Software as input into the evolving Open Source Software policy of the City of Cape Town.

He holds a BA degree with a major in Economics and Private Law, a LLB and an MBA all from the University in Cape Town.

Kurt Ackermann AB

(Analyst – based in Cape Town)

Kurt Ackermann helps organisations invent and re-invent themselves, their strategies, business models and brands in the face of globalisation and technological change. This work has spanned the public and private sectors in first world and developing economies. Over the past five years, Kurt has helped clients create nearly $US 1 billion in market value and improve the lives of millions of people.

Over the past two years, Kurt has helped the City of Cape Town and the Provincial Government of the Western Cape re-invent the tourism, trade, film and investment promotion agencies associated with their commitments to joint marketing. This has encompassed designing integrated business models and technologies that drive these agencies. He has also developed strategies, completed planning and undertaken project management associated with economic development, e-government, and e-business in the public sector. In the private sector, Kurt has helped a major global airline become more customer-centric, and also helped an international boutique management consulting firm productise their intellectual property and re-invent their brand to grow their client base.

Previously, Kurt was co-founder, EVP and chief strategist of an award-winning US-based regional consultancy providing integrated technology and marketing services. Prior to this, Kurt developed the US interactive strategy for the world's largest public relations firm and managed the daily operations of its US interactive business unit, considered by analysts to be "key advisors to Global 2000 management in the development of e-commerce strategies." He has worked with the Internet professionally for fifteen years.

Kurt has a bachelor's degree cum laude from The University of Chicago, has completed postgraduate coursework in their Graduate School of Business and was elected Phi Beta Kappa as well as a member of Mensa. He has taught university and postgraduate courses, served as a founding board member of an affiliate of the Association for Internet Professionals, was named to Who's Who in Technology and has been a grant reviewer for the US National Institutes of Health.

Kgaogelo Isaac Modipa ND BAdmin

(Research Officer PNC Pretoria)

Kgaogelo is currently working at the Presidential National Commission as research officer, where he is responsible for research work done within the commission. This includes investigating current government ICT strategies, writing questionnaires and making Provincial visits to promote awareness of ICT nationally.

He holds a national diploma in Public Management majoring in Economics and Public Administration from Technikon Northern Gauteng, a BAdmin from University of Pretoria, and is currently a Postgraduate in Public Policy at the same institution.

Modikwe Kgapola BA

(Research Officer PNC Pretoria)

Modikwe holds a Bachelor of Arts with Communication and Information Science as his major subject. He worked at UNISA in 2001 to 2003 as an assistant in the library where he was responsible for doing Internet searches and downloads of online acts, journal articles as well as other academic documents. He also liased with other Unisa library branches to ensure that clients and students get their requested

study material. In April 2003 he joined the Presidential National Commission as an intern, where he works on a number of ICT projects including current ones on ICT strategies, the use and impact of ICTs among children, as well as among business within South Africa. Modikwe was also part of the delegation that undertook provincial visits to introduce and create awareness on the existence of PNC. Among other resposibilities during these visits was presenting on ICTs and the Information Society as a way of introducing these technologies to the people and the impact they bring to our lives.

Kitsiso Rakoma Bcom

(Research Officer PNC Pretoria)

Kitsiso started working as an intern at Department of Communications in 2002 with the mandate to learn about communications industry, policies governing it nationally and international and be involved in policy recommendations and amending of Acts. She is currently an intern at Presidential National Commission on Information Society and Development (PNC on ISAD) doing desk research investigating on how information and communication technology (ICT) can help youth and how it can enhance education globally. Kitsiso was also involved in Provincial Consultative Forums to make provinces aware of the PNC and ICT and writing reports of what transpired in the workshops. Kitsiso did her B.Com degree at the University of North West specializing in economics and statistics.

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12

Appendices

12 Appendices

12.1 Glossary

Open[175]:

A product or system is described as open when its workings are exposed to the public and capable of being modified or improved by anyone. The alternative is a proprietary product or system.

Open Source Software (OSS)[176]:

In general, Open Source Software (OSS) refers to any program whose source code is made available for use or modification as users or other developers see fit. Open Source Software is usually developed as a public collaboration and made freely available. In a stricter sense, OSS refers to software that complies with the "Open Source Definition".

The Open Source Definition[177]:

Open Source is a software certification mark owned by the Open Source Initiative (OSI). Developers of software that is intended to be freely shared, possibly improved, and redistributed by others can use the Open Source trademark provided that their distribution terms conform to the OSI's Open Source Definition. To summarize, the Definition model of distribution terms require that:

- The software being distributed must be redistributed to anyone else without any restriction
- The source code must be made available (so that the receiving party will be able to improve or modify it)
- The licence can require improved versions of the software to carry a different name or version from the original software

[175] Blume et al, 69.

[176] Blume et al, 69.

[177] From the "Open Source Initiative (OSI) definition of Open Source" found at http://www.opensource.org/docs/definition_plain.php in Blume *et al*, 69.

Open Standards[178]:

Open Standards are characterized by the fact that the specifications on which they are based are owned by a vendor neutral organisation rather than by the original developers. Anyone is free to build software according to the specifications without infringement of intellectual property rights, though typically there are several freely available implementations (commercial or Open Source). Their real virtue is that they have been adopted by the industry and are "future proof'. An open standard is more than just a specification. The principles behind the standard, and the practice of offering and operating the standard, are what make the standard "open":

- Availability - Open standards are available for all to read and implement.
- Maximize End-User Choice - Open standards create a fair, competitive market for implementations of the standard. They do not lock the customer in to a particular vendor or group.
- No Royalty - Open standards are free for all to implement, with no royalty or fee. Certification of compliance by the standards organisation may involve a fee.
- No Discrimination - Open standards and the organisations that administer them do not favour one implementer over another for any reason other than the technical standards compliance of a vendor's implementation. Certification organisations must provide a path for low and zero-cost implementations to be validated, but may also provide enhanced certification services.
- Extension or Subset - Implementations of open standards may be extended, or offered in subset form. However, certification organisations may decline to certify subset implementations, and may place requirements on extensions (see Predatory Practices).
- Predatory Practices - Open standards may employ licence terms that protect against subversion of the standard by embrace-and-extend tactics. The licences attached to the standard may require the publication of reference information for extensions, and a licence for all others to create, distribute, and sell software that is compatible with the extensions. An open standard may not otherwise prohibit extensions.
- An important aim of adhering to open standards is to achieve and promote interoperability.
- A second set of open standards is typically created by a consortium of industry leaders (being institutions or individuals) that determined that there is a general requirement for a specific standard. It is also important to note the influence of general acceptance of open standards. If a standard is not widely adopted its

[178] From the "Principles and Practice of Open Standards" found at http://perens.comlOpenStandards/Definition.html in Blume *et al*, 69.

development will probably stop and it will end up supporting only a very limited number of proprietary products' interaction.

