



# **GOROKA GENERAL HOSPITAL**

## **IT Projects Update – September 2008**



### **“An Open Source Software (OSS) initiative in a PNG Hospital”**

## **Introduction**

The Strategic Plan for the Papua New Guinea Health Sector has outlined the need to improve Infrastructure and Management Support processes. The implementation of effective Health Information Systems within Goroka General Hospital is therefore in alignment with the National Health objectives. The Management and Board of Goroka General Hospital are committed to the implementation of an Information Management and Technology (IM&T) vision and strategy using Information Systems that are both cost effective and in alignment with the National Health objectives. As these objectives are met the benefits will ultimately flow on to our most important stakeholder - the patient.

The implementation of effective and sustainable Information Systems (IS) within any organisation is never an easy and simple task due to complex nature of these systems and the necessary changes required in management, business processes and organisational culture. These issues combined with the local Budget constraints makes the project at Goroka General Hospital a particularly challenging one.

The foresight and ongoing commitment by the Board and Executive have enabled Goroka General Hospital to become pioneers within the PNG Health System in relation to the implementation of Information Systems within Hospitals. Furthermore, what is now being achieved at the Hospital could ultimately be replicated at other Health Institutions across the country at very low cost due to the Open Source philosophy of the project. Ultimately, an integrated Health Information System (HIS) across the country would be feasible provided NDOH are committed and the necessary resources are made available.

## **Completed IT Projects**

Since early 2007 the newly established Hospital's IT Section has completed and delivered the following Projects at Goroka General Hospital, many a first for a PNG Hospital:

- The setting up and refurbishment of the **Business Resource Center (BRC)**. This has allowed the Hospital to centralise the use and monitoring of printing, scanning, faxing and email services thus saving costs and also providing much needed access to these services to Hospital staff. A loan service has also been established for easy access to laptops, multimedia projector and digital camera.
- Thanks to the generosity and hard work of a South Australian organisation called **ITShare** we have now deployed approximately 60 PC's and Laptops in various Departments and Sections throughout the Hospital. This donation combined with the installation of Open Source Software - **Ubuntu and OpenOffice** productivity suite has realised enormous cost savings for the Hospital.
- The establishment of a State of the Art **IT Training Center** with 12x PC's. The Center offers a number of IT Training courses ranging from Introductory level through to Intermediate level modules. Close to 100 staff have already been through the training and this has benefited the Hospital by raising the level of Computer Literacy and confidence of Hospital staff. More advanced courses are being planned for future delivery.
- The establishment of an **Information Management and Technology Working Group (IM&T)**. This Group currently meets monthly and coordinates all IT Projects and tasks within Goroka General Hospital. This Working Group has been instrumental in educating Hospital Management in the role and function of IT within the organisation.
- The commissioning of a dedicated Internet connection. Nominated Hospital staff (clinicians, medical staff and Department Heads) now have much needed access to **email and the World Wide Web (WWW)**.
- Once access to the Internet was commissioned a free subscription to Health InterNetwork Access to Research Initiative (**HINARI**) was made available to clinical

staff. The HINARI program, set up by WHO together with major publishers, enables developing countries to gain access to one of the world's largest collections of biomedical and health literature. Over 3750 journal titles are now available to health institutions in 113 countries, benefiting many thousands of health workers and researchers, and in turn, contributing to improved world health.

- The preparation and submission of an **IT Service Improvement Plan (SIP) and Annual Activity Plan (AAP)** for the 2009 – 2011 period.
  
- Several Hospital applications were developed based on the **Open Source Software** model are now being successfully used by various Hospital Sections:
  - A **Laboratory Results** application deployed in the Hospital's Lab for data entry and also in one of the clinics for enquiries.
  - A **Pharmaceutical Stores** application currently used in the Hospital's Pharmacy to manage and monitor inventory levels and availability of medical supplies.
  - A **Staff Attendance Register** which is currently being used within the Corporate Services Division and assisting management to improve staff attendance and punctuality.
  - A number of **Registers** have been created to assist with the recording of ongoing information and produces monthly reports for statistical purposes.

