

8-2010

Enterprise Systems in Universities: A Teaching Case

Ahmad A. Rabaa'i

Queensland University of Technology (QUT) Brisbane, Australia, a.rabaii@qut.edu.au

Wasana Bandara

Queensland University of Technology (QUT) Brisbane, Australia, w.bandara@qut.edu.au

Guy G. Gable

Queensland University of Technology (QUT) Brisbane, Australia, g.gable@qut.edu.au

Follow this and additional works at: <http://aisel.aisnet.org/amcis2010>

Recommended Citation

Rabaa'i, Ahmad A.; Bandara, Wasana; and Gable, Guy G., "Enterprise Systems in Universities: A Teaching Case" (2010). *AMCIS 2010 Proceedings*. 171.

<http://aisel.aisnet.org/amcis2010/171>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISEL). It has been accepted for inclusion in AMCIS 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISEL). For more information, please contact elibrary@aisnet.org.

Enterprise Systems in Universities: A Teaching Case

Ahmad A. Rabaa'i

Queensland University of Technology (QUT)
Brisbane, Australia
a.rabaii@qut.edu.au

Wasana Bandara

Queensland University of Technology (QUT)
Brisbane, Australia
w.bandara@qut.edu.au

Guy G. Gable

Queensland University of Technology (QUT)
Brisbane, Australia
g.gable@qut.edu.au

ABSTRACT

This teaching case aims to contribute to understanding the phenomenon of Enterprise Systems (ES) implementations in universities. Through this case, students will gain understanding of the importance of 'contextual elements' for large scale information systems (IS) implementations, in particular ES. This teaching case illustrates how these contextual factors contribute to the success or failure of such implementations, and how they can influence the decisions that dictate the lifecycle of such systems. The case describes ES implementations at a leading Australian university, and presents a rich account of the institutional, national and industry-sector contexts that have influenced the directions and decisions taken. The journey encountered with the main Enterprise Systems that support Financials, Human Resources and Facilities are described suggesting the lifecycle phases, critical success factors and lessons learnt.

Keywords

Teaching case, Enterprise systems, Universities, System implementation, Tertiary education sector.

INTRODUCTION

Leading Enterprise Systems (ES)¹ vendors, first SAP in 1996 and then others soon afterwards, established academic alliance programs to bring their software applications into university classrooms (Grenci & Hull, 2004). However, concerns that "many universities have struggled with how to implement such major changes to their courses and curriculum" (David, Smith, Maccracken, & Reckers, 2003, p: 417, as cited in Grenci & Hull, 2004) have been raised. According to Watson & Schneider (1998), while some have called for the development and broad dissemination of ES-related classroom materials and exercises that could benefit both alliance and non-alliance faculty, others have suggested that incremental integration might precede a more comprehensive, cross-functional employment of ES application in curriculum (Grenci & Hull, 2004). According to Grenci & Hull (2004), both of these views emphasize the merit of creating and incorporating ES material as building blocks of curricular change.

However, Grenci & Hull (2004), in reference to Landry et al. (2003), argued that need for such change must be weighed against the need for curricula that "balances tradition with innovation". In other words, "universities must bring new innovations and technologies into the classroom within the framework of traditional and foundational concepts that provide a knowledge base for the discipline" (Grenci & Hull, 2004, p: 278). Grenci & Hull stated that tradition can be found in the systems development life cycle (SDLC). In this case we argue that tradition can also be found in the critical success factors (CSFs) of ES implementations. For instance, the importance of ES implementation issues has been highlighted by well-known SAP University Alliance members (Stewart, Gable, Andrews, Rosemann, & Chan, 1999; Watson & Schneider, 1998).

¹ Enterprise System (ES) is herein synonymous with the term Enterprise Resource Planning (ERP) system (see Klaus et al. (2000)) for more details. In the university context, ES are called administrative systems (see Rabaa'i et al. (2009)).

This teaching case aims to contribute to understanding the phenomenon of ES implementations, and is positioned within the university context. The university context was chosen as the target audience (i.e. university students) will be familiar with, and not foreign to, the context, hence; they can better understand the intended messages from this teaching case. The descriptive narrative summarizes the experiences of one of the leading universities in Australia; Queensland University of Technology (QUT).

This teaching case can be used to illustrate the importance of 'contextual elements' such as: national economics and politics, vendor mergers, and partner collaborations for large scale information systems (IS) implementations. The narrative also depicts how these contextual elements can influence the decisions that dictate the life-cycle of such systems and contribute to their success or failure. Students can identify the technology and organizational risks associated with ES implementation projects, and then assess how well QUT's management manage these risks over the life-cycle of the project. A brief review of the literature provides a basis for understanding ES and an overview of the historical road of ES to the university sector. Specific examples of top management support, effective project management, communications and training initiatives are detailed in the case so that students can better understand change management practices in the context of a major large-scale system implementation. In addition, the adoption of ES at the case site is described, depicting how major decisions across the ES implementation phases were made. Also, an analysis of what has led to the current success provides a rich and interesting avenue for introducing students to the relevance and implications of ES applications as well as CSFs. Finally, the paper ends with some open issues on what the future might hold for the ES case site.

WHAT ARE ENTERPRISE SYSTEMS (ES)?

The term Enterprise Systems or ES was reportedly first introduced by analysts at the Gartner Group. ES, purportedly the most important and expensive development in organizational use of IT (Rabaa'i, 2009b), are "*large-scale, real-time, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology (IT) to support processes, information flows, reporting, and business analytics within and between complex organizations*" (Seddon, Calvert, & Yang, In Press).

ES are sold by many different vendors. The four most well-known are SAP, Oracle, PeopleSoft and JD Edwards. While they compete with each other in the same market, it is important to note that their systems differ significantly; each having relative strengths and weaknesses, deriving from their respective individual development history. None of the systems is superior in all respects, and how well each supports a particular business is very much determined by the fit of its design characteristics with the requirements of the customer's business.

