An Exploration of the Implementation and Effectiveness of IT Governance Processes in Institutions of Higher Education in Australia

Jyotirmoyee Bhattacharjya
School of Information Systems
Curtin University of Technology
jyoti.bhattacharjya@gmail.com

Vanessa Chang
School of Information Systems
Curtin University of Technology
vanessa.chang@cbs.curtin.edu.au

Abstract

Over the past decade, IT governance has become a key issue of concern for senior IT decision makers around the world. This exploratory study examined how IT governance is being implemented through a number of processes, structures and relational mechanisms in four leading institutions of higher education in Australia. This paper will focus particularly on the implementation of IT governance processes in these institutions and examine how internationally recognized standards such as COBIT, ITIL and ISO17799 are being utilized in this implementation. The study reveals a number of findings in the context of the implementation of IT governance processes in the higher education environment.

Key Words: IT governance processes, IT governance and management standards, higher education sector

1.   INTRODUCTION

IT governance has emerged as an important issue in organizations across the world. This paper analyses how formal IT governance practices are implemented in four major Australian institutions of higher education, and the issues that these institutions face in the implementation of IT management and governance standards. Section 2 discusses the relevant literature followed by a discussion of the research question and methodology in section 3. Section 4 discusses the IT governance processes in the four case study institutions followed by the findings and conclusions in sections 5 and 6 respectively.

2.   LITERATURE REVIEW

In the wake of the Enron and MCI WorldCom incidents in the US, corporate governance issues have received increasing attention across the world. Corporate governance is essentially defined as *"... the system by which companies are directed and managed. It influences how the objectives of the company are set and achieved, how risk is monitored and assessed, and how performance is optimised"* (ASX 2003). IT governance has been recognized as a key area of concern under the umbrella of corporate governance because of the pervasive influence of information systems and the associated technology infrastructure in every area of an organization's activities. The IT Governance Institute describes IT governance as being an integral part of the corporate governance which consists of *"the leadership and organizational structures and processes that ensure an organization's IT*

sustains and extends the organization's strategy and objectives" (ITGI 2003). IT governance can be challenging to implement and can often lag behind the implementation of corporate governance in an organization. This is seen both in the present study and in previous literature discussed in Section 2.1. Section 2.2 discusses the IT governance implementation framework proposed by De Haes and Van Grembergen (2004). The implementation of IT governance in the case study institutions in this study will be examined against this model. Section 2.3 highlights some of the internationally recognized standards that are available to IT professionals for governing and managing IT. This is followed by a brief overview (in Section 2.4) of the Australian higher education sector and the importance of implementing IT governance practices in this sector.

2.1 Previous Research in IT Governance

The term IT governance, started to appear in the research literature towards the late 1990s, with its main proponent being the IT Governance Research Institute (De Haes and Van Grembergen 2005). Since then, the need to implement and improve IT governance has been receiving growing recognition by senior IT management across the world. However, implementing IT governance can be an extremely complex undertaking (Brown 1997; Sambamurthy and Zmud 1999; Duffy 2003; Marshall and McKay 2003; De Haes and Van Grembergen 2004; Weill and Ross 2005). A survey of top 10 priorities for senior IT management by Gartner Inc. in 2003, found the need for improving IT governance to be included in the list for the first time (De Haes and Van Grembergen 2004). In 2003, the IT Governance Institute conducted a survey through PricewaterhouseCoopers of 335 CEO/CIO level executives around the world in order to determine their IT governance priorities (ITGI 2004). The survey found that while 75% executives recognized the requirement for implementing IT governance only 40% were taking any action in this direction.

2.2 An IT Governance Implementation Framework

Based on the work of Peterson (2003), De Haes and Van Grembergen (2004) propose that IT governance can be implemented through a framework of structures, processes, and relational mechanisms. This framework is presented in Table 1. Structures include the existence of well defined roles and responsibilities and IT steering committees. Processes involve strategic decision making and the use of various IT governance and management standards (eg. COBIT and ITIL) which can provide the IS organization with the means of examining its activities and its value to business. Relational mechanisms include shared learning and strategic dialogue between business and IT, and ensuring proper communications at all times.