## **Current and Future IT Projects**

The implementation of IT within any organisation is a long term and continuing process and although much has been achieved in the past 18 months, there remains much work to be done. Goroka General Hospital is committed to the vision of an integrated Health Information System (HIS) at the Hospital.

The following are some of the current and future IT projects at the Hospital:

- We are very excited to announce that the Hospital has commissioned its own **website**, a first for a PNG Hospital. Although initially being setup with minimal content and functionality, it has been designed to allow for future growth and the easy addition of new functionality. An Online Health has also been setup and is available to Health Professionals with access to the Internet; this Forum will allow PNG medical staff to discuss and exchange information on a range of relevant health and clinical topics. The address for the Hospital's website is: [www.ggh.org.pg](http://www.ggh.org.pg).
- The IT Section has been busy developing a Hospital **Intranet** which is now almost complete. The Intranet is an online resource that will only be made available to Hospital staff; and will make information such as staff telephone directories, standard forms and other internal resources easily accessible. It is envisaged that all future Hospital Information Systems and Applications will be deployed through the Hospital's Intranet.
- Continue to **grow and develop technical skills** of the Hospital's IT Staff team – specifically in the areas of Open Source Software (OSS) and Software Development.
- Develop **new training modules** and continue to deliver IT Training to Hospital staff using the Ingots framework. We also intend to gain **National Training Council (NTC) accreditation** for the IT Training Center, Courses and Instructors.
- Our next major challenge is the development of an **Electronic Patient Records System (PRS)** including the tidy up of Hospital's Records whilst adhering to recognized International Health Record keeping standards. This task has already commenced and is envisaged to run for the next 18 months to two years. The basis and starting point for a PRS at Goroka General Hospital will be the evaluation of an existing Health Information Systems (HIS) through the **Open Source Software (OSS)** community.

## Open Source Software

The **Open Source Software** (OSS) model for applications development is based on principles of openness and collaboration compared to the Proprietary model which is Closed and is primarily focused on profit. Open Source Software is a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of Open Source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in.

According to a recent Garter report, *The State of Open Source in 2008* “in few years time, almost all business will use Open Source”. The report goes on to say that “by 2012, more than 90% of enterprises will use Open Source in direct or embedded forms”.

Although a thorough analysis and study of processes and business requirements should always precede the decision as to which software is to be used in any organisation, there currently exists a window of opportunity in Papua New Guinea for Open Source projects and implementations. This window of opportunity that now exists within PNG can be attributed to the so called “Green Field” situation and the fact that many institutions are now just embarking upon Information Systems (IS) projects and thus are able to bypass the high costs associated with migration from a Proprietary to an Open Source solution.

The tangible **benefits** when adopting an Open Source method to software implementations within PNG Hospitals are as follows:

- Open Source Software is almost **100% immune** to virus, spyware and other forms of malicious attacks. One can safely deploy PC's in an organisation without the need to install complex and costly Virus Protection Software and at the same time feel confident that their PC's will remain virus free. This point alone gives incredible strength to the argument for Open Source. Goroka General Hospital

has close to 60 PC's deployed, not one runs any form of Anti Virus Software and in the past 12 months we have not had one single virus incident.

- There are no software licensing costs associated with Open Source Software. Because Open Source is based on a collaborative model rather than a model for profit, the costs savings in software licensing alone make for a very strong business case for Open Source. At Goroka Hospital and to use our IT Training Center as an example – we have saved the Hospital K5,000 per PC, that is approximately K60,000 in software licenses that we would have needed to purchase had we installed PC's with Microsoft Windows and Microsoft Office.  
**Note:** Although software copyright laws have been effective in PNG for over five years, many institutions both government and private continue to deploy unlicensed software throughout their organisation's. This illegal practice eludes criminal prosecution due to the non-existence in PNG of a Government Body to regulate these unprofessional practices. It also distorts IT Budgets as software license costs are generally omitted from the financial planning process thus giving an inaccurate and under-estimated financial snapshot of Total Cost of Ownership (TOC).
  
