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# The Role of IT Governance in the Evolution of Organizations in the Digital Economy: Cases in Australian Higher Education

Jyotirmoyee Bhattacharjya<sup>1</sup> and Vanessa Chang<sup>2</sup>

<sup>1,2</sup>School of Information Systems, Curtin University of Technology, Perth, Australia  
e-mail: jyoti.bhattacharjya@gmail.com ; vanessa.chang@cbs.curtin.edu.au

**Abstract** — In recent years, IT governance has become a key concern issue for senior IT decision makers across various industries. When appropriately implemented, IT governance can play the role of a central nervous system effectively ensuring the wellbeing of the organizational system. The health of the organizational system ultimately contributes to the health of the distributed business ecosystem in which the organization co-exists with other organizations. The underlying goals for adopting formal IT governance practices are improvement of business performance and conformance with regulations. This exploratory study examined how IT governance is implemented in four Australian institutions of higher education through a number of IT governance structures, processes, and relational mechanisms. This paper discusses the importance of these practices as these institutions increasingly compete and collaborate with each other, various government agencies and other research institutions in the digital economy.

**Index Terms**—business ecosystems, governance, IT governance processes, Australian higher education ecosystem

## I. INTRODUCTION

IT governance has emerged as a vital issue for organizations across the world. This paper examines how formal IT governance processes are implemented in four Australian higher education institutions in the digital economy. A literature review of business ecosystems and IT governance issues in the Australian higher education domain is presented in Section II. Section III discusses the research questions and methodology. The case study institutions are described in Section IV. A discussion of IT governance processes in each institution is presented in Section V and a summary in Section VI. Section VII discusses the evolutionary status of the Australian higher education ecosystem and the significance of IT governance practices in this context with a conclusion in Section VIII.

## II. LITERATURE REVIEW

### A. Business Ecosystems

The term ‘ecosystem’ refers to a collection of organisms living together with their environment and functioning as a loosely interconnected dynamic unit [24]. The concept of a ‘business ecosystem’ was a strategic planning concept first introduced by Moore [16], who wrote: “I suggest that a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovation.” The elements of a business

ecosystem are: 1) governance, regulations and industrial policy, 2) human capital, knowledge and practices, 3) service and technical infrastructure, and 4) business and financial conditions [9]. Nachira [9] describes the term ‘digital business ecosystem’ (DBE), as shown in Fig. 1, as a complex ecosystem comprising of a business ecosystem layer supported by a multilayer digital ecosystem.

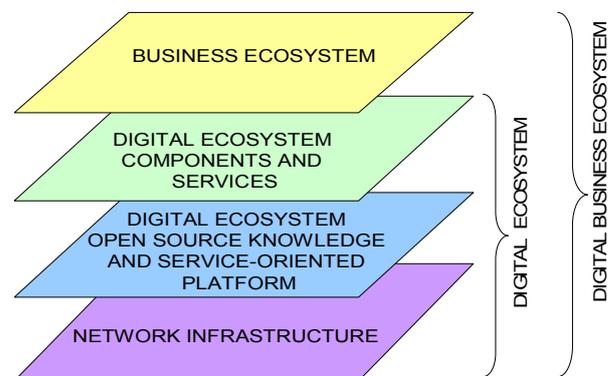


Fig. 1 Multi-layer digital business ecosystem (after Nachira [9])

Although the Australian higher education ecosystem can be discussed in terms of elements in all four layers of the digital business ecosystem model in Fig. 1, this paper focuses on an important element associated with the top layer (ie. business ecosystem layer) of the DBE – governance, specifically IT governance. The wellbeing of the individual enterprise can affect the wellbeing of the larger business ecosystem in which it co-exists with other organizations. Appropriate governance mechanisms therefore need to be in place in individual enterprises to ensure that harmony in the larger business ecosystem is maintained.

### B. Corporate and IT governance

Corporate governance has become important worldwide, especially in the wake of the Enron and MCI WorldCom incidents in the US. The Australian Stock Exchange Corporate Governance Council defines corporate governance 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” [1]. IT governance has become a key area under the umbrella of corporate governance because of the pervasive influence of information systems (IS) and the associated technology infrastructure in every area of an organization’s activities. The IT Governance Institute describes IT governance as 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” [12].

### C. Previous research in IT governance

The term IT governance, started to appear in the literature towards the late 1990s, with its main proponent being the IT Governance Research Institute [19]. Since then, the need to implement and improve IT governance is recognized by senior IT management across the world. However, implementing IT governance is a complex undertaking (eg. [5],[23],[15],[18],[20],[19]). A survey of top 10 priorities for senior IT management by Gartner Inc. in 2003, found the need to improve IT governance to be included for the first time [20]. In 2003, the IT Governance Institute conducted a survey through PricewaterhouseCoopers of 335 CEO/CIO level executives around the world to determine their IT governance priorities [12]. The survey found while 75% executives recognized the requirement for implementing IT governance only 40% were taking any action in this direction.