Interoperability[179]:

The IEEE defines interoperability as the ability of two or more systems or components to exchange information and to use the information that has been exchanged. Interoperability is the ability of a system or a product to work with other systems or products without special effort on the part of the customer. The term is widely used in product marketing descriptions.

Products achieve interoperability with other products using either or both of two approaches:

- By adhering to published interface standards
- By making use of a "broker" of services that can convert one product's interface into another product's interface lion the fly"

A good example of the first approach is the set of standards that have been developed for the World Wide Web. These standards include TCP/IP, Hypertext Transfer Protocol, and HTML. The second kind of interoperability approach is exemplified by the Common Object Request Broker Architecture (CORBA) and its Object Request Broker (ORB).

Compatibility[180]:

The term compatibility, in the software context, is closely related to interoperability. A product is compatible with a standard but interoperable with other products that meet the same standard (or achieve interoperability through a broker).

Free Software[181]:

Free software is software that comes with permission for anyone to use, copy, and distribute, either verbatim or with modifications, either gratis or for a fee. In particular, this means that the source code must be available. "Free software" is a matter of liberty, not price. Within this context, "free" should be understood as in "free speech", not as in "free beer". Free software deals with the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom for the users of the software:

- Freedom 0 - The freedom to run the program, for any purpose

[179] Blume *et al*, 70.

[180] Blume et al, 71.

[181] See the Free Software Foundation (FSF) definition of Free Software from http://www.gnu.org/philosophy/free-sw.html in Blume *et al*, 71.

- Freedom 1 - The freedom to study how the program works, and adapt it to your needs - access to the source code is a precondition for this
- Freedom 2 - The freedom to redistribute copies so you can help your neighbour
- Freedom 3 - The freedom to improve the program, and release your improvements to the public, so that the whole community benefits - access to the source code is a precondition for this.

Free Software vs. Open Source[182]:

There is significant disagreement in the software community about these two (largely synonymous) concepts - to some extent, the Free Software movement and the Open Source movement are like two political camps within the free software community. The official definition of "Open Source Software", as published by the Open Source Initiative, is very close to the definition of "free software" used by the Free Software Foundation, even though it is a little "looser" in some respects. We will not go further into this debate, except to acknowledge it as a contentious issue.[183]

Semi-free software[184]:

Semi-free software is software that is not free, but comes with permission for individuals to use, copy, distribute, and modify (including distribution of modified versions) for non-profit purposes. PCP is an example of a semi free program.

Proprietary Software[185]:

Proprietary software describes software that is owned exclusively by a single company that carefully guards knowledge about the technology used and the software's inner workings. Some proprietary products can only function properly if at all when used with other products owned by the same company. Proprietary software is software that is not free or semi free. Its use, redistribution or modification is prohibited, or is restricted so much that you effectively cannot do it freely.

Commercial software[186]:

A software program is commercial if it is developed as a business activity. Commercial software can be free or non-free, depending on its licence. Likewise, a program developed by a school or an individual can be free or non-free, depending

[182] Blume *et al*, 71.

[183] See http://www.gnu.org/philosophy/free-software-forfreedom.html for more information in Blume *et al*, 71.

[184] Blume *et al*, 71.

[185] Blume et al, 72.

[186] Blume et al, 72.

on its licence. The two questions, what sort of entity developed the program and what freedom its users have, are independent. "Commercial" and "proprietary" are not synonymous - most commercial software is proprietary, but there is commercial free software, and there is non-commercial non-free software.

Copylefted software[187]:

Copyleft (as opposed to "copyright") is the idea and the specific stipulation when distributing software that the user will be able to copy it freely, examine and modify the source code, and redistribute the software to others (free or priced) as long as the redistributed software is also passed along with the copyleft stipulation. The term was originated by Richard Stallman and the Free Software Foundation. Copylefted software is free software whose distribution terms do not allow redistributors to add any additional restrictions when they redistribute or modify the software. This means that every copy of the software, even if it has been modified, must be free software. Copyleft is a general concept; to actually copyleft a program, you need to use a specific set of distribution terms (see reference below).

Public domain software[188]:

Programs that are uncopyrighted because their authors intended to share them with everyone else are in the public domain. The UNIX community has developed a number of such programs over the years. Programs in the public domain can be used without restriction as components of other programs. The simplest way to make a program free is to put it in the public domain, uncopyrighted. This allows people to share the program and their improvements, if they are so minded. However, it also allows people to convert the program into proprietary software. They can make changes, many or few, and distribute the result as a proprietary product, thus removing the freedom that the original author provided. Public domain software is software that is not copyrighted. If the source code is in the public domain, it is a special case of non-copylefted free software, which means that some copies or modified versions may not be free at all. In some cases, an executable program can be in the public domain but the source code is not available. This is not free software, because free software requires accessibility of source code.

Freeware[189]:

The term "freeware" has no clear accepted definition, but it is commonly used for software packages that permit redistribution but not modification (and their source code is not available). Freeware is offered at no cost, but it is typically copyrighted

[187] See the Free Software Foundation (FSF) definition of Copyleft from http://www.gnu.org/copyleft/copyleft.html in Blume *et al*, 72.