- Collaboration Groups around the world that are currently involved in software development initiatives for Health Information Systems (HIS) are mature and offer a wide range of Health Informatics application software solutions. To list all of these groups is beyond the scope of this document but several that have had a major impact on the delivery of Health Care Solutions globally but also in the Pacific Region are:
  - The Open Source Health Care Alliance (OSHCA) – <http://www.oshca.org/>
  - The International Open Source Network (IOSN) – <http://www.iosn.org/>
  - Care2x HIS Solution - <http://www.care2x.org/>
  - LinuxMedNews – <http://www.linuxmednews.com/>
  - University of the Philippines National TeleHealth Center - <http://telehealth.ph/>

## **Case Study #1: Beaumont Hospital**

The following excerpts have been extracted from a report compiled by Brian Fitzgerald from the University of Limerick (Ireland) and Tony Kenny from Beaumont Hospital of Dublin (Ireland) titled: “Open Source Software can Improve the Health of the Bank Balance - The Beaumont Hospital Experience”.

“This study describes the implementation of open source software in a large Irish public sector organization, Beaumont Hospital. The findings reveal a radical shift in open source deployment from invisible horizontal infrastructure systems to highly visible vertical applications. The case study describes the implementation of these systems, the difficulties encountered, and also the benefits in terms of astonishing cost savings of €13m over 5 years”.

“Given that Beaumont were already receiving academic pricing discounts for many of their original proprietary closed source applications, the savings for a typical commercial organization could be even higher”.

“Also, in many cases, the extra functionality available in the OSS systems deployed allowed for a richer feature set overall”.

“In more recent times, OSS products have started to be deployed in more visible applications, desktop applications for word processing, spreadsheet, email etc. Also, the OSS phenomenon is now moving from horizontal infrastructure back-office systems (Ghosh & Prakash, 2000) and now producing applications in vertical business sectors, an X-Ray imaging system in the case of Beaumont Hospital, as will be discussed later. Although it has not always been plain sailing, as the case will illustrate, it is interesting and noteworthy that Beaumont, buoyed by their overall positive OSS experience, are now considering developing some applications, such as Payroll, in an open source fashion using XBRL (eXtensible Business Rules Language) to model these applications

as a set of business rules. The OSS experience has been very successful in Beaumont, achieving savings of circa €4.7 million in the first year, and a further €8.3 million in continued savings on an ongoing basis over five years”.

“As the following Table illustrates, the once-off savings of OSS over closed source alternatives are in the order of €4.6m. Furthermore, given that annual maintenance costs are typically about 20% of purchase price, when viewed over a 5-year period, the savings are even more dramatic, in the order of €8.4m. 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 receive 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. ”

	Open Source Software Solution		Comparable Closed Source Software Solution	
Application	Initial Cost	Total cost over 5 years	Initial Cost	Total cost over 5 years
Desktop Applications	€27.5K (StarOffice)	€34.7K	€120K (e.g. MS Office)	€288.5K
Content Management	€20K (Zope)	€32.1K	€126K (e.g. Lotus Notes)	€140.2K
Digital Imaging -X-Ray	€150K	€237K	€4.3m	€7.339M
Application Server	€10K (JBOSS)	60.5K	€302K (e.g. Websphere)	€595.3K
Email	€1K (SuSE Email)	€8.7K	€110K (e.g. Lotus Domino)	€175K
Elearning	€1K (Claroline)	€4K	€35K	€175K
<b>TOTAL</b>	<b>€209.5K</b>	<b>€377K</b>	<b>€4.883M</b>	<b>€8.713M</b>

“Strassman (2000) has pointed out that the IT marketplace has always been dominated by a demand for integration. For the first 35 years, he argues that this was provided by IBM, and that since about 1985, Microsoft have performed this function. In both cases they have used their market strategy to generate enormous profits. Beaumont have come to realise that the reach and range of OSS solutions is very considerable, and that much of the integration capabilities offered by proprietary solutions can be equally effectively achieved using open source solutions instead.