De Haes and Van Grembergen [21] propose that IT governance, as listed in Table 1, can be implemented through a framework of structures, processes and relational mechanisms. Structures include the existence of well defined roles and responsibilities and IT steering committees. Processes involve strategic IS planning and the use of various IT governance frameworks which provide the IS organization with the means to examine its activities and value to business. Relational mechanisms include shared learning and strategic dialogue between business and IT.

Key Elements in the implementation of IT governance
<b>Structures:</b> Roles and responsibilities, IT organisation structure, CIO on board, IT strategy committee, IT steering committee(s)
<b>Processes:</b> Strategic information systems planning, Balanced IT scorecards, Information Economics, Service Level Agreements, COBIT and ITIL, IT alignment/governance maturity models
<b>Relational mechanisms:</b> Active participation and collaboration between principle stakeholders, Partnership rewards and incentives, Business/IT collocation, Cross-functional business/IT training and rotation

Table 1. Structures, process and relational mechanisms for implementing IT Governance (De Haes and Van Grembergen [21])

### D. IT governance frameworks and standards

A number of IT best practice frameworks and standards such as Control Objectives for Information and Related Technology (COBIT), ISO17799, IT Infrastructure Library (ITIL) and Capability Maturity Model (CMM) are available to IT organizations to help them improve their accountability, governance, and management. COBIT is designed by the IT Governance Institute as a high-level “umbrella” framework for IT governance and it works well with frameworks like ITIL and ISO17799 which focus on specific aspects of IT management [8]. 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 managing the security aspect of IT.

A recent Forrester Research survey of 135 IT managers in North America revealed that about 20% rely on COBIT while another 20% use ITIL [6]. These frameworks are not necessarily mutually exclusive and increasing the value of IT from a business perspective requires an understanding of their strengths, weaknesses and focus [4]. IT governance frameworks are being increasingly adopted because they not only assure conformance with regulations but also help in ensuring performance [17]. Organizations may benefit from adopting what they find useful from each framework rather than just adopting a single one [8].

In addition to these frameworks and standards, Australian organizations have 3 local standards available to guide their IT governance and management practices [22]. 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). The information and communication technology (ICT) governance standard, AS 8015-2005, provides a set of principles for business decision makers regarding the effective and efficient use of ICT within their organizations, irrespective of the industry sector. The ICT service management standard, AS 8018.1-2004 adopts the British standard BS 15000-1:2002, and specifies the requirements for delivering an acceptable quality of managed IT services. The related standard, AS 8018.2-2004 adopts BS 15000-2:2003 and recommends a common terminology for IT service providers.

### E. IT governance in Higher Education Domain

Higher education is a multi-billion dollar industry in Australia, and as such, is importance to the country’s economy [10] [2]. It is a major consumer of IT products and services as well as a major provider of services using ICT. IT has helped the improvement of a range of activities including research, teaching, learning and administration. Significant developments have been made in the area of online teaching and learning. The demand for IT based products and services has also increased in the last 15 years due to a rapid increase in student population.

Much work is required to be done by university governing bodies and policy makers in order for these universities to tap and capitalize on emerging information technologies to maintain their competitive positions internationally [10]. The issues range from infrastructure, applications, delivery and services to staffing and appropriate regulatory frameworks. Also, IT applications have not penetrated all aspects of university teaching and effort is required to improve this area. Despite the wide range of concerns facing IT governing bodies in Australian universities in the digital economy, there has been very little research regarding how IT governance may be implemented in these institutions for it to provide optimal benefits to higher education.

## III. RESEARCH QUESTION AND METHODOLOGY

The paper investigates the adoption of IT governance practices in four Australian higher education institutions and discusses the significance of these practices in the higher education ecosystem. The research questions are:

- 1) *How are formal IT governance practices adopted and implemented within the higher education environment in Australia?*
- 2) *What is the significance of formal IT governance practices in the context of the evolving higher education ecosystem in Australia?*

As suggested by Benbasat et al [11], the case research 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 higher education institutions in Australia, where the knowledge of researchers regarding new methods, techniques, problems and prospects lags that of practitioners. Four leading Australian institutions in different stages of adopting and implementing formal IT governance practices were selected. In keeping with participants’ requests for anonymity, the institutions are referred to as Institutions A, B, C and D. The data collected was primarily qualitative in nature. The data was gathered from semi-structured interviews with 7 senior IT and 5 business decision makers as well as from relevant documents obtained from interviewees and the websites of the institutions. The interviews were recorded and later transcribed and analyzed.

