Opening the door to open source?

Birmingham City Council's experience with open source

Birmingham City Council

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1 Executive summary

An implementation of open source software across the library service at Birmingham City Council (BCC) has demonstrated that open source software is a viable alternative to proprietary software.

The library service has piloted, and at the time of writing is in the process of rolling out, a full open source desktop[1] on its public IT facilities and the open source productivity package, OpenOffice, on its staff PCs. The project indicates that for most users, OpenOffice is a suitable tool that meets their functionality needs, although power users[2] may experience more difficulties with functionality and may need to retain Microsoft Office capacity.

The open source operating system chosen by BCC, Linux[3], caused more issues. The library service found that some of its core software was not interoperable with Linux, and users initially experienced some problems with functionality. There may be a case for introducing an open source operating system for certain users, or alongside a proprietary operating system, however BCC's experience shows that open source is not yet a suitable replacement for proprietary operating systems in all business environments.

Some of the key learning points in this report are about the *process* of a first-time implementation of open source rather than outcomes. In particular, the project showed that there are considerable costs incurred in decision-making, because of the huge range of open source options available. The extra resources involved in decision making and project management mean that the cost of this first-time open source implementation for BCC was significantly higher than for a comparable proprietary upgrade, despite the minimal licence costs for open source software. It is also difficult to identify any ongoing savings from the choice to implement open source software.

The overall business case for open source looks strongest where there is existing open source experience and capacity, and where there are likely to be economies of scale.

Further detail about the learning points from the BCC pilot can be found in section 8 of this report: a checklist for local authorities considering open source implementation is included at Appendix A. The BCC business case is attached at Appendix B.

[1] Composed of an open source operating system and productivity package
[2] Those who use the more complex functions available in software applications
[3] An open source operating system

2 Background

2.1 About this report

This report has been produced by iMPOWER Consulting Ltd as an independent evaluation of the Open Source Academy project at BCC. The project will rollout open source software across 40 community libraries and Birmingham Central Library. iMPOWER spent five weeks meeting with the project team, librarians and public users. This report is the result of that research.

The structure of the report is as follows:

- What is open source software?
- The BCC project:
  - Background
  - Running the project
  - Outcomes
- Conclusions from the Birmingham project

The appendices include:

- Is open source appropriate for other local authorities?
- The business case for the BCC implementation

2.2 Why an open source project?

This implementation was one of a series of workstreams, collectively known as the Open Source Academy (OSA), which was formed by the Office of the Deputy Prime Minister (ODPM). The OSA is an e-innovations project that brings together a partnership of Local Authorities and other organisations to promote the use of open source software in the public sector. Another OSA project was the development of a business case for StarOffice[4] at Bristol City Council. Further information about the Academy and its projects can be found on the OSA's website[5].

The OSA follows on from previous government open source initiatives. In 2002, the Office of Government Commerce (OGC) released an open source policy under which it specified for the first time that central government could look at open source solutions alongside proprietary ones during IT procurement, considering all options on a value for money basis. The OGC concluded in 2004 that "open source software is a viable and credible alternative to proprietary software for infrastructure implementations, and for meeting the requirements of the majority of desktop users."

[4] StarOffice is Sun Microsystems' commercialised version OpenOffice, an open source productivity package similar in function to Microsoft Office.
[5] www.opensourceacademy.gov.uk

However, despite this advice, a report by the University of Maastricht into free/*libre* and open source software (FLOSS) found the UK to have a below average proportion of local government FLOSS users: 32.1% of all software users compared to the 78.7% European average[6]. Further information about open source developments across Europe can be found through the Open Source Observatory[7].

This report provides a timely and objective analysis of the experience of Europe's largest local authority in implementing open source software in one of its public-facing services. We hope that the information and guidance provided here will help IT managers considering open source software for other local authorities.

[6] *Free/Libre and Open Source Software: Policy Support*, September 2005
[7] http://europa.eu.int/idabc/en/chapter/452

3 What is open source software?

3.3 Defining open source software

One of the simplest ways to understand the concept of open source software is to compare it with proprietary or "off-the-shelf" software, for example Microsoft Office. Use of proprietary software is restricted; you must purchase a licence to use it. This licence gives the customer the right to use the software, but not to share it with others or to access its source code[8].

In contrast, open source software has publicly available source code, and is published under an open source licence. Such a licence gives users the freedom to use, share, modify and redistribute the software – rights which are not granted under standard proprietary software copyright. There may be requirements which oblige users to share and redistribute any modified code. These requirements excepted, there are generally very few restrictions on the use of open source software.

Open source software is not necessarily free to acquire, but at most only minimal distribution costs are charged. Instead costs associated with open source software are usually incurred through procuring support from third party organisations. Novell, for example, offers support packages for Linux.

3.4 Growth of open source

The open source movement is seen as having its own philosophy, particularly concerning the practical benefits of freely accessible source code. It has its roots in hacker culture, and the internet is host to a community of open source enthusiasts.

Over the last five years, it has increasingly come to be seen as a viable alternative to proprietary software. There are open source equivalents for many software applications. Examples include:

	Open source application	Proprietary equivalent
Productivity package	OpenOffice	MS Office
Internet browser	Firefox	Internet Explorer
Operating system	Linux	Windows
Web server	Apache	IIS
PDF reader	Evince	Acrobat
Picture editor	GIMP	Photoshop

[8] The human-readable programming instructions

While Windows holds 90% of the market for operating systems, Apache dominates the web server market. OpenOffice has been downloaded over 57 million times[9]. The Firefox web browser is used on an estimated 8-10% of computers globally[10]. A number of large software companies are now involved in the development of open source products.

3.5 Development process

Open source software is released on the web at a very early stage of development by its original developer. The source code is subsequently modified by the wider development community. In contrast, proprietary software is privately developed by software companies then released commercially as a finished product.

Open source software will typically go through an initial rapid phase of development. Frequent releases allow for a much tighter feedback loop between users and developers. The concept of 'survival of the fittest' applies: as software evolves, successful products will be advanced by developers and will build up a substantial user base; weaker alternatives will not.

3.6 Understanding lock-in

Advocates make many claims about the benefits of open source software; some of these are considered in Appendix A. One worth raising here is that use of open source software reduces the risk of lock-in. Lock-in is a situation in which the customer is dependent on a supplier for a product or service and is unable to move to a different supplier without incurring a substantial cost. Lock-in may occur contractually or technically:

- Contractual lock-in: For example, the terms of an existing software support contract may mean support would not extend to a new configuration involving open source software, beyond any originally specified
- Technical lock-in: May occur when a piece of software does not work outside the supplier defined framework. For example, if a local authority is dependent on a particular piece of software which only runs in Windows, then the authority is locked in to using Windows unless they can reconfigure that piece of software

Use of proprietary software carries a high risk of lock-in – being tied to a single supplier and therefore any price increases or support restrictions they may stipulate. Lock-in is easier to avoid with open source software; its very nature encourages competition. The open standards[11] of the software make it

[9] Source: http://stats.openoffice.org/index.html
[10] Source: *Firefox swings to the rescue*, The Economist, 14 December 2005
[11] "*Publicly available specifications for achieving a specific task*." (Wikipedia)

easier to move between different systems or suppliers, and the access to the source code means support may be proffered from the wider development community; the open source community agree the standards then compete on the implementation.

Lock-in may sometimes occur at least partly because of an organisation's own inertia, or from the perception that migrating from current technology might be too costly, rather than from the use of proprietary technology per se.

3.7 In brief

The key differences between open source and proprietary software include:

- The source code of open source software is freely available for modification and redistribution
- The licensing costs for open source software are much lower than for proprietary software
- Open source is released much earlier and more frequently in the development process
- The open source movement is sustained by a support-based business model, as opposed to licence fees
- Use of open source can avoid the risks of lock-in associated with proprietary software

The risk profile for a local authority associated with a first-time open source implementation is very different from that of an upgrade of an existing proprietary system[12]. However, despite these differences, the assessment, procurement and rollout of open source technology should essentially be managed in the same way as an implementation of proprietary software.

[12] See Appendix A for a discussion of these risks

4 Background to the Birmingham project

4.1 Overview

BCC's Open Source Academy project was a trial of open source software in its library service. The Council's motive for applying to the OSA was to investigate whether it is possible for a local authority to make savings by implementing an open source desktop. Its perspective on open source was (and remains) neutral. Having not used open source extensively before, BCC's interest was simply to make an objective assessment on whether and how open source could benefit the council.

The library service was chosen by BCC as an appropriate service to host the project for two reasons. Firstly, IT in the service was seen as largely discrete, used by non-power users, and without business applications reliant on Microsoft Office. Secondly, IT in the library service was in need of significant investment.

4.2 Project team

The project was managed and overseen by a project team and board largely composed of staff from three different teams within BCC:

- Birmingham Libraries
- Business Solutions and IT's (BSol&IT) central infrastructure team
- The Learning and Culture IT team (L&CIT), BSol&IT's support team for education and libraries

Based in the Resources Directorate, BSol&IT is responsible for managing and supporting IT across all of BCC's 18,000 desktops. L&CIT is part of BSol&IT, but specifically supports IT across the education department and library service, including running an individual helpdesk for the libraries.

The management and technical aspects of the project were led and supported by staff from BSol&IT and L&CIT.

4.3 Project plan

The project began in April 2005 with the intention to rollout a Linux desktop and OpenOffice for over 330 PCs in the library service. It was anticipated that a pilot would be deployed in October 2005 in the Central Library and two community libraries, Acocks Green and Spring Hill. Rollout to the remaining 38 community libraries was expected to commence at the end of January 2006.

The complexity of choosing a suitable open source desktop configuration and the difficulties customising and configuring the chosen desktop to a standard where it could be rolled out meant that this timescale was not met. Instead the progress of the project has followed the timescale illustrated in Figure 1. More configuration and testing work was required to set up the public PCs, so the pilot and rollout of these has been more severely delayed than for the staff PCs.

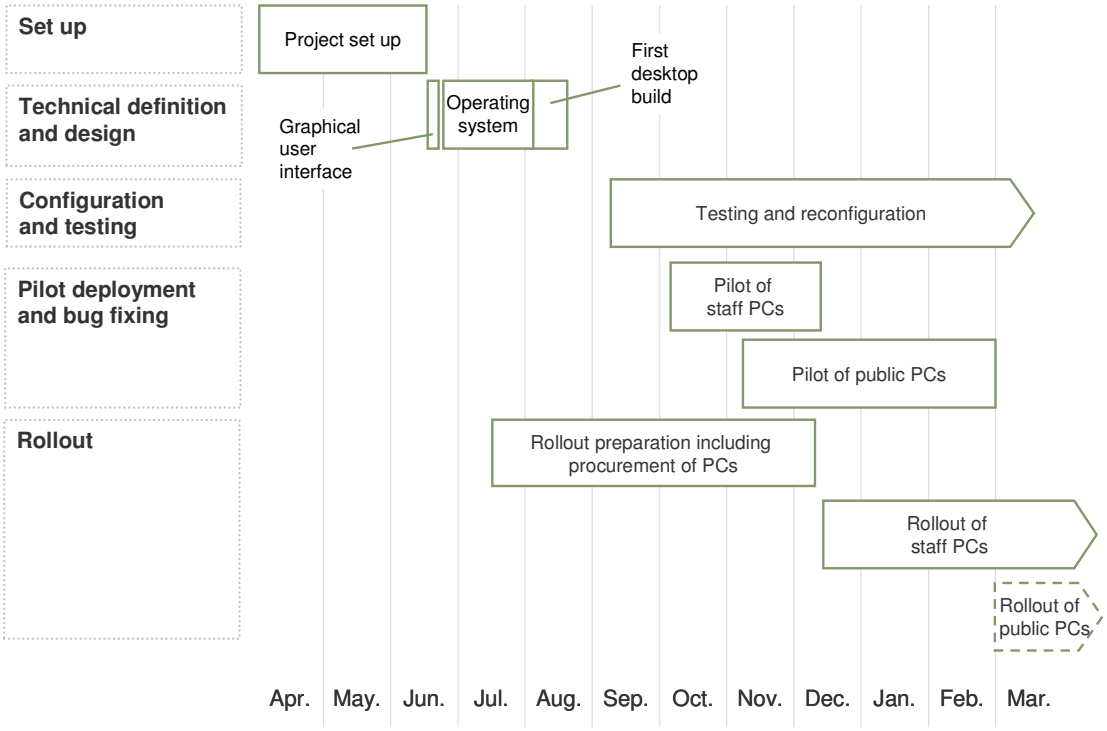

Figure 1: The actual progression of the project from initial set up in April 2005

4.4 Libraries in context

One of the features of IT in a library service, setting it apart from many other local authority services, is that it is used by both staff and the public. Since a major investment in IT facilities in 2001, Birmingham Libraries has seen a dramatic change in the habits of library users:

	Year		
Library use	**1997**	**2000**	**2003**
Borrow/Return Books	78.70%	55.30%	49.50%
Use a pc	N/A	N/A	15.30%
Use the Internet	N/A	N/A	21.80%

Proportion of users borrowing books has declined.

37% of users now use IT facilities in BCC's libraries.

Public IT facilities were introduced to the library service in 2001.

Figure 2: Results of a survey of over 12,000 library visitors in Birmingham into library use

Several librarians in Birmingham estimated that they now spend just 50% of their time managing book lending, and around 30% of their time dealing with IT related issues including queries and issues raised by the public. In the context of the pilot, it is worth noting that any difficulties arising for the public were in the first instance referred to staff with only limited open source training.