“As can be seen from the above, Beaumont have made enormous savings, amounting to some €13m over five years through the deployment of OSS solutions. Also, these solutions have been in high-profile user applications, and in many cases a richer functionality than in closed source proprietary alternatives has been achieved. The implementations have not been completely trouble-free, but overall the experience in Beaumont has been very satisfactory. Also, Beaumont have been able to find a way of contributing back to the OSS community in their own unique way by providing systems in the domain with which they have most expertise, thus increasing the potential domains in which ‘developers perceive an itch worth scratching’, to use Raymond’s memorable phrase (Raymond, 1999) all of which bodes well for the future of OSS”.

## **Case Study #2: China takes lead in Open Source education**

Since the Chinese government [began supporting domestic open source communities](#) in 2005, hundreds of thousands of young people in the world's most populous country have become a part of the open source world.

With the help of the government-supported [Leadership of Open Source University Promotion Alliance](#) (LUPA), [Zhejiang Technology Institute of Economy \(ZJTIE\)](#) founded its Linux Training & Examination Center in 2006. The center started out offering a simple 48-hour course; upon completion, students received a Linux operator certificate or a Linux network administrator certificate or both. According to ZJTIE, 1,500 students in the last two years have passed the examination. However, those students who wanted to learn more had to learn by themselves.

Now, however, LUPA offers nine Linux certificates, including certificates for software engineers, C programming language engineers, and LAMP system engineers. In response to a requirement from China's Ministry of Education, LUPA published 11 new Linux textbooks in July. The Ministry hopes that these textbooks will help Chinese students learn more advanced Linux technologies.

### **Rising employment**

Some Chinese schools believe that Linux education has helped students gain employment. According to ZJTIE, 90% of the students in its Economic Information Department received the LUPA certificates in 2006; as a result, employment rose to the highest the school has seen. This may be a result of the booming open source market in China. According to [CCID Consulting](#), the sale of Chinese open source software increased 17.1%, while sales of Linux increased 20.2% in 2007.

As Linux accounts for 66.5% of China's open source market (according to a 2007 survey from CCID Consulting), open source education has been focused mostly on Linux.

However, its success has encouraged ZJTIE to expand its teaching and certification. In March 2008, ZJTIE worked with LUPA to expand its education system from Linux to the whole open source industry.

According to LUPA, more than 300 Chinese universities and colleges have joined its system. Open source technology has become a required course in many of these schools. Although the total number of students who have been trained for open source technologies is not available yet, Zhang Jianhua, chairman of LUPA, estimates that LUPA will train 100,000 students in Linux per year.

### **Beyond the classroom**

Besides developing open source courses, government-supported communities also regularly hold activities such as open source conferences, speeches, contests, festivals, and campus marches to attract students to learn more about the culture, history, ideas, and technologies of the open source industry. At the same time, open source communities without government support have brought many young Chinese to the open source world by offering free open source information, translation of open source articles from other countries, and forums for open source technologies communication.

Thanks in part to promotion by these communities, open source has become a powerful idea among Chinese programmers. In a survey by [PHPChina](#) in June 2007, 32.6% of PHP professionals said that they chose PHP mostly because it's open source, and 64.8% of interviewees who would start to learn PHP believed that "open source is the strong point of PHP." The same survey also showed that more than three quarters of the Chinese PHP professionals learned something from or received information through domestic PHP communities.

The rapid growth of China's open source expertise has yet to result in much contribution to the development of the global open source industry. This may be because young Chinese people are still novices in the open source industry, or it may be due to the fact that they have to work more than 60 hours a week to fight for their new jobs and have no time to work on open source projects for the time being. However, as the open source education system improves and as more young people become open source veterans, the global open source community will benefit from China's presence.