#### IV. THE CASE STUDY INSTITUTIONS

The four institutions all have documented corporate governance structures and are in different stages of implementing formal IT governance practices. Institutions A and C have adopted formal IT governance practices since 2000. Institution B has started formalizing its practices since the beginning of 2006. Institution D has adopted formal IT governance practices since 2004. The institutions have revenues of between 300 to 500 million dollars and spend between 6-10% of their revenue on IT. All four institutions are members of the Australian Vice-Chancellor’s Committee (AVCC). While they cooperate for advancing Australian higher education through this forum, they also compete amongst each other for market share both locally and internationally.

#### V. IT GOVERNANCE FRAMEWORK

As indicated previously and also shown in Table 1, the key elements of structures, processes, and relational mechanisms are required to implement IT governance [21]. The IT governance structures and relational mechanisms in these institutions have been discussed elsewhere [13] [14], and will only be discussed briefly here. The overall trend in these institutions with IT governance structures is toward centralization of the IT organization. IT governance relational mechanisms are directed at building closer ties with the business. As stated earlier, IT governance processes involve strategic decision making and the use of various performance monitoring frameworks and tools such as Strategic IS Planning, COBIT, ITIL, Balanced Scorecard, and others [20]. This paper concentrates on the IT governance *processes* in these institutions. Each institution’s strategic IS planning is discussed first. This is followed with a discussion of the adoption of various performance monitoring frameworks and standards, and tools in each institution.

Issues surrounding the implementation of the above will also be discussed.

##### A. Institution A

The institution has an overall strategic plan and follows a balanced scorecard. IT has an ICT enabling plan, which is regularly updated. An important issue is that this ICT enabling plan is not directly associated with a budget for strategic expenditures. The present budget allocation for ICT is for staff, software licenses, site licenses, and refreshing the IT infrastructure.

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.

COBIT is adopted since the year 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 centralized IT governance environment. 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. In subsequent years, objectives have been identified based on the original interviews and results of an 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 training. The current focus is on getting better at incident management, change management, problem management, IT strategic planning and managing the IT architecture. Consultative, Objective and Bi-functional Risk Analysis (COBRA), based on ISO17799 is used for facilitating risk management.

Since COBIT requires the use of a standard project management methodology, Project Management Body of Knowledge (PMBOK) is selected as the guide. 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 the standard of IT staff management and development. However, a lot of work is required for 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 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 in implementing frameworks like COBIT 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 and managing large applications used

by thousands of people. Despite this, process improvements continue to take place because of the continued commitment of senior IT management.

Another difficulty area is finding appropriate performance metrics measurement. Current technical measures include percentage downtime, percentage access failure, and the number of students accessing their email on the official communications channel. A particular measure, the number of available desktops in the laboratories 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 facilities. The institution continues to work on developing a balanced business-IT metrics.

### *B. Institution B*

Institution B has an overall strategic plan and central IT undertakes strategic IS planning under the supervision of the IT steering committee. While Institution A has primarily used COBIT to evaluate and improve key IT processes, Institution B used 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 in the implementation of the model was the lack of IT governance concepts amongst business decision makers and resistance to change. This is gradually 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 the technical details of COBIT.

COBIT is also used for risk assessment and management. While ISO17799 provides guidance with security, COBIT guides management on how these goals should be achieved. The IT security manager is trained in ISO17799 and will undertake the security management training program provided by the developers of COBIT.

Capability is also being built up in the project management and business process analysis domain to reduce the current dependence on external consultants. Service level agreements (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. Other issues include the lack of standards and controls and the existence of multiple helpdesks. As part of the central IT service desk project, it is planned to implement ITIL to handle change and incident management. Service desk staff are required to undertake ITIL Foundation level training.

As in the case of Institution A there is difficulty in deciding on which metrics to measure. Current metrics used in-

clude 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.

### *C. Institution C*

Intra-industry benchmarking is important in Institution C due to the experience of the senior 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 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 others 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. APT is aligned with PMBOK. The software development group within IT have received training in APT. 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. Risk analysis workshops are conducted with key stakeholders for each project. The disadvantage of using a formal methodology is the almost 30% overhead in terms of cost and time when using a formal methodology.

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

### *D. 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 fact that there was no clear idea of what it would 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.

The IT Director believes in the need for IT to demonstrate its value in order not to be seen as just a cost of doing business. However, developing appropriate indicators to

extract the value of the IT has proved difficult. The measurements for a set of indicators need to be made over time to provide useful information. Key indicators 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).

The potential for implementing ITIL and establishing a single incident management process and the possibility of reducing the duplication of processes led to one of the first initiatives taken by the IT Director in 2004. This involved the consolidation 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 and commercial services is currently under consideration.