ES can link different areas of an organization, such as manufacturing, order management, financial systems, human resources, suppliers and customers, into a tightly integrated system with shared data and visibility (Chen, 2001). ES hold the promise of improving business processes and decreasing costs (Beheshti, 2006), as these systems facilitate communication and coordination, centralise administrative activities, improve ability to deploy new information system functionality and reduce information system maintenance costs (Siau, 2004). A successfully implemented ES can be the backbone of business intelligence for an organization (Rabaa'i, 2009b; Rabaa'i, Bandara, & Gable, 2009), by giving managers an integrated view of the business processes (Parr & Shanks, 2000).

The adoption of ES involves business process improvement, best practice implementation, intra-enterprise integration, and inter-enterprise coupling, as they are designed to replace various and separate legacy systems used in organizations, with synchronized suites of enterprise-wide applications (Nah & Delgado, 2006). The most important characteristics of ES are its ability to share common data and practices across the entire enterprise in order to reduce errors, automate and integrate business processes across organizational functions and locations, produce and access information in a real-time environment to facilitate rapid and better decisions and cost reductions, and enable implementation of all variations of best business practices with a view towards enhancing productivity (Soja, 2006).

Despite the substantial potential benefits associated with the implementation of ES, there are too substantial potential costs and risks. The implementation of these systems requires a modern computing hardware environment with appropriate networking capabilities, massive data storage, powerful processors, sophisticated change management strategies, a comprehensive change management program, and professionally managed relations with the vendor and any implementation partners (i.e. consultant firms).

THE ROAD TO UNIVERSITIES

The environmental impetuses for universities to become more efficient and effective have been many, including: continuing decline in per-student government funding and support, globalization and global competition, continuing growth in student

numbers, changes in the nature of academic work, increasing competition between institutions, government pressure to improve operational efficiency, and generally diverse and shifting expectations of stakeholders (Pollock & Cornford, 200; Rabaa'i et al. 2009). These substantial and continuing shifts in the university sector, demand more efficient management processes and improved administrative operations as well as management systems.

The university sector has had to respond to rapidly evolving government policy and social and economic influences. This has created need for substantive improvements in economic efficiency, and ultimately restructuring of the entire sector. Guthrie and Neumann (2001) refer to this as "*the corporatization of universities*". Consequent strategic initiatives of universities have included the use of information technology (IT) to streamline, manage and integrate administrative operations. Universities have sought to utilize IT to increase competitiveness through improvements in efficiency; mainly by implementing large-scale commercial IS such as ES. Oliver and Romm (2000) described these large systems as "*necessary for survival*" [for universities].

The concerns universities face are similar to those of a wide range of organizations. Hence, the standard tools of contemporary organizational analysis and institutional management are being adopted and applied in the university sector. One of the prominent trends from this is the adoption of Enterprise System (ES) applications. ES vendors have responded with products better tailored to this relatively new market, and similar to large corporations, many universities have replaced their long established administrative systems with ES applications.

The similarity and differences between universities and business corporations have been discussed for several decades (e.g. Lockwood, 1985; Pollock and Cornford, 2004). Universities are unique and different to other organizations (Pollock & Cornford, 2004). Lockwood (1985) characterizes universities as having a unique combination of: complexity of purpose, limited measurability of outputs, both autonomy and dependency from wider society, diffuse structure and authority, and internal fragmentation, suggesting their unique and impossible-to-model structures and decision-making processes warrant specific attention. Questions that continue to be asked include; *Are there unique requirements in universities that have yet to be considered? Do standard software packages (such as ES) support these unique needs of universities? Will universities succeed in deploying software packages that were originally designed to mainly cater for the corporate environment?*

According to Fisher (2006), ES were initially introduced into universities in the US in response to the same drives that encouraged private sector adoption. In Australia, the Australian Vice Chancellor's Committee (AVCC) created the Core Australian Specification for Management and Administrative Computing (CASMAC) steering committee in 1991. CASMAC followed the UK universities' MAC (Management and Administrative Computing) initiative, which was introduced in the late 1980's, when universities in the UK agreed that they were not really in the business of software development, and decided to take a common approach to finding systems solutions. CASMAC was created to develop a set of common management and administration systems across the Australian university sector. This committee attempted to provide guidance and advice on systems development approaches for universities.

The main aim of ES system implementations in the university sector has been to integrate different administrative functions into a more systematic and cost effective approach. The integration of administrative functions in the university sector spans the integration of student administration, human resource management, facilities management, and financial systems that have in the past been supported by legacy systems whose disparity results in duplication of resources and services and inconsistency. ES were adopted to resolve this. US universities, for example, viewed ES adoption as a method of gaining greater integration of their management systems to better manage increasingly complex operations (Frantz, 2001). In fact, the main advantages of ES for universities are (1) improved information access for planning and managing the institution, (2) improved services for the faculty, students and employees, (3) lower business risks, and (4) increased income and decreased expenses due to improved efficiency (King, 2002).

With the passage of time and continuing improvements in ES packages, the contemporary wisdom now is that customization should be minimized in order to achieve the full benefits of the ES (Bajwa, Garcia, & Mooney, 2004) and to avoid lengthening the implementation project, introducing new bugs into the system, or complicating future upgrades to new versions from the vendor (Shehab, Sharp, Supramaniam, & Spedding, 2004) Yet, the maturity of these packages varies by sector. And though Davenport (1998) maintains that ES are based on "*best business practices*" which are "*defined structures of doing business operations*" that the implementing organization can choose to exploit, and though ES vendors promote their packages as having "*Universal Applicability*", none yet well address the full needs of universities (Heiskanen, Newman, & Simila, 2000; Rabaa'i et al., 2009).