*Chen Nan Yang is a Chinese freelance journalist and former IT director in the Chinese government.*

### **Case Study #3: Gartner: Open source will quietly take over**

**by Peter Judge** ZDNet.co.uk

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**In a few years' time, almost all businesses will use open source, according to Gartner; even though IT managers may be unaware of it, and prefer to talk about fashions such as software as a service.**

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document.write("<div class=\"findBox\" id=\"resultRelatedContainer39379900\">" +
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"<img src=\"/i/z5/gl/ico/related-articles.gif\" width=\"13\" height=\"14\" alt=\"\" title=\"\"
border=0/>Show related <br />" +
"<span class=\"alignSecondLine\">articles</span></a></span><div
id=\"resultRelatedContent39379900\" style=\"display: none; clear: both\"></div></div>");
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Open-source promoters have welcomed the endorsement by what is seen as a conservative commentator, but predict the changes will go further than Gartner assumes.

"By 2012, more than 90 percent of enterprises will use open source in direct or embedded forms," predicts a Gartner report, *The State of Open Source 2008*, which sees a "stealth" impact for the technology in embedded form: "Users who reject open source for technical, legal or business reasons might find themselves unintentionally using open source despite their opposition."

However, Gartner argues that at the operating-system level, Linux deployments are showing smaller benefits in total cost of ownership (TCO) as it is applied to more demanding projects, because of the technical skills required to use it: "Much of the availability, management and DBMS licensing costs will remain proprietary," says the report, and "version control and incompatibilities will continue to plague open-source OSs and associated middleware".

"Gartner has woefully underestimated the penetration of open source," said Mark Taylor, president of promotion group the Open Source Consortium. "Everyone uses [open source] on a daily basis in services like Google."

However, he welcomed the analyst's prediction that open source would disappear from view: "Open source has been promoted since 1998. If it fades from view now, because it is embedded in the mainstream, that is exactly what we wanted."

Gartner has also underestimated the benefits of Linux, said Taylor: "There are a range of open-source business models, from a completely proprietary version where open source is used as a sprinkling of magic pixie dust, to a full-on, services-based deployment using a free Linux distribution. Gartner assumes that the pseudo-open proposition will hold sway, but companies change. They may initially need the reassurance of a proprietarised version of Linux but, in our experience, they are then increasingly happy to go to a services model, using a distribution like Debian."

Gartner misses the point that a free licence does more than cut the cost of ownership, said Taylor, pointing out that it provides other benefits. "Licensing is only a slice of the total cost, but historically, companies have only bought as many licences as they can afford. If you remove the licence cost, you may only remove three percent of the of total cost of the existing project, but you also remove the brakes — you massively expand the numbers that project can be rolled out to at no extra cost.

"Open source gives massive scalability at no transaction cost, for whatever you are doing," he said.

IT managers who simply want to cut costs will look to software as a service (SaaS) rather than open source, says the Gartner report. "More technically adventurous IT projects will often prefer the direct use of open source and on-premises software development, but the mainstream IT organisation looking to reduce the IT cost burden will tend to choose SaaS where it is available."

This is nothing more than marketing-speak, said Taylor: "It's a very superficial analysis," he said. "The two will become almost indistinguishable as 98 to 99 percent of SaaS will be open source." And Gartner agrees that, by 2011, open source will dominate software infrastructure for cloud-based providers.

## **Conclusion**

The ultimate objective of our work at Goroka General Hospital is to provide both Management and Staff with accurate and timely information that supports and enhances the delivery of an efficient Health Service to the public of the Eastern Highlands. This goal will only be achieved through the provision of efficient, reliable and integrated Health Information Systems that are cost effective.

The IT Team at Goroka General Hospital is more than happy to share their experiences with other PNG Hospitals about to embark upon a similar exercise.

## **About the Author**

Robert Schilt is an Australian currently on assignment at Goroka General Hospital through Australian Volunteers International. Robert has over 25 years experience in the IC&T Industry and comes to the Hospital with experience in a wide range of aspects relating to the implementation of Information Systems. Before coming to PNG in 2005 Robert was a key team member on a high profile, large scale and successful E-Government implementation. Robert can be contacted on email address: [rschilt@hotmail.com](mailto:rschilt@hotmail.com) or through his website at <http://www.trupela.com/>