[188] Blume *et al*, 72.

[189] Blume et al, 73.

so that you can't incorporate its programming into anything you may be developing. Note that, based on this definition, "freeware" ? "free software".

Shareware[190]:

Shareware is software that is distributed free on a trial basis with the understanding that the user may need or want to pay for it later. Some software developers offer a shareware version of their program with a built-in expiration date (after 30 days, the user can no longer get access to the program). Other shareware (sometimes called liteware) is offered with certain capabilities disabled as an enticement to buy the complete version of the program. Shareware comes with permission for people to redistribute copies, but anyone who continues to use a copy is required to pay a licence fee. Shareware is not free, or even semi free software, for two reasons: - For most shareware, source code is not available; thus, you cannot modify the program in any way. - Shareware does not come with permission to make a copy and install it without paying a licence fee, not even for individuals engaging in non-profit activities. (In practice, people often disregard the distribution terms and do this anyway, but the terms do not permit it.)

Liteware[191]:

Liteware is a term for software that is distributed freely in a version having less capability than the full for-sale version. It is usually designed to provide a potential customer with a sample of the "look-and-feel" of a product and a subset of its full capability. Liteware can be considered a type of shareware (where shareware also includes products distributed freely, usually on a trial basis, that do have full capability).

Postcardware[192]:

Postcardware is freeware (no-charge software that is freely shared) that requires only that the user send the software provider a postcard as a form of payment. The idea is to humanize the transaction, remind the user that someone else shared something freely, and remind the provider that someone is actually using the creation.

Utility model[193]:

A delivery model of IT services based on the customer paying for exactly and only as much IT as they are using. There is a significant impact on infrastructure to implement this model and it will take a few years before this is the case.

[190] Blume et al, 73.

[191] Blume et al, 73.

[192] Blume et al, 73.

[193] Blume et al, 73.

Web services:

A set of standards, which will allow wider and better integration between competitor products.

ICT:

Information, communication and telecommunication / technology

NOC[194]:

A Network Operations Centre is used to monitor and manage support services and SLA's.

OSS / BSS[195]:

Operations Support Systems / Business Support Systems are two acronyms adopted by the telecommunications industry to describe the software used to manage telecommunications facilities. (Not to be confused with Open Source Software)

LA.M.P.[196]

A development environment consisting of the opensource products Linux Apache, MySQL and PHP.

Eclipse[197]

A integrated development environment from IBM which was released into the public domain.

C# / .NET[198]

A programming language similar to C++ and Java as well as a web services based platform which was developed by Microsoft to amongst other reduce its dependence on Java.

[194] Blume et al, 74.

[195] Blume et al, 74.

[196] Blume et al, 74.

[197] Blume et al, 74.

[198] Blume et al, 75.

12.2 Primary Survey Questionnaire

Note to the interns:

Please populate the results from the questionnaire into the spreadsheet provided after the interview.

Introduction

Good morning / afternoon, my name is <insert your name here>. I am working on a project for the Presidential National Commission and we are conducting a research study on government department's use of Open Source Software and Open Content.

This research is designed to fulfill the Commission's mandate to create an integrated policy framework for optimally using ICT to address South Africa's development strategy.

Before we proceed, I want to mention that this will take less than 5 minutes of your time, but if you think that you are not the right person for me to be talking to, is there somebody else that I should be speaking to in your organisation? (I am willing to speak to as many people as necessary in your organisation.)

If correct person, then proceed further with the questionnaire…

If incorrect person, then capture the contact details of the new contact and thank them for their time and assistance."

This questionnaire will attempt to explore your existing use of Open Source Software adoption within your organisation. Should you have implemented an open source project, we will contact you again in the near future in order to conduct a more in depth interview.

Please note that your answers will remain confidential and the survey results will be presented in aggregated format only.

Note to the Interns:

Before we proceed you must be clear by what is meant by Open Source Software and Open Content:

Characteristics of OSS:

- The source code must be available to the user
- The software must be redistributable
- The software must be modifiable, and the creation of derivative works must be permitted

- The license must not discriminate against any user, group of users, or field of endeavour
- The license must apply to all parties to whom the software is distributed
- The license cannot restrict aggregations of software.

"Open content" refers to content (all books, policies, publications, articles, documentation, images, databases, etc.) - that is shared for modification, use, and redistribution, under a license similar to those used by the open source software community e.g. Acts Online and other information on websites that users copy or reuse.

Question 1:

Before we start please can you provide me with the following information:

Name

Title

Department / organisation

Email address

Tel number

Question 2:

(a) Are you aware of:

The open source strategy compiled by the GITO Council (Government IT Officers Council) for using open source in the South African government?

Yes / No

If yes:

(b) What in your opinion is the level of awareness of this strategy in your organisation?

(On a scale of 1 to 10)

1 2 3 4 5 6 7 8 9 10

Question 3:

(a) Are you aware of:

The Handbook on Minimum Information Interoperability Standards (MIOS).

Yes / No

If yes:

(b) What in your opinion is the level of awareness of this document within your organisation? (On a scale of 1 to 10)

1 2 3 4 5 6 7 8 9 10

Question 4:

(a) Has your organisation initiated or implemented any open source / Open Content projects?

Yes / no

If yes, please list these projects:

(b) Name of project	(c) Contact person	(d) Tel number	(e) Email

Question 5:

(a) Are you aware of any other open source projects undertaken within the government sphere?

Yes / no

If yes, please list these projects:

(b) Name of project	(c) Contact person	(d) Tel number	(e) Email

Question 6:

Are you aware if somebody within your organisation has developed and / or used Open Content?

Yes / no

Question 7:

Finally I have three questions regarding your organisation:

(a) How many IT people does your organisation employ? *(Approx if not accurate)*

(b) How many desktops does you organisation have?

(c) How many employees in your organisation?

Now that we have finished the questionnaire do you think that there is anybody else in your organisation that we should also talk to?

Capture the contact details.

Thank you for your time and effort – your responses have been very valuable for the project. If you would like we will make a copy of the final report available to you.