The institution has a security 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 (DRP) is currently under development. An audit of PCs, servers, domain name servers, IP addresses is being conducted to gain an understanding of the physical environment in the event of a disaster. The DRP 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 and the loss of individual systems. The development of the DRP 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.

While ITIL is the adopted framework for IT service management and all central IT staff have received training on ITIL, there is no industry standard 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.

## VI. SUMMARY OF IT GOVERNANCE PROCESSES IN THE CASE STUDY INSTITUTIONS

This section addresses the first research question of how formal IT governance practices are implemented in institutions of higher education in Australia. As indicated previously, only IT governance *processes* are addressed here.

Based on the experiences of all four institutions, the following findings emerge with regard to the implementation of IT governance processes:

- (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) In all four institutions improving communication between central and divisional IT groups are helping in the general acceptance of central IT standards.
- (iii) 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.
- (iv) 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.
- (v) As in other industries measuring the performance of IT remains a big challenge for IT decision makers in institutions of higher education.

The following findings also emerge from some of the institutions:

- (vi) Institutions A and B 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 IT staff efforts without increasing the satisfaction of staff and students. A consolidation of systems could potentially help in the reduction of staff numbers (leading to reduced costs).
- (vii) COBIT requires the use of a project management methodology. Institution A's adoption of COBIT has led to its adoption of PMBOK. This was important as the institution's IT staff does 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 staff and requiring its outsourcing partners to be trained in the methodology.
- (viii) Equally as important as consolidation of systems is the consolidation of services. In Institutions C and D the consolidation of the helpdesk has led to increased satisfaction amongst users.

## VII. EVOLUTIONARY STATUS OF THE AUSTRALIAN HIGHER EDUCATION ECOSYSTEM

This section pertains to the second research question regarding the significance of formal IT governance practices in the evolving higher education ecosystem.

Moore [16] described 4 stages of an evolutionary business ecosystem: birth, expansion, leadership, and self-renewal. The birth stage determines what customers want and how to deliver it optimally. In this stage it often pays to cooperate within the ecosystem. In the expansion stage business ecosystems expand to acquire new territories and direct battles for market share with other ecosystems are likely to ensue. The third stage is marked by leadership struggles within the ecosystem. The strong growth and profitability of the ecosystem and the stability of structures and processes crucial to the ecosystem lead to the onset of the leadership struggle. The fourth stage, self renewal, occurs when the community undergoes a sudden environmental change (eg. changes in macroeconomic conditions and government regulations) or if the community is threatened by rising new innovations and ecosystems. Based on this evo-

lutionary picture and the activities of the case study institution, the Australian higher education ecosystem is currently between the second and third stage of evolution, ie. between expansion and leadership struggles.

These institutions are expanding their territories beyond Australian borders (into the territories of other higher education ecosystems) by taking advantage of increasingly enhanced technologies for web-based teaching and learning. As IT plays a key role in this expansion (eg. formalising IT plan to support e-learning), the effective governance of IT to ensure its value to business should be a strategic focus. The attempt to be ahead in the leadership struggle has seen strategic alliances formed between different groups of universities, generating mini-ecosystems within the larger Australian higher education ecosystem. For example, Institution A is a member of the Australian Technology Network of Universities (ATN) and Institution C is a member of the Innovative Research Universities of Australia (IRU). An area that is receiving attention is the competitive cooperation of e-research which embraces new research methodologies arising from increasing access to broadband communication networks, data repositories, secure connectivity services and application tools [7]. Ensuring secure connectivity and the implementation of appropriate application tools can be achieved through effective IT Governance and the adoption of industry best practice frameworks and standards.

One body contributing to the stability in structures and processes in the context of IT governance is the Council of Australian University Directors of Technology (CAUDIT) which seeks to enhance the ability of its members as key advisers on strategic use of IT. Its strategies include encouraging the use of industry best practices and standards as well as undertaking benchmarking projects in its member institutions. The top 10 issues identified by CAUDIT for 2006 include IT governance and processes associated with strategic planning, security, BCP and DRP [3]. It is possible that a forum like CAUDIT will succeed in enhancing IT governance practices in Australian institutions over the next decade and in doing so expand the possibilities for technology enabled innovations in education and research.

### VIII. CONCLUSIONS AND FUTURE WORK

The paper highlights some key issues in the context of adopting formal IT governance practices, in particular, IT governance *processes*, in the higher education ecosystem. While some useful insights into IT governance practices in this domain are obtained from this study, the researchers intend to conduct a number of case studies in order to generalize findings in the context of this domain and develop an appropriate IT governance implementation model by refining De Haes and Van Grembergen's framework. A longitudinal study involving the case study institutions in this paper is also planned in order to obtain a better understanding of the business benefits of improving formal IT governance practices in the evolving higher education ecosystem.

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