	Structures	Processes	Relational Mechanisms	
Tactics	− IT executives and accounts − Committees and councils	− Strategic IT decision making − Strategic IT monitoring	− Stakeholder participation − Business/IT partnerships	− Strategic dialog − Shared learning
Mechanisms	− Roles and responsibilities − IT organization structure − CIO on board − IT strategy committee − IT steering committee(s)	− Strategic information systems planning − Balanced IT scorecards − Information economics − Service level agreements (SLA) − COBIT and ITIL − IT alignment/ governance maturity models	− Active participation by principal stakeholders − Collaboration between principal stakeholders − Partnership rewards and incentives − Business/IT co-location	− Shared understanding of business/IT objectives − Active conflict resolution (non-avoidance) − Cross-functional business/IT training − Cross-functional business/IT job rotation

Table 1: A framework of structures, processes and relational mechanisms for implementing IT governance (Source: De Haes & Van Grembergen 2004)

2.3 International and Local Standards For IT Governance

Oud (2005) highlights the value of adopting internationally recognized standards for the governance and management of IT. A number of international standards such as Control Objectives for Information and Related Technology (COBIT), ISO17799, IT Infrastructure Library (ITIL) and Capability Maturity Model (CMM), Project Management Body of Knowledge (PMBOK), are now available to IT organizations to help them improve their accountability, governance, and management. These standards are not necessarily mutually exclusive and increasing the value of IT from a business perspective requires an understanding of their strengths, weaknesses and focus.

COBIT is designed by the IT Governance Institute as a high-level "umbrella" standard for IT governance and it works very well with other standards like ITIL and ISO17799 which focus on specific aspects of IT management (Chickowski 2004). It contains 34 high-level control objectives and 318 detailed control objectives defined for four IT domains: planning and organization, acquisition and implementation, delivery and support, and monitoring. ITIL is the de-facto standard for IT service management and is organized around five areas: business perspective, application management, infrastructure management, service delivery and service support. ISO17799 provides guidelines for the security and risk management aspects of IT. Organizations can benefit from adopting what they find useful from each standard rather than just adopting a single one.

In addition to these international standards, Australian organizations have three local standards available to guide their IT governance and management practices (SAI 2006). These are AS 8015-2005 (ICT governance standard), AS 8018.1-2004 (specification for ICT service management) and AS 8018.2-2004 (code of practice for ICT service management).

2.4 IT Governance in Australian Institutions of Higher Education

Higher education is a multi-billion dollar industry in Australia, and as such, is of vital importance to the country's economy (Higher Education IT Consultative Forum 2000; Nelson 2002). There is much work needed to be done by university governing bodies and policy makers in order for these universities to continue tapping emerging information technologies in order to maintain their competitive positions internationally. The issues range from infrastructure, applications, delivery and services to staffing and appropriate regulatory frameworks. IT applications have also not yet penetrated all aspects of university teaching and more effort is required to bring about improvements in this area. However, despite the wide range of concerns facing IT governing bodies in Australian universities, there has been very little research regarding how IT governance may be implemented in these institutions in order to generate maximum value from IT.

3.   RESEARCH QUESTION AND METHODOLOGY

The study investigated the implementation of IT governance practices in four Australian institutions of higher education. The overall research question was as follows:

How is IT governance implemented within the higher education environment in Australia?

As suggested by Benbasat et al. (1987), the case research method is useful for addressing the "how" questions, i.e., in the exploratory stage of knowledge building. This is particularly useful for a study on IT governance in the context of institutions of higher education in Australia, where the knowledge of researchers regarding new methods, techniques, problems and prospects lags that of practitioners. A case research strategy was expected to provide rich insight in this context. Four leading institutions of higher education in Australia in different stages of adopting and implementing formal IT governance practices were selected for the study based on the availability of senior IT and business decision makers in these institutions for participating in this research. The number of case study institutions selected for the study are in keeping with the work of Eisenhardt (1989) who recommends a sample

of between four and 10 cases for in-depth qualitative case studies. Another factor in the selection of the total number of cases was the researchers' time constraint (six months) for completing this study.