12.3 Secondary Interview Questionnaire

Introduction

Good morning / afternoon, my name is <insert your name here> .I am working on the project for the Presidential National Commission and we are conducting a research study on government departments use of Open Source Software and Open Content .

I obtained your information from <insert interviewees name here> and the purpose of this follow up call is to gather further details for our research.

Please note that this questionnaire should take less than ten minutes of your time.

Question 1:

Apparently your organisation has implemented open source / Open Content projects?

Please can you describe the nature of these projects and / or initiatives?

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Question 2:

What were these projects intended to deliver?

(If not already *addressed in question 1)*

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Question 3:

At what stage are these projects (or are they ongoing) and to what extent are they succeeding?

(If not already addressed in the questions above)

_____
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Question 4:

Please could you mention any criteria that influenced your decision to use open source / Open Contents? (Why did you implement these projects?)

(If not already addressed in the questions above)

_____
_____
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Question 5:

What are the critical success factors of these projects?

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Question 6:

Do you have any internal policy documents or guidelines that guide the appropriate use of Open Source Software and Open Content standards?

_____

(If so, please obtain a copy)

Now that we have finished the questionnaire do you think that there is anybody else in your organisation that we should also talk to?

Capture *the contact details:*

Name: _____

Title: _____

Telephone *number:*_____

Email address: _____

Once again thank you for your time and effort – your responses ha ve been very valuable for the project.

Glossary

Here are some useful explanations (in case you should need them during the interview):

1. Open Source Software

Characteristics:

- The source code must be available to the user
- The software must be redistributable
- The software must be modifiable, and the creation of derivative works must be permitted
- The license must not discriminate against any user, group of users, or field of endeavour
- The license must apply to all parties to whom the software is distributed
- The license cannot restrict aggregations of software.

2. Open content

"Open content" refers to content (all books, policies, publications, articles, documentation, images, databases, etc.) - that is shared for modification, use, and redistribution, under a license similar to those used by the open source software community e.g. Acts Online and other information on websites that users copy or reuse.

12.4 Respondents to Primary Research

	Name	Title	Organisation
1.	Glenda White	Exec Director	CPSI
2.	Mr Thomas Bambo	IT Director	Department of Education
3.	Arno Webb	CIO	Department of Arts and Culture
4.	Gostav Meyer	Support manager	Department of Communication and Information Systems
5.	Eric Phenya	Acting Director IT	Department of Correctional Services
6.	Nicolus Telgaard	Senior staff officer IT	Department of Defence
7.	Ernst Karg	Director IT	Department of Environmental Affairs and Tourism

8.	Constant Hughes Treherne	Acting Director	Department of Foreign Affairs
9.	Willem Van Der Waldt	Principal data Technologist	Department of Health
10.	Zanele Mongalo	Acting Chief Director IT	Department of Home Affairs
11.	Jabulani Makondo	Deputy Director IT	Department of Housing
12.	Joleen Bester	IT Contract Manager	Department of Labour
13.	Kgabo Hlahla	GITO	Department of Land Affairs
14.	J.G Shilubane	Acting GCIO	Department of Public Service and Administration
15.	A Watts	D:IT	DTI
16.	Krish Naidoo	Information security manager	ESKOM
17.	L Chilwane	CIO	Gauteng Provincial Government
18.	Gerald O Sullivan	Director IT	HSRC
19.	Esteel Kruger	IT manager	Independent Complaints Directorate
20.	S.B Emslie	D:IT	KZN
21.	Moris Botha	IT Consultant	National Treasury
22.	J Hasselmann	CD:IT	North West Provincial Government
23.	Sipho Ngcobo	GITO	OPSC
24.	H Wellemse	D:IT	Premier's Department (Free State)
25.	Bashir Fleming	Acting GITO	Provincial Government of the Northern Cape
26.	Rob Engela	GITO	Provincial Government of the Western Cape
27.	V.B. Magagula	CIO	Public Enterprise
28.	Dewit Cotsee	IT Specialist	Public Service and Administration
29.	Augustine Leberegane	IT Specialist	SAMDI
30.	M Meyer	GITO:SAPS	SAPS
31.	Ellen Terblanche	Head of Policy & Research	SASS
32.	Shane Adams	Manager	South African Revenue Services
33.	Ntsundeni Madzunya	CIO	South African Post Office

34.	Philip Jordaan	CIO	Sports and Recreation SA
35.	Sydney Molefe	GITO	Statistics SA
36.	A Barkuizen	Head of IT	The Presidency
37.	M Makgeta	D:IT (Systems)	Transport Department
38.	Zanele Nkosi	CTO	SITA
39.	M Nakene	Open Project Leader	CSIR
40.	G Manyatshe	CIO	Water Affairs & forestry

12.5 International Public Sector OSS Situation Analysis

Countries were chosen for this analysis that fairly represented both developing and developed countries. The following tables are a summary of the all the public sector information that was obtained via desk research on Open Source Software and policy developments from these countries.

The information on each country was captured in six columns, namely the status of the open source policy, an overview and rationale of the policy, the criteria for using Open Source Software and the outcomes of the open source projects, where available. The column labelled "other" was a catchall column if there were any other initiatives or projects that required mentioning.