4.5 IT in the libraries

Prior to the project, there was an array of different hardware and software being used by both staff and the public, as Figure 3 shows. Much of the IT was outdated. Public access to the Internet was generally limited to terminals on the People's Network[13], installed in 2001, and still running original web browsers.

IT	Public	Staff
Hardware model	Sun terminals and PCs	Pentiums – Pentium 4s
Operating system	Unix or Windows	Windows 3.11 (1993) – Windows XP (current)
Productivity package	StarOffice or Microsoft Office	Microsoft Office (various versions)

Figure 3: The pre-project configurations of Birmingham Libraries' desktop equipment

Old equipment, compounded by ageing network infrastructure, resulted in frequent complaints from the public about the lack of basic functionality. The

[13] A government-funded initiative which aims to ensure everyone in the country has access to a computer and the Internet through their local

most common issues were that machines were slow, froze on a regular basis and did not provide members of the public with the facility to save work.

For staff too, the IT caused a number of frustrations:

- Staff using different versions of Microsoft Windows and Office could not always open the same documents
- There was no network for sharing documents across the library service, meaning that most data sharing between staff was by floppy disk

The library service historically has not had a budget for a standard IT replacement cycle. Instead staff hardware has been replaced on an ad-hoc basis as funding has become available.

4.6 Objectives

From the beginning, the project had multiple stakeholders, the OSA and Birmingham Libraries (see Figure 4). Both had different objectives in implementing open source. For the OSA, these were to:

- Test the viability of using open source technology in a local authority setting
- Develop a business case for the use of open source technology
- Produce a case study report evaluating the impact of using open source technology in the libraries

In addition to these, Birmingham's library service outlined a number of goals it hoped to achieve from the project. In summary, these were to:

- Improve public satisfaction with the IT facilities offered
- To allow customers to benefit from improvements including increased speed of the desktop, the ability to save to portable media devices[14], and a greater number of PC terminals
- Improve the accessibility of IT equipment for customers, and the ability to display languages other than English
- Improve the efficiency of the library service IT for staff
- Ensure that all staff had access to the latest operating system and software releases, and to a shared network

Having two key stakeholder groups influenced the way the project progressed.

[14] Such as USB memory sticks, CDs and floppy disks

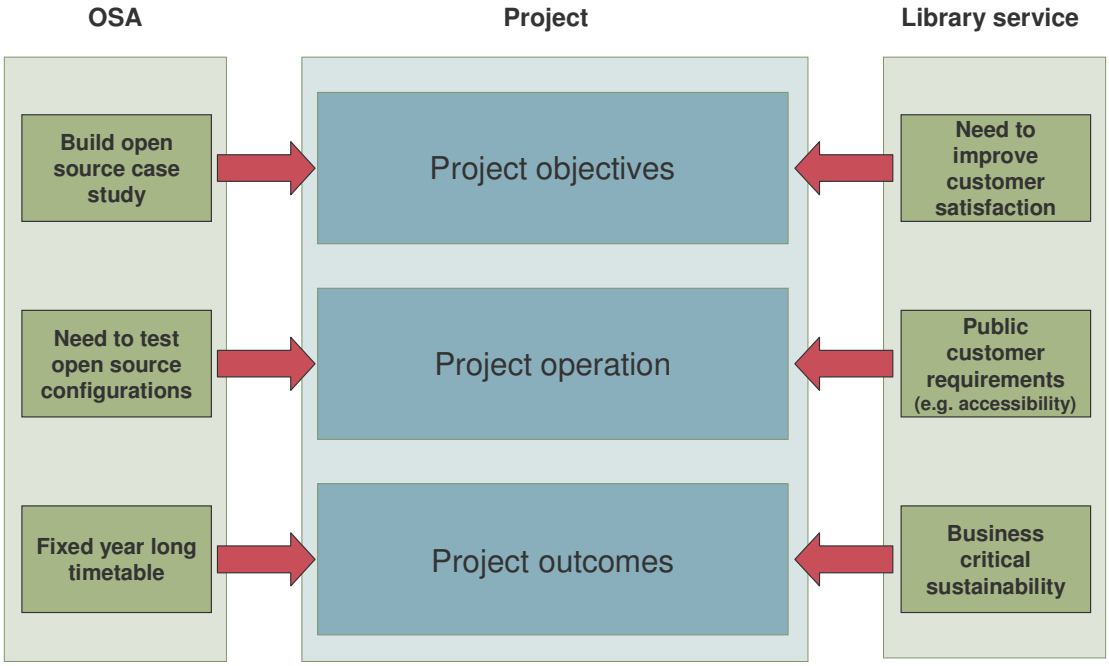

Figure 4: The two stakeholders had distinct sets of objectives for the project

In hindsight, it has become clear that it would have been easier to manage if there had been a single set of objectives. Instead, the project had to balance the need to meet Birmingham Libraries' business requirements and the need to fully test and implement an open source desktop on behalf of the OSA.

4.7 Internal skills base

The project budget included £100,000 for skills support, based on the assumption that it would be necessary to bring in consultants to develop the open source desktop and configuration. However, it quickly transpired that the council had a number of technical staff who already had some open source experience and were interested in working on the project. It was therefore possible to put together a team of five staff members from BSol&IT to lead the technical side of the project.

While the BSol&IT team led the development and configuration, L&CIT were responsible for planning and undertaking the deployment of open source across public and staff desktops. Staff in L&CIT did not have previous experience with open source technology. Therefore five members of the team went on an external Linux training course; two subsequently went on a more advanced course. The project itself has been a valuable learning experience for L&CIT staff and has resulted in the development of open source knowledge within BCC.

5 Running the Birmingham project

5.1 Choosing a configuration

The first step in choosing a configuration was to get the right desktop manager. This component includes the graphical user interface (GUI), which controls the look and feel of the desktop. Sirius, a founding member of the Open Source Consortium[15] (OSC), provided four Linux configuration options for Birmingham to trial; Sun provided a Java[16] desktop running on the Solaris operating system. A customer survey asked users their opinions of these five open source configurations, based on the look and usability of the desktop. The criteria considered were:

- Familiarity of the desktop
- Recognition of icons and menu options
- Ease of logging in
- Ease of opening applications from the desktop screen
- Ease of moving between applications

As a result of this survey the desktop manager chosen was GNOME.

The second step was the identification of the core business applications, so that the best operating system, or distribution, could be determined. The OSC facilitated a two-day workshop, where a list of ten distributions was reduced to five. From these, BCC selected the SUSE LINUX 9.3 Professional (SUSE 9.3) as its preferred operating system configuration. This was selected for the following reasons:

- It was compatible with key business applications
- It was the easiest to install and configure
- It is a mature and stable distribution
- Some members of the technical team already had experience with it
- It is developed by Novell, which inspires additional confidence

Four new SUSE[17] SLES[18] servers were also purchased to support the new hardware and software beyond the lifespan of the project.

The open source productivity package chosen was OpenOffice 2.0, which can be downloaded for free. This provides open source equivalents of Microsoft Word (Writer), Excel (Calc), Access (Base) and PowerPoint (Impress). The open source internet browser chosen was Firefox. GIMP was selected for installation as a picture editing tool.

[15] Represents the open source business community in the UK
[16] A programming language
[17] A Linux package
[18] A server-based Linux distribution

Staff PCs
It became apparent early in the project that Galaxy, the library management system, does not run on Linux. The manufacturer, DS, could not guarantee support for the current version of Galaxy when running through a Windows emulator[19] on a Linux desktop. They offered instead to undertake development work to enable the latest version of Galaxy to run on Linux.

BCC did not commission this development work as the project budget did not allow for such development costs. In addition, while Birmingham Libraries is planning to upgrade to the latest version of Galaxy, it will do so outside the timescales of the open source project. This meant that the open source implementation on the staff PCs has had to be scaled back. Instead of Linux, the new staff PCs are running Windows XP alongside OpenOffice 2.0 and other open source products.

Some library staff use desktop publishing software. As the most suitable open source equivalent of Publisher, Scribus, is still being developed for the Windows platform[20], some Microsoft Office capacity has been retained for this purpose.

Public PCs
The open source implementation on the public PCs is more substantial. The Linux operating system described above will be installed on 130 new public PCs in the central and community libraries. Some Windows capacity will be retained for the libraries to run some specific applications that are incompatible with Linux, such as the Learndirect website. Learndirect is a initiative that provides online courses for post-16 education, enabling registered users to learn anywhere that they have access to the internet. Some Learndirect courses require the Macromedia Authorware plug-in that is not available for Firefox running on Linux. This means that among other things, Linux users cannot access the European Computer Driving Licence course.

Some of the public PCs in the community libraries earmarked for replacement with PCs running Linux desktops are used for learning software. In order to continue to make use of this software, the library service asked that those PCs instead run Windows XP.

The table below summarises the main new software and hardware scheduled to be rolled out during the project, including the pilot phase:

[19] Which allows software built for Windows to run on a different operating system
[20] The latest version of Scribus is currently unable to open documents produced in Publisher

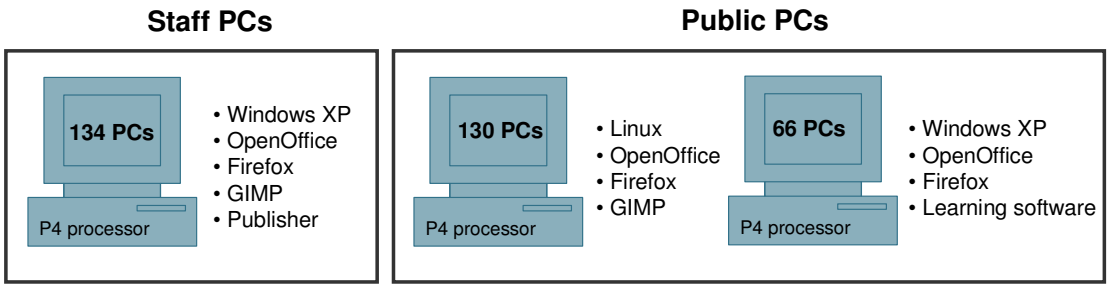

Figure 5: The anticipated desktop configuration of the new PCs

5.2 The iterative testing process

Once the configuration was decided, the desktop could be built. To replicate a desktop over a number of PCs, a ghosting or cloning mechanism can be used. This is where an 'image' is taken of the original desktop and then reproduced on other machines. The first desktop image was made available for testing in the user acceptance testing (UAT) lab, set up in the Central Library.

The user acceptance testing (UAT) for the project effectively took place in three phases:

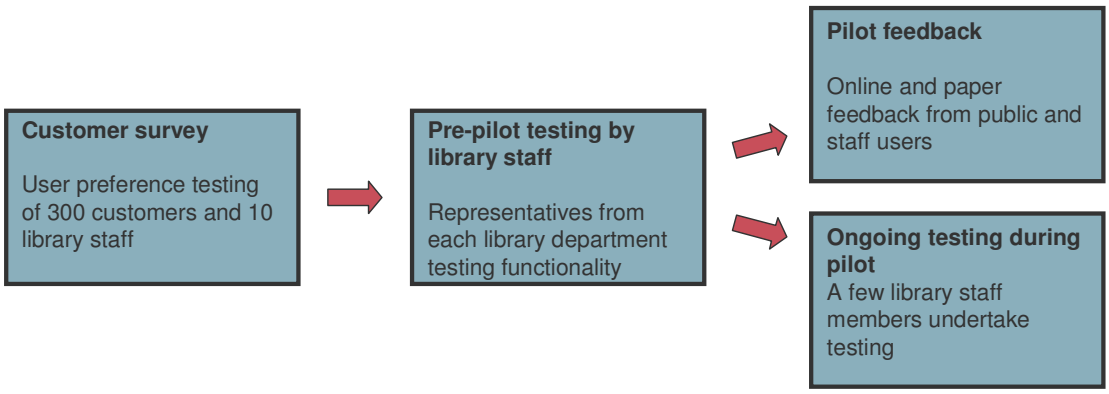

Figure 6: The three phases of the testing process

The first phase of testing was the customer survey of desktop managers discussed above (Section 5.1).

The intention of the second phase was to test the functionality of the first open source configuration due to be released on the public PCs. No security issues were identified.

As soon as testing began it became clear that the cloning process used had produced a very poor replica of the original desktop; the machines kept freezing. It took almost another two weeks for an improved image to be installed so testing could begin properly. There then began an iterative

process of continual testing and reconfiguration, which continued throughout the pilot. The purpose of this testing process was to ensure that the library service was satisfied with the desktop configuration before rollout began. Some Libraries staff felt that the pilot began before user acceptance testing was fully completed.

5.3 The pilot

Thirty-five Windows PCs for staff were installed in the Central Library and two community libraries at the beginning of October 2005. Complications with agreeing the Linux configuration meant that the 25 public PCs for the pilot were not installed for another month.

Three librarians at the Central Library were particularly involved with ongoing testing of the desktops during the pilot. This was carried out on an ad-hoc basis. Any functionality issues (see Section 6.1) that arose were logged and fed back to the technical team for investigation.

Following a number of interoperability issues raised during the pilot (see Section 6.2), BCC decided to replace their chosen desktop manager, GNOME, with KDE. Having spent three months developing the SUSE 9.3 configuration with GNOME, the technical team was able to undertake the same work with KDE in less than a week. This demonstrates a substantial gain in skills. However it means that the pilot on the public PCs has been running with a different desktop configuration to that which will be rolled out. As a consequence, a second pilot phase will be undertaken with a KDE desktop.