All participating institutions in this study are recognised as universities by the Australian Vice-Chancellor's Committee (AVCC), which advances higher education in Australia through voluntary, cooperative and coordinated action amongst its member institutions. In order to gain a comprehensive understanding of IT governance practices within the sector, institutions were selected based on their membership of different groups based on their research and teaching objectives within this sector. The institutions selected included members of the Group of Eight (Go8), Australian Technology Network of Universities (ATN) and Innovative Research Universities Australia (IRU). Senior IT decision makers were identified from the organizational charts and interviewed briefly (for five to 10 minutes) over the phone in order to obtain an initial understanding of IT governance practices in their institutions as well as their willingness and availability for participating in this study. Once the participating IT decision makers in a particular institution were identified, senior business decision makers (also identified from the organizational chart) in that institution were contacted and requested to participate in the study. The first set of interviews was conducted in Institution A. During these interviews the questionnaires were further refined. The data collected was primarily qualitative in nature. The data was gathered from semi-structured interviews with senior IT and business decision makers in the four institutions as well as from relevant documents obtained from interviewees and the websites of the institutions. The interviews with IT decision makers were between 60 and 90 minutes in duration. The interviews with business decision makers lasted between 45 to 60 minutes. The interviews were recorded and later transcribed and analyzed. Further information and clarifications were obtained via email. The data sources from the institutions are summarized in Table 2. In keeping with participants' requests for anonymity, the institutions will be referred to as Institutions A, B, C and D in this paper.

Institution	Interviewees	Documents
Institution A	- 2 senior IT decision makers - 2 senior business decision makers	- Overall strategic plan and strategic IS plan - Draft form of disaster recovery plan - Organizational chart and committee structures - Security policies and procedures - Personnel statistics - Student satisfaction surveys - Corporate governance statement
Institution B	- 2 senior IT decision makers - 1 senior business decision maker	- Overall strategic plan and strategic IS plan - Draft IT governance model - Organizational chart and committee structures - Security policies and procedures - Personnel statistics - Corporate governance statement
Institution C	- 2 senior IT decision makers - 1 senior business decision maker	- Overall strategic plan and strategic IS plan - Organizational chart and committee structures - Security policies and procedures - Corporate governance statement - Annual report
Institution D	- 1 senior IT decision maker - 1 senior business decision maker	- Overall strategic plan and strategic IS plan - Draft IT governance model - Security policies and procedures - Personnel statistics - Organizational chart - Corporate governance statement

Table 2: Data sources from the four case study institutions

4.   THE CASE STUDY INSTITUTIONS

The IT governance structures and relational mechanisms in the case study institutions have been discussed in details elsewhere (Bhattacharjya and Chang 2006, Bhattacharjya 2006). The overall trend in these institutions with regards to IT governance structures is toward centralization of the IT organization, and IT governance relational mechanisms have been directed toward building closer ties with the business. This section focuses on the IT governance processes in the institutions.

4.1 Institution A

The institution has an overall strategic plan and follows a balanced scorecard. ICT has an ICT enabling plan, which is regularly updated. An important issue in this regard is that this ICT enabling plan is not directly associated with a budget for strategic expenditures.

IT management decision making within the institution is influenced by the guiding principles of the Australian ICT governance standard AS 8015-2005 and the service management standards AS 8018.1-2004 and AS 8018.2-2004. However these standards were found not provide the level of granularity required for guiding implementation as provided by COBIT and ITIL. COBIT has been adopted since 2000 for assessing and improving the institution's IT governance processes. A direct effect of this has been the realization by senior IT decision makers that the effective utilization of COBIT across the institution requires a more centralized IT governance environment. However, given the size of the COBIT framework, only a small number of processes and objectives are identified for review each year. The objectives were initially based on a large number of interviews conducted across the campus in 2000 by IT staff. In subsequent years, objectives have been identified based on the original interviews and results of annual survey of student and staff satisfaction on IT issues.

