

**ISSUES IN IT GOVERNANCE & IT SERVICE  
MANAGEMENT - A Study of their adoption in  
Australian Universities**

**By  
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## ABSTRACT

*IT service management (ITSM) has emerged as one of the approaches to implementing IT Governance in Australian Universities. A number of ITSM frameworks have been proposed however, **IT Infrastructure Library (ITIL)** and **Control Objectives for Information and related Technology (COBIT)** have been most widely accepted and implemented internationally and within Australia.*

*The research reported in this thesis was undertaken to shed light on the issues related to ITIL adoption and implementation within Australian universities. To date academic research in ITIL adoption and implementation has not been extensive as it is comparatively a new framework, especially within Australian universities.*

*The theoretical framework proposed in this thesis has IT service management as the central concept, implementing IT Governance to align the university and technology. This framework is used to examine the experience of ITIL adoption in seven Australian universities, plus a detailed case study on one university's experience.*

*This research reveals a complex web of factors relating to ITIL implementation including; the pre-implementation process; processes implemented; order of implementation; hiring external expertise; tool selection; staff training; ongoing assessments; managing cultural change; managing learning curve and resource strain. The findings provide an insight into practical lessons for other Australian universities or similar organisations considering implementing IT Governance through IT Service management frameworks. The method used in this research may be useful for other organisations and researchers analysing universities and similar organisations implementing ITIL. IT Governance and IT service management frameworks are diverse and important areas which open a poorly researched field for further work.*



## **CERTIFICATE OF AUTHORSHIP OF THESIS**

**Except where indicated in footnotes, quotations and the bibliography, I certify that I am the sole author of the thesis submitted today entitled –**

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A Study of their adoption in Australian Universities**

**in terms of the Statement of Requirements for a Thesis issued by the university Higher Degrees Committee.**

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## 1. Introduction

Australian Universities have an extensive network of IT services covering organisational, sector specific and unique systems for research and teaching (McKinnon, et al., 2000). IT services support teams are responsible for the effective and efficient availability of the services for the business and the stakeholders. In order to carry out this responsibility, IT services team and university staff work together in coordination to achieve University objectives. This dependency magnifies the significance of the need to align IT with university goals and processes. This is where IT Governance comes into the picture. IT Governance provides a controlled environment for IT services and enables the organisations to align IT services with their objectives (ITGI, 2004b). Another factor requiring a well controlled IT services environment is the increasing expectation of better quality services from management with faced decreasing budgets (Kaarst-Brown and Kelly, 2005) IT service management (ITSM) has emerged as one of the approaches to meets the need of IT Governance. A number of ITSM frameworks have been proposed although, **IT Infrastructure Library (ITIL)** and **Control Objectives for Information and related Technology (COBIT)** have been most widely accepted and implemented both internationally and within Australia (Cater-Steel and Tan, 2005).

Information Technology Infrastructure Library abbreviated, as ITIL is a set of rules guiding organisations through a quality approach to achieve business effectiveness and efficiency in the use of information systems. ITIL provides well-structured processes and best practices for IT services. Many Australian Universities are in the process of implementing ITIL for IT service improvement. The adoption of ITIL involves cultural change in IT services and demands huge investment of financial, staff and technological resources.

This thesis is a report of a study into IT service management and its increasing adoption in Australian Universities. The study focuses on the various ITIL adoption factors and implementation issues, in the context of Australian universities. The theoretical framework

identifies the gap in research on ITIL in Australian universities. The purpose of this research is to analyse the adoption and implementation issues for ITIL that have not been well researched.

The aim of the research is to achieve broader understanding of IT Governance and IT service management within Australian Universities. To achieve this, the research will explore the factors that enable or inhibit the decision to adopt ITIL and examine the issues related to ITIL implementation.

## *1.1 Thesis Structure*

Following the introduction, Chapter 2 reports on a review of the literature. The main categories of publication are: IT services and their importance in the Australian context; different industry IT services management frameworks and a wider view of how organisations generally have implemented IT services using various IT service management frameworks. The literature reveals many of the assumptions underlying the adoption and implementation of ITIL.

Chapter 3 defines a theoretical framework, using evidence from the literature to provide the necessary background to identify relevant issues in IT Governance and IT service management. The theoretical framework defines a gap in the literature and Chapter 4 explains how this research addresses the gap. Based on the gap identified, the research objectives are listed in Chapter 4. These objectives are defined in a set of two major aims and the approach towards addressing the problem area.

In Chapter 5, the research design describes the methods undertaken to resolve the problem area. Two major methods in the design are (i) a review of seven Universities experience with ITIL and (ii) a detailed case study of one University. This chapter also defines a protocol to be used in the two methods for analysis and data collection.

