

Issues of Open Source Software Uptake in Australian Government Agencies

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Abstract

Software generally used by individuals and organizations is proprietary software. This kind of software is closed, available at a cost, and its copyright is owned by the organization that develops it. This means that the end user does not have access to source code, cannot make changes to the software to suit individual needs, and the software cannot be redistributed. Open source software, on the other hand, allows its user access to source code, thereby allowing them to customize the software according to their needs and integrate it with existing software infrastructure; and, if need be, redistribute it. Open source software, therefore, has potential benefits for government agencies in terms of electronic service provision to general public. However, there are many issues around open source software uptake in government agencies, and if the adoption of OSS is to be encouraged then these issues have to be addressed. This paper presents an account of these issues as identified by the government agencies from Australia and New Zealand.

1. Introduction

Open source is a development methodology for software which involves the benefits of distributed peer review. Code is developed by an individual or a group and is reviewed and debugged by their peers, and in the process it is perfected. The method allows complete transparency of the process and thus results in code of better quality, higher reliability, lower cost and more flexibility [1]. Open source software (OSS) is not copyright exempt, though it allows the licensee to make changes to the software and redistribute the modified software. In doing so, the rights of the original software author are protected and he or she is free to distribute the software under other licences. Nevertheless, Coar [2] argues that a software to be classified as OSS, it must be free for redistribution without royalty requirements; include source code or instruction on how to obtain the same; allow modifications and derived works; not discriminate against any person or group of persons; not discriminate against fields of endeavour; preserve the author's source code integrity; apply the same rights to all to whom the program is redistributed; not be specific to a product; not place restrictions on other software that is distributed along with the licensed software; and be technology-neutral. OSS, thus, presents itself as a viable alternative for government agencies as an enabler of infrastructure for

electronic service provision to general public.

Governments produce, use, and manage massive amounts of information routinely. This information becomes highly valuable when it is readily accessible to citizens, businesses, and government counterparts. As information technologies continue to evolve into more complex and globally interconnected networks, governments are under constant pressure to provide efficient and reliable services - including those supporting military operations, trade and travel security, social services delivery, and a range of citizen services. The modularity of the source code makes OSS very flexible and highly configurable in comparison to proprietary systems [3].

This paper sets the agenda for research into OSS within government agencies in Australia and New Zealand. It reports the initial findings of a research workshop that is a precursor to establishing an ongoing research initiative of OSS related research in government agencies. The paper highlights that issues relating to OSS uptake in government agencies are multifaceted and have technical, humanistic, financial, procedural, and legal dimensions. It concludes that a top down approach will be most suited to initiate research into these areas, so that research participants as well as research subjects are aware of the potential of OSS.

2. OSS and Government Agencies

Proprietary software is tightly controlled and thus leads to dependency. At the same time, proprietary softwares available to government agencies, do not meet all of their demands, have on going support and up-gradation constraints, and contractual restrictions. OSS allows government agencies a participatory forum that engages general public to decrease their dependence on software providers. This dependence is not just restricted to source code, functionality, and contractual commitments, but also includes innovations in software. Proprietary softwares follow a product lifecycle, which means their development and support is phased out gradually to make way for newer version of products. Every time there is a new version of software, business managers are forced to upgrade for the sake of support and keeping up with the changes in technology, and for government agencies it means continuous dependency on software vendors. OSS is continuously evolving and, therefore, does not pose any possibility of running the user into the blind alley or dead-end of development trajectory through product refresh. Due to the open nature of OSS there is no dearth of

software development and operator skills available in general public, which means that OSS can be maintained over a period of time, and can be easily accommodated within existing software infrastructure. However, the most significant benefit of OSS to government agencies is the allowance of translating the software into local language.

Government worldwide are acknowledging the potential of OSS and research in viability, usability, maintainability, and supportability of OSS is gaining momentum. European Union has been a forerunner in these areas, where various national governments as well as European Union itself has been actively pursuing a research agenda in OSS. The e-Europe initiative is of particular significance in this regard. Other notable jurisdictions with substantial activity in OSS research in government agencies include, United Kingdom, Sweden, France, Germany, Denmark, Belgium, Switzerland, Netherlands, Italy, and Spain. In North America, prominent research initiatives have been undertaken by the Canadian government, US Department of Defence, and some state governments of the United States of America; most noteworthy are the OSS adoptions in states of Massachusetts and Rhode Island. OSS potential has also attracted interests of governments in Latin America, and countries such as Brazil, Cuba, and Venezuela have established strategies for utilization of OSS in government agencies. In the African continent, governments of South Africa and Tunisia have an active agenda of use and exploitation of OSS. In the Asian continent, governments with interest in OSS include China, Japan, India, Malaysia, Indonesia, and Vietnam. Apart from these, United Nations has also undertaken numerous research projects in economic efficiency, technical capability, and use of OSS in public sector [4]. In Australia, the Australian Government Information Management Office (AGIMO) has an active interest in OSS adoption within government agencies. Although Australian Government agencies are free to procure goods and services subject to their needs, they are required to comply with the Australian Government procurement policy framework when procuring information and communication technologies. AGIMO has developed guidelines for the sourcing of OSS in Australian Government agencies. These guidelines, however, are essentially a policy and reference document and do not provide insight into the real life experience of government agencies.