5.4 Rollout

Rollout of the remainder of the 134 staff PCs, running Windows XP, began in the middle of December 2005 and is still ongoing at the time of writing. The difficulties in agreeing a Linux desktop mean that the rollout of the remainder of the public PCs has not yet begun. Some final testing of a new script to manage a functionality issue with portable media devices (see Section 6.1 below) needs to take place before rollout can begin.

6 Outcomes of the Birmingham project

6.1 Functionality issues

The public facing nature of library IT meant that the software has been exposed to a rigorous test environment. Most public users of IT in the libraries would fall under the '80/20 rule', where 80% use just 20% of functionality. However, the demands of the remaining 20% make it difficult to predict exactly what will be required of the IT.

OpenOffice
Libraries staff reported few or no functional issues with OpenOffice, and only minor interoperability issues (see Section 6.2). Indeed, some staff did not immediately notice any difference upon moving to the OpenOffice suite of software. Although it is too early to reach a definitive conclusion, it appears that OpenOffice provides a satisfactory equivalent to Microsoft products for those using basic or intermediate functionality (i.e. those who are not power users).

Most Libraries staff will only use Writer, Calc and Impress. An area in which OpenOffice does not provide a strong equivalent is in its Base software, an alternative to Microsoft Access, which is widely acknowledged as a less mature development. There are outstanding interoperability issues in Base when trying to import databases from Access.

Linux operating system
Public users experienced some difficulties with the functionality of the chosen Linux desktop during the pilot. An early problem identified was that when users double-clicked on an icon to open an application, there was no symbol to indicate that the application was opening. This led to users opening multiple versions of the same application, which slowed the PCs down and caused frustration. This issue was resolved when BCC switched from GNOME to KDE.

Another problem was the difficulty that many public users experienced when trying to save work. In some cases, machines didn't recognise that portable media had been inserted into the PC; in others, the Linux desktop file manager erroneously reported the portable media as being full. This problem caused a lot of frustration for public users, and for library staff who were unable to resolve the problem themselves. Many users found it hard to navigate to portable media devices so that they could save work; media are located somewhere different in the file structure to where users would be used to looking with Windows. The issue was significant enough to require the technical team to reconfigure the original interface so that users can save work more easily.

During the pilot, it was discovered that Linux created a profile which lists the files saved on any mounted portable media device. To ensure user privacy it was requested that the technical team find a way to delete this profile once the user had logged off. However the script devised also deleted the actual files off the media device, if it was still in the machine at the time of logging off. The script has been adapted to first check if any media devices are mounted; the delete function will not execute if a device is present.

6.2 Interoperability issues

OpenOffice
There have been few interoperability[21] issues with OpenOffice 2.0 although there have been difficulties with formatting not transferring exactly between MS Office and OpenOffice 2.0. This seems to be a particular problem with text that has been copied and pasted from MS Office files; it reverts to its original formatting when the file is reopened[22]. There have also been issues in transferring document templates from MS Office and OpenOffice 2.0, although this is also an issue when transferring between different versions of MS Office.

Linux operating system
A number of interoperability issues occurred with Linux. These are summarised below:

Interoperability issues

Software	Website	Portable media
Some library software not compatible with Linux Formatting problems with OpenOffice	Inability to use plug-ins on some key websites	Difficulties locating and saving to USB memory sticks, floppy discs, etc

Figure 7: Interoperability issues associated with the Linux operating system

Library service staff identified that a number of core pieces of library software, such as the Windows-based Deepfreeze, were not compatible with Linux. Deepfreeze is an application that reboots PCs after each user has finished, restoring the default settings after every session. As Deepfreeze is not available for Linux, a script replicating its functionality was developed by the

[21] Defined here as the capability of different programmes to exchange data in a common way
[22] From Bristol City Council's experience with StarOffice, this problem may be resolved by pasting the text without formatting and then applying the formatting within OpenOffice

technical team. While library staff were able to control Deepfreeze themselves, they are not able to do so with the new script; this has reduced flexibility.

Issues with browser plug-ins led to some problems once the Linux operating system and Firefox browser was installed. Other website issues included:

- Some users initially experiencing difficulties accessing foreign language websites
- Users being frustrated at not being able to use MSN Messenger

The foreign language issue was easily resolved by installing the full set of language packs available. Any foreign language websites that still did not display correctly did not have the character set properly identified in their code. This was therefore not a problem with open source. There are some open source alternatives for MSN Messenger available but these were not tested as Libraries are not keen for public users to use web chat functionality.

Another problem for public users was that sometimes the text they typed appeared on screen in Chinese characters. This was due to a programme called SCIM, which was activated by certain combinations of keystrokes. The Chinese characters appeared when users inadvertently pressed multiple keys simultaneously. As part of the move to the KDE desktop manager, SCIM was removed from the installation.

Finally, a number of members of the public had difficulties when they attempted to use CDs, or burn or format DVDs. Some users were unable to access CDs from the CD ROM icon, whilst others needed multiple attempts to format DVDs.

6.3 Staff perceptions

The attitude of library service staff prior to the pilot implementation phase was positive, in recognition of the need for investment in IT infrastructure and PCs. However, the pilot has undoubtedly caused some frustration. This is due to the difficulties experienced by public IT users, who turn to library staff as a first point of contact. Difficulties in supporting the public have been compounded by the varying standards of IT literacy among both users and staff.

The library staff interviewed by iMPOWER welcomed the improvements achieved by investing in new IT equipment in the libraries. They were also positive about their experience of using OpenOffice. However, they felt that the implementation of the Linux operating system had in some cases doubled the amount of time they were spending on resolving IT issues and assisting members of the public.

There was also concern about the number of different combinations of systems now being run in some libraries: for example community libraries are

operating People's Network Sun terminals with StarOffice; new PCs with the Linux operating system; and new PCs with the Windows operating system. Staff felt that this exacerbated the difficulties for non-IT literate staff in identifying why problems were occurring.

6.4 Public perceptions

iMPOWER conducted a modest survey of 22 public IT users in the Central Library. Most were regular users of the library computers, visiting every day or a few days a week, and over half had English as a second language.

The most commonly used functionality was the internet and webmail. Many users also reported using the computers to search or apply for jobs. Some of the public users may have used StarOffice on the People's Network terminals. This means that they may already have been comfortable using non-Microsoft products. It should be noted that in commenting on the changes brought about by the project, users did not really distinguish between the open source software and the new hardware.

Users made only positive comments about the new hardware, but thoughts on the Linux operating system and browser were more mixed:

- Some found the new desktops more user-friendly, faster, and more intuitive.
- Some were frustrated by the number of prompts and security pop-ups[23].
- There were no reported concerns about navigating around the Linux desktop.
- Only a small number of users said that they used OpenOffice, with no particular opinions expressed about it.
- Five users had had difficulties with saving work; they were unable to save to their chosen media, including USB memory sticks, CDs and floppy disks.
- Users felt that language capability had improved, for example the computers can now be used to read and write Arabic text.
- Users experienced problems with downloading information from ancestry.com, which requires a browser plug-in, but did not report difficulties with any other websites.
- Only a few users had noticed that they were using Firefox rather than Internet Explorer, and were satisfied with it.

Where users had experienced problems, these did not appear to have been resolved. In one case, a user and a librarian struggled for 10 minutes to

[23] These inform the user that they are submitting information to a website or are about to leave a secure website. These settings were specifically configured by Libraries, and can be disabled by the user after the first occurrence.

understand why she was unable to save to CD. The problem could not be resolved and the user had to try again on another computer.
The image for public PCs is currently being reworked.

6.5 Accessibility

The Disability Discrimination Act (1995) stipulates that organisations must make reasonable adjustments to meet the needs of disabled users. The major issue relating to the implementation of OpenOffice is its incompatibility with Gnopernicus, software designed to enhance accessibility for blind and visually impaired users. Similarly, there is no Linux version of Supernova, the screen magnification product already used in all 40 libraries, which the library service would like to rollout further. No third-party, equivalent, applications appear to be available for Linux. This issue has not been fully resolved although some workarounds are in place; such as a zooming capacity built into the Linux configuration and the text-to-speech functionality offered in KDE.

6.6 User training

Following discussions about staff training needs, consultants were brought in to run OpenOffice familiarisation sessions for key business support staff members within L&CIT. The main purpose of these sessions was to highlight the main differences between Microsoft Office and OpenOffice. Staff were also given OpenOffice user manuals to take away with them.

L&CIT designed and delivered additional training. Initially sessions were held to demonstrate the differences between Windows and Linux desktops. These were attended by 142 librarians. In addition, basic training on OpenOffice software has now been developed.

No formal training was provided for public IT users. It was hoped that the high usability of the new software would mean that training was not necessary.

6.7 Decision making and 'switch'

BCC's initial choice of GNOME as the desktop manager was largely dictated by user preferences based on 'look and feel' (See Section 5.1). Given a fuller set of decision criteria, the choice of desktop manager may have been different: there was already some in-house experience with KDE; the user preference for GNOME was slight.

It should be noted, however, that BCC's public usability trials were used not only as a way of selecting a preferred configuration, but also to publicise the open source project to the public.

Issues over settling on an appropriate configuration do highlight the overall complexity of decision-making on the project. Decision-making was more involved and lengthy, compared with previous proprietary upgrades, because:

- As a first-time implementation, BCC needed to take more care over its decision; there were no in-house experiences to learn from
- BCC needed more time to develop the internal expertise required to make a decision on configuration, for example it sought help from an external consultancy to run a workshop on different options
- The range of options available for desktop configuration are many and varied, compared with a single option for a Windows upgrade
- BCC needed to demonstrate due diligence in its role as an Open Source Academy project

As well as decision-making, BCC's lack of previous experience with open source also meant more involved development, bug-fixing and training. Collectively, the extra time and effort spent on these activities may be referred to as 'switch' costs (See Section 7.6).

Although the increased effort in 'switch' is not limited to moving to open source, much of BCC's project has been taken up by these kinds of activities and especially the decision-making required to choose a configuration. Should BCC wish to proceed to a subsequent implementation of open source, the amount of decision-making, and 'switch' costs, will be reduced.

6.8 External consultancy and support

The project team had general discussions with the Open Source Consortium during the early stages of the project. The in-house technical team undertook as much development work as possible, using external support only where necessary.

At the implementation stage, BCC utilised the skills of a consultancy, having agreed a year long support contract at a cost of £4,995. Among other things, the consultancy provided support to develop a strategy for the deployment of software, something which no one involved in the project had any previous experience of.

Under an existing agreement Novell provides support for the SLES servers that were installed as part of the project.

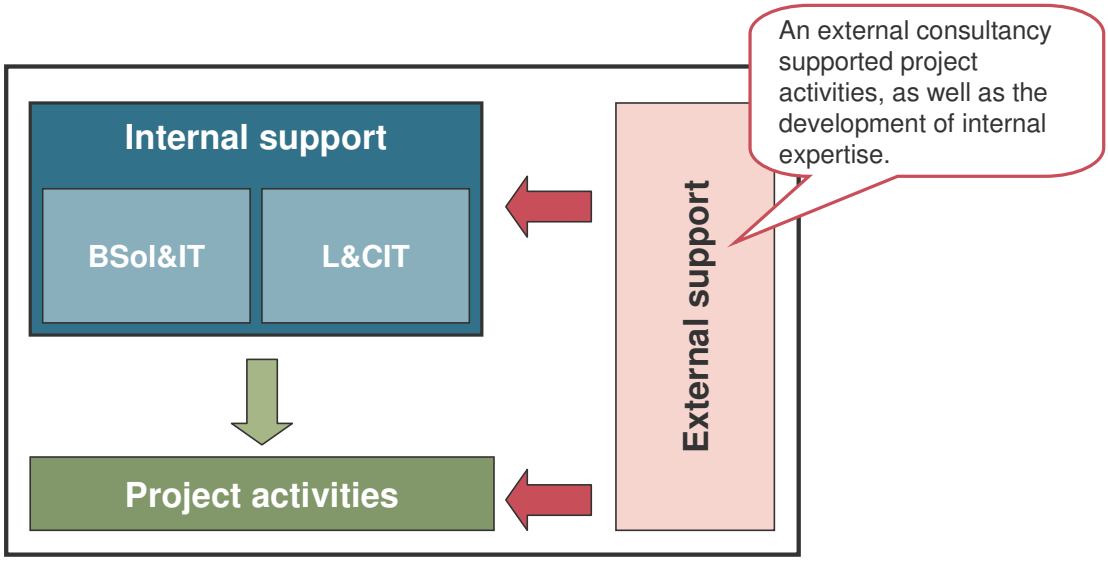

Figure 8: Technical support for the project came from two internal teams and an external consultancy

Given the loss of the project consultancy role from BSol&IT at the end of the project, it seems likely that the contract with the external consultancy will need to be extended to support L&CIT in-house capacity.

6.9 A process improvement

By investigating open source technology the technical team were able to utilise a system[24] that could be used to cut down on printing costs from the public IT facilities. Based on this system, the team were able to devise a script which sends all print jobs to the central print server and only releases the print job to a printer when the customer has been to the desk to confirm that they want it. This functionality should cut down on the cost of unintentional printing.

This system is as yet untested at BCC. It will be trialled once the configuration of the open source software is stabilised and rollout is complete.

6.10 Next steps

To meet agreed OSA project timescales, this evaluation has been undertaken before the project has finished. Although some initial conclusions can be drawn and are set out below, it is too soon to make an assessment of some other key issues, such as security. Therefore further evaluation is recommended, at least six months after the project has finished, to assess the sustainability of open source in the library service.