ES implementation in universities is often described as difficult, expensive and risky and has often been considered unsuccessful or ineffective (e.g. Rabaa'i et al., 2009). Nonetheless, belief in the solution, and its adoption across the sector, has continued globally (Von Hellens & Beekhuizen, 2005). This belief is exemplified by the chief information officer at

George Washington University, who believes that integrated information solutions give universities a competitive advantage, stating that: "...institutions, which are unlikely to switch to integrated information solutions, will find it difficult to retain their market share of students. Students will, sooner or later demand services, offered by other institutions..." (Murphy, 2004). Vitale (2000) suggests that the importance of administrative computing to the smooth, economical operation of a tertiary institution cannot be denied. Thus, not surprisingly, in 2002, 86% of Australian universities, for example, were implementing or intended to implement at least one module of an ES (Beekhuyzen, Goodwin, & Nielsen, 2002).

INTRODUCING THE CASE: QUT

Located in Brisbane, Australia, Queensland University of Technology (QUT) traces its origin back to 1849, with the establishment of Brisbane School of Arts. Through the years, the institution morphed several times, eventually becoming "Queensland University of Technology" in January 1989. Its original goal was "To strengthen its distinctive national and international reputation by combining academic strength with practical engagement with the world of the professions, industry, government, and the broader community" (QUT, 2009). This goal has inspired the University's dedication to the education of students, research in a broad range of disciplines, and service to the state's citizens. QUT is focused on being 'a university for the real world,' delivering relevant and practical courses leading to excellent graduate outcomes.

QUT also has a reputation for adopting the latest technologies that support their core and supporting functions. QUT is part of a three-campus system and now is home to several national research centers and research institutes supported by government and philanthropic bodies. At present, QUT has approximately 5,000 employees (full time equivalent). QUT's enrolment is approximately 40,000 students who study in the University's nine faculties- Built Environment and Engineering, Business, Science and Technology, Creative Industries, Law, Humanities, Education, Health, as well as QUT International College. QUT's annual budget was approximately AU\$ 600 million in 2008.

QUT is an institution worthy of observation with regard to ES implementations in the university sector. It is among the first universities in Australia to adopt ES (Rabaa'i et al., 2009), and QUT IT executives hold lead roles in relevant associations, including HES (Higher Education Services- part of the Human Resource Information Systems (HRIS) Group).

The Adoption of ES at QUT

QUT used over 40 separate systems before the ES projects were started, many of which were developed internally by QUT over the prior three decades. These legacy systems² were expensive to operate and difficult to maintain and develop. They did not provide the accurate, consistent and accessible data required for effective and timely decision-making and performance assessment. There was widespread dissatisfaction with the functionality of the legacy environment and data was mistrusted because of multiple points of access and multiple databases. The systems development staff spent most of their time building custom interfaces between the systems and trying to resolve the disjoint between different systems.

The consensus among QUT's executives was that the university's existing systems needed to be improved in line with rapid changes in the university sector. There were also major concerns about being able to grow the university and become more global without an integrated systems capability.

"In order to deal with the rapid changes in the university sector, we recognized that we had to do something about various QUT's systems that <then> used separated databases" (QUT IT Services Senior Management³)

As a result, QUT had decided that they would review the systems for Student Administration, Finance, and Human Resources. The review team consisted of primarily director-level higher executives and managers. The review team quickly realized that the key to achieving success with rapid changes in the university environment would be to revamp the current outdated legacy systems infrastructure and migrate to a new, flexible and integrated system. It was felt that the new system should at a minimum (1) seamlessly integrate QUT's Finance, HR and Students functions, (2) be reliable and affordable and (3) have the flexibility to support QUT's specific business processes. QUT quickly realised that all of these requirements were probably best met by one particular type of package: Enterprise System (ES) software.

² Legacy systems, in this study context, are defined as applications (often standalone) that have been built using a prior era's technology and been in the organisation for many years. These systems are often 'due' for retirement, but still exist within the organisation encapsulating the existing business processes, organisation structure, culture, and information technology (Rabaa'i et al. 2009)

³ Some primary evidence was gathered for this teaching case through interviews of QUT IT Department senior management. Several interviews were done individually, and others in groups. This data source is referred to throughout this case as 'QUT IT Services Senior Management', to maintain anonymity by not revealing individual identities.

At that time, QUT's executive faced several major decisions: *To Buy or build? If to buy; whom to buy from (what products)? How to customize these systems for our needs? How can we make them work with our existing systems? Should we have an implementation partner involved?*

To Buy or to Build?

Joe Dascoli was hired as the new member in the IT committee at QUT and became a member of the review team soon after. Dascoli had more than 15 years of IS experience including project management, and had led a successful large-scale IS implementation at a multi-divisional organization. When Dascoli arrived at QUT, there were no automated processes to manage different business functions; it was a totally paper-based system. However, sitting waiting on Dascoli's new desk was a detailed specification of QUT needs in relation to the Human Resource (HR) function.

In the first six months of his appointment, Dascoli with other IS personnel, built an initial HR prototype based on QUT requirements. However, QUT's top management had come to the view that developing a new system from scratch was not an option. Though, the IT committee at QUT had been in charge of setting up and maintaining different business packages in the past, it had never developed a large scale system like the HR/Payroll system for example. Hence, the decision was made to not build Greenfield applications, but rather to tender and work with a suitable vendor/partner collaborator.

"QUT's top management decided that this was not the place to be building Greenfield applications for the university and it should go out to tender and find a partner"(QUT IT Services Senior Management)

What Package(s) to Consider?

QUT set up a cross-functional team to select an ES package. This team consisted of director-level executives, managers and selected operational staff from the different business areas. The selection team commenced collecting the necessary information on which top management could base a sound decision for a particular package. In particular, they wanted to understand how well the various systems could support QUT's needs and what resources (e.g. time, money and expertise) it would take to install them.

