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Does open source software have a place in school jurisdictions' IT portfolios?
Researching open source software applicable for use in Australian schools

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Abstract

The question of whether open source software has a place in school jurisdictions' IT portfolios, is an urgent one nationally. Schools and school jurisdictions are concerned about the recurrent costs of proprietary software licences. Using data drawn from a national research project conducted by the South Australian Department of Education in 2004 about the potential use of open source software in schools, this paper outlines some of the research undertaken that specifically addressed two of the research questions:

- *What are the models and their underlying assumptions for identifying total cost of ownership for using open source software operating systems and applications within Australian and New Zealand schools?*
- *What are the components for determining total cost of ownership of open source software that could be used within school sectors and systems compared to existing products?*

Against the backdrop of European experiences, this paper outlines the findings concerning these two questions.

Introduction

Between February and June 2004 the Department of Education and Children's Services in South Australia conducted a national research project funded through the National Fund for Educational Research. The purpose of the study was to investigate the use of open source software operating systems and applications within school sector environments with a view to informing local, state and national policy decisions about its potential as an alternative to existing software by:

- trialing open source software in South Australian school environments;
- collaborating with others interested in this research; and
- rapidly making the findings from this research available to other schooling sector jurisdictions.

The overarching question for the research was: 'does open source software have in school jurisdictions' IT portfolios?' The following research questions were used to address this overarching question:

1. What is the potential for using open source operating systems and software applications for wide scale deployment, as an alternative to proprietary software within school sector environments?
2. What open source software operating systems, applications and technical documentation, currently exist, that have applicability to Australian school sector?
3. What are the models and their underlying assumptions for identifying total cost of ownership for using open source software operating systems and applications within Australian schools?
4. What are the components for determining total cost of ownership of open source software to be used within school sectors and systems compared to existing products?
5. What sorts of skills and expertise are required in order to use and maintain the use of open source software?

Data has been collected through researching, testing and trialing possible open source software solutions; and by comparing open source software with proprietary software.

The following six research methods were used concurrently:

1. Total cost of ownership framework(s) development and analysis
2. Collection of case studies
3. Review of open source software and technical documentation
4. Testing of open source software in a controlled environment

5. Trialing of open source software in a school
6. Skills audit

The major focus of the research was on the development of total cost of ownership framework(s) and analysis of other total cost of ownership work. This paper outlines some of the work undertaken concerning the research about the total cost of ownership of IT in schools.[1].

What is total cost of ownership?

'Total cost of ownership' is a phrase developed by the Gartner Group[2] to refer to all the costs associated with the use of computer hardware and software including the administrative costs, licence costs, deployment and configuration, hardware and software updates, training and development, maintenance, technical support and any other costs associated with deploying, operating, maintaining and upgrading computer systems in schools and sectors.

Total Cost of Ownership analyses are undertaken for a variety of purposes including the following:

- To identify the components of an information technology (IT) deployment;
- To enable calculations of what the total assets are worth;
- To allow for the weighing up of options;
- To help in the management of risk; and
- To enable analysis from a system perspective.

Examining total cost of ownership components and frameworks is important because:

- The role of technology within classrooms and schools should be outlined;
- Purchases of hardware, software, licences, professional development and other associated costs should match the roles required of the technology in classrooms and schools and deliver a return on investment;
- Decisions about what purchases can best be handled at the school, regional and central levels can be made based on documented total cost of ownership analyses;
- Schools, regions and central agencies have to budget over time according to the architecture and standards;
- Completed total cost of ownership frameworks provide a basis upon which to monitor costs over time.

The following considerations should be kept in mind when undertaking a total cost of ownership analysis:

- There is 'no' right number;
- A low total cost may mean that the technology is not being used to its full advantage;
- First data is likely to be incomplete or based around rough estimates;
- First data helps us to focus on what we don't know;
- Total cost of ownership work should be repeated at regular intervals;
- A total cost of ownership analysis should lead to more formal record-keeping;
- Data collection over time should become easier and more accurate;
- Regular total cost of ownership analyses are valuable for monitoring and tracking changes over time;
- Individual organisations should use their own data within an agreed total cost of ownership framework to enable comparisons of final figures over time and with other agencies using the same framework.

Experiences from Europe

Considerably more work investigating the potential for using open source software in the public sector and in education has been undertaken in Europe than has occurred in Australia. Research by the *Interchange of Data between Administrations (IDA)* in 2001 provides insights into the use of open source software in public administrations within the European Union. The diagram below summarises the reasons why six selected public sectors within the European Union are using open source software.

[1] That is, this paper is addressing the questions 3 and 4 on the previous page.
[2] See http://www3.gartnergroup.com

Diagram one: Reasons for using open source software in the six European countries' public sectors (Interchange of Data between Administrations, 2001, p15)

Total cost of ownership models

To determine the total cost of IT deployment in schools and to consider whether open source software represents a cost-effective option, several models for analysis are available to use. Here I briefly outline three ways of considering the financial costs associated with using open or proprietary software.

The Gartner Group approach to undertaking Total Cost of Ownership analyses is to divide the costs for ICT into groups that enable consistent and reliable comparisons to be made. The Gartner Total Cost of Ownership model uses two major categories to organise costs: direct or budgeted costs and indirect or unbudgeted costs.