[24] CUPS, a modularised printing system that allows a computer to act as a print server

What requires further evaluation?
• Impact and sustainability of rollout • New operating system configuration (KDE) • Planned OpenOffice, SUSE and Firefox upgrades • Ability to meet accessibility standards • Security • Ability of L&CIT to provide support after the pilot has finished • Longer-term operation of the open source software • A change request management process

When the BCC pilot phase ends, L&CIT will be responsible for supporting the new open source desktops. The team is likely to continue on a steep learning curve for some time, so may need additional support. At the time of writing it is unclear how support from the BSol&IT infrastructure team will be managed.

Further projects could test the viability of Linux in different business environments.

7 Costing the project

7.1 Introduction to the business case

The business case which supports the findings of this section is included as Appendix B of this document.

The business case estimates:

- (1) The first-time (capital) costs of Birmingham's open source project
- (2) The likely cost of maintaining Birmingham Libraries' new infrastructure, which combines both open source and proprietary software

In order to provide a comparison with proprietary software, the business case also estimates:

- (3) The first-time (capital) costs of an equivalent upgrade project, which would have involved the replacement of PCs and an upgrade to a Windows XP desktop with the Office XP package
- (4) The likely cost of maintaining this equivalent infrastructure upgrade
- (5) The first-time (capital) costs of an equivalent upgrade project, in a business environment where educational licence rates would not apply

The basis of estimating these costs is summarised as follows:

Cost	Basis of costs

(1) Open source project capital costs
 	
compares with…
 	
(3) Equivalent Windows XP upgrade project capital costs
	• Hardware
	• Software
	• Team costs, broken down into:
	  ○ Project set up
	  ○ Project management
	  ○ Technical definition
	  ○ Development and testing
	  ○ Pilot deployment
	  ○ Rollout
	  ○ Training
	These costs are themselves split between:
	  ○ Internal resource time
	  ○ External resource time

Cost	Basis of costs
(2) Open source project maintenance costs compares with… (4) Equivalent Windows XP upgrade project maintenance costs	• Software licences • Internal support • External support • Licence auditing • Contract management • Budgeting and purchasing • Training • Ongoing upgrade costs

All figures are based on costs and assumptions provided by BCC.

It is important to note that costs are based on moving from BCC's existing infrastructure, and therefore 'switch' is a major element of all costs. Most local authorities considering an open source desktop will need to consider these 'switch' costs.[25] Local authorities intending to roll out an open source desktop on a greenfields site should anticipate a slightly different cost profile to that illustrated here.

7.2 The Gartner model

A model for estimating the Total Cost of Ownership (TCO) of Linux desktops and OpenOffice software versus Microsoft solutions has been developed by Gartner[26]. This model includes variables which relate to different profiles of software user and office documentation. The costs of document migration are an important component of the Gartner model, as are potential productivity losses relating to any move away from the Microsoft suite of collaboration tools such as SharePoint and Outlook.

A version and discussion of Gartner's model, adjusted for use in local authorities, has been developed by Bristol City Council for the Open Source Academy[27]. Birmingham Libraries did not need to migrate documents, and were not using Microsoft collaboration tools. The great majority of library staff experienced no real issues in migrating to OpenOffice. The business case presented here is therefore based on a much simpler model.

[25] See Section 7.6 for a discussion of 'switch' costs.
[26] Available to subscribing clients at http://www.gartner.com
[27] Available at www.opensourceacademy.gov.uk

7.3 First-time costs

Although the project was funded by a grant of £498,800 from the OSA, the total first-time cost[28] to Birmingham was £559,710, if taking into account the indirect costs of time spent by staff in Libraries and L&CIT.

Over half of the total project cost went directly on upgrading hardware and infrastructure, with the result that by the end of the project, the library service will have over 330 new PCs for both staff and public users, with up-to-date desktop and office software.

Actual BCC project costs

Hardware and infrastructure	£309,450
Software licences	£12,550
Team costs	
• **Project set-up**	£31,700
• **Project management**	£41,710
• **Technical definition and design**	£14,360
• **Development and testing**	£22,510
• **Pilot and bug-fixing**	£19,510
• **Rollout**	£97,190
• **Training**	£8,530
• **Miscellaneous**	£2,200
Total costs	£559,710
(Less OSA costs)	(£25,000)
Total project costs	**£534,710**

Identifying the costs of 'open source' is complicated by the fact that the eventual rollout contained both open source and proprietary elements. Nevertheless, it is clear that BCC incurred substantial costs beyond software and hardware alone. Team costs, which have been broken down into separate figures for each of the different stages in the open source project, are high because they reflect the extended thinking, decision making, design and development undergone by BCC as it implemented a new and unfamiliar technology.

The project incurred some costs that are simply attributable to its status as an ODPM / Open Source Academy project. An element of project management and project sponsor time was taken up in engaging with these external stakeholders, at a total estimated cost of £25,000. Because these costs are not directly attributable to the BCC implementation itself, they have been deducted to give the project's total cost figure of £534,710.

[28] That is, the total cost involved in implementing the new PCs and configuration, excluding any ongoing running costs

BCC decided to invest specifically in internal skill development on the project, rather than on support from consultancies. As a consequence, BCC spent a total of £48,310 on external consultants. A substantial proportion of this was actually the result of the project's decision to use a contractor to manage the rollout of the PCs. Removing this cost, the total cost of external open source expertise was £32,760, a small sum in terms of the overall project.

Internal versus external team costs

Internal	£187,200
External (including use of contractors)	£48,310
External (open source support only)	£32,760

7.4 Ongoing costs

By implementing open source across at least some of the PC infrastructure, BCC will incur, at least in the short-term, some increased support costs. BCC already has an existing Novell support contract which covers Linux server support, but it has committed to one year of second-line Linux support from a specialist. The cost of upgrading open source software is estimated at an extra £600 per year.

Estimated ongoing costs for BCC

Software licences	£0
Linux support (first year)	£5,000
Software upgrade costs	£600
Sub-total	**£5,600**
Pre-existing support costs[29]	£214,460
Total	**£220,060**

However, the contribution of these additional items to the total ongoing costs of maintaining Libraries IT is actually very small. Pre-existing support costs for Libraries desktop infrastructure are estimated at almost £215,000. Training is paid for through a pre-allocated budget and will not change, although it will be split between developing Linux and Microsoft skills in the future. Management and licence auditing costs will not change either, since Birmingham Libraries is maintaining a significant proprietary capacity. Overall, the ongoing costs related to the actual open source implementation are minimal.

[29] Includes allocation for training, management and licence auditing costs (See Appendix B for more details)

7.5 Costing an equivalent Windows upgrade

In order to place BCC's implementation costs in context, it is necessary to estimate how much BCC would have spent on a project to upgrade Libraries infrastructure with Windows XP desktops, and MS Office software.

Estimated costs for an equivalent Windows upgrade project[30]

Hardware and infrastructure	£297,760
Software licences	£39,420
Team costs	
• **Project set-up**	£3,790
• **Project management**	£3,190
• **Technical definition and design**	£0
• **Development and testing**	£2,710
• **Pilot and bug-fixing**	£5,150
• **Rollout**	£77,400
• **Training**	£0
• **Miscellaneous**	£500
Total costs	**£429,960**

An equivalent proprietary upgrade would have been much simpler to implement. Although software costs would be higher than BCC spent in its open source project, team costs would be much lower, reflecting the lower resource requirements for decision making and development. An equivalent proprietary upgrade has also been estimated as a shorter project, which also contributes to lower costs for items such as project management and rollout.

Estimated ongoing costs for an equivalent Windows upgrade project

Software licences	£0
Software upgrade costs	£0
Sub-total	**£0**
Pre-existing support costs[31]	£214,460
Total	**£214,460**

It is difficult to establish any significant ongoing costs that BCC might have incurred had it implemented an equivalent Windows upgrade. Birmingham Libraries pays a one-off cost for its Windows licences. Keeping up-to-date with Windows upgrades is easy to manage through Windows' auto-update function, and therefore comes at no extra cost to BCC. Other costs, such as

[30] Upgrading to the latest Windows operating system (Windows XP), plus the MS Office suite of products. The implementation of Windows 2003 R2 Servers would also be included in the upgrade (See Appendix B for more details).
[31] Includes allocation for training, management and licence auditing costs (See Appendix B for more details).

training, licence auditing and management, are already budgeted for, and a Windows upgrade would not alter these costs for BCC.

7.6 Was there a business case for open source at BCC?

The project does not demonstrate that money will be saved by implementing open source on some of the library service's PCs – at least in the short run. A comparison of the project's first-time costs with those from an equivalent pure Windows XP upgrade shows an extra one-off cost of £105,000.

Although BCC could be expected to spend more on licence costs, at £39,420 for a Windows XP upgrade compared with the £12,550 that was actually spent, the project spent a great deal of time – and therefore incurred a substantial cost – in making the decision about configuration, and developing the preferred option. The more complex nature of the project meant that project management and rollout costs were also much higher. All of these are reflected in greater team costs.

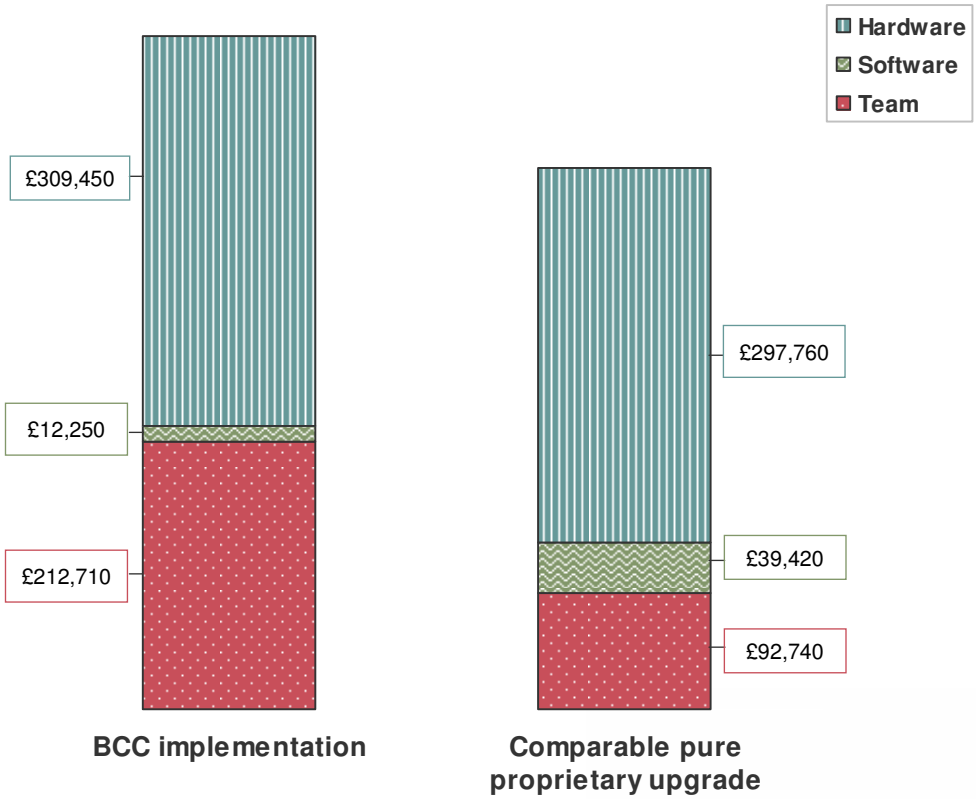

Figure 9: Breakdown of the one-off costs for BCC's open source implementation versus an comparable proprietary upgrade

Comparing the respective team costs gives an indication of how much the 'switch' has cost BCC. 'Switch' cost is a way of identifying the expense of the greater thinking and decision making that will be incurred in any movement

from one technology to another unfamiliar one. In moving to open source, BCC also incurred design and developments costs in configuring the Linux desktop – these can also be included as 'switch' costs.

BCC spent £212,710 on team costs in its open source implementation, compared with an estimated £92,740 under an equivalent Windows upgrade. The difference – nearly £120,000, may be identified as BCC's 'switch' cost.

In terms of ongoing costs, BCC will not deliver any real savings in moving to open source, when comparing with an equivalent Windows XP upgrade. After the first year, when the current third-party support contract ends, ongoing costs, which will relate to upgrade overheads, will be around £600. This compares against an estimated annual spend of around £0 for a Windows XP upgrade.

7.7 Payback trends

With an extra £105,000 incurred by moving down the open source path, and no ongoing savings made when compared with a Windows XP and Office upgrade, BCC's will not recoup the investment made into open source, unless non-financial benefits are taken into account.