Several ES packages were evaluated in depth. Representatives from the various business areas participated in walkthroughs of specific modules, and the selection team also visited several different vendors' customers. The strengths and weaknesses of each package were mapped into an evaluation matrix, including: the vendor reputation, the stability and history of the ES vendor, last 12-month track record of ES sales, implementation support from the vendor, and improvement in ES software packages. The selection team also did some benchmarking on implementation approaches and success rates.

Back in the 1990's, given the relatively recent interest from Universities in packaged ES solutions (e.g. compared to the manufacturing sector) and the concomitant relatively recent interest from ES vendors in the sector (a chicken-and-egg scenario), it is not surprising that many full-scale solutions were either not yet available, or were yet evolving. In these circumstances, it is reasonable to assume that most Universities' application portfolios included some mix of packaged and custom systems. It is also relatively more likely in these circumstances that ES solutions will be best-of-breed (BoB), whereby client organizations (universities) selectively choose different modules from different vendors, as the various major vendors and more established (in this sector) niche vendors jostle for position (no single solution having achieved ascendance). For instance, some organisations prefer to use a mix of ES modules and legacy modules because they are unwilling to change their implicit business model, and concomitantly, they are reluctant to change the source code of the ES module to fit their business needs. This mixing of modules is called the best-of-breed approach, whereby the organisation chooses to mix and match various software modules from different ES vendors, often in combination with legacy modules. Best-of-breed offers organisations more choice and flexibility with functionality, but can complicate ES integration and implementation.

When QUT went out to tender (for an ES vendor), they could find no single solution spanning student, finance and HR, let alone the many other systems they needed at that time. Consequently, QUT pursued a best-of-breed solution, believing that this strategy provided value and flexibility to deploy the most powerful and suitable modules on offer.

"The strength of the best of breed approach is you get the richest functionality in each of the areas you are looking at. This was one of the main reasons why QUT went that path. Also, we couldn't find a tender that provided all of QUT's required systems" (QUT IT Services Senior Management)

Hence, it was resolved that QUT would adopt the 'Concept' HR system and 'Oracle Financials,' and would build the Student system because nothing was available in the market.

“If you go back to the 1990’s and think where the IT industry was at, there were relational databases, and there were many options. We considered various options, and Oracle was one of these options as we <QUT> are an Oracle shop. However, at the time because Oracle didn’t have their own HR product, so their recommended product from their point of view was what was called, Concept/ALESCO HR product, which has now been bought out by another company called Talent2. This system was built on Oracle relational database. So that influenced our decision to which HR system to select, and since 1990 we are using ALESCO product as our HR/Payroll systems.”
(QUT IT Services Senior Management)

In regards to the financial system for example, though the selection team looked at various financial systems, from the outset their research effort was mainly geared towards learning whether Oracle Financials software would be capable of meeting QUT’s requirements. Despite their predisposition towards Oracle, the selection team decided to conduct a comprehensive analysis to assess the fit and features of the Oracle Financials software before finally recommending that package to QUT’s top management. The selection team found that at that time over a third of Australian universities had implemented Oracle Financials.

“Oracle Financials was the one selected in those early days and there would’ve been 8 or 9 universities that went that way and implemented the Oracle Financials bit, there were a number of different organizations including universities overseas using Oracle Financials and that was one of the main reasons we went there. In fact, we found Oracle Financials set to be a strong fit with our needs.” (QUT IT Services Senior Management)

How much to Customize?

QUT, like any other university implementing an ES, faced the difficult decision of how much customization should be done to the ES to address existing shortcomings. QUT knew customization of the ES software package should be avoided or at least minimized in order to achieve the full benefits of the ES and to avoid future complications.

“We got a lot of customizations done for our various systems ... but the last thing you want is too many customizations; it makes your life a nightmare” (QUT IT Services Senior Management)

The intention at QUT was simply to replace existing systems (a ‘technology swap’), and keep most business processes ‘as is’ to the extent possible. While QUT expected that the new systems would improve efficiency, they were not interested in re-engineering processes any more than necessary to accommodate the new packages. Not surprisingly; there were instances where additional functionality had to be developed to complement the ES. The quote below is an example related to the HR system:

“To be able to see your payroll payslip online and on time was properly done several years ahead of the vendor doing it in their own core product. The reason is we saw this functionality as a strategic importance and a differentiator for QUT.”(QUT IT Services Senior Management)

In the past, QUT had done much custom-development as add-ons (enhancements) to vendor packages. However, QUT was not licensed to modify the ES products. Further, every time they went through an upgrade or the vendor released a new version, QUT had to re-enter and re-validate all custom enhancements, which was becoming increasingly expensive. In order to get the functionality they needed and yet minimize customization, QUT started to work with the vendors themselves. If some custom module was needed, or something was done a bit differently at QUT, they would collaborate with the vendors to develop a custom module (an enhancement) for QUT. This way, during upgrades, the vendors took over the maintenance/upgrade responsibility.

“We’re starting to move away from custom development because every time we go through an upgrade or the vendor releases a new version you’ve got to get all your custom work checked out and it’s an additional load. Nonetheless, if we do need any custom modules or something done a bit differently for QUT, we now try to work with the vendors themselves, so that they will actually develop a custom module or form for us and therefore when we do an upgrade they take on that responsibility. We pay obviously each time but we’re not breaching or risking that we’re doing something wrong. If we ran something that broke or didn’t work or caused a problem elsewhere because we wrote it, then it would be our responsibility, whereas if they’ve written it they will make sure their local customizations work at QUT.” (QUT IT Services Senior Management)

In addition, the vendors saw an opportunity to market and offer enhancements made for QUT to other universities, and began including them as part of the core product in their future releases. QUT by these means, found a way get the additional functionality they sought, and by being the first adopter of these new enhancements, had significant influence on (future) product releases. QUT also often joined forces with other universities in these situations to benefit from economies of scale.