3. Challenges Posed to Government Agencies

The speed with which technology is being updated, government agencies are finding it hard to meet general public's demands in terms of electronic services provision. A Government CIOs Summit held in Ottawa, Canada in 2006 [5] concluded the major challenges posed to government agencies.

These challenges are fairly common and prevalent in almost all western democracies around the world. These include,

- a. Increased public expectations of accessibility to services, magnified by incomplete view of data and services and the difficulty to deliver new services and/or respond to new legislation.
- b. Empowering workforce to deliver higher value and productivity, due to difficulty in finding expert users and developers of systems, and sharing best practices.
- c. Improving operational and organizational effectiveness that is held up due to costly and slow processing, classification, tracking, retaining, and disposing of information.
- d. Collaboration across government for increased efficiency, due to the existing incoherence between cross-agency/department processes facilitated by the lack of information integration and technical interoperability.
- e. Sensing, responding and managing across geopolitical boundaries, since the critical information is scattered among departments/agencies, and is made up of inconsistent data standards and rules of engagement for usage.

4. Establishing the Research Agenda in OSS for Government Agencies

Research into open source software has gained momentum in recent years. Much of this has been focussed on software development, as well as the coordination and collaboration processes associated with the software development process. Comparatively little research has been done into the social processes, work practices, and organizational contexts that are necessary for the successful implementation of open source software into different operational settings. Consider, for example, the inherent tensions that arise between the philosophical freedom of open source and the institutional constraints of government. Government is obligated to be conservative and risk-averse when considering its software procurements, the need to demonstrate responsible usage of taxpayer funds being paramount. Open source, on the other hand, can be subject to continuous change, and may therefore be perceived as lacking the stability or continuity needed to support ongoing government business processes. The contrast between the dynamic supplier community and conservative user community gives rise to some important research issues. On the supplier side, these can be grouped into three streams, i.e., developer motivation; governance, organization, and innovation processes; and competitive dynamics. On the user side, they include issues like, total cost of ownership – costs of procurement, management and support, hardware costs; transition costs – system migration and training; ongoing software maintenance support – costs and expertise; configuration and integration with other applications; interoperability - between

systems and in enabling system sharing; functionality and reliability - stability in all aspects of the software; awareness of CIOs of OSS solutions; commercial OSS support models;

security and trust; knowledge of best of breed OSS solutions; contractual and legal obligations; lack of turnkey solutions; and insufficient public sector oriented applications.

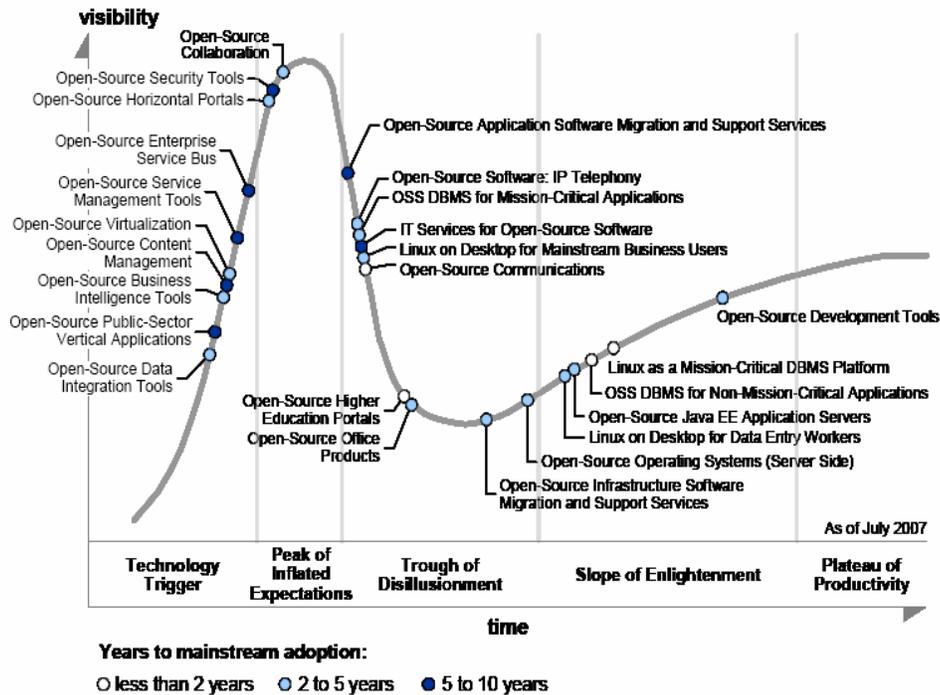


Figure 1 - Hype Cycle for Open-Source Software

Source [6]

A research study conducted by Gartner (Figure 1) illustrates that OSS specific to public sector organisations lies at the initial stages of the OSS hype curve. This suggests that government agencies need to be proactive in uptake of OSS and provide triggers for development and adoption of OSS. The study argues that mainstream OSS adoption patterns are changing in two ways. Open-source solutions are deployed in increasingly mission-critical scenarios where the service level must be equal to or better than closed-source alternatives, and open-source solutions are also being adopted by increasingly conservative IT organizations, such as government agencies, that regard cost and risk mitigation as their primary concerns.