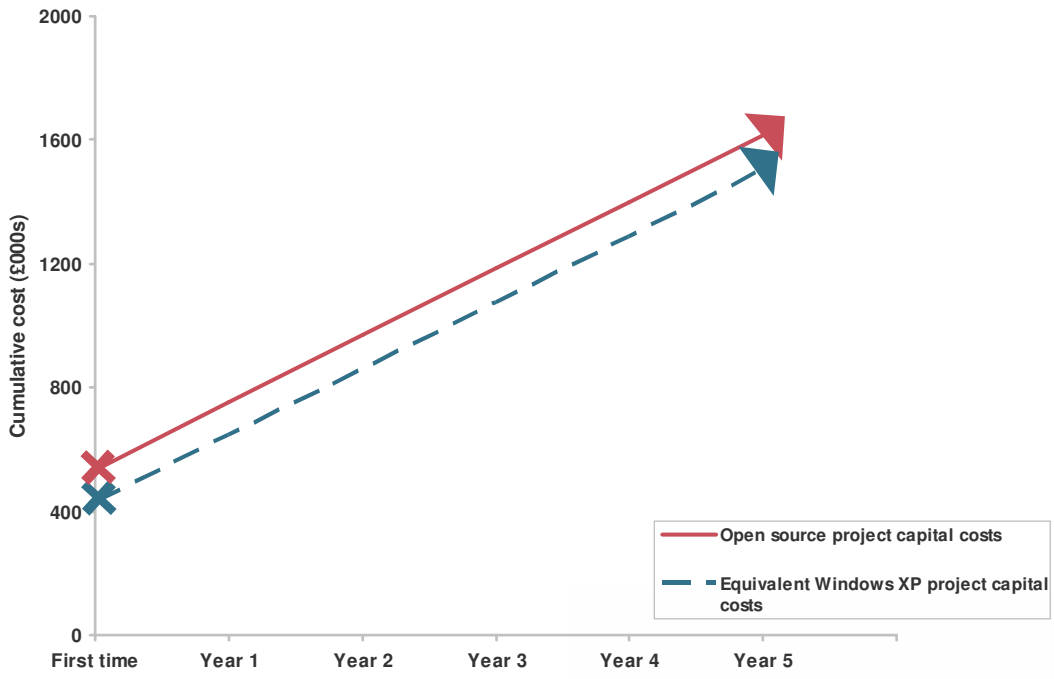

Figure 10: Cumulative costs for BCC's open source implementation versus an equivalent Windows XP upgrade

7.8 Is there a business case for open source?

BCC did not demonstrate a business case for its Libraries implementation. With little existing open source experience, it needed to spend the time and money considering its options more closely.

But BCC's implementation was not on a 'greenfields' site. BCC incurred substantial 'switch' costs in moving to open source in Libraries. Also, now that it has developed its open source capacity, any successive implementations at BCC will have proportionally lower 'switch' costs, which may bring costs closer to comparable Windows upgrades.

Scale is also key consideration. On a much larger project savings on licences may well have compensated for the increased "switch" costs. For example the rollout of StarOffice on 5,500 PCs at Bristol City Council saved the organisation over £600,000 on one-off licence costs.

It is important to note also that the business case for open source is not assisted by Birmingham Libraries' ability to draw upon favourable rates for Microsoft products as part of a broader Education SELECT licence arrangement. For example, Birmingham Libraries pays £58 for a Windows XP licence, whereas the normal rate for an OEM licence may approach £100.[32] Section 10.6 estimates how much BCC would have spent on a Windows upgrade project if Libraries needed to pay the standard corporate licence for Windows software. Accounting for corporate instead of Education SELECT licences would have added nearly £50,000 to a Windows upgrade project.

Although BCC was unable to identify any ongoing savings in moving to open source, there is an argument to be made that in choosing Windows XP, BCC would have locked itself into a particular development path, largely determined by Microsoft. Major upgrades – say from Windows XP to its successor operating system Windows Vista[33] – may be influenced by a decision by Microsoft to drop support for its older products. Any upgrade to a successor operating system will require spend on new licences.

Assuming that a major Windows upgrade would take place before the end of a five year hardware replacement cycle, this would increase the cost of choosing the uniform Windows XP upgrade route by somewhere in the region of £100,000 for BCC, perhaps £150,000 if corporate rather than Education SELECT licences are required.

[32] An OEM licence (Original Equipment Manufacturer) is usually bought pre-installed on a new computer. It only allows you to use the software on the specific computer it came with.
[33] Windows Vista is currently scheduled to reach consumers before the end of 2006

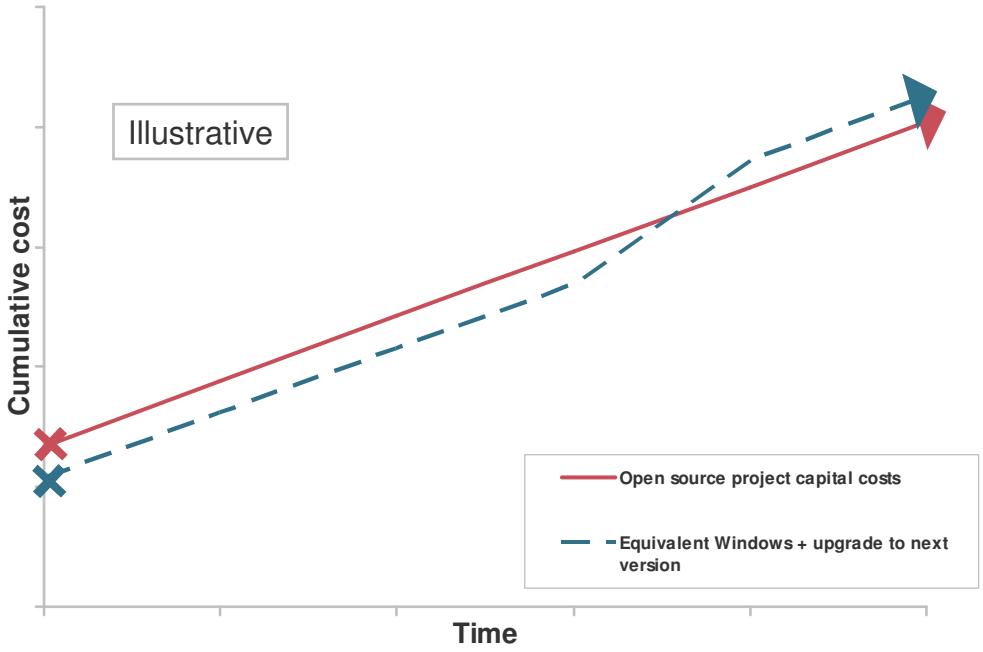

Figure 11: Adding the cost of future Windows upgrades makes the case for open source more compelling

A Linux desktop goes through upgrades as well, and the estimate of BCC's ongoing costs includes a component for annual upgrades. But some argue that the incremental nature of Linux development enables a smoother, and therefore more cost-effective, management of desktop upgrades. Additionally, upgrading Linux desktops does not incur extra licence costs.

It is risky to make estimates based on future Windows upgrades – costs are not obvious at this stage. But by moving towards open source, BCC is avoiding to some extent the implicit costs of continued upgrades which are determined outside its control.

8 Conclusions from the Birmingham project

First, it is important to recognise the particular context of this project.

8.1 Evaluating the project

1. *This was not a pure trial of open source software. New hardware was also implemented and both Windows XP and Linux desktops were installed in the libraries. These factors impacted user perceptions and the project management.*

2. *To meet agreed OSA project timescales, this evaluation has been undertaken before the project has finished.*

3. *In many ways, the varied IT requirements of the public has exposed the project to a more rigorous testing environment, which has been valuable for identifying technical problems but has added to project complexity.*

8.2 A framework for evaluating open source

In light of Birmingham's experience with open source software, a number of conclusions can be drawn that will be of use to other local authorities. The criteria by which to evaluate open source are categorised here as follows:

Technical	Management	Cultural	Financial
Functionality Need to balance technical and business requirements **Interoperability** Interaction with existing systems **Security** System vulnerability **Maturity and sustainability** Stability and future support **Migration** Effort of transferring files	**Objectives** Identify business drivers **Decision making** Investing in researching and selecting the software **Lock-in** Risk of getting stuck with a single supplier **Skills** In-house knowledge **Technical support** Procurement of support **Warranties** Sufficient cover **Legalities** Understand the licence	**Usability** Ease of use **Support** Provision of support and training **Communication** Keeping users involved and informed	**Licenses** Cost of initial purchase **Upgrades** Cost of keeping up-to-date **Resources** Project management and technical **Training** Cost of developing technical skills

Figure 12: The technical, financial, management and cultural issues to consider

Below are the key conclusions from this project, valuable for any authority considering implementing open source software:

8.3 Technical conclusions

1. *Management of portable media is very different for Windows and Linux and should be investigated carefully by local authorities before implementation.*
   BCC found the different way that Linux manages portable media to be a more pressing issue with the GNOME configuration than with KDE on SUSE v9.3.

2. *The functionality of OpenOffice will suffice for most non-power users, but it may be necessary to retain some Microsoft Office capacity.*
   Functionality was not an issue for most of the library staff at BCC. However, even though the library service was put forward as a business area without power-users, small pockets of power-users were identified during the pilot.

3. *Interoperability issues with Linux are likely to make it necessary to retain some Microsoft Windows capacity.*
   BCC were unable to rollout as many Linux desktops as originally planned because it was not compatible with the existing library management system.

4. *Implementing a Linux desktop is likely to involve additional configuration to make it better suited for its proposed environment.*
   Birmingham's choice of Linux desktop is still being configured, at the time of writing, to make it suitable for public users.

5. *An open source implementation project may uncover opportunities to improve business processes.*
   BCC took the opportunity to design a new print management system.

6. *Accessibility is particularly important in the public facing context; where an organisation has demanding accessibility requirements, the implementation of open source may be restricted.*
   Birmingham have been unable to fully resolve their accessibility issues.

8.4 Management conclusions

1. *First time implementations of open source will require significant investment in decision making. This is because of the number of choices associated with open source software and the increased knowledge required to make these choices.*
   It took BCC six months to move from project start to actual implementation.

2. *Any organisation implementing open source for the first time must have a full set of criteria for evaluating configurations.*
   BCC selected its initial configuration based only on user preferences and subsequently had to spend more time on development to make the configuration fit for purpose.

3. *Having multiple stakeholders will affect progression of an open source desktop rollout.*
   Meeting the library service's business requirements meant that BCC could not proceed with a full open source rollout as anticipated by the OSA.

4. *Use of open source technologies can avoid the risk of lock-in.*
   BCC demonstrated the ease of switching by having KDE up and running within a week, although additional configuration was still required.

5. *Local authorities should carry out a full audit of existing systems, applications and support contracts to determine the feasibility of an open source implementation.*
   BCC was prevented from implementing the Linux desktop on staff PCs because they could not secure a support agreement for a business critical application.

6. *Local authorities who are considering moving to open source in the future should seek to renegotiate support contracts now in preparation, or switch to suppliers that routinely support open source technology*[34]*.*
   As BCC progresses with its open source policies, it is likely to be more aware of the contractual lock-in that prevented a full rollout of the Linux desktop.

7. *Large local authorities should seek employees within the organisation who have expertise in open source.*
   Birmingham assembled a technical team using existing resources. The

[34] Another OSA project aims to create a list of accredited open source suppliers for local authorities

value of this was reflected in much lower use of external consultants than anticipated.

8. *Moving to open source commits a local authority to an open source support capacity.*
   BCC has both up-skilled internal support staff and procured a year of second-line Linux support from an external agency. It remains to be seen whether this is sufficient in the long-term.

8.5 Cultural conclusions

1. *For a first-time implementation of open source, understanding and defining your user requirements is especially important.*
   BCC spent a couple of weeks carrying out user acceptance testing before the pilot began, but at the time of writing development work to make the Linux configuration acceptable to users is still ongoing.

2. *Local authorities rolling out OpenOffice to those staff who are not power-users will find there are few cultural issues.*
   BCC found library staff adapted quickly to using OpenOffice with relatively few difficulties.

3. *Local authorities rolling out open source software to the public are unlikely to find that perceptions of open source itself are a barrier.*
   Once technical issues were addressed, BCC found that public users were largely ambivalent about open source technology.

8.6 Financial conclusions

1. *In an organisation with little prior open source capability, the extra decision making costs involved in considering and configuring the implementation will likely outweigh any savings made on licences.*
   BCC spent over £100,000 more on the open source project than they might have on an equivalent Windows XP upgrade, and anticipate no savings on licences each year[35].

2. *Open source projects will demonstrate economies of scale. The larger an implementation, the more likely that savings on licences will compensate for extra decision making costs.*
   BCC could have rolled out open source to additional PCs, and therefore made more savings on licences without incurring any extra decision making costs.

3. *Open source may provide added savings in the longer term by avoiding the cost of major upgrades necessary in proprietary solutions.*

[35] See the business case in Appendix B for more details

By rolling out open source on some machines, BCC estimate that they will make savings of tens of thousands of pounds[36] which would otherwise be incurred with the licences necessary upgrade to the next Windows operating system.

4. *Open source also allows greater control over the upgrade cycle – and therefore greater control of associated costs.*
   BCC anticipate spending a small amount each year to upgrade the Linux desktop, compared to much larger one-off costs associated implementing Windows upgrades.

[36] See the business case in Appendix B for more details

9 Appendix A: Is open source appropriate for you?

This section brings together the lessons learnt at BCC, with other important considerations raised by a review of the literature, to give a list of criteria by which to evaluate open source. For each criterion, guidance is given on how to both understand the project requirements and build a business case.

Technical issues

9.1 Functionality – will it do the job?

The software must be fit for purpose. Bear in mind that open source software may not be an exact replica of its proprietary equivalent. An example of how Calc, the OpenOffice version of Excel, offers less functionality is the maximum number of rows in a worksheet – in OpenOffice 2.0, Calc worksheets are limited to 32,000 rows, compared to 65,536 with Excel 2003. Staff at BCC found OpenOffice's Base to be less useful than Microsoft Access.

Functionality is likely to be the biggest issue for power-users. It is easy to both overestimate and underestimate functionality requirements. The BCC project demonstrates that spending insufficient time specifying functionality requirements can result in needing to change configurations.

Some software may require customisation. One advantage of open source in this situation is that customisation is possible. Customisations will need to be replicated when software is upgraded; there will be a cost attached to this.