ITIL is used as the standard for service management. A number of operational level staff members have ITIL Foundation level training. The current focus is on getting better at incident management, change management, problem management, IT strategic planning and managing the IT architecture. The progress made has also been assessed against COBIT and ITIL. Consultative, Objective and Bi-functional Risk Analysis (COBRA), a software package, based on ISO17799 is being used for facilitating risk management.

Since COBIT requires the use of a standard project management methodology, Project Management Body of Knowledge (PMBOK) has been selected as the guide in this regard. Based on the perceptions of business decision makers, in the last two years IT has shown considerable maturity in project management and delivery. This is the result of adopting a strong project management methodology.

People Capability Maturity Model (P-CMM) is used as the standard of IT staff management and development. However, a lot of work is required in the area of staff development.

The value to business from the implementation of best practice frameworks has been in terms of reducing the number of ad-hoc processes, bringing a lot of discipline to IT support activities and improving accountability. Whilst IT has made significant strides since the year 2000, the IT management recognizes that there is a long journey ahead.

One problem that has been faced in implementing the best practice frameworks like COBIT, which have high resource requirements, has been the shortage of adequate staff. The demand for staff time and services are also increasing. Most of the central IT teams find it difficult and at times challenging to achieve their operational objectives. Staffing in the server support area, for example, consists of about 10 people supporting 300 servers of various kinds, implementing, changes to the infrastructure as well as managing large applications used by thousands of people. Despite the staffing issue, however, process improvements continue to take place because of the continued commitment of senior IT management.

Another key area of difficulty has been that of finding appropriate performance metrics measurement. Currently, technical measures being used include percentage downtime, percentage access failure, the number of students accessing email on a regular basis on the official communications channel, etc. One particular measure, the number of available desktops in the computer laboratories per student was found to be not particularly useful. It was found that when the number of desktops was doubled based on survey responses; the satisfaction level was actually lower than in the previous year. Management decision makers in the institution attribute this to the increasing expectations from ICT with the rapid advances technology. The institution continues to develop a balanced business-IT metrics.

4.2 Institution B

The COBIT framework has been utilized differently here than in Institution A. While Institution A has primarily used COBIT to evaluate and improve key IT processes, Institution B has utilized COBIT to develop its overall IT governance model and outline the various roles and responsibilities. The development of the IT governance model has resulted in substantial involvement of business decision makers in making decisions regarding IT investment, risk and priorities. This has made it easier for business decision makers to appreciate the value of key decisions regarding IT. The initial problem faced in the implementation of the model was the lack of IT governance concepts amongst business decision makers and the resistance to change. This is gradually being overcome and the need for accountability for IT related decision making across the institution is better accepted. This is achieved by communicating to business decision makers their roles and responsibilities in IT related decision making for the benefit of the business, without making it necessary for them to know any technical details regarding COBIT.

COBIT is also being used for risk management. IT management felt that while ISO17799 provided guidance on what needed to be achieved in the context of security, COBIT provided more detailed guidelines on how these goals should be achieved. The IT security manager has been trained in ISO17799 and will additionally undertake the security management training program provided by the developers of COBIT. The institution has an overall strategic plan and central IT undertakes strategic information systems planning under the supervision of the IT steering committee.

SLAs are in place for hosting and managing application systems including the student system, the facilities management system, the HR and finance system. At present there is a lack of enterprise-wide standards for infrastructure and applications. The key issues that IT intends to tackle over the next year include the lack of standards and controls and the existence of multiple help desks. As part of the central IT service desk project, it is planned to implement ITIL to handle change and incident management over the next few months. As part of the ITIL implementation service desk staff will be required to undertake ITIL Foundation level training. Capability is also being built up in the project management and business process analysis domain to reduce the current dependence on external consultants.

As in the case of Institution A there is difficulty in deciding on which metrics to measure. Current metrics being used include the number of service calls being answered to completion, the number of network and database administrators and the ratio of total IT cost to organizational cost. However, there is a realization that these metrics are not adequate for representing the value of IT to business.