“...in recent times, once we have proven that we are good at what we are doing, what we are trying to do now is not to create new ideas by ourselves, but create in partnership with the vendors. So that has not been something that just happened by accident, it has been our strategy that we have had in place. So any good idea that we have here at QUT, explore it, unpack it, determine what it is, get out to other universities to support it, and when there is sufficient support then the vendor will do something about it. If the vendor does not want to build it at their own cost, then look at how to share it amongst the universities; each university wants to have this new idea can contribute, or we may get the Federal Government to fund it; we have done both, and we have been very successful.” (QUT IT Services Senior Management).

How to Integrate Different ES?

According to a Deloitte and Touche survey (as cited in Al-Mashari et al., 2003), one of the main intangible benefits of ES is their ability to provide tighter integration across different business functions. ES are based in an organisation-wide, process-oriented design (Al-Mashari et al. 2003), which must be tightly integrated into an organization's daily operations to achieve full benefit from the system. Moreover, the integration of organisation-wide data is essential to ensure the successful implementation of ES (e.g. Somers & Nelson, 2001). If successfully implemented, ES can provide seamless integration of processes across functional areas with improved workflow, standardization of various business practices and access to real-time up-to-date data (Ehie & Madsen, 2005; Mabert, Soni, & Venkataramanan, 2003).

“...When we started, the systems were completely separate and there was nothing in between. It was then decided that we want the systems integrated. So this was the first stage of our integration process, where, for example, the Payroll system is interfaced with the Financials system. The second phase of the integration process we followed, is that you want the integration to be a bit more active, and therefore instead of interfacing the systems; you actually have some form of a tool, that's called a transformational tool, that allows to perform the integration in an active way. We've bought a product called Constaller Hub; it's a tool that you can run nightly, hourly or every five minutes, to achieve that kind of integration, we have been using this product for more than five years” (QUT IT Services Senior Management).

However, as suggested earlier, a best-of-breed approach has limitations, an obvious potential complication being integration of different vendors' systems and legacy systems. For example, the business manager of the Archibus/FM system, a space management system that creates and maintains accurate and up-to-date records of all buildings and current usage at QUT, which was implemented at QUT in 2000, stated that:

“... the way our systems are integrated is working nicely. However, the integration can be done better; what we really would like to see is a real-time or immediate integration between the various systems.” (QUT IT Services Senior Management).

Also, the business manager of SyllabusPlus, a system that prepares QUT's class and examination timetables, which was implemented at QUT in 1998, said:

“SyllabusPlus is actually integrated with many systems at QUT, ES packages and in-house built applications, which make the integration between these systems a bit problematic. However, QUT is moving towards improving the entire integration processes between its systems.” (QUT IT Services Senior Management).

This discrepancy might be a result of QUT's decision to select multiple systems through their best-of-breed strategy, however it is not a decision that QUT regrets

“... QUT had chosen to go with the best-of-breed. The main difference between the best-of-breed approach and an ES suite is that when you buy Oracle-PeopleSoft or TechOne suites, for example, someone else has done the integration for you, or at least has done some amount of the integration for you. However, the strength of the best-of-breed approach is you get the richest functionality in each of the areas you are looking at, but the problem with that is you then need to do your own integration.” (QUT IT Services Senior Management).

In summary, systems integration at QUT is an area that needs improvement. QUT acknowledges that this is predominantly a result of their best-of-breed software selection strategy. However, QUT is looking at means to better improve system integration and have dedicated projects/ resources working on this issue.

WHAT ARE THE FACTORS THAT LED TO SUCCESSFUL ES IMPLEMENTATION AT QUT?

Management literature (e.g. Peppers, Gengler, & Tuunanen, 2003) has emphasized the value of reviewing success factors. While such a review provides a good basis to understand what elements contributed to success (or failure) they also form a

firm foundation for future planning; highlighting those elements on which to focus and why. Okland (1995, p: 325) defined critical success factors (CSFs) as: “*What the organisation must accomplish to achieve the mission by examination and categorisation of the impacts*”. Verville and Bernadas (2005) claimed that one single critical factor by itself will not ensure the success of an ES acquisition process, but rather it is a mixture of critical factors that will result in the desired outcomes. In an ES context, (Rabaa'i, 2009a) defines CSFs as a set of activities that need special consideration, and continual attention for planning for and implementing of an ES. This section summarizes some of the success factors that QUT experienced during its ES implementation.

Top Management Commitment and Support

With increasing financial and competitive pressures on universities, combined with growing student numbers, QUT's executives realized they had to be “in the ES game” if they wanted to continue thriving in the new environment. Hence, QUT's executive issued a directive that the university would move towards implementing ES. This was strongly supported by top management. The implementation of different ES at QUT was viewed as a high priority by top management, as the system would change how the university does its business.

Top management support and commitment at QUT did not stop at the initiation and facilitation stage but was extended to the full implementation of the ES. Consistent with (Shehab et al., 2004), top management support at QUT was divided into two roles: the project sponsor role and the project champion role. In the project sponsor role, QUT's top management was able and willing to allocate the required resources (e.g. personnel, time, and necessary budget) to the project. Top management support can be considered as “*a propagated approach of individuals and champions who can effectively implement change programs*”(Al-Mashari, Al-Mudimigh, & Zairi, 2003, p: 5).

“... Top management support and commitment to various implementation projects was the main factor for success. <They> have shown strong leadership, allocated the required resource for different projects, and supervised different change management strategies ...” (QUT IT Services Senior Management)

Change Management

The implementation of an ES is more than just changing the software or hardware systems; it will enable the organization to achieve a higher level of performance through restructured business processes (Ehie & Madsen, 2005). In fact, the implementation of an ES will change the way an organization conducts its business, and may require the re-engineering of essential business processes and/or the development of new business processes to support the organization's goals (Umble, Haft, & Umble, 2003). However; QUT was well positioned to implement and accept the changes brought about by ES implementations, as QUT had developed a university culture that was receptive to change.