Chapter 6 presents the review of seven universities and makes an initial determination of issues. Chapter 7 reports a case study of the University of Canberra.

Based on the evidence collected in Chapter 6 and Chapter 7, Chapter 8 evaluates and discusses the findings against the literature review. Contradictory and similar views are discussed in Chapter 8. The protocol defined in Chapter 5 was used to evaluate all the universities, and hence to maintain the flow of design, Chapter 8 uses the same research design protocol for discussion.

Finally, Chapter 9 draws conclusions. It also explains how this research work has addressed the problem area and achieved the aims. The thesis concludes with a reflection on the contribution of this research, its limitations and directions for further work.

The notation “pers comm.” is used in the thesis referring to personal communication.

## 2. Literature Review

Organisations have recognised their dependence on IT infrastructure to achieve their objectives. In areas such as health, defence and financial institutions, IT services availability is of great importance. This is where IT service management plays a significant role with many organisations already benefiting from its implementation (Haes, et al. ., 2005). With the increased demand for stronger quality of IT service, best practice models and frameworks are being used to ensure systematic structuring of customer focused IT management processes at reduced costs and risks (Hochstein, et al., 2005). ITIL (Information Technology Infrastructure Library) has emerged as one of the most significant frameworks in IT service management in the past two decades. Similarly, COBIT (Control Objectives for Information and related Technology) is one of the most prominent frameworks. Sallé (2004) categorises COBIT as an IT Governance Standard than an IT service management standard, however he also establishes that these standards can be used independently or collectively for IT Governance.

Australian Universities provide educational, research and industry services supported by complex IT infrastructure. These services are a key determinant of university performance (Hiew, 2002). Hence, it becomes critical for IT and university strategies to remain aligned and re-aligned in case of changed strategies, in order to meet new strategic imperatives (O'Brien and Ryan, n.d.).

With organisations, not just in Australia but also around the world, experiencing positive results, adoption of best practice frameworks in Australian universities is progressively increasing. A recent research also reports limited academic work in the adoption of COBIT (Ridley, et al., 2004). The research reported in this thesis aims to address the issues in the understanding and implementation of IT service management frameworks in the context of Australian Universities.

This Chapter reviews the literature on IT services in Universities. The following sections include an analysis of the different frameworks for IT Governance and IT service management. An understanding of these frameworks provides an insight regarding various issues related to the adoption and implementation of these frameworks.

## ***2.1 IT services and Governance in Australian universities***

Australian universities have been recognised for their use of Information and Communications Technology (ICT) to support its teaching and learning. According to Hiew (2002), behind these developments have been two significant government agencies, the Committee for the Advancement of University Teaching (CAUT) and the Committee for University Teaching and Staff Development (CUTSD), which have funded 731 projects costing \$33 million. This funding supports the ‘Information and Communication Technologies and their role on flexible learning’ project under the guidance of Australian Universities Teaching (AUT).

In 2001, the Department of Education Science and Training (DEST) released the results of a survey on online education and services in Australia. The report (Hiew, 2002) highlights the extent of online education in Australian universities, with 90% of 207 fully online education courses being postgraduate specialised courses. 54% of the courses’ contents were available online as supplements. The findings of the report suggested that there were very strong developments towards online education, and these would increase due to the escalating pressure of flexible learning. However, full online learning is an area that requires further exploration to offer benefits in teaching and learning.

Australian universities have an extensive IT infrastructure to support their business functions and other services. A guideline by McKinnon, et al. (2000) to managing these IT services was issued by the Department of Education, Training and Youth Affairs (DETYA) now called DEST (Department of Education Science and Training). DETYA discussed the performance indicators that are audited in the AQUA (Australian Universities Quality Agency) quality audits in Australian universities. These indicators are at the lowest level of IT Governance. The University of Canberra, for example has defined the indicators in the tactical plan, as they need to be followed up on in the audits. However, DETYA does not insist on any particular framework or model for IT service management, but these indicators are similar to those in ITIL. The

benchmarking provided by DETYA suggests some good practices for IT infrastructure with an emphasis on maintaining availability and reliability logs. Other services such as helpdesk and information services e.g., university websites and the Internet should be assessed for their effectiveness in terms of availability, reliability, security, response times and the degree of standardization (McKinnon, et al., 2000, p9). DEST also provides a template to assess the level of maturity of IT services, based on their performance.