4.3 Institution C

Intra-industry benchmarking is emphasized in Institution C due to the experience of the senior-most IT decision-maker with IT benchmarking practices. IT undertakes strategic IS planning regularly and maintains SLAs with its clients within the institution. Disaster recovery planning (DRP) and business continuity planning (BCP) have been undertaken

since 2004. Being able to successfully involve the business side has resulted in this institution being ahead of the other three with respect to BCP.

At present central IT is in the process of adopting ITIL and both management and staff have received basic ITIL training. While incident management with ITIL has been accomplished satisfactorily, change and configuration management require further attention. The adoption of ITIL has led to improvement in the customer focus of IT and a consolidation of the helpdesk. This has in turn led to satisfaction amongst customers across the institution.

Central IT uses APT methodology developed by APT Systems as its project management methodology. The APT methodology is aligned with PMBOK. Following the methodology ensures that stakeholders stay involved in the project and the outcome is a quality product. Some of the development work is outsourced. Knowledge of APT methodology is required of external developers when outsourcing is done. This ensures the end product would be satisfactory by internal standards. The APT methodology requires undertaking risk assessment during projects. This has led to risk analysis workshops being undertaken in conjunction with key stakeholders for each project under the guidance of the internal audit department. The disadvantage of using a formal methodology, is the almost 30% overhead in terms of cost and time when using a formal methodology. However, according to the IT managers, the advantages far outweigh the overheads.

IT currently uses some functional cost efficiency measures such as number of helpdesk calls resolved, average length of customer time spent in queue, number of support staff, number of data network points, etc. As in the other institutions this area needs to be further addressed.

4.4 Institution D

The institution undertakes strategic IS planning. Although the process existed before 2004, it was more mechanical than effective. A key problem was the uncertainty of the cost to implement the developed strategies as no budget was associated with the plan. This issue is currently being addressed by the IT Director. The priority areas addressed by the strategic IS plan include IT architecture and standards, service delivery, technology for flexible teaching and learning, web portals, electronic communications, security and costs.

Developing appropriate indicators to extract the value of the IT has proved difficult. The measurements for a set of indicators also need to be made over a period of time in order to provide useful information. Key indicators currently being used include financial indicators, network performance indicators (up and down times), application availability indicators, service desk performance indicators (numbers of calls, levels of service, etc) and HR indicators (absentees, staff on leave, attendance at meetings, etc). Since the statistics have only been collected for a year, there is a lot more work needed in this area.

The potential for implementing ITIL and establishing a single incident management process as well as the possibility of reducing the duplication of processes led to one of the first initiatives taken by the present IT Director in 2004. This involved the consolidation of a number of different helpdesks spread across the institution into one centralized helpdesk in order to provide a single point of contact for users. The possibility of expanding the services of this consolidated helpdesk to include HR and finance related services as well as commercial services is currently also under consideration.

The institution has a good policy framework. However, the problem with the implementation of the security policy lies in getting the policy across to users, given the high turnover of students and staff. The added problem is of students attempting to breach security wilfully.

A process of identifying critical systems was started in 2005 and a disaster recovery plan is currently under development. A complete audit of PCs, servers, domain name servers, IP addresses is also being conducted to gain an understanding of the physical environment in

the event of a disaster. The disaster recovery plan outlines processes for recovering critical systems within 24 hours. At a granular level, the plan refers to processes for dealing with the loss of primary, secondary and tertiary computer sites as well as the loss of individual systems. The development of the disaster recovery plan is expected to be followed by the development of business continuity plans in conjunction with business process owners. However the difficulty lies in making business process realise that BCP needs to be driven by the business rather than by IT.

It must be noted here that while ITIL has been adopted as the best practice framework for IT service management and all central IT staff have received some basic training on ITIL, there is no industry standard being followed for project management. It is possible that this may be a cause for a somewhat less satisfactory performance of IT with respect to project management than in relation to helpdesk services.