Change management programs at QUT were led by teams, composed of seven to ten employees, who were charged with the analysis, redesign, and implementation and improvements in specific business or administrative processes. QUT's change management teams realized that a strong willingness to accept new technology and formal education and training provided to users would aid in implementation efforts. Hence; QUT's change management teams have decided that education, training, and professional development of the users are critical and resources (i.e. money and time) should be spent on various forms of education and training.

“... Change management programs were one of the main factors of success. The change management team worked closely with systems users to ensure that they understand the system. Step-by-step instructions were provided as well as training programs ...” (QUT IT Services Senior Management)

Project Management

Effective project management is essential for a successful ES implementation, and QUT recognized and supported the significant role of the project manager. QUT's top management not only endorsed the changes, but also provided the necessary support and resources for the project managers to ensure the success of the implementation process. The project managers were fully aware of the project size, scope and the complexity of ES implementation in the university environment. In the early stages of the implementation process, QUT's project managers established a detailed project plan, which was linked to the project goals.

“... ES project managers at QUT were fully experience and aware of complexity of the implementation process. <They> have agreed on the projects' goals, define the scope, and build the project plan that best suit the projects' goals and scope ...” (QUT IT Services Senior Management)

QUT's project management concern was to avoid 'scope creep' by not being overly distracted by the immediate organizational problems (e.g. strong resistance engendered by manpower reductions, and the daily business demands). Rather, QUT project management concentrated on important optimization and automation aims. This approach is advocated by Cooke & Peterson (1998) who stated that managing against well-defined milestones and making rapid, and empowered, decisions at the proper levels, both help avoid scope creep, and keep implementation efforts on track. Also, QUT's project management realized that having a comprehensive measurement, to estimate the anticipated implementation efforts, provides a "feed-in" mechanism to track implementation efforts.

"... the progress of the implementation projects and their resulting benefits were regularly measured, such as turnover, manpower..."(QUT IT Services Senior Management)

The Implementation Team

QUT's project management comprehended that the right internal resources should be selected for the project implementation team. Choosing the right implementation team is critical because it will be responsible for creating the preliminary and detailed project plans and schedules, assigning required responsibilities to tasks, and determining the deadlines (Umble et al., 2003). The implementation team at QUT was selected from all functional units. For example, during the HR implementation, fifteen of the most capable and knowledgeable people were selected from different employment cohorts, including: strategic, management, operational, and technical. The project team members were familiar with the internal business processes and with industry best practices.

"... One of the main sources of ES implementations success at QUT is the implementation team. Knowledgeable and experienced personnel from different functional areas were chosen by project managers to lead various implementation processes ..." (QUT IT Services Senior Management)

The project team considered the ES project as their top and only priority. They worked full-time on the project and the top management motivated and rewarded the team upon the successful implementation of the project. Additionally, trust and authority were granted to the team through critical decision-making capability

"... a reward system was deployed by QUT's top management to reward the implementation team upon the successful implementation of each project ..." (QUT IT Services Senior Management)

Effective Communication

Effective communication on large scale implementation efforts can help build the competence of the whole organization, and gain everyone's commitment, support and responsiveness. In addition, an effective communication plan will lead to the development of trust and the exchange of information needed for process changes and the acceptance of the new ES (Amoako-Gyampah, 2004). Consistent with Sumner (2000), QUT's executives realized that the communication plan should not just exist between senior management and project team members. Hence, in their ES implementations, QUT established extensive internal communications channels. QUT's project management was charged with communication and coordination of the implementation resources, including newsletters and e-mails to help keep employees informed about new developments and answer questions about different implementations.

QUT project managers believe that strong communication throughout the various stages of the implementation process is essential in allowing employees to understand what is going on in the project, why change is necessary, and how it will benefit the organization.

"... Effective communication throughout various implementation projects was the other main factor for success. QUT's project managers kept all communication channels open during different implementation processes. <They> have used different strategies, like focus groups, newsletters, e-mail and Web-based archives, to help keep employees informed about new developments, and answer questions about different implementations..." (QUT IT Services Senior Management)

The Implementation Partner

The implementation partner (external consultants), often plays an essential role in ES selection, customization and integration. ES implementation consultants must be familiar with the business process capabilities of the software products being implemented, and must be able to align those capabilities with the desired business process requirements of the implementing organization (Rabaa'i et al., 2009). The same QUT team that selected the ES software vendors was responsible for selecting an implementation partner.

The associate IT director at QUT commented on the role of consultants at QUT:

“There is a difference between QUT’s mode of implementation and other universities. We never really relinquish control of our projects, we didn’t bring consultants in to tell us what to do; we employed consultants to supplement where we don’t have the required expertise. But the authority, the project management, the control points and the governance points of any project are kept under QUT’s control. So if you look at a whole project and you say we have enough expertise here we can do that, and we have enough expertise in here to do that, but in this area we don’t have the expertise or we don’t have the people to do the appropriate work, then we ask how can we supplement that? So we are always supplementing where don’t have the required expertise as oppose to bringing an implementation partner who says you don’t know what to do, so follow my lead....”

QUT takes pride in its in-house capabilities, hence seeks consultant input only where they lack the required skills, expertise or experience. The consultants’ task and expected deliverables are made clear upfront and are managed throughout. QUT believes this approach to engaging consultants allows them to maintain control, ownership, championship, and motivation for the project – within its internal members.

SUMMARY OF QUTS ES JOURNEY

Overall, QUT has moved away from being an in-house developer and looks to ES solutions whenever new or revised IT functionality is sought for in the organization. This shift is strongly influenced by the need to respond to rapid changes in the environment and replace disjoint systems in the university. While this shift is apparent today, it was a consequence of decades of ICT practice and review, which was highly influenced by a range of contextual aspects that occurred in the Australian Higher Education Sector. This was a significant shift, and succeeded only due to a range of critical success factors that supported the initiatives.