	Status of open source policy	Overview and rationale for the policy	Criteria for using open source	Current examples of public sector open source projects	Outcomes of open source projects (where available)	Other
Argentina	In the pipeline	A Bill has been drafted that requires the use of free software in government computers is currently before the legislature. This will require all government offices to use OSS. The Bill of Free Software (904-D-02) / Article 2 (27 March 2002) states that "The Executive, Legislative and Judicial Powers, decentralised organisations and companies where the National State is a major stockholder, will use only free programs (software) for their systems and IT equipment."	The Bill of Free Software states the following: If no OSS solution then: 1. Develop an OSS solution or 2. If there are time constraints to develop an OSS solution then apply for permission to use proprietary software in the following circumstances: a) If the proprietary software is free except for the right to distribute b) If there are other OSS projects that will soon enable the proprietary software to be replaced c) If permission to use the proprietary software is requested for 2 years. (the permission will only be extended if still no OSS solution has been developed but there must be a warranty that the data storage used is in an open data format.)	Implemented OSS in the Department of Justice	-	-
Australia	In the pipeline	The Australian federal politicians have stated their intention to make open source software their first choice when making software purchasing decisions. This has led the Australian government to debate an Open Source Bill. The Bill has been formally put before the Senate for legislation designed to **promote** the use of open source software in Commonwealth Departments. The main argument is that the departments were being locked into a dependency on proprietary software. This proposed policy has not yet been finalised.	Not yet officially published but appears from press releases that the government is now expected to take a cautionary stance and not force OSS solutions to be included in government contracts. Appears that OSS will be evaluated on a case by case basis and continue to maintain a neutral approach.	The National Archives of Australia (NAA) is using the open source software to help store and display archived documents from government agencies. They are using the OpenOffice.org office suite as part of plans to preserve the quality and accessibility of government documents. Other OSS projects have been initiated within the Department of Veterans Affairs, the Bureau of Meteorology and Centrelink.	Ongoing projects but the Bureau of Meteorology recently reported on their successes of using OSS with VisAD, Linux on forecaster and the www server. They still only have 5% of IT expenditure on OSS.	-
Belgium	Proposals have been tabled requesting a policy to be formulated	Even though there is no apparent OSS policy the government is calling for open source in public tenders. The Belgium Minister of the Economy and the President of the Region of Brussels has however encouraged the use of OSS.	-	The Computer Centre for the region of Brussels, an advisory and coordination office, uses OSS for all their servers. The Belgian National Army uses OSS for mainframe terminal emulation and Internet applications. Brussels-based Union des Classes Moyennes (UCM) is a government agency that calculates salaries for small doctors and dentists agencies in the French-speaking regions of Belgium. To consolidate its workload onto a single server, UCM has now upgraded to a new Linux-based IBM eServer. 8 pilot project projects have been initiated to place 40 000 computers in 2500 schools using OSS Other departments using OSS include the Natural Sciences Unit and the Ministry of Public Affairs and the National Belgium Botanical Garden.	Ongoing projects but the UCM has stated that the Linux based server has lowered its total cost of ownership and is more reliable. According to the IT manager of the National Botanical Garden , Linux gives "complete satisfaction" on servers, but on desktop the use of Linux by the users is about 30% (Windows is used 70% of the time). There are also frequent claims, by Linux desktop users, that they do not have the same office software functionality as other users.	-

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Brazil	National policy in the pipeline but many cities already have an OSS policy. The government recently created the "Chamber for the Implementation of Software Libre" to pave the way for OSS migration within government.	The government intends to make OSS mandatory on all computers in state institutions but various city councils and municipalities have passed their own laws pertaining to OSS use and development. For example the City Council of Amparo, passed a law requiring the municipal governments to prefer free unrestricted OSS. Several other municipalities and cities including Recife, Campinas, Solonopole, Amparo, Sao Carlos and Port Alegre have also passed similar legislation.	It appears that the government intends to make OSS mandatory on all computers in state institutions.	The government plans to migrate 80% of its desktop computers to OSS. A three year pilot project has been implemented that will see one of the government ministries use Linux instead of Windows.	The reasons given for the Linux trial are cost, security, and a desire to foster the production of local software and democratise access to knowledge.	-
China	In the pipeline	A new policy by China's governing body is in the pipeline that will rule that all ministries buy only locally produced software at the next upgrade cycle. This action by the State Council is aimed at breaking the dominance of U.S.-based Microsoft on desktop computers and plans to eliminate Microsoft's Windows operating system and the Office productivity suite from hundreds of thousands of Chinese government computers in a few years' time.	OSS must be used as the default option wherever feasible.	Financial support has been given to Linux based computer systems as the government wants to rival Microsoft as they believe national security is in jeopardy if they rely on Microsoft applications. Thus China, together with Japan and Korea have formed a group to develop open-source software as a replacement for Windows in certain applications. It is believed this project will encompass desktop applications, embedded programs, middleware, and operating systems. OSS is presently being used in the Ministry of Statistics, Ministry of Science, the National Labour Unit, the national postal system and on Beijing desktops.	-	-
Denmark	No policy has been developed	Not yet formulated.	Not yet formulated	The Danish Board of Technology working group has compiled an analysis of the use of open source software in public administration in Denmark - especially the economic perspectives. (The Danish Board of Technology is an independent body established by the Danish Parliament in 1995.)	The analysis shows that open source software is a viable alternative to the proprietary software. Based on the analysis and the conclusions of the report, the working group lists a set of recommendations for a policy of creating more competition on the software market which could lead to a possible switch to open source software. The report states that OSS should be considered a serious alternative to proprietary software within Danish public administration. The report recommends that the Danish federal government and other authorities formulate principles and goals for the procurement of software. One such principle includes the introduction of open standards.	-
European Commission	Published a set of ***guidelines*** to provide practical and detailed recommendations on how to migrate to OSS based office applications, calendaring, e-mail and other standard applications.	The rationale for the OSS migration guidelines emerged from the following: -Political requirements to build e-government on a non proprietary bases from EC Lisbon summit -Turn IT spending from licenses to services -Develop new research support opportunities	Criteria listed before using OSS: -Must be interoperability i.e. the OSS must be able to work with Windows -Must be a clear understanding of the reasons to migrate before starting -Ensure there is active support from IT staff and users -Ensure there is a 'champion for change' -Build up OSS expertise and relationships -Start with the non-critical systems.	IDA OSS migration project (The IDA is the Interchange of Data between Administrations)	The project recommends that European administrations should share software on an open-source licensing basis, to reduce e-government information technology costs. The report from the project recommends that this sharing could be achieved through a clearing house, to which administrations could "donate" software for reuse. It is envisaged that this facility will concentrate on applications specific to the needs of the public sector and will encourage the replication of good practice in e-government services.	The Interchange of Data between Administrators (IDA) drew up the Open Source Migration Guidelines to set out the basic principles that countries should follow. The guidelines were designed to support the rapid electronic exchange of information between European member states' administrations. The guidelines are aimed at IT managers in public administrations and includes information on staff changes, interoperability, security, mobile and remote user support. See http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=news&documentID=1647