University of South Australia along with the South Australian Government's department of Transport, Energy & Infrastructure, arranged a workshop as a precursor to a cross national research initiative in OSS aimed at improving electronic service provision within government agencies through OSS uptake. Representatives from AGIMO, New Zealand government, New South Wales government, Victorian government, Queensland government, Australian Capital Territory government, South Australian government, and

University of South Australia participated in this workshop. The workshop was moderated by two people with substantial experience of OSS development, consultancy, and research. Participants were asked to raise research issues that they deemed were important in the space of OSS for government agencies, on the basis of criticality, value, and effort required (how much effort it would take to overcome or implement). As a result an extensive list of research issues was developed. These issues were categorised and consolidated under specific themes. The list includes the following themes and research areas,

- a. Knowledge and Awareness
 - (i). Identification of best of breed OSS applications
 - (ii). Assessment of existing OSS quality and maturity
 - (iii). Investigation of capability of existing OSS available to Australian government agencies
- b. Software Support
 - (i). Inquiry into sustainability of support for Australian government agencies in terms of availability of development and operator skills, and integration with the existing IT infrastructure

- (ii). Assessment of skills available to Australian government agencies
- (iv). Investigation into critical success factors of OSS adoption
- c. Financial Factors
 - (i). Assessment of value for money of OSS
 - (ii). Assessment of economic impacts of OSS
 - (iii). Assessment of total costs of ownership
 - (iv). Assessment of total costs of migration and transition
- d. Organisational/Human Factors
 - (i). Development of change management methodologies for OSS
 - (ii). Study of cultural barriers to OSS implementation
 - (iii). Inquiry into training strategies for OSS
 - (iv). Investigation into political barriers and top management for OSS
 - (v). Study into acceptance and perceptual/human element - barrier to adoption
- e. Technical Factors
 - (i). Investigation of OSS Security
 - (ii). Inquiry into interoperability of OSS with proprietary software
 - (iii). Investigations into context specific interoperability and compatibility of OSS
 - (iv). Studying OSS development models for government agencies
 - (v). Study of critical success factors for business applications
 - (vi). Custom app development platform
 - (vii). Study barriers to OSS desktop adoption in public sector
 - (viii). Understanding issues and opportunities relating to open standards
- f. Value/extraction of value from OSS
 - (i). Investigation of business value (technical, organisational, cultural, financial) from OSS
 - (ii). Development of code sharing/writing/releasing methodologies
 - (iii). Investigation of barriers to public sector sharing of code written by government agencies
 - (iv). Assessment of appropriate frameworks for IP sharing and licensing
 - (v). Feasibility of identification and promotion of open sourcing of in-house developed software
- g. Adoption Frameworks
 - (i). Development of frameworks so as to extend the AGIMO guide
 - (ii). Development of context specific OSS adoption frameworks
 - (iii). Inquiry into OSS and open standards policies
- h. Procurement
 - (i). Investigation into ICT procurement approaches and investment decision making in government agencies
 - (ii). Assessment of processes to identify, implement, and adopt OSS in government agencies, and the factors that influence their adoption
 - (iii). Study of concerns of developers and users in government agencies with regards to OSS
- j. Intellectual property (IP) and legal issues
 - (i). Study of IP policy, resolution of IP, and ownership of IP with regards to OSS developed and procured by Australian government agencies
 - (ii). Identification of relevant IP knowledge and risks specific to government agencies
 - (iii). Study of IP issues with OSS in government agencies

5. Recommendations and Conclusions

The existing base of OSS with reasonable quality control and distribution can potentially save millions of dollars to government agencies. With such a wealth of solutions available at the disposal of these agencies, it seems surprising that the penetration of OSS in government agencies is minimal. The research issues identified here are multifaceted and each of these issues has its own significance and value to government agencies. However, it is clear that issues relating to OSS are present at technical, operational, as well as strategic level. As a starting point, it is recommended that this research should follow a top-down approach through a case based research agenda and examine implementation and efficacy of open source software in Australian government agencies from technical and organisational perspectives. This study will provide assessment of business value, which will allow for better information technology infrastructure planning, change management strategies, and effective risk mitigation strategies. An insight into these areas will provide important indicators on resolving the tactical, operational, and technical issues identified above.

6. References

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