At present, QUT sees in-house development as a risk and expense and in-nature opts for best-of-breed solutions. Best-of-breed ES implementations are seen and treated as a long term investment, where QUT openly accepts that it will take time to yield true visible benefits in proportion to system costs. Table 1 summarizes QUT’s current best-of-breed solution portfolio for the selected administrative areas of HR, Facilities and Financials.

Investments in contemporary information systems, such as ES, are particularly complex and costly. QUT, like many other organizations, do not have a systematic way to evaluate the success of systems they deploy. There are currently no procedures to evaluate the impacts of the systems they are using

“We are not using any formal method to evaluate our systems.” (QUT IT Services Senior Management)

The inexistence of a systematic approach to evaluate the success of an ES at QUT raises a number of questions: ***How can QUT know for sure the value and impacts of the systems they have deployed? What can QUT do to proactively <better> prepare for global, national and institutional challenges? How can information and communication technologies (ICT) aid QUT (and other institutions) to face these challenges?***

SUGGESTED DISCUSSION QUESTIONS⁴

1. What are some of the environmental aspects in Higher Education that calls for more effective Information systems?
2. Are Enterprise Systems an appropriate solution for these challenges? Justify your answer.
3. What are the primary decisions to consider when implementing ESs in Universities? Are they any different to ES implementations in other sectors? If yes, explain why.
4. What are the typical critical success factors of ES implementations? List and describe how these existed within QUT’s ES implementations described in the case narrative.
5. In the context of ES, IS literature support that one single critical factor by itself will not ensure the success of an ES acquisition process because it is a mixture of several critical factors that will result in the desired outcomes. Using

⁴ Extra materials, including: teaching notes, discussion questions and model answers are available upon request from the first author. A comprehensive Teacher support pack that includes, a slide pack to introduce the case study, a glossary of terms to distribute to the students in the class and a list of additional references are also available.

the QUT narrative provided, explain in your own views, how the different success factors identified under Q 4, may have influenced other success factors at QUT ?

| Functional Areas | Application (Vendor) | Description | Install Year | Review Year |
|------------------|---|---|--------------|-------------|
| HR | ALESCO (Talent2) | The central and primary database for all employee information. It enables QUT to manage information related to staff from recruitment to retirement, i.e., employee information, leave conditions, pay, on-line access to services | 1990 | 2008 |
| Facilities | Archibus (ICAD Consulting) | Used for space management - creates and maintains accurate and up-to-date records of all buildings and current usage. | 2000 | 2009 |
| Facilities | BEIMS (Mercury Computer Systems) | Supports corrective maintenance work orders and maintenance and capital works project activities | 2005 | 2010 |
| Financial | Oracle Financials (Oracle) | Oracle Financials is a subset of modules from Oracle Applications. This is used to record and report on the financial related transactions that the University performs with external and internal clients. Functions include purchasing, fixed assets, accounts payable, accounts receivable, general ledger and cash management | 1999 | 2008 |
| Research | Research Master (Research Master P/L) | A research administration tool that allows users to manage scholarships, postgraduates, grants, publications, ethics/bio-safety and intellectual property/commercial development. | 1999 | 2008 |
| Facilities | SyllabusPlus (Cyon Knowledge Computing P/L) | Used to prepare university class and examination timetables. Class timetables are developed with Syllabus Plus Course Planner, and examinations timetables are developed with Syllabus Plus Exam Scheduler. | 1998 | 2008 |

Table 1. Summary of QUT's current Enterprise Systems Solution Portfolio

6. Select 2 of the success factors from your response to Q 4, and illustrate how these factors influenced the following major decisions with QUT's ES implementations:
 - *Should we Buy or Build?*
 - *What package(s) to consider?*
 - *How much to customize?*
7. QUT currently has no procedures to evaluate the impacts of the ES they have deployed. Which frameworks might QUT use to evaluate the success of their Enterprise Systems?

ACKNOWLEDGMENTS

The Authors acknowledge the generous support from Mr. Joe Dascoli, the associate IT director at QUT, Ms. Kathy Hessling and Mr. Stephen Callaghan, corporate systems Managers at QUT, and all corporate systems managers at QUT who participated in this study.

REFERENCES

1. Al-Mashari, M., Al-Mudimigh, A., & Zairi, M. (2003). Enterprise resource planning: A taxonomy of critical factors. *European Journal of Operational Research*, 146(2), 352-364.
2. Amoako-Gyampah, K. (2004). ERP implementation factors. *Business Process Management*, 10(2), 171-183.