5.   FINDINGS

The increased dependence of IT in the higher education environment has led to the need for implementing formal IT governance practices. The four case study institutions (A, B, C, and D) have been implementing IT governance through a mixture of structures, processes and relational mechanisms as suggested by the De Haes and Van Graembergen (2004) framework. Moreover, the focus of IT governance implementation seems to be on five key areas as described by the IT Governance Institute (2003). The five focus areas are: 1) strategic alignment, 2) value delivery, 3) risk management, 4) resource management, and, 5) performance measurement. IT governance in the four institutions is implemented through a number of processes, structures and relational mechanisms in the context of these five areas. This is illustrated in Figure 1 below.
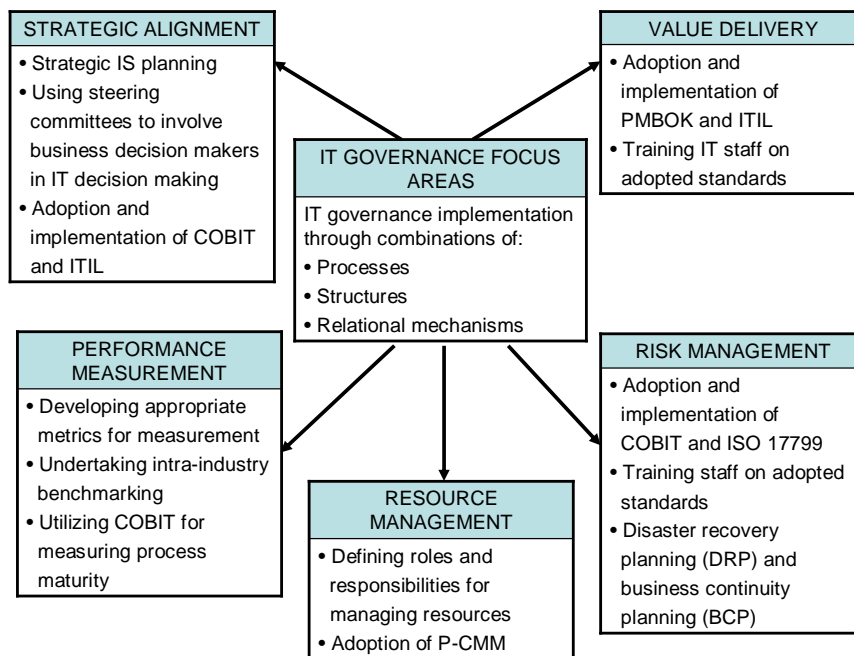

Figure 1: Key IT governance practices in Institutions A, B, C and D in relation to the of the five focus areas of IT governance

As shown in Figure 1, the focus area of strategic alignment in the four institutions appears to be addressed through processes such as strategic IS planning and the adoption and implementation of standards such as ITIL and COBIT that help in the attainment of business objectives. Structures like steering committees are used to involve business decision makers

in strategic level IT decision making. This growing interaction between business and IT is helping to build a shared understanding between business and IT on key issues. This is an important relational mechanism in the De Haes and Van Grembergen framework (2004).

With respect to value delivery (Figure 1), the adoption of standards such as PMBOK and ITIL for improving project management and service delivery was found to be an important process. While ITIL has been adopted by all four institutions, PMBOK appears to have been adopted by institutions A and C only. Attention given by management to ensure staff training was found to be an important relational mechanism.

COBIT and ISO17799 were found to be utilized by institutions A and B for risk management purposes (Figure 1). Institutions C and D appeared to be ahead of the other two in terms of DRP, while BCP was the most advanced in institution C.

It must be noted that although all four institutions had reasonably well understood roles and responsibilities (Figure 1) for the management of key resources such as business applications and supporting infrastructure (Bhattacharjya and Chang 2006; Bhattacharjya 2006), the institutions are all yet to have a formal documented governance model in place clearly outlining these structures. The adoption of P-CMM is guiding the management of human resources in institution A.

As in other industries measuring the performance of IT remains a big challenge for IT decision makers in institutions of higher education and suitable measures are gradually being developed (Figure 1). COBIT has been used for evaluating IT process maturity in Institution A. Intra-industry benchmarking practices are also gradually catching on.