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Finland	Policy has been formulated	The policy is outlined in the General Terms and Conditions of Government Procurement of Information Technology. The policy ensures that OSS is always taken into account.	Criteria: -Source code must always be available and the right to modify it -OSS should always be considered with proprietary software -if the source code cannot be purchased then a source code escrow should be arranged -Open applications and standards should be favoured	The government OSS project started 2 years ago. The OSS Office suite was tested in 13 government agencies. Finland is working to establish the Applied Linux Institute (ALI). The ALI currently is a joint venture of three public institutions: the Department of Communications at the University of Helsinki, the Institution of Adult Education of Vantaa (University of Helsinki) and the Department of Schooling and Education of the City of Vantaa. The ALI is a network-type organization, dedicated to multi-disciplinary research and development of free and open systems.	Open Office was found to be a good office tool but can only be recommended for use in government where there is little exchange of documents with other organisations because of the closed file formats used in Windows.	Finland is regarded as one of the most prolific users of OSS within government.
France	Policy has been formulated	Two bills - still to be enacted. First bill states that all software used by government should be open code and recommends the implementation of an open source agency to oversee the transition and the second bill explains the criteria to be followed in choosing OSS.	The criteria for choosing OSS are contained in the second bill: -The software should not come from one manufacturer and must be open code so as to be compatible with software from other manufacturers; -Future use of the software should not depend on the good will of the manufacturer and therefore the source code should be available as OSS allows users to see if there are any backdoors, -Principles of compatibility and competition in software and respect for civil liberties should be established.	Many government departments have switched to OSS. E.g. Ministry of Culture and Communication has started a migration towards Linux. Other departments have also started implementing Linux e.g. Ministry of Justice, the Department of National Education, Ministry of the Economy, Finance and Industry. Some examples of OSS use in government include the Ministry of Defence having installed FreeBSD on its systems and the Ministry of Culture having migrated 400 servers from Unix and NT to Linux and having plans to use OSS throughout by 2005. Other examples include the Ministry of the Economy, Finance and Industry planning to migrate 950 servers and 60 workstations to Linux for security and reliability issues. The National Education department is also moving	-	Government report by ESIS (European Survey of Information Society Projects and Actions) stated one of the eleven priorities was "open and free software". The Agency for Information and Communication Technology in the Administration) was set up in 2001 as an e-government agency and strongly supports the implementation of OSS in the French public sector.
Germany	Policy has been formulated	The policy has mainly been driven by the following reasons: -Develop local IT industry and skills -Reduce reliance on foreign software and services -Increase cost savings on purchase and maintenance -Provide secuirty, stability, flexibility and privacy -Create IT jobs in Germany The Ministry of Inner Affairs took up a leading role in championing the German policy concerning open source. Its "Koordininierungs und Beratungsstelle fur Informationstechnik (KBSt) acts as a coordinator and advises public administration within their open source implementation process. This body has also being publishing information on current open source events. Other driving force in German open source policy is the "Bundesministerium fur Wirtschaft und Technologie" BMWI (Ministry of Economy and Technology) that has published information on open source for SMMEs and funds BerliOS, a platform mediating open source software and software projects like GnuPG, an encryption technology based on OpenPGP standard	Essentially the policy encourages government organisations to use OSS wherever feasible. See http://www.kbst.bund.de/ for German policies etc.	The German Parliament and the Ministry of the Interior is to move most of its servers to Linux. Also the Ministry of Transport decided last years to orient its entire field of operations towards open standards and OSS in the long term. The Federal Institute for Agriculture and Food uses SuSe Linux for their web servers and Intranet. Police in lower Saxony have installed Linux on 11 000 workstations The local government in Munich has voted to move 14,000 computers from Microsoft's Windows to the Linux operating system, despite efforts by Microsoft.	Positive feedback and the government continues to use OSS. It started using OSS in the early 1990's as many of the government departments were familiar with Unix. Linux has successfully run the servers and various applications within the Federal Administration for a number of years. Still scepticism in some government agencies about using OSS on workstations due to OSS not having all the functionality as Microsoft.	The Ministry of Interior has issued a report on open file formats which was published in August 2002. The purpose of the report is to stimulate debate by showing different ways of developing and maintaining an open standard for document exchange. Migration guidelines have recently been published for federal agencies, state and local governments, and other public-sector administrations interested in migrating their computer systems to open source software, particularly the Linux operating system.
Ghana	No policy has been developed	-	-	Ashesi University is building skills in the OSS arena	-	A National ICT policy will be finalised shortly and it is believed that this might include a reference to OSS.