3. Bajwa, S., Garcia, E., & Mooney, T. (2004). An integrative framework for the assimilation of enterprise resource planning systems: Phases, antecedents, and outcomes. *Journal of Computer Information Systems*, 44(3), 81-90.
4. Beekhuizen, J., Goodwin, M., & Nielsen, L. (2002). ERP in universities: The Australian explosion. Paper presented at the 13th Australian Conference on Information Systems (ACIS), Melbourne, Australia.
5. Beheshti, H. (2006). What managers should know about ERP/ERP II. *Management Research News*, 29(4), 184-193.
6. Chen, I. J. (2001). Planning for ERP systems: analysis and future trend. *Business Process Management*, 7(5), 374-386.
7. Cooke, D., & Peterson, W. (1998). SAP Implementation: Strategies and Results. Research Report (1217-98-RR), The Conference Board: New York, NY.
8. Davenport, H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76(4), 121-131.
9. David, Smith, J., Maccracken, H., & Reckers, P. (2003). Integrating Technology and Business Process Analysis into Introductory Accounting Courses. *Issues in Accounting Education*, 18(4), 417-425.
10. Ehie, I., & Madsen, M. (2005). Identifying critical issues in enterprise resource planning (ERP) implementation. *Computers in Industry*, 56, 545-557.
11. Fisher, D. (2006). Staff Perceptions of an Enterprise Resource Planning System Implementation: A Case Study of three Australian Universities. Unpublished PhD Thesis, Central Queensland University, Queensland, Australia.
12. Frantz, S. (2001). Perceptions of selected administrators regarding Enterprise Planning software implementation best practices, and the relationship between these perceptions and selected variables. Unpublished doctoral thesis, The University of Southern Mississippi.
13. Greci, R., & Hull, B. (2004). New Dog, Old Tricks: ERP and the Systems Development Life Cycle. *Journal of Information Systems Education*, 15(3), 277-286.
14. Heiskanen, A., Newman, M., & Simila, J. (2000). The social dynamics of software development. *Accounting, Management and Information Technology*, 10(1), 1-32.
15. King, P. (2002). The promise and Performance of Enterprise Systems in Higher Education, Respondent Summary. Retrieved September 10, 2008, from http://net.educause.edu/ir/library/pdf/ecar_so/ers/ers0204/EKF0204.pdf
16. Klaus, H., Rosemann, M., & Gable, G. (2000). What Is ERP? *Information Systems Frontiers*, 2(2), 141-162.
17. Landry, P., Harold, J., Longenecker, H., & Feinstein, D. (2003). A Common Theme for IT Degree Programs. *Communications of the ACM*, 46(11), 117-120.
18. Lockwood, G. (1985). Universities as organizations. In G. Lockwood & J. Davies (Eds.), *Universities: The Management Challenge* (pp. 139-163). Windsor, UK: NFER-Nelson Publishing.
19. Mabert, V. A., Soni, A., & Venkataramanan, M. A. (2003). Enterprise resource planning: managing the implementation process. *European Journal of Operational Research*, 146, 302.
20. Murphy, C. (2004). Once and Future King of Campus Computing. *Campus Technology*. Syllabus Media Group. Retrieved August 13, 2008, from <http://www.campustechnology.com/article.asp?id=8868>
21. Nah, F., & Delgado, S. (2006). Critical success factors for enterprise resource planning implementation and upgrade. *The Journal of Computer Information Systems*, 46(5), 99-113.
22. Okland, S. (1995). *Total Quality Management- Text with Cases*. Oxford: Butterworth-Heinemann.
23. Oliver, D., & Romm, C. (2000). Issues in university administration systems: A regional Australian case. Paper presented at the 15th Annual Conference of the International Academy for Information Management (IAIM), Brisbane, Australia.
24. Parr, A., & Shanks, G. (2000). A model of ERP project implementation. *Journal of Information Technology*, 15(4), 289-303.
25. Peffers, K., Gengler, C. E., & Tuunanen, T. (2003). Extending Critical Success Factors Methodology to Facilitate Broadly Participative Information Systems Planning. *Journal of Management Information Systems*, 20(1), 51-85.
26. Pollock, N., & Cornford, J. (2004). ERP Systems and the University as a "unique" organisation. *Information Technology and People*, 17(1), 31-52.
27. QUT. (2009). QUT Institutional Plan (QUT Blueprint). Retrieved June 13, 2009, from http://www.qut.edu.au/about/university/qut_blueprint_2008.pdf

28. Rabaa'i, A. (2009a). Identifying critical success factors of ERP Systems at the higher education sector. Paper presented at the Third International Symposium on Innovation in Information & Communication Technology (ISIICT, 15 - 17 December, 2009), Philadelphia University, Amman, Jordan.
29. Rabaa'i, A. (2009b). The Impact of Organizational Culture on ERP Systems Implementation: Lessons from Jordan. Paper presented at the 13th Pacific Asia Conference on Information Systems (PACIS): July 10-12, 2009, Hyderabad, India
30. Rabaa'i, A., Bandara, W., & Gable, G. (2009). ERP Systems in the Higher Education Sector: A Descriptive Case Study. Paper presented at the 20th Australasian Conference on Information Systems. , Monash University: Caulfield Campus, Melbourne (2-4 December 2009).
31. Seddon, P., Calvert, C., & Yang, S. (In Press). A Multi-project Model of Key Factors Affecting Organizational Benefits from Enterprise Systems. *MIS Quarterly*.
32. Shehab, M., Sharp, W., Supramaniam, L., & Spedding, A. (2004). Enterprise resource planning- An integrative review. *Business Process Management*, 10(4), 359-386.
33. Siau, K. (2004). Enterprise resource planning (ERP) implementation methodologies. *Journal of Database Management*, 15(1), i-vi.
34. Soja, P. (2006). Success factors in ERP systems implementations: lessons from practice. *Journal of Enterprise Information Management*, 19(6), 646-661.
35. Somers, M., & Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations. Paper presented at the 34th Hawaii International Conference on System Sciences, Hawaii.
36. Stewart, G., Gable, G., Andrews, R., Rosemann, M., & Chan, T. (1999). Lessons from the field: A reflection on teaching SAP R/3 and ERP implementation issues. Paper presented at the Americas Conference on Information Systems, Milwaukee Wisconsin: August 16-19, 1999.
37. Sumner, M. (2000). Risk factors in enterprise-wide/ERP projects. *Journal of Information Technology*, 15, 317-327.
38. Umble, E. J., Haft, R. R., & Umble, M. M. (2003). Enterprise resource planning: implementation procedures and critical success factors. *European Journal of Operational Research*, 146, 241-257.
39. Verville, J., & Bernadas, C. (2005). So you're thinking of buying an ERP? Ten critical factors for successful acquisitions. *Journal of Enterprise Information Management*, 18(6), 665-677.
40. Von Hellens, L., & Beekhuyzen, J. (Eds.). (2005). *Qualitative Case Studies on Implementation of Enterprise Wide Systems*. Hershey, USA: IDEA Group Publishing.
41. Watson, E., & Schneider, H. (1998). Integrating the SAP R/3 System into an MIS Program. Paper presented at the Americas Conference on Information Systems, Indianapolis: August 16-19, 1998.