The fact that different combinations of processes, structures and relational mechanisms have been used to address five focus areas in the four case study institutions, suggests the possibility for providing further granularity to the De Haes and Van Grembergen framework as shown in Figure 2.
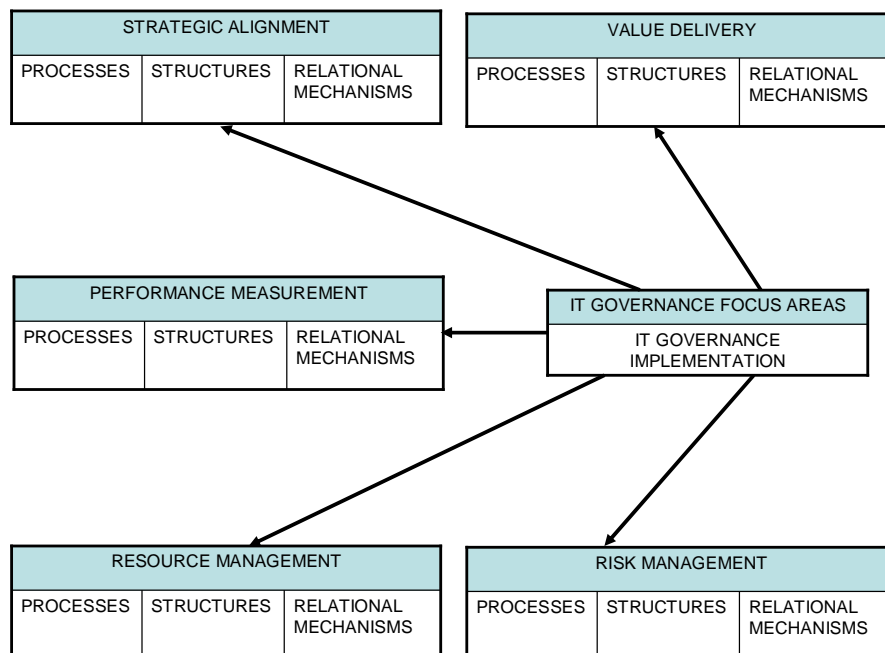

Figure 2: A generalized IT governance implementation model based on the findings of this study and the De Haes and Van Grembergen (2004) framework.

In Figure 2, the implementation of IT governance through processes, structures and relational mechanisms is categorized by the five focus areas of IT governance: strategic alignment, value delivery, performance measurement, resource management and risk

management. This generalized framework shown in Figure 2 could potentially be used by any organization in any industry sector as a guideline for developing and documenting its formal IT governance model. The specific combination of processes, structures and relational mechanisms under each category would differ based on the specific business requirements of the organisation. The benefits to business from implementing IT governance could be gauged by the perceived improvements in these five focus areas.

Other key findings with regard to the implementation of IT governance at the four case study institutions include the following:

(i)   Senior IT decision-makers in all four institutions agree that while an institution of higher education has to deal with low staffing levels, this should not be a deterrent in adopting industry best practices. However, each institution needs to implement best practice frameworks based on its business needs and available resources.

(ii)   COBIT requires the use of a good project management methodology. Institution A's adoption of COBIT has led to its adoption of PMBOK. This was particularly important as the institution's IT staff undertake a considerable amount of the project implementation and delivery work in-house. Institution C has adopted APT methodology as its project management methodology and has benefited from training its own staff as well as requiring its outsourcing partners to have an understanding of the methodology.

(iii) In all four institutions improving communication between central IT and divisional IT groups is helping in the general acceptance of central IT standards.

(iv)   In all four institutions improving communication between IT and business has led to the gradual acceptance of IT as a valued service provider rather than just a cost of doing business.

(v)   Institutions A and B have realized that although the use of multiple learning management systems and multiple email systems may be the existing norm in the divisions, this leads to duplication of ICT staff efforts without increasing the satisfaction of staff and students across the institution. A consolidation of systems could potentially lead to reduced costs (e.g. reduction in staff numbers).

(vi)   Equally as important as consolidation of systems is the consolidation of services. In institution C and D the consolidation of the helpdesk has led to increased satisfaction amongst users.

(vii) Strategic IS planning and DRP appear to have improved over past practices, however, BCP requires further attention. Improving technological support for e-learning has become a key issue in strategic IS planning in all four institutions.