	Status of open source policy	Overview and rationale for the policy	Criteria for using open source	Current examples of public sector open source projects	Outcomes of open source projects (where available)	Other
India	In the pipeline - the government is considering the adoption of OSS for its IT operations and in Education. No clear stance yet as to whether the use of OSS will be mandated.	Rationale is primarily driven by cost, increased stability, and security.	-	Indian government is recommending OSS. The Indian IT department has commenced a project that will introduce Linux into the national government systems and in the school systems all over the country. The motive is primarily financial.	-	-
Israel	In the pipeline	The reason stated for the new policy is to bridge the Microsoft licensing price gap that prevents poorer Israeli citizens from purchasing PCs.	Proposed amendment to the Mandatory Tenders Law, which will require government agencies and institutions to only purchase software based on open-source code. Agencies can only deviate from the purchase of open source software, with the approval of the Minister of Finance, who has to justify all exceptions in writing.	The government is moving to OSS. It is believed that by shifting the government to OSS, the citizens of Israel have more incentive to acquire open source software for themselves.(If only to be compatible with government and education agencies.) It is hoped that this lead-by-example policy will effectively reduce the overall cost of a PC by removing Microsoft Windows and other proprietary software.	-	The Israeli Ministry of Commerce has suspended all governmental contracts with Microsoft, and indicated that the ban will last throughout 2004
Italy	Policy has been formulated	Resolution passed favouring the use of OSS. In a motion passed by the city government of Florence, Italy, legislators warned that continued use of proprietary software was leading to subjection of the Italian state to Microsoft.	OSS to be used unless no solution exists	The public administration of the province of Pescara has commenced introducing and developing OSS.	-	-
Japan	No policy has been developed	-	-	The governments of Japan, China, and South Korea have reached basic agreement on the formation of a joint OSS project that could encompass desktop applications, embedded programs, middleware, and operating systems. The plan was proposed by Takeo Hiranuma, the Japanese Minister for Economy, Trade and Industry, when he met with representatives of the Chinese and South Korean governments at an Association of South East Asian Nations (ASEAN) meeting. The Japanese Government has also set aside Euro 440 000 for a study that examines the options of the use of OSS for its single-language version of Windows.	-	
Kenya	No policy has been developed	-	-	The Ministry of the Office of the President (OOP) has chosen an open source solution for the whole ministry. It has been proposed that Linux be used for the desktops and also within the server environment. It is believed that other government departments will follow.	-	No specific reference to OSS in the Kenyan ICT policy
Malaysia	No policy has been developed	The Energy, Communications and Multimedia Minister stated that the government would implement OSS in its departments and agencies. Rationale is driven mainly by concerns over the rising costs of software licensing, faster hardware obsolescence, and an over-dependence on foreign	-	The government has implemented OSS in the Treasury and it plans to also implement an OSS operating system in other government agencies.	-	-
Mozambique	No policy has been developed	-	-	The Police force are apparently using Linux. No further details were available.	-	-
Namibia	No policy has been developed	-	-	SchoolNet Namibia is a non profit provider of internet service and training to schools. Since 2000, approximately 250 schools have received free hardware and free training on a Linux operating system.	-	
New Zealand	Policy has been formulated	The government announced a policy update in April 2003 that encourages OSS alternatives for all government agencies whenever acquisitions, upgrades or licensing software is being implemented.	Criteria: Must be value for money Fitness for purpose Interoperability Security	Government Housing Agency uses OSS for its core applications.	Microsoft windows is still used on the desktops	The government is very conscious about the use of OSS in government and has recommended that OSS be regarded as a viable alternative to proprietary software when upgrading or relicensing any software in government.

	Status of open source policy	Overview and rationale for the policy	Criteria for using open source	Current examples of public sector open source projects	Outcomes of open source projects (where available)	Other
Peru	In the pipeline	A bill that requires the use of free software in government computers is currently in the legislature. The Peruvian government introduced a bill in April 2002 mandating the use of OSS by the state. The basic principles which inspire the Bill are linked to the basic guarantees of a state of law, such as: -Free access to public information by the citizen -Permanence of public data	If the bill becomes law then proprietary software will only be able to be used for government applications when no OSS application exists.	-	-	The Peruvian government feels that OSS is an enabler for the development of local software and skills. This is reflected in in the bill which states that OSS must be free to be use, free to modify and free to distribute without restrictions for the benefit of all humanity.
Russia	No policy has been developed	-	-	IBM and the Russian Ministry of Communications and Computerisation have agreed to implement a Linux Competency Centre in Moscow to help develop the open-source operating system in Russia.	-	-
Rwanda	No policy has been developed	-	-	University initiatives have been put in place to use and train students in OSS.	-	-
Singapore	No policy has been developed	-	-	A government agency (EDB) responsible for planning strategies to aid the economy has reportedly decided to promote Linux. The agency targets software developers, distributors, service providers and offers economic incentives such as tax breaks and grants for Linux related economic development.	-	Singapore has the benefit of being able to have introduced computers into all aspects of society from very early on. This has, unfortunately, meant that there is a high degree of influence of the proprietary software companies. OSS is not as widely used exactly for that reason. There is a high degree of resistance to move to OSS products, especially on the desktop.
South Africa	A policy has been formulated.	The government recently adopted a policy to use OSS as the default option, which encourages or requires government organisations to use OSS, wherever feasible. Reason cited include: -Reduction of costs -Reduce reliance on foreign software and services -Foster local skills -Provide affordable software for individuals, enterprises and government with localised language support -Reduce security risks -Provide easy public access to government data without barriers of proprietary software and data formats -Permit freedom to redistribute software without licensing restrictions	The policy states that the "primary criteria for selecting software solutions will remain the improvement of efficiency, effectiveness and economy of service delivery by the government to its citizens. OSS offers significant indirect advantages. Where the direct advantages and disadvantages of OSS and proprietary software are equally strong and where circumstances in the specific situation do not render it inappropriate, opting for OSS will be preferable."	Three examples of active and direct government involvement with OSS" 1. The Dept of Science and Technology (DST) and the State Information Technology Agency are involved in a number of open source research projects. The DST has set up an "ICT Technology Mission" group, which is involved in a number of ICT initiatives including OSS. 2. The Dept of Health has used OSS to develop and enterprise document management system for its Medical Research Council. 3. The Eastern Cape Local Government ICT Council has conducted an evaluation of Open Office.	The Eastern Cape Local Government ICT Council has concluded that Open Office is able to meet the needs of the municipalities of the Easter Cape and has recommended its implementation.	-
South Korea	Policy has been formulated	The South Korean government has announced a plan to have proprietary software on a substantial number of its PCs and servers replaced with OSS alternatives by 2007.	-	Changing of 20% desktop and 30% server software to OSS Thousands of computers in government ministries, agencies and universities will have their proprietary software replaced by OSS alternatives during the next three years. The South Korean government has announced a plan to have proprietary software on a substantial number of its PCs and servers replaced with open source alternatives by 2007.	-	-