Understand your requirements	Build the business case
• What do users need from the software? • Can all their needs be met by open source software or will some proprietary resources need to be maintained? • Will any customisation be required?	• Will the change in functionality affect productivity? • Can a cost be attached to this? • If customisation is necessary calculate resource requirements

9.2 Interoperability – will it work with existing systems?

Within a local authority there will be many processes where data flows from one system to another, both internally and externally. Suppliers, the public or other parts of the organisation will still be using proprietary software. Therefore any new software must be interoperable with existing systems. A

team within BCC's library service produces reports for the ODPM and had to retain Microsoft Office to avoid interoperability issues.

Interoperability should be considered on a number of levels:

- System-to-system: For example, is your accounting system currently designed to produce reports through Excel? Will the chosen open source solution work with your organisation wide email client?
- Document-to-document: Will documents created with proprietary software open and function properly within an open source equivalent? One example of a known compatibility issue is that macros written in Visual Basic for Excel will not work in OpenOffice's Calc. Online help centres provide detailed, but not exhaustive list of issues and offer some workaround solutions.

Regardless of specific and immediate interoperability concerns there is an argument for proactively implementing open standards. Implementing open standards should allow access to data independent of any particular piece of software.

Understand your requirements	Build the business case
• Identify systems already in place - will the new software be compatible? • Research known compatibility issues • What will be demanded of interoperability in the future? • Is there a strategic case for moving to open standards?	• Identify the consequences of incompatibility • Can these issues be resolved and at what cost?

9.3 Security – is it safe?

Opinions on the relative security of proprietary and open source products are divided. While the open access to source code might conceivably reduce the security of open source software, it has also been suggested that open access actually reduces the number of security failures by increasing the number of developers reviewing the software. Historically, hackers have more commonly targeted proprietary software, because it is used by more people and perhaps because the hacking community feel more in tune with philosophy of open source.

Looking at reported security flaws does not give a clear case either way. The code for IIS web servers (proprietary) has many more serious flaws reported

each year than for Apache servers. However, Unix/Linux operating systems had many more vulnerabilities reported than Windows over 2005[37].

Ensure that appropriate safeguards are in place to ensure that IT security is not diminished by the implementation of an open source technology.

Understand your requirements	Build the business case
• Research known software security issues	• Cost the necessary resources, either in-house or external, to ensure security is sound

9.4 Maturity and sustainability – is it viable?

The nature of open source technology is that it is in a permanent state of development and is typically first released onto the market at an early stage. Implementing software that is in an early or rapid state of development brings heightened uncertainty and risk. Local authorities should normally favour software that is in a reasonably mature state of development; they are unlikely to want to be occupied with shaping the development path by being involved early in the development process. For example, OpenOffice 1.1.5 is more mature than version 1.0, and will contain less bugs.

The software may demonstrate stability through being tested and used by other local authorities or large organisations. Case studies can be found through the Open Source Observatory[38] and the OSA[39]. Also, look for high download figures and online user forums for the product.

As with any software, there is no guarantee that it will continue to be developed and maintained. Look for a good development track record and a history of innovation. Assess the long-term viability of the software to avoid being left with unsupported technology.

[37] Source: *Cyber Security Bulletin 2005 Summary*, United States Computer Emergency Readiness Team - this figure does not account for the severity of the risk
[38] http://europa.eu.int/idabc/en/chapter/452
[39] http://www.opensourceacademy.gov.uk

Past ← **Present** → **Future**

How has the software developed in the past?	Is there a user and support base?	How is the software likely to develop in the future?
• Look at the history of version releases	• Has anyone made a major implementation? • Are there any case studies? • Are there many online forums? • How many times has it been downloaded?	• What is the track record of development? • Is there a technology roadmap available? • Is there a history of innovation with this software?

Figure 13: Evaluating the state of maturity (past), user and support base (present) and long-term viability (future)

Understand your requirements
• Research the maturity of possible solutions • Look for a substantial supporter base • Assess likelihood of projected future developments.

9.5 Migration – which files do you need to convert and when?

Although not restricted to open source, it is possible that an open source implementation will require the migration of documents to new file formats. With simple office documents it should be sufficient to open and then save them again using the new open source software. For staff users during the BCC project, some formatting was lost when opening Microsoft Word documents with OpenOffice Writer. Complex documents will take time and effort to migrate and some may not migrate successfully. Test all the document formats that will be affected by the new software to identify high risk files.

Migration will be a bigger issue for users who exchange files externally, where parties are more likely to be using proprietary software

Understand your requirements	Build the business case
• Is it possible to transfer all necessary files? • How would this be managed? • When would files need to be converted? • Assess the risk of losing work • Do templates need to be created for the new software?	• Estimate likely file numbers for conversion • Can historical files simply be archived as they are? • How much will it cost to migrate these?

Management issues

9.6 Objectives – what is the desired outcome?

In a local authority context, it is unlikely that implementing open source software will be an objective in itself. It is critical that business objectives are agreed before beginning to consider any possible software solutions. At Birmingham, the different stakeholders had different objectives for the project, which made executing and evaluating it difficult. Stating clear objectives will make evaluation of the suitability of open source easier. For example, defining the time frame for desired cost savings would make it clear whether increased initial project costs for an open source implementation would be acceptable.

Understand your requirements	Build the business case
• Decide clear and explicit business objectives of the new software implementation	• Identify what the business case will be used for - to make a decision about possible software, to cost an agreed implementation, etc.

9.7 Decision making – which solution to choose?

The process of choosing the right open source solution for the organisation is no small task and should not be underestimated. There are over 70,000 open source packages, all providing different functions, all at different levels of development and all with different degrees of support available. BCC decided to bring in consultants to help them shortlist possible open source solutions. With a proprietary supplier such as Microsoft, desktop software is often

bundled together[40], reducing the flexibility to choose individual components but keeping decision making costs to a minimum.

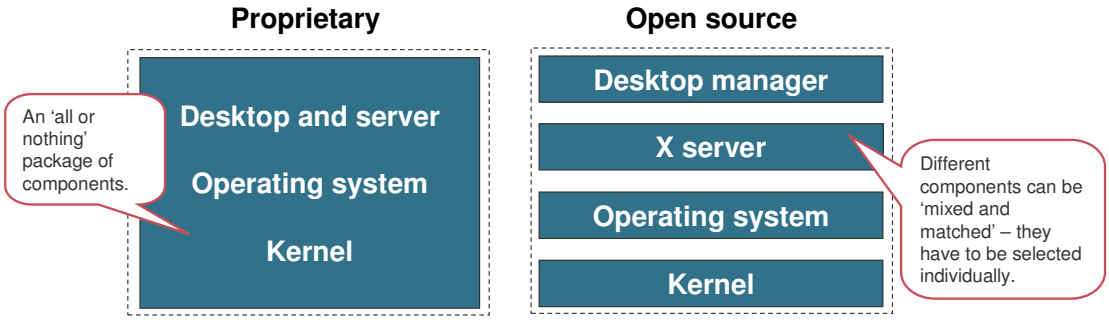

Figure 15: The Windows "all or nothing" desktop software bundle compared with "mix and match" open source components

At BCC, overemphasis on user preferences led to technical difficulties which necessitated a change to the configuration. Instead, consider all the criteria below, as appropriate, and be prepared to compromise to find the best overall solution:

- Technical: interoperability and functionality
- Management: in-house expertise
- User preferences: usability, the look of the desktop
- Financial: cost of the product, contractual implications

Again, case studies from previous open source projects can provide guidance, as will identifying the preferences of the development community and seeking third party advice. Weigh up the investment at this stage against the cost of having to implement another solution if the first is unsuccessful. A benefit of open source is that reconfigurations can be managed internally and cost should be minimal, as demonstrated by BCC's successful switch from the GNOME to the KDE graphical user interface.

Understand your requirements	Build the business case
• Which product would best meet all requirements including user preferences and functionality?	• Estimate how much resource and time will be necessary to investigate and make a decision about the options

9.8 Lock-in – is getting stuck with a single solution a risk?

Local authorities will need to consider the implications for existing contracts of switching to open source and whether it will be possible to change to using a

[40] Although this practice is now being challenged under anti-competition laws

different type of open source or proprietary technology once open source has been implemented.

Birmingham's library service was locked into using Windows on staff machines as the supplier of their library management information system was unable to offer support for it to run on Linux at the time of the project.

As with implementing open standards, there is an argument that moving to open source software helps safeguard against future lock-in risk, but there is a cost attached to doing this.

Understand your requirements	Build the business case
• Are there any lock-in implications with existing proprietary software? • Is there any risk of lock-in once the open source solution has been implemented?	• Will there be any financial implications of moving away from an existing supplier or contract such as replacing support or reconfiguring software?

9.9 Skills – what is already known internally?

Organisations should consider whether they already have access to internal open source expertise, or whether they will need to develop it (and if so, how to develop it). To do this it will be necessary to identify the requirements likely to be imposed on IT support staff. Often there are unrealised skills or interest in open source within a large organisation, as at BCC. However, if an authority is moving from a historically proprietary system to open source there will be increased costs in developing the skills base.

Understand your requirements	Build the business case
• Is there any existing internal knowledge? • How can knowledge transfer be managed? • What can be learnt from other departments that have already implemented open source solutions?	• How much will need to be invested on developing new skills? • What will such support cost?

9.10 Technical support – who can help?

The growing use of open source has created a market for relevant technical support and it is now offered by a number of major IT service providers.

Research the market place to find out what contractual support could be purchased. If a local authority is already tied into an existing IT service contract, they should confirm whether the existing supplier is able or willing to supply support for open source software in addition to, or instead of, proprietary software.

Additionally, there are many online Linux user groups which can offer valuable information and support.

Understand your requirements	Build the business case
• What IT service provision is already in place – does this cover open source software too?	• Calculate the cost of any external technical support required

9.11 Warranties – is protection available?

Free downloads of open source software are typically not covered by warranty and should be considered carefully under due diligence and risk assessment. Alternatively open source products can be procured through external providers who may offer their own warranty.

Understand your requirements
• How mature is the software – how risky would it be to not be covered by warranty? • Is appropriate support available? • If not, research procurement options that would provide cover

9.12 Legalities – what does the licence mean?

Most open source licences fall in to one of two types. They either allow you to create new closed source proprietary products from the open source software, or mean you have to “share and share alike” any modifications that are made. Understand the type of licence that applies.

Understand your requirements
• What sort of licence would be acquired? • What would the legal requirements for the organisation be?

Cultural issues

Cultural issues are generally underestimated in any technical implementation. Open source projects are no exception. User attitudes will be important; for some non-users, there is a fear of the unknown. Simple familiarisation training, as was carried out at BCC, may be advisable to deal with misperceptions.

9.13 Usability – is it easy to use?

The less usable the software is the more cultural issues will arise. If the change in user experience is large, say when moving from Windows to Linux, then this is likely to be reflected in higher training costs. The more usable the software is, the less disruption to productivity. For example, the BCC project showed that there should be few usability issues for non-power users switching from Microsoft Office to OpenOffice.

Understand your requirements	Build the business case
• Will users be able to adapt easily to the new software?	• Assess the likely impact of a change in usability • If it is substantial, account for this with initially reduced productivity and increased training costs

9.14 User training – how to support them?

It has been reported, for example by the Office of Government Commerce, that one of the key success factors for an open source implementation is the provision of sufficient training, at the right level. The level and extent of training required will vary depending on what is being implemented and which users will be affected. For example, Birmingham offered OpenOffice familiarisation sessions. If correctly pitched, training will help users to feel comfortable with the new software, therefore minimising the disruption to work caused by the changeover.

Understand your requirements	Build the business case
• Who would receive training and to what level?	• Calculate likely training costs, whether provided in-house or externally • If possible, calculate the cost of lost work time whilst training is attended

9.15 Communication – how to keep staff informed?

Often neglected, two-way communication gives staff the opportunity to express concerns and share experiences. Involving staff from the outset – for example by seeking opinions on the possible software options as Birmingham did during UAT – will increase staff buy-in and therefore the chances of a successful implementation.

Understand your requirements	Build the business case
• What communication channels could staff use?	• Allow for a communications budget, appropriate to the scale of the project • Include a portion of the project management team's time

Financial issues

Potential cost savings are often one of the main drivers for considering open source solutions. The business case for open source software is controversial but the following section highlights some of the major financial issues for consideration.

9.16 Licences – what will they cost?

While open source software is not necessarily free, licensing cost will be minimal compared with those for proprietary equivalents. This is one of the most convincing arguments for open source technology. As an example, at Bristol City Council, 5,550 StarOffice licences cost £88,000, compared to £618,682 for Microsoft Office. OpenOffice, trialled at BCC, is available as a free download. The business context may be relevant here; Birmingham Libraries were able to take advantage of cheaper educational licence fees.

There are also possible cost savings to be made from not having to manage licences. Microsoft Office and StarOffice both require some degree of licence tracking; OpenOffice does not. These savings may not be recognised as licence management would only reflect a small portion of someone's role. However a clear benefit to not having licence costs is that there will be no risk of non-compliance.

Understand your requirements	Build the business case
• What will the licences cost? • Will licence management be necessary?	• Cost the licences and compare to those for the proprietary equivalent • Factor in resources for licence management if appropriate

9.17 Upgrades – what will it cost to keep current?

There are two types of upgrades to consider – step-ups to new versions and incremental, small upgrades.

Over the last ten years, there have been six major new versions of Microsoft Windows. Upgrading to each of these will carry a cost for licences. In the same period, SUSE Linux has been developed from version 3 to 10. The licence is effectively inherited from one version to another so upgrades can be acquired for free.