Gartner refers to direct costs as budgeted costs (albeit that some costs may be hidden) such as the capital, software and labour costs spent by an organisation such as a school or department of education on the delivery of information technology products and services. These costs include capital expenses, IT management, IT support, maintenance and upgrade costs, communication fees, outsourcing fees, procurement costs, training and professional development costs, travel and procurement costs. The purpose of identifying the direct costs is to determine the overall costs for the provision of an IT infrastructure.

Gartner refers to indirect costs as those unbudgeted items that are not seen as having a direct, causal relationship to the provision of IT infrastructure but nonetheless do have an impact. Indirect costs include self and peer support, and items that generate inefficiencies. These costs tend to be difficult to identify and quantify.

The Consortium for School Networking (CoSN) is a United States national non-profit organization. CoSN is sponsored by a range of organisations including major IT vendors including Gartner and the Federal Department of Education. They have developed a total cost of ownership framework for use in schools. The CoSN Total Cost of Ownership checklist components are:

- Professional development
- Support
- Connectivity
- Software
- Replacement costs
- Retrofitting

A report prepared concerning open source software use in the Danish public sector[3] identified the following components for assessing cost-effectiveness of open source software compared with proprietary software products:

- Procurement prices and or licence costs
- User friendliness: ie the effect of the software's user-friendliness on indirect costs in the user's environment;
- Requirements for end-user training;
- Requirements for training in the internal IT maintenance function or for new service contracts;
- Software compatibility with surrounding software (ie degree of interoperability);
- Surrounding hardware and technical assumptions especially capacity requirements;
- Software for maintenance and support;
- Expertise for maintenance and support; and
- Software operating stability.

[3] See http://www.sun.com/software/star/staroffice/whitepapers/index.html

The IDA Report (2001) *Study into the use of open source software in the public sector* recommends that more consideration should be given to open source software Total Cost of Ownership models, so that budget transfers (eg from free or low-cost licenses licences to services and training) can be accommodated. This IDA report argues that better value for public money should be taken into consideration through the financial analysis model used which would see compensation for the lower cost of licences with higher services and training.

IT deployment options

It is apparent from the literature as well as this research, that costs of IT are influenced by the deployment model used. The following table summaries a continuum of characteristics of IT deployment. Schools and different agencies will be able to identify themselves somewhere on the continuum. A total cost of ownership analysis should facilitate identification of where schools and corporate offices currently are on this continuum and to determine to where they would like to move.

Table one: Continuum of characteristics of deployment[4]

Components of TCO	**Continuum of characteristics of deployment**	
	IT deployment theory (target) (Central office)	**'Doing what we can with what we've got' (actual) - (School)**
Software (including upgrades)	Centralised, standardised purchasing is cheaper than local purchasing	Local school management means that schools look for local software 'bargains'
	The greater diversity of software the more support is required	A diversity of software is supported
	Upgrading of software is necessary	Upgrading of software is not possible or is not seen as necessary
	Only centrally approved software is installed on computers	Both centrally approved software and other software are installed
Hardware (including repairs & replacement costs)	Keep the age of computers in a narrow range [based on asset depreciation and rollover]	Computers are turned over when they can no longer be repaired
		Schools purchase hardware to meet the specific purpose required: eg limited number of more expensive, high level machines and a lot of cheaper, smaller (including second hand) machines
	It is cheaper to manage the purchase and deployment of hardware centrally [economies of scale]	Central office provides partial funding for hardware & schools make up the difference
		Recycled and donated computers are used to increase the student to computer ratio
	Asset register is maintained and updated centrally according to standards	Asset management is the responsibility of the school and is maintained as best they can
Networks	Fully integrated, connected, interoperable	Disparate, disconnected, local networks, locally supported
Compliance and avoiding lock-in	Compliance costs are managed centrally	Compliance is managed 'as best we can'
	One inventory system is in place and regularly updated	Multiple inventory systems are in place in various states of accuracy
	Legal requirements are managed and monitored	Legal requirements are managed 'as best they can'
	Lock-in to one proprietor for given products and services is avoided	Lock-in occurs as IT is purchased because 'we need it now' rather than as a result of longer term planning
Maintenance and support	Support is allocated at a ratio of one support person to every 50 computers[5]	Support is allocated based on available budget rather than on number of computers requiring maintenance
		Support is allocated on persons per regional area rather than person to computer ratios
		Funded support only partially covers the required support, which sees informal support networks fill the void
		Support relies on goodwill, local knowledge and a mixture of teachers, students and others
Associated physical infrastructure	Required modifications to buildings to accommodate the technology (eg electrical, heating, cooling, desks) are budgeted and met	Required modifications to buildings occurs when funding is available
Professional development	15-30% of total annual budget is devoted to staff professional development[6]	Staff professional development is provided according to what can be afforded. Majority of professional development occurs in the school.
	Is included in the price of the licensing agreement	Is reliant on local knowledge and communities of practice

[4] Based on work by COSN: see http://www.cosn.org
[5] Gartner assumption. See http://www3.gartnergroup.com
[6] Proposed amount of professional development required in the US

Where to from here?

As a result of this research project several reports have been developed and will be published on EdNA. The reports will also be circulated to all education department Chief Information Officers, for their consideration. As the acquisition, deployment and maintenance of school systems IT infrastructure is a sector or state/territory responsibility, it will be up to each jurisdiction to determine what actions they wish to take as a result of the research undertaken and reports prepared.

In South Australia, the Department of Education and Children's Services continues to investigate open source software options and in particular Moodle as a potential online learning environment for use in schools.

References

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