	Status of open source policy	Overview and rationale for the policy	Criteria for using open source	Current examples of public sector open source projects	Outcomes of open source projects (where available)	Other
Spain	Policy is still to be developed.	Resolution passed favouring the use of OSS	-	The Canary Islands Regional Parliament has approved a proposal that urges the regional government, in partnership with local authorities and companies, to promote use of OSS through traiing courses and increasing of public awareness about OSS availibility. Main implementation is the Virtual Map project of the Ministry of Public Administration. This has seen Linux installed on 220 servers with an additional 400 in the pipeline. The Spanish province of Extremadura has seen the regional government adopt Linux as the official operating system within schools. The 670 schools are based on OSS. The region of Extremadura has also initiated a campaign to migrate all of the region's computer systens from Windows to Linux. The regional government has invested in a competence and development centre for developing business adapted systems for finance and health which are distributed free of charge. They have also distributed over 150 000 CDs containing these	-	-
Sweden	In the pipeline	The Ministry of Employment and the Ministry of Industry and Commerce is working on an ICT strategy for the public sector together with a strategy for OSS.	-	Swedish public administration OSS projects: -The Swedish Meteorological and Hydrological Institute has implemented an OSS project that uses a Linux environment to carry out complex calculations -Swedish Premium Authority-uses Linux for systems which administer pension funds -The Swedish National Labour Market Administration has carried out a study on the possibility of replacing their current office suite with Star Office.	The Swedish Meteorological and Hydrological Institute reported the following experiences from using OSS: Positive: No lock in effects from vendors, lower procurement costs Negative: Increased requirements for in house competence, development often dependant on enthusiasts, no extensive documentation The Swedish Premium Pension Authority: Migration to Linux has been regarded as favourable but on the desktop front they are waiting for Star Office to get more functionality. The Swedish National Labour Market Administration reported that there are no technical obstacles to migrating to Star Office but there are still interoperability issues when trying to communicate	The joint agency called the FNS under the Department of Employment and Administration, the Norwegian Association of Local Authorities and the Agency for Public Administration decided not to renew its core agreement with Microsoft.
Thailand	Government advocated OSS in their national ICT policy.	-	-	Demand for Thailand's recently launched Linux-based desktop and notebook PCs, subsidised by the government, has exceeded expectations. There are currently two products offered, a notebook and a desktop. The notebook is being produced by HP, and the desktop by Belta, SVOA and Computec. They both run on LinuxTLE, a version of Linux localized into Thai Language.	-	-
Uganda	No policy has been developed but there are now calls for an OSS policy as the private sector has been embracing the use of OSS since the early 90's.	-	-	OSS projects have been implemented at the educational level. The Martyr's University is migrating to open source and there are various OSS initiatives being implemented at a school level	-	-

	Status of open source policy	Overview and rationale for the policy	Criteria for using open source	Current examples of public sector open source projects	Outcomes of open source projects (where available)	Other
UK	Policy has been formulated	The justification for adopting this policy are as follows: -OSS solution should be decided on a case by case basis -Must be interoperability of systems -The cost and risk to government must be reduced -Security of government systems is vital and must not be compromised.	The key decisions of the policy are as follows: -UK government will consider OSS solutions alongside proprietary ones in IT procurements. Contacts will be awarded on a value for money basis. -UK Government will only use products for interoperability that support open standards and specifications in all future IT developments -UK Government will seek to avoid lock in proprietary IT products and services -UK Government will obtain full rights to bespoke software code that it procures and all customisations of COTS (Commercial Off the Shelf) packages that it uses wherever this achieves value for money -UK Government will explore further the possibilities of using OSS as the default exploitation route for Government funded R & D software by academic research institutes.	The Office for Government Commerce (OGC) has just announced a deal with IBM to trial open source software - programs Main implementation of OSS has been in the National Healthcare System. The Police forces have signed a contract for the delivery of Linux based desktop computers. The pilot is being run at the West Yorkshire police force on 3500 computers and for this alone there is a projected savings of Euro 1.4 million. The Government has announced its latest development to promote wider competition in the public sector IT market by launching a series of Open Source Software (OSS) trials across both central government departments and the wider public sector. Eight 'proof of concept' trials are being coordinated by the Office of Government Commerce (OGC) and the Office of the eEnvoy (OeE). They build upon the joint OGC/OeE strategy on the use of OSS across the public sector and aim towards the implementation of OSS as an alternative to proprietary software.	-	The government has mandated open standards and open specifications in its e-Government Interoperability Framework (e-GIF) and allowing market driven products to support these. This policy does not specifically state a preference for OSS rather it reinforces the organisation's need to ensure that all the options are considered and that value for money is achieved.
USA	No national OSS policy as there is powerful lobbying groups within the USA for OSS and against it. In the US Federal Government policies on OSS are determined on a department by department basis. At a local level, various states have introduced legislation for supporting and using OSS. Many of these bills have however not fared well die to special interest groups that have lobbied from proprietary software vendors. Texas has an OSS bill in the pipeline but California and Oklahoma 's bill's were not successful. Oregon however has passed a bill that ensures that OSS must be considered in purchasing decisions. Rhode Island became the first state government to implement a public OSS technology portal.	-	-	The National Weather Service, NASA, the Department of Justice and the Department of Defence are extensively using OSS applications and infrastructure. The largest user of OSS is the Department of Defence that has published OSS usage guidelines, which allows the adoption of OSS if it meets the same criteria as the proprietary software.	Defence Department believes that OSS has proved to be more secure for the following reasons: -The systems are less vulnerable to attacks -The DoD own development work is based on OSS and they have developed tools for looking for weaknesses in the system -They are able to fend off cyber attacks quickly as the code is available The US Census Bureau has reported that OSS has proved to be portable in a mixed environment and does not have the delays in procurement situations, the systems development work proceeds quickly, maintenance costs are low and the applications are stable.	Various consortia and interest groups have been lobbying against legislation favouring OSS at every level of government. These lobbyists include the Business Software Alliance (BSA), Initiative for Software Choice, American Electronics Association and Association for Competitive Technology.

12.6 International Research Supporting Information

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