Queensland University of Technology (QUT) has a strong emphasis on the issue of IT Governance (Fraser and Tweedale, 2003). QUT has its own Information Technology Strategic Governance Committee (ITSGC), which is the focal point for IT planning at QUT. This committee is deliberately set at a senior level. Similarly to having a CIO (Chief Information Officer) in a commercial organisations, Pro-Vice Chancellor of Information and Academic Services (PVC -IAS), is delegated the role of head of IT services within the university. The majority of the submissions and meeting-to-meeting actions are the responsibility of the PVC - IAS. Two more deans with PVC - IAS have the responsibility to project how the IT services meet the university objectives.

With the increased demand for stronger quality of IT service, reference models to ensure systematic structuring of customer focused IT management processes at reduced costs and risks are being used (Hochstein, et al., 2005). ITIL (Information Technology Infrastructure Library) has emerged as one of the most significant standards in IT service management in the past two decades. Similarly, COBIT (Control Objectives for Information and related technology) as one of the major IT Governance standards has an eminent role to play in IT management. Sallé (2004) categorises COBIT as an IT Governance standard rather than an IT service management standard, however later he also establishes that these standards can be used independently or collectively for IT Governance and IT service management services.

## ***2.2 IT Governance through IT service management frameworks***

### **IT Governance**

The Oxford Dictionary explains Governance as the act, manner or function of regulating the proceedings of a corporation. In IT, Governance is well explained by Gartner as “*Assignment of decision rights and the accountability framework to encourage desirable behaviour in the use of IT*” (Turbit, 2005). Based on these dictionary definitions, Turbit (2005) defines IT Governance as a set of those rules and regulations that control or run the functions in the IT departments and also as a mechanism to ensure the IT department complies with these rules and regulations.

IT Governance according to Gelinas et al. (2004) represents a framework for internal control, where internal control ‘*is a system of integrated elements-people, structure, processes and procedures-acting together to provide reasonable assurance that an organisation achieves its business process goals*’. According to the author the internal control is management’s responsibility and involves strategic planning from top to bottom in the organisation. It refers to the series of actions or operations leading to a particular and usually desirable result.

Weill and Woodham (2002) define IT governance as “*specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT*”. IT Governance aims to achieve a state of control and IT service management is one of the possible ways towards establishing control.

### **IT service management**

IT is emerging more as a strategic, rather than a technological component in organisations. IT service management and IT Governance are the two domains that work together to achieve this transformation of IT from a technological perspective to a more strategic perspective. IT service management has become popular due to the ever-increasing focus on customer-based service in

the planning, development and delivery of IT services. Different frameworks have been proposed, designed and implemented with both service management and Governance capabilities. Generally, for IT service management ITIL, Microsoft Operations Framework (MOF) and Hewlett Packard IT service management (HP ITSM) have been most widely found in the literature. In comparison to that, COBIT, based on control processes, is most widely acceptable as an IT Governance framework for audit purposes. Following is an overview of these frameworks.

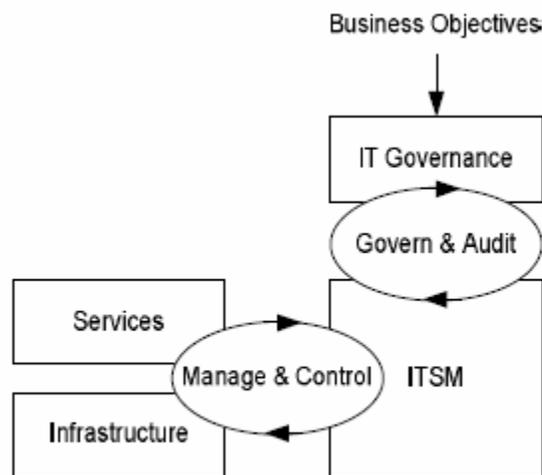
Van Bon (2002) defines IT service management as “*a set of processes that cooperate to ensure the quality of live IT services, according to the levels of service agreed with the customer*”. It is based on management domains and process domains.

IT service management is primarily known as the process and service focused approach of what was known as IT Management. The objective of IT service management is to contribute to the quality of the IT services (Van Bon, 2004). IT management is used to reveal patterns otherwise unseen and to understand relationships outside the topic both forward and backward (Shay, 2003). IT Service Management Forum itSMF defines IT service management as an approach that was previously called IT Management and currently is defined as process and service focused (Van Bon, 2004, 29). itSMF (Lloyd, et al., 2003) defines the key objectives of Service Management as:

- To align IT services with the current and future needs of the business and its customers.
- To improve the quality of the IT services delivered.
- To reduce the long-term cost of service provision.