Whereas with Windows, with which minor upgrades can be executed using automatic updates, with Linux there would be some resource cost to managing these. With open source, scripts can be created so that when booted up, PCs search for upgrades to be downloaded from the server. This means upgrades can be carried out in a controlled way across all PCs.

Understand your requirements	Build the business case
• Find out if upgrades can be acquired for free • Plan the process for implementing updates across the system	• Calculate the cost of future upgrades and long-term maintenance compared to any likely proprietary upgrades

9.18 Resources – how much to implement and maintain?

As with a proprietary upgrade, there will be a number of resource costs associated with choosing, implementing and maintaining open source technology. Project management requirements will vary by project and will depend on the local authority's level of experience with open source. The salary costs of having a project management team will need to be factored into the business case.

Resources will also be required to configure, implement and maintain the open source technology. Will this resource come from a dedicated team or be an additional responsibility for IT support staff?

Understand your requirements	Build the business case
• Identify what project management and technical resources will be appropriate to the scale of the project • Are these resources available?	• Decide on project and technical teams • Work out how much of each person's time will be required and over what timescale the project will run • Calculate resourcing costs accordingly

9.19 Training – how much investment is needed in training?

Developing the necessary technical skills to switch from proprietary to open source software will also incur some cost. IT support staff will need to be trained so that they can support the implementation across the organisation, including training and supporting non-IT staff. Developing these skills will expand the organisation's knowledge base. However, the requirement for training represents an additional cost for a first-time open source implementation, both in provision and in productive time lost.

Understand your requirements	Build the business case
• Does the IT support department have any open source experience? • How much training will be required?	• Source and cost required training provision • Allow for reduced productivity whilst training is undertaken.

10 Appendix B: Business Case

10.1 Summary: open source versus proprietary

This chart shows:
(a) Birmingham's costs for an open source upgrade, based on the first time project costs of moving to its new configuration, and five years of maintenance. The costs are based on the detail in worksheets 1 and 2. Costs do not include an allowance for inflation, and the total cost is a nominal figure only used for comparison.
(b) Birmingham's costs for an equivalent proprietary (Windows XP) upgrade, and five years of maintenance. The costs are based on the detail in section 10.4 and 10.5.

Notes:
(1) Costs do not include an allowance for inflation, and the total cost is a nominal figure for comparative use only.
(2) Maintenance costs are based on the yearly support costs attributable to the relevant implementation and existing and ongoing internal and external support costs.
(3) Maintenance costs include licence costs, upgrade costs and external support; annual costs to maintain the proprietary solution include licence costs.
(4) Open source maintenance costs include a component, in Year One, for third party support. It is assumed this will not be needed in subsequent years.

	First time	Year one	Year two	Year three	Year four	Year five	Total cost for five years
Open source	£534,712	£220,056	£215,061	£215,061	£215,061	£215,061	
Open source cumulative	-	£754,768	£969,829	£1,184,890	£1,399,951	£1,615,012	**£1,615,012**
Proprietary	£429,964	£214,463	£214,463	£214,463	£214,463	£214,463	
Proprietary cumulative	-	£644,427	£858,890	£1,073,353	£1,287,816	£1,502,279	**£1,502,279**

10.2 Implementing open source (1)

These tables show the capital cost of Birmingham's implementation of open source.

1. HARDWARE AND SOFTWARE	Units	Unit cost £	Total cost £	Data Source / Notes
UAT AND DEVELOPMENT LABS				Based on information from project spending. Source: MM
Hardware				
PCs and Monitors - Tempus Computers (UAT)	6.00	763.00	4,578.00	
PCs and Monitors - Tempus Computers (Dev)	6.00	763.00	4,578.00	
Subtotal - Test and UAT lab PCs			**9,156.00**	
STAFF PCs				
Hardware				Based on information from project spending. Source: MM
Servers				
Storage server	0.50	123,858.88	61,929.44	Cost of server shared with another project. Storage server not material to open source project.
Web proxy server	2.00	3,011.38	6,022.76	
Desktops				
Tempus PCs	134.00	559.00	74,906.00	
Lock and fitting	134.00	57.90	7,758.60	
Infrastructure				
Switches			3,855.00	
Slip printers			200.00	
Barcode reader			300.00	
Server cabinet cable banks			645.00	
Subtotal - staff hardware costs			**155,616.80**	
Software				Unit numbers and licence costs supplied by BCC. Source: DR/SM.
Servers				
None				
Desktops				
Windows XP	134.00	58.00	7,772.00	
Windows Client Access licence	0.00	2.00	0.00	
MS Office 2003	10.00	59.00	590.00	Based on small number of staff PCs retaining MS Office capacity
OpenOffice 2.0	124.00	0.00	0.00	Based on small number of staff PCs retaining MS Office capacity
Firefox 1.0.1	124.00	0.00	0.00	
Subtotal - staff software costs			**8,362.00**	
Subtotal - Staff hardware and software costs			**163,978.80**	
PUBLIC PCs				
Hardware				
Servers				Based on information from project spending. Source: MM

Application servers (running SLES)	4.00	5,842.69	23,370.76	
Desktops				
Tempus PC	196.00	559.00	109,564.00	
Lock and fitting	196.00	57.90	11,348.40	
Portable Hard Disk (used in deployment)	1.00	394.00	394.00	
Subtotal - public hardware costs			**144,677.16**	
Software				Unit numbers and licence costs supplied by BCC. Source: DR/SM.
Servers				
SUSE Linux Enterprise Server 9 licence	4.00	60.75	243.00	
Desktops				
SUSE Linux 9.3 Professional licence	0.00	0.00	0.00	
SUSE Linux 9.3 Manuals	3.00	38.47	115.41	
Open Office 2.0	196.00	0.00	0.00	
Firefox 1.0.1	196.00	0.00	0.00	
Windows XP	66.00	58.00	3,828.00	
Subtotal - public software costs			**4,186.41**	
Subtotal - Public hardware and software costs			**148,863.57**	
TOTAL HARDWARE / SOFTWARE COSTS			**321,998.37**	

2. TEAM COSTS	Day rate £	Man days	Total cost £	Data Source / Notes
				Based on timesheets/estimates from project staff. Allocation to project stages based on iMPOWER's own estimates.
Project set up (Apr - Jun)				
Project sponsor (1)	311.25	10.80	3,361.50	
Project sponsor (2)	211.42	19.50	4,122.69	
Project manager	151.47	33.00	4,998.51	
Support manager	220.50	8.70	1,918.35	
Rollout contractor	225.00	2.60	585.00	
External technical consultants			1,680.00	One day workshop - introduction to OS - by OSC.
External technical consultants			8,400.00	Set up desktops for Usability Study - 10 working days.
External technical consultants			6,632.00	User study
Subtotal - project set up			**31,698.05**	
Project governance & management (Jul - Mar)				
Project sponsor (1)	311.25	26.40	8,217.00	
Project sponsor (2)	211.42	58.50	12,368.07	
Project manager	184.50	114.50	21,125.25	
Subtotal - project governance & management			**41,710.32**	
Technical definition and design (Jul - Aug)				
Technical team lead	184.50	26.70	4,926.15	
Technical architect	184.50	12.00	2,214.00	
Technical support (1)	144.45	15.70	2,267.87	
Technical support (2)	148.10	4.30	636.83	
External technical consultants			3,360.00	Mechanism for distribution, server environment
External technical consultants			958.60	Expenses for OSC
Subtotal - technical definition and design			**14,363.45**	
Development and testing (Sep - Nov)				
Technical team lead	184.50	28.90	5,332.05	
Technical architect	184.50	6.50	1,199.25	

Technical support (1)	144.45	9.60	1,386.72	
Technical support (2)	144.45	40.30	5,821.34	
Technical support (3)	148.10	47.50	7,034.75	
External technical Consultants			1,740.00	SUSE Consultancy - configuration work
Subtotal - configuration and testing			**22,514.11**	
-				
Pilot and bug-fixing (Dec - Jan)				
Technical team lead	184.50	22.50	4,151.25	
Technical support (1)	144.45	4.80	693.36	
Technical support (2)	144.45	16.90	2,441.21	
Technical support (3)	148.10	43.20	6,397.92	
External technical consultants			2,550.00	SUSE Consultancy - clustering of servers, bug-fixing
External technical consultants			425.00	SUSE Consultancy - floppy discs support
Senior librarian	162.62	5.20	845.64	Estimates of time from librarians
Librarian (1)	117.87	1.73	204.31	Estimates of time from librarians
Librarian (2)	121.97	14.73	1,797.02	Estimates of time from librarians
Sub-total - pilot and bug-fixing			**19,505.72**	
Rollout design and implementation (Jul - Mar)				
Support manager	220.50	78.00	17,199.00	
Rollout contractor	225.00	66.50	14,962.50	
Rollout team lead	151.01	86.10	13,001.96	
Rollout support (1)	195.75	121.30	23,744.48	
Rollout support (2)	195.75	121.30	23,744.48	
Rollout support (3)	183.28	20.00	3,665.66	**Assumption:** 1 FTE from Birmingham Libraries spent 20 days at community libraries identifying machines for replacement
External technical consultants			870.00	SUSE Consultancy - refining rollout procedures
Subtotal - rollout design and implementation			**97,188.07**	
Training				
In-house training	151.91	15.70	2,384.99	Based on hours provided by L&CIT staff
User familiarisation session for librarians (1)			1035.00	
User familiarisation session for librarians (2)			690.00	
GNOME course - 5 members of technical team			620.50	
Linux course (Basic) - 5 members of L&CIT			3,000.00	
Linux course (Advanced) - 2 members of L&CIT			800.00	
Subtotal - training			**8,530.49**	
Miscellaneous				
Travel, Hospitality and Miscellaneous expenditure (to date)			1,503.00	
Travel, Hospitality and Miscellaneous expenditure (anticipated)			700.00	
Subtotal - miscellaneous			**2,203.00**	
Total Internal			**187,201.60**	
Total External			**48,308.60**	
PROJECT COSTS			**237,713.20**	
Less costs associated with being an Open Source Academy project			25,000.00	Reflection of estimated time spent by project sponsor and project team on handling enquiries, meeting with the OSA, etc. Source: LT
TOTAL PROJECT COSTS			**212,713.20**	

TOTAL OS PROJECT CAPITAL COSTS	**534,711.57**

10.3 Maintaining open source (2)

This table shows an estimate of how much it is likely to cost Birmingham to maintain open source in the libraries alongside the Windows capacity.

1. LICENCES & SUBSCRIPTIONS	Units	Licence cost £	Total cost £	Data source / notes
STAFF PCs				
Software				Unit numbers and licence costs supplied by BCC. Source: DR/SM.
Desktops				
Windows XP	134.00	0.00	0.00	One-off licence cost
Windows Client Access licence	0.00	0.00	0.00	One-off licence cost
MS Office 2003	10.00	0.00	0.00	One-off licence cost
OpenOffice 2.0	124.00	0.00	0.00	One-off licence cost
Firefox 1.0.1	124.00	0.00	0.00	One-off licence cost
Subtotal - Staff PCs			**0.00**	
PUBLIC PCs				
Software				.
Servers				
SUSE Linux Enterprise Server 9 licence	4.00	0.00	0.00	
Desktops				
SUSE Linux 9.3 Professional licence	0.00	0.00	0.00	
Open Office 2.0	196.00	0.00	0.00	
Firefox 1.0.1	196.00	0.00	0.00	
Windows XP	98.00	0.00	0.00	One-off licence cost
Subtotal - Public PCs			**0.00**	
TOTAL LICENSING COSTS			**0.00**	

2. SUPPORT	Day rate £	Man days	Total cost £	Data source / notes
Internal				Based on FTE costs library service pays to L&CIT IT. Source: CP/AK
Learning and Culture support for Libraries (4FTEs)	151.92	840.00	127,612.80	Based on 210 working days p/a.
Learning and Culture support for Libraries (1FTE)	183.28	210.00	38,488.80	Based on 210 working days p/a.
Learning and Culture support for Libraries (2 x 0.5 FTEs)	151.92	210.00	31,903.20	Based on 105 working days p/a.
External				**Assumption:** excluding DS contract, no library service server support independent of BCC wide support.
Server support			0.00	
Linux support			4,995.00	2nd line support (one year) - transition phase, while developing own skills
SUBTOTAL - SUPPORT COSTS			**202,999.80**	

3. MANAGEMENT	Day rate £	Man days	Total cost £	Data source / notes
				Based on estimates from L&CIT staff (source: AK/SM)
Licensing and auditing				
Technical support	151.01	8.00	1,208.08	Based on 2 days per quarter
Contract management, budgeting and purchasing				
Support manager	220.50	12.00	2,646.00	Based on 3 days a quarter
Technical support	151.01	4.00	604.04	Based on 1 day a quarter
SUBTOTAL - MANAGEMENT COSTS			**4,458.12**	

4. TRAINING	Day rate £	Man days	Total cost £	Data source / notes
Support staff training			12,000.00	**Assumption:** £1,000 per head training for technical and business support teams.
SUBTOTAL - TRAINING COSTS			**12,000.00**	

5. UPGRADES	Day rate £	Man days	Total Cost £	Data source / notes
				Assumption: based on 2 days input from 2 members of technical team.
Technical support	151.01	2.00	302.02	
Technical support	148.10	2.00	296.20	
SUBTOTAL - UPGRADE COSTS			**598.22**	

TOTAL FINANCIAL COSTS			**220,056.14**	
TOTAL ONGOING COSTS ATTRIBUTABLE TO OPEN SOURCE PROJECT			**5,593.22**	
TOTAL ONGOING COSTS ATTRIBUTABLE TO OPEN SOURCE PROJECT AFTER YEAR 1			**598.22**	External Linux support costs cease

10.4 Implementing a Windows XP upgrade (3)

This table shows an estimate of how much Birmingham would have spent on a simple upgrade to Windows XP, equivalent to the open source implementation.