(viii) The IT governance structure is in different stages of evolution towards a more centralized model in all four institutions.

6.   CONCLUSIONS AND FUTURE WORK

The paper highlights some key issues regarding the adoption of formal IT governance practices in the higher education sector for the benefit of practitioners, academics, and researchers. While some useful insights into IT governance practices in this sector have been obtained from this study, the researchers intend to conduct a longitudinal study in order to gain a better understanding of the business benefits of formal IT governance practices in this sector.

7.   REFERENCES

ASX (2003). Principles of Good Corporate Governance and Best Practice Recommendations. Retrieved January 15, 2006, from http://www.asx.com.au/about/pdf/ ASXRecommendations.pdf.

Benbasat, I., Goldstein, D. & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems, *MIS Quarterly*, 11, 3, 368-386.

Bhattacharjya J. & Chang, V. (2006, July 18). The Evolving IT Governance Practices for IT and Business Alignment – A Case Study in an Australian Institution in *Proceedings of the 4th Annual Conference on Information Science, Technology and Management*, Chandigarh, India.

Bhattacharjya J. (2006). *Capitalizing Business Benefits Through the Use of IT Governance Best Practices*. Masters Thesis. Curtin University of Technology.

Brown, C. V. (1997) Examining the Emergence of Hybrid IS Governance Solutions: Evidence from a Single Case Site, *Information Systems Research*, 8, 1, 72-94.

Chickowski, E. (2004). Models of IT Governance – Is it time to evaluate your decision-making process? *Processor*, 26, 15. Retrieved January 15, 2006, http://www.processor.com/ editorial/article. asp.

De Haes, S. and Van Grembergen, W. (2004). IT Governance and its Mechanisms. *Information Systems Control Journal*, 1.

De Haes, S. D. & Van Grembergen, W. (2005). IT Governance Structures, Processes and Relational Mechanisms: Achieving IT/Business Alignment in a Major Belgian Financial Group in *Proceedings of the 38th Hawaii International Conference on System Sciences*, Hawaii.

Duffy, J. (2003) IT Governance and Business Value Part 1: IT Governance – An Issue of Critical Influence, Retrieved January 15, 2006, from http://www.networkworld.com/ research/reports/IDC27291.html.

Eisenhardt, K. M. (1989) Building Theories from Case Study Research. *Academy of Management Review*, 14, 4, 532-550.

Higher Education IT Consultative Forum. (2000). *The Way Forward – Higher Education Action Plan for the Information Economy Department of Education Science and Training*, Retrieved January 15, 2006, from http://www.backingaustraliasfuture.gov.au/ fact_sheets.htm.

ITGI (2003). Board Briefing on IT Governance, Retrieved January 15, 2006, from http://www.itgi.org.

ITGI (2004). IT Governance Global Status Report, Retrieved January 15, 2006, from http://www.isaca.org.

Marshall, P. and McKay, J. (2003) Steps Towards Effective IT Governance: Strategic IT Planning, Evaluation and Benefits Management in *Proceedings of the 7th Pacific Asia Conference on Information Systems,* Adelaide, South Australia.

Nelson, B. (2002). *Higher Education at the Crossroads – An Overview Paper*. Retrieved January 15, 2006, from http://www.backingaustraliasfuture.gov.au/ fact_sheets.htm.

Oud, E. J. (2005). The Value to IT of Using International Standards, *Information Systems Control Journal*, 3.

Peterson, R. (2003). Information Strategies and Tactics for Information Technology Governance. In Van Grembergen (Ed.), *Strategies for Information Technology Governance*. Pennsylvania: Idea Group Publishers.

SAI. (2006).Welcome to the Technology Focus, Retrieved January 15, 2006, from http://www.saiglobal.com/shop/script/ PortalIT.asp.

Sambamurthy, V. and Zmud, R.W. (1999). Arrangements for Information Technology Governance: a Theory of Multiple Contingencies. *MIS Quarterly*, 23, 2, 261-290.

Weill, P. and Ross, J. (2005) A Matrixed Approach to Designing IT Governance. *MIT Sloan Management Review*, 46, 2, 26-34.