Migration to open source software – Beaumont Hospital Dublin, Ireland

This article describes the implementation of an information systems infrastructure using open source software (OSS) in a large Irish public sector organization, Beaumont Hospital. The study identifies the primary organizational drivers in Beaumont's move to OSS, namely principle and pragmatism. Indeed, free access to source code played a very limited role in Beaumont's motivation, where given the budgetary constraints, zero cost was of more concern than open source.

Introduction

In more recent times, OSS products have started to be deployed in more visible applications such as desktop applications for word processing, spreadsheet, e-mail, etc. Beaumont Hospital, a large Irish public-sector organization, recently embarked on the implementation of their overall information systems (IS) infrastructure through the deployment of OSS solutions. The objective of this study was to investigate this implementation, with the twin aims of (1) understanding the motivation behind the move, the benefits, and associated problems, and (2) helping to ensure a successful intervention in the overall implementation of an OSS infrastructure.

Background: The Beaumont Hospital Context

Beaumont Hospital was formed from the amalgamation of three of the oldest hospitals in Ireland and employs 3,000 staff directly.
It serves as the training hospital for the Royal College of Surgeons in Ireland (RCSI) and Dublin City University (DCU). Similar to many other organizations worldwide, Beaumont's IT budget has undergone a significant contraction since 2000 in the wake of the increased budget in the lead up to the Y2K, and in 2003 alone they faced a € 17 million budgetary shortfall.
The current IT environment features 36 Intel-based servers, 22 running Red Hat or SuSE Linux and 14 running Microsoft Windows NT. In addition to the Intel servers, Beaumont's primary clinical application is based on a HP 3000 mainframe computer. The overall environment is thus characterized by a heterogeneity of application platforms and associated servers.

Beaumont has always followed a mixed-market policy, acquiring software solutions where these were readily available, and creating or modifying existing applications as necessary. This mixed-market philosophy extends to the range of application providers who are involved in business relationships with Beaumont. This includes Hewlett-Packard, IBM, Sun, Linux providers (Red Hat and SuSE), and Microsoft.

Beaumont has approximately 1,000 desktop machines to support. Approximately one-third of these are bordering on obsolete, specified at 64 MB RAM or less and with clock speeds of less than 300 MHz. This situation arises because of a relatively low level of funding to sustain its IT infrastructure. As a direct consequence of this, as money became available, Beaumont acquired a variety of software of different vintages and capabilities, including a mixture of application packages. This in itself created problems as staff who changed departments usually insisted on bringing their familiar desktop applications with them.

Phase 1: Implementation of Beaumont's IS Infrastructure with OSS

The proposed IS infrastructure in Beaumont reveals a move away from an architecture of legacy applications toward a Web-based service-oriented architecture. In the first phase, extensive use has been made of OSS components in supporting this overall architecture. However these will continue to coexist alongside proprietary solutions where the latter have been perceived to offer greater functionality, or are simply easier to operate for the hospital's IT department and can fulfil requirements satisfactorily.
Buoyed by the success of this first phase, Beaumont is planning a second phase of OSS implementation for an overall hospital information system, a financial systems suite, and is even considering developing their payroll system in an open source fashion.

Applications Examples:

1. Desktop Applications: Star Office

In February 2002, Beaumont began a roll-out of the Star Office 5.2 desktop suite. This deployment was very problematic for users and the technical staff. Indeed, the latter became very disenchanted with the implementation. However, this was felt to be largely due to problems in the version of Star Office. In September 2002, Star Office 6.0 was deployed with some support from Sun.

However, this implementation was also troublesome. The IT manager wanted to pursue a thin client strategy based around the concept that all applications should be downloaded from the network where practical. The Star Office package was initially loaded onto a single Linux server, but this became overwhelmed, and was then clustered to sustain a dual server strategy. Despite this, users continued to lose network connections in an unpredictable fashion. This inevitably increased frustration and tension among the entire workforce who were dependent on these tools. The IT manager conceded that, "we stuck with the network solution too long. It was only after a series of ferocious encounters with users - and with my own staff - that I recognized that we had to shift."
So although it would conflict with a purist architectural dogma, Star Office was reinstalled on the desktop instead for those who wanted it. While this move did not immediately ameliorate the users' perception of the problem, it did, over a number of months, have a marked impact on the overall level of satisfaction with the solution.
Interestingly, a number of users, who either already had current alternative products or the money to purchase them, opted not to install Star Office. Approximately 80 users (about 8 percent) of the installed base made this choice. However, the IT manager informed them that this would have consequences in that they would have to assume responsibility themselves for ensuring that the hardware which they use is upgraded and providing resources for future maintenance upgrades.
One of the unexpected benefits of this solution has been the capacity of Star Office to exploit its in-built XML capabilities. This is a very powerful feature of the application which enables documents to be structured in such a way that processing logic is built into different sections of the document, i.e., an on-line human resources form request, for example, which is then automatically routed to the human resources department for processing. This is a significant new

feature and provides additional functionality over what was previously offered in Beaumont's proprietary desktop applications.
Beaumont is gearing up to install Star Office 7.0. This contains a number of enhancements which increase the ease of use and attractiveness of the product. Roll-out of this release will commence when Sun releases Star Office 7.0 officially (anticipated in September 2003). Beaumont has had a beta version of the product for training purposes. "This version really breaks down the myth of needing proprietary solutions for presentations and other purposes," according to Beaumont's lead systems trainer, and they are currently planning a widespread training and awareness campaign to ensure that the user community is briefed on the new features in Star Office version 7.