Sallé (2004) draws attention to a major anomaly with the definition and categorisation of various frameworks of IT Governance or IT service management. IT Governance Institute (ITGI, 2004a) refers to IT Governance as the notion of alignment of IT with business objectives, also referred to as strategic alignment. IT service management is perceived as a set of processes to enable the quality of services as agreed upon between the customer and the business. However, the difference is in the dimensions of IT service management dealing with efficient and effective provision of IT services whereas IT Governance deals with contributing to the business operations and performance not just in the present but also in the future challenges.

Sallé (2004) also categorises COBIT as the IT Governance framework with others such as ITIL, HP ITSM the IT Service management frameworks. However, Van Bon (2002) lists COBIT as one of the models of IT service management with other frameworks as ITIL and IBM's IBM's Systems Management Solution Lifecycle (SMSL). Sallé (2004) has also described the relationship of IT Governance and IT service management along with IT services and operations in a very concise and simple way as shown in the Figure 1 (Relational model between IT Governance and IT service management and IT operations and services in Figure 1 below (Sallé, 2004, p3)).



**Figure 1: Relational model between IT Governance and IT service management and IT operations and services (Sallé, 2004, p3).**

Industry leaders are divided in their opinion on the categorisation of these frameworks. In a recent article in the Sydney Morning Herald (29 Nov 2005) Mark Toomey, an IT Governance expert in Australia, said frameworks such as ITIL and COBIT are basically IT management frameworks but are often called IT Governance systems which they are not (Philipson, 2005). Contradicting this is the view of McLane (2003) who categories ITIL, ISO17799 and COBIT as IT Governance frameworks.

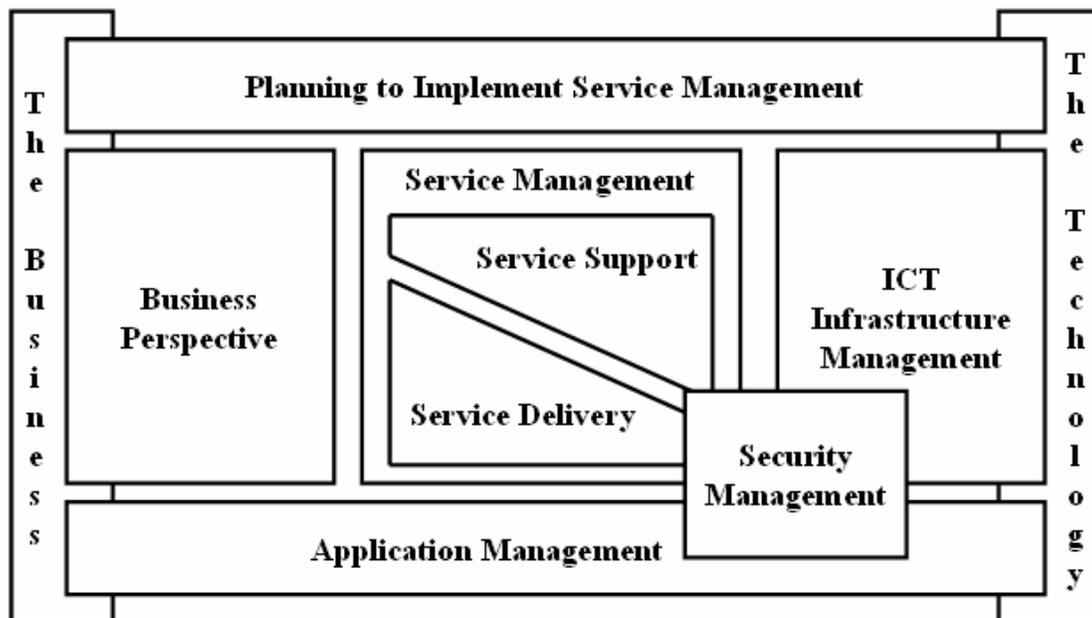
Every definition and categorisation provides a perspective of IT service management and IT Governance and there is a difference of opinion how both these wide areas are defined. However, all identify the common goal that IT service management strives to work for. That common objective is the improvement in IT services through process improvement and utilising the available resources to provide optimum services to the customers.

In the context of this research, IT service management is defined as those processes which work together to ensure the quality of available IT services are based on the agreed service levels with the customer (Bon, 2002). Turbit (2005) provides a similar definition for IT Governance as a set of those rules and regulations that control or run the functions in the IT departments and also defines a mechanism to ensure the IT department to comply with these rules and regulations. Hence, these definitions focus on the fact that IT service management works at a more operational level, whereas IT Governance works at a level above IT service management, next to the business managers and owners, *specifying an accountability framework to encourage desirable behavior in the use of IT.*

### ***2.3 Information Technology Infrastructure Library (ITIL)***