1. HARDWARE AND SOFTWARE	Units	Unit cost £	Total cost £	Data Source / Notes
UAT AND DEVELOPMENT LABS				Based on information from project spending. Source: MM
Hardware				Identical equipment would be bought for testing as in open-source implementation. Source: SM
PCs and Monitors - Tempus Computers (UAT)	6.00	763.00	4,578.00	
PCs and Monitors - Tempus Computers (Dev)	6.00	763.00	4,578.00	
Sub-total - Test and UAT lab PCs			**9,156.00**	
STAFF PCs				-
Hardware				Based on information from project spending. Source: MM
Servers				
Storage server	0.50	123,858.88	61,929.44	
Web proxy server	2.00	3,011.38	6,022.76	
Application server (running Windows Server 2003 R2)	1.00	5,842.69	5,842.69	**Assumption:** BCC would need to buy 2 Windows servers, 1 for staff and 1 for public. See below for other server reference. Source: SM
Desktops				
Tempus PCs	134.00	559.00	74,906.00	
Lock and fitting	134.00	57.90	7,758.60	
Infrastructure				
Switches			3,855.00	
Slip printers			200.00	
Barcode reader			300.00	
Server cabinet cable banks			645.00	
Subtotal - Staff hardware			**161,459.49**	
Software				
Servers				
Windows Server 2003 R2	1.00	75.00	75.00	
Desktops				
Windows XP	134.00	58.00	7,772.00	
Windows Client Access licence	134.00	2.00	268.00	
Microsoft Office (Educational SELECT licence)	134.00	59.00	7,906.00	
Subtotal - Staff software			**16,021.00**	
Sub-total - Staff hardware and software costs			**177,480.49**	
PUBLIC PCs				
-				
Hardware				
Servers				

Application server (running Windows Server 2003 R2)	1.00	5,842.69	5,842.69	**Assumption:** BCC would need to buy 2 Windows servers, 1 for staff and 1 for public. See above for other server reference. Source: SM
Desktops				
Tempus PC	196.00	559.00	109,564.00	
Lock and fitting	196.00	57.90	11,348.40	
Portable Hard Disk (used in deployment)	1.00	394.00	394.00	
Subtotal - public hardware			**127,149.09**	
Software				
Servers				
Windows Server 2003 R2	1.00	75.00	75.00	
Desktops				
Windows XP	196.00	58.00	11,368.00	
Windows Client Access licence	196.00	2.00	392.00	
MS Office 2003 (Educational SELECT licence)	196.00	59.00	11,564.00	
Subtotal - public software			**23,399.00**	
Subtotal - Public hardware and software costs			**150,548.09**	
TOTAL HARDWARE / SOFTWARE COSTS			**337,184.58**	

2. TEAM COSTS	Day rate £	Man days	Total cost £	Data Source / Notes
				Based on estimates supplied by SM/DR
Project set up (Apr - May)				**Assumptions (staff input):**
Project sponsor	211.42	8.6	1,818.21	1d p/w
Technical team lead	151.01	8.6	1,298.69	1d p/w
Rollout contractor	225.00	3.0	675.00	3d during set-up
Subtotal - project set up			**3,791.90**	
Project management (Jun-Dec)				
Project sponsor	211.42	15.1	3,192.44	0.5 d p/w
Subtotal - project management			**3,192.44**	
Development and testing (1st week Jun)				
Technical team lead	151.01	5.00	755.05	5d
Technical support (1)	195.75	5.00	978.75	5d
Technical support (2)	195.75	5.00	978.75	5d
Subtotal - testing			**2,712.55**	
-				
Pilot and bug-fixing (2nd - 4th week of Jun)				
Technical team lead	151.01	3.00	453.03	1d p/w
Technical support (1)	195.75	12.00	2,349.00	4d p/w
Technical support (2)	195.75	12.00	2,349.00	4d p/w
Subtotal - pilot and bug-fixing			**5,151.03**	
Rollout design and implementation (Jun - Dec)				
Support manager	220.50	78.00	17,199.00	
Rollout team lead	151.01	26.00	3,926.26	1d p/w
Rollout contractor	225.00	53.00	11,925.00	1.75 d p/w
Rollout support (1)	195.75	104.00	20,358.00	4d p/w
Rollout support (2)	195.75	104.00	20,358.00	4d p/w
Rollout support (3)	183.28	20.00	3,665.66	**Assumption:** 1 FTE from Birmingham Libraries spent 20 days at community libraries identifying machines for upgrade

Subtotal - rollout design and implementation	**77,431.92**	
Training		
Training sessions	0.00	**Assumption**: no training required for XP upgrade due to familiarity with Windows Source:CW
Subtotal - training	**0.00**	
Miscellaneous		
Travel, hospitality and miscellaneous expenditure	500.00	**Assumption:** misc project costs capped at £500
Subtotal - miscellaneous	**500.00**	
Total Internal	**79,679.84**	
Total External	**12,600.00**	
TOTAL PROJECT COSTS	**92,779.84**	

TOTAL OS CAPITAL COSTS	**429,964.42**

10.5 Maintaining a Windows XP upgrade (4)

This table shows an estimate of the costs associated with maintaining an upgrade to Windows XP.

1. LICENCES & SUBSCRIPTIONS	Units	Licence cost £	Total cost £	Data source / notes
STAFF PCs				
Software				Unit numbers and licence costs supplied by BCC. Source: DR/SM.
Servers				
Windows Server 2003 R2	1.00	0.00	0.00	One-off licence cost
Desktops				One-off licence cost
Windows XP	134.00	0.00	0.00	One-off licence cost
Windows Client Access licence	134.00	0.00	0.00	One-off licence cost
Microsoft Office 2003	134.00	0.00	0.00	One-off licence cost
Subtotal - Staff PCs			**0.00**	
PUBLIC PCs				
Software				
Servers				
Windows Server 2003 R2	1.00	0.00	0.00	One-off licence cost
Desktops				One-off licence cost
Windows XP	196.00	0.00	0.00	One-off licence cost
Windows Client licence	196.00	0.00	0.00	One-off licence cost
MS Office 2003	196.00	0.00	0.00	One-off licence cost
Subtotal - Public PCs			**0.00**	
TOTAL LICENSING COSTS			**0.00**	

2. SUPPORT	Day rate £	Man days	Total cost £	Data source / notes
Internal				Based on FTE costs library service pays to L&CIT. Source: CP/AK
Learning and Culture support for Libraries (4FTEs)	151.92	840.00	127,612.80	Based on 210 working days p/a.
Learning and Culture support for Libraries (1FTE)	183.28	210.00	38,488.80	Based on 210 working days p/a.
Learning and Culture support for Libraries (2 x 0.5 FTEs)	151.92	210.00	31,903.20	Based on 105 working days p/a.
External				**Assumption:** excluding DS contract, no library service server support independent of BCC wide support.
Server support			0.00	
SUBTOTAL - SUPPORT COSTS			**198,004.80**	

3. MANAGEMENT	Day rate £	Man days	Total cost £	Data source / notes
				Based on estimates from L&CIT staff (source: AK/SM)
Licensing and auditing				
Technical support	151.01	8.00	1,208.08	Based on 2 days per quarter
Contract management, budgeting and purchasing				
Support manager	220.50	12.00	2,646.00	Based on 3 days a quarter
Technical support	151.01	4.00	604.04	Based on 1 day a quarter
SUBTOTAL - MANAGEMENT COSTS			**4,458.12**	

4. TRAINING	Day rate £	Man days	Total cost £	Data source / notes
				Assumption: £1,000 per head training for technical and business support teams.
Support staff training			12,000.00	
SUBTOTAL - TRAINING COSTS			**12,000.00**	

5. UPGRADES	Day rate £	Man days	Total cost £	Data source / notes
				Assumption: Minor upgrades for Microsoft products are auto-upgrades
Technical support	0.00	0.00	0.00	
Technical support	0.00	0.00	0.00	
SUBTOTAL - UPGRADE COSTS			0.00	

TOTAL FINANCIAL COSTS	**214,462.92**
TOTAL ONGOING COSTS ATTRIBUTABLE TO WINDOWS UPGRADE PROJECT	**0.00**

10.6 Implementing a Windows XP upgrade - corporate licences (5)

This table shows an estimate of how much Birmingham would have spent on a simple upgrade to Windows XP in a business environment where the cheaper educational licences would not apply.

1. HARDWARE AND SOFTWARE	Units	Unit cost £	Total cost £	Data Source / Notes
UAT AND DEVELOPMENT LABS				Based on information from project spending. Source: MM Identical equipment would be bought for testing as in open-source implementation. Source: SM
Hardware				
PCs and Monitors - Tempus Computers (UAT)	6.00	763.00	4,578.00	
PCs and Monitors - Tempus Computers (Dev)	6.00	763.00	4,578.00	
Sub-total - Test and UAT lab PCs			**9,156.00**	
STAFF PCs				-
Hardware				Based on information from project spending. Source: MM
Servers				
Storage server	0.50	123,858.88	61,929.44	
Web proxy server	2.00	3,011.38	6,022.76	
Application server (running Windows Server 2003 R2)	1.00	5,842.69	5,842.69	**Assumption:** BCC would need to buy 2 Windows servers, 1 for staff and 1 for public. See below for other server reference. Source: SM
Desktops				
Tempus PCs	134.00	559.00	74,906.00	
Lock and fitting	134.00	57.90	7,758.60	
Infrastructure				
Switches			3,855.00	
Slip printers			200.00	
Barcode reader			300.00	
Server cabinet cable banks			645.00	
Subtotal - Staff hardware			**161,459.49**	
Software				
Servers				
Windows Server 2003 R2	1.00	334.34	334.34	
Desktops				
Windows XP	134.00	82.58	11,065.72	
Windows Client Access licence	134.00	12.73	1,705.82	
Microsoft Office (Standard corporate licence)	134.00	163.44	21,900.96	
Subtotal - Staff software			**35,006.84**	
Sub-total - Staff hardware and software costs			**196,466.33**	

PUBLIC PCs				
-				
Hardware				
Servers				
Application server (running Windows Server 2003 R2)	1.00	5,842.69	5,842.69	Based on assumption of buying 2 Windows servers, 1 for staff and 1 for public. See above for other server reference. Source: SM
Desktops				
Tempus PC	196.00	559.00	109,564.00	
Lock and fitting	196.00	57.90	11,348.40	
Portable Hard Disk (used in deployment)	1.00	394.00	394.00	
Subtotal - public hardware			**127,149.09**	
Software				
Servers				
Windows Server 2003 R2	1.00	334.34	334.34	
Desktops				
Windows XP	196.00	82.58	16,185.68	
Windows Client Access licence	196.00	12.73	2,495.08	
MS Office 2003 (Standard corporate licence)	196.00	163.44	32,034.24	
Subtotal - public software			**51,049.34**	
Subtotal - Public hardware and software costs			**178,198.43**	
TOTAL HARDWARE / SOFTWARE COSTS			**383,820.76**	

2. TEAM COSTS	Day rate £	Man days	Total cost £	Data Source / Notes
				Based on estimates supplied by SM/DR
Project set up (Apr - May)				**Assumptions (staff input):**
Project sponsor	211.42	8.6	1,818.21	1d p/w
Technical team lead	151.01	8.6	1,298.69	1d p/w
Rollout contractor	225.00	3.0	675.00	3d during set-up
Subtotal - project set up			**3,791.90**	
Project management (Jun-Dec)				
Project sponsor	211.42	15.1	3,192.44	0.5 d p/w
Subtotal - project management			**3,192.44**	
Development and testing (1st week Jun)				
Technical team lead	151.01	5.00	755.05	5d
Technical support (1)	195.75	5.00	978.75	5d
Technical support (2)	195.75	5.00	978.75	5d
Subtotal - testing			**2,712.55**	
-				
Pilot and bug-fixing (2nd - 4th week of Jun)				
Technical team lead	151.01	3.00	453.03	1d p/w
Technical support (1)	195.75	12.00	2,349.00	4d p/w
Technical support (2)	195.75	12.00	2,349.00	4d p/w

Subtotal - pilot and bug-fixing			**5,151.03**	
Rollout design and implementation (Jun - Dec)				
Support manager	220.50	78.00	17,199.00	
Rollout team lead	151.01	26.00	3,926.26	1d p/w
Rollout contractor	225.00	53.00	11,925.00	1.75 d p/w
Rollout support (1)	195.75	104.00	20,358.00	4d p/w
Rollout support (2)	195.75	104.00	20,358.00	4d p/w
Rollout support (3)	183.28	20.00	3,665.66	**Assumption:** 1 FTE from Birmingham Libraries spent 20 days at community libraries identifying machines for upgrade
Subtotal - rollout design and implementation			**77,431.92**	
Training				
Training sessions			0.00	**Assumption**: no training required for XP upgrade due to familiarity with Windows Source:CW
Subtotal - training			**0.00**	
Miscellaneous				
Travel, hospitality and miscellaneous expenditure			500.00	**Assumption:** misc project costs capped at £500
Subtotal - miscellaneous			**500.00**	
Total Internal			**79,679.84**	
Total External			**12,600.00**	
TOTAL PROJECT COSTS			**92,779.84**	

TOTAL OS CAPITAL COSTS	**476,600.60**