2. Content Management System: Zope

Beaumont's content management system (CMS) is based on the Digital Creation's Zope. The product itself may be downloaded for free, but the implementation in Beaumont cost € 20,000 in support from a small software company, OpenApp, who specialize in brokering OSS solutions.
Beaumont's CMS provides information such as human resources policies, laboratory standard operating procedures, personnel and nursing on-line forms, minutes of working group meetings, multidisciplinary patient care documents, etc. The Zope application server enables these documents to be managed in an automated manner by using the metatags associated with each document type, which implement rules about how information should be displayed, who is authorised to see it, who can change it, etc. This approach is supplemented by close integration with the Beaumont's LDAP directory server where details of every individual employee are held. Based on their employment category, employees are granted corresponding privileges on the CMS server. Overall, the experience has been very positive, and use of the CMS is growing within Beaumont.

3. E-Mail: Skyrix

Like many large organizations, Beaumont has been using e-mail for internal and external communications, and held an 800-user licence for Lotus Domino. There was a demand from the organisation to expand the coverage of e-mail to all 3,000 staff, but the cost of achieving this was beyond the tight budget available. A search for an alternative e-mail solution was instigated and the Skyrix mail package was selected (www.skyrix.com). According to the lead computer operator who managed the implementation, this provides all the basic e-mail functions that users require and, more importantly, it provides e-mail access to all 3,000 staff in the organization, a feature which is greatly appreciated by the various administrative functions in Beaumont.
Any organization considering implementing Internet or e-mail solutions needs to ensure that they have appropriate protection and content filtering services in place. Proprietary solutions are essentially licensed on a per-user basis. While the unit cost is modest in some cases, the overall costs rapidly mount up as the numbers increase. Beaumont identified a number of open source system management tools which fulfil this purpose. These include IP Chains, a firewall system based on the Linux operating system that essentially provides the same degree of functionality that is offered through more expensive commercial offerings. Beaumont utilizes content filtering rules based on the Black Hole product, a rules-based Web content filtering tool. It provides the usual facilities of black lists, white lists and other organization-specific rules which Beaumont's

own staff set up and maintain. Spam Assassin screens all incoming mail and rates the contents on preset rules. Beaumont sets its own trigger level to identify likely spam deliveries. Any messages that exceed this content quota are quarantined for further inspection by the e-mail administrator.

Migration Principle

The IT manager in Beaumont stated their fundamental underlying principle was the desire to get the best possible return for the taxpayers' money as the hospital was largely funded from government funds each year. Table 1 identifies the information systems components already implemented in Phase 1 as discussed above. As can be seen from Table 1, the actual cost savings in the move to OSS were extremely significant.

As Table 1 illustrates, the once-off savings of OSS over closed source alternatives are in the order of € 4.75 million. Furthermore, given that annual maintenance costs are typically about 20 percent of purchase price, when viewed over a five-year period, the savings are even more dramatic, in the order of € 8.166 million, leading to an overall saving of € 13 million from the first phase of OSS implementation in Beaumont.
In these calculations, every effort has been made to compare like with like, in that the estimate of the comparable costs is based on prior experience in Beaumont or on two alternative estimates. However, it is also worth noting that Beaumont receives academic pricing discounts for many of these applications, thus the costs for a typical commercial organization implementing such proprietary packages would be even higher, and the deployment of OSS alternatives would thus result in even greater savings.

Table 1. Cost Comparison of OSS versus Comparable Closed Solutions for Phase 1

	Initial Cost		**Total Cost Over 5 Years**	
Application	**OSS**	**Proprietary***	**OSS**	**Proprietary**
Desktop Applications	€ 27,500 (StarOffice)	€ 120,000 (e.g. MS Office)	€ 34,700	€ 288,500
Content Management	€ 20,000 (Zope)	€ 126,000 (e.g. Lotus Notes)	€ 32,100	€ 140,200
Digital Imaging —X-Ray	€ 150,000	€ 4.3 million	€ 237,000	€ 7.34 million
Application Server	€ 10,000 (JBOSS)	€ 302,000 (e.g. Websphere)	€ 60,500	€ 595,300
E-mail	€ 10,000 (SuSE Email)	€ 110,000 (e.g. Lotus Domino)	€ 8,700	€ 175,000
TOTAL	**€ 208,500**	**€ 4.958 million**	**€ 373,000**	**€ 8.539 million**

***Beaumont Hospital receives academic discounts for most of these applications

For Beaumont, the drive to OSS was primarily due to the necessity of reducing cost. The IT manager was very frank that it was not driven by any doctrine or anti-Microsoft ideology,

pointing out that Microsoft was the first to ease Beaumont's budget problems by granting them academic pricing status in 1995. Also, one of the most recent systems implemented - a system to support a comprehensive clinical record for renal patients - was entirely based on Microsoft components.

Free access to source code was not really a factor in Beaumont's decision to deploy OSS solutions. The IT manager admits that open source software in the Beaumont case amounts to "zero cost or as cheap as possible." Thus, even though they have been seeking OSS solutions, they are more guided by the zero or low cost availability rather than open source code. Indeed, this is evident in their choice of Star Office rather than the pure-play open source equivalent Open Office. This decision was taken due to the availability of support directly from Sun. Access to some form of external support provides a degree of reassurance at all levels in the organization, especially when contemplating a major shift in operating paradigms.

Pragmatism

The choice of OSS solutions in Beaumont was also largely driven by pragmatic considerations. Beaumont's IT budget had undergone a significant contraction since 2000 in the wake of an increased budget in the lead up to the Y2K, and the IT manager did not foresee much prospect of an improved budget allocation in the near future. So, faced with the choice of either reducing their overall level of service to cope with these restrictions or looking for less costly alternatives, the focus was on what could be found in the open source market-place. Beaumont's IT staff undertook an extensive phase of desk research over a six-month period.

The IT manager considers it fortunate that a number of key staff, particularly in the computer operations department, rapidly adapted to the new OSS environment, and he describes the operations team as the "leaders in the overall adoption of OSS."
Indeed, Beaumont is now a little worried that their operations staff with experience in OSS deployment may be poached by other organizations It also helped that Beaumont already had strong experience with UNIX applications to draw on, so the transition was not as radical as it would have been if staff experience was simply based on GUI-enabled systems administration. In the words of the Linux systems administrator, "We are not afraid of the command line interface."

Beaumont's IT staff have also been very impressed with the scalability/stability of the OSS solutions, and have actually moved a number of DOS-based applications onto Linux in such a smooth transition that the user community never even noticed the change. Indeed, the IT manager expressed the concern that staff who had gained experience in deploying OSS solutions would now become targets for poaching by other organizations, rather than being deskilled by not having continued experience in commercial software packages.
The IT manager also cited the fact that the functionality and the look and feel of the OSS applications were practically identical to the conventional proprietary ones. Interestingly, it seems to be the case that even though the functionality provided by OSS products is pretty much identical, users prefer the comfort of an identical interface. Thus, Ximian are currently working on a release of Open Office that will clone the MS Office interface, even to the extent that the default format for saving files is the MS one! The comfort factor of a familiar interface should not be underestimated. One of the key complaints from the administrative staff and users in

Beaumont who moved to an OSS platform was that they feared being deskilled if they didn't have skills in popular proprietary applications.

Evaluation

First, the study reveals a shift in OSS applications from predominantly invisible infrastructure back-office applications in horizontal domains to more visible front-office applications in vertical domains, X-ray imaging in the case of Beaumont, for example. Also, Beaumont has chosen to deploy OSS and conventional proprietary systems in parallel in achieving there is infrastructure. The study also reveals very significant cost savings of € 13 million over five years in relation to software purchase and maintenance costs through the first phase of OSS deployment. As Beaumont received academic discounts on many of their proprietary applications, the savings would be even greater for the typical commercial organization. In addition to this, in many cases, the flexibility and ready availability of additional features in their OSS applications allowed Beaumont to offer extra functionality they could not offer in proprietary alternatives. The issue of access to source code comes to the fore in this study, with Beaumont acknowledging that, given their budgetary constraints, ideology played a lesser role, and that zero or low cost was much more important to them than open source.

While Beaumont is sufficiently satisfied with their first phase implementation to plan the second phase, the first phase implementation was not without problems. There was resistance from staff who feared being deskilled through not having experience with popular commercial software packages. Also, Beaumont is a little worried that their operations staff who have amassed considerable experience in OSS deployment may now be poached by other organizations. The importance of changing the mind set in relation to the new support paradigm implied by OSS is also significant. By and large, reliance on a standard maintenance contract is not an option, and bulletin boards may be the main source of support. Thus, it is hardly surprising that support from top management is critical. Also, even though OSS may be available at little or no cost, organizations should not expect maintenance and support to be available at a lesser cost than would apply for commercial software. Indeed, OSS represents a very good opportunity for small software companies all around the world to treat it as an infrastructure component, like the highway or telecommunications lines, and then use it as a bootstrap to build a service and support business model on top.

Further Information:

Beaumont Hospital
Netproject

Source:

This is an edited version of the study "Open Source Software can Improve the Health of the Bank Balance - The Beaumont Hospital Experience" by Brian Fitzgerald, Professor at the University of Limerick and Tony Kenny, IT Project Manager at Beaumont Hospital, Dublin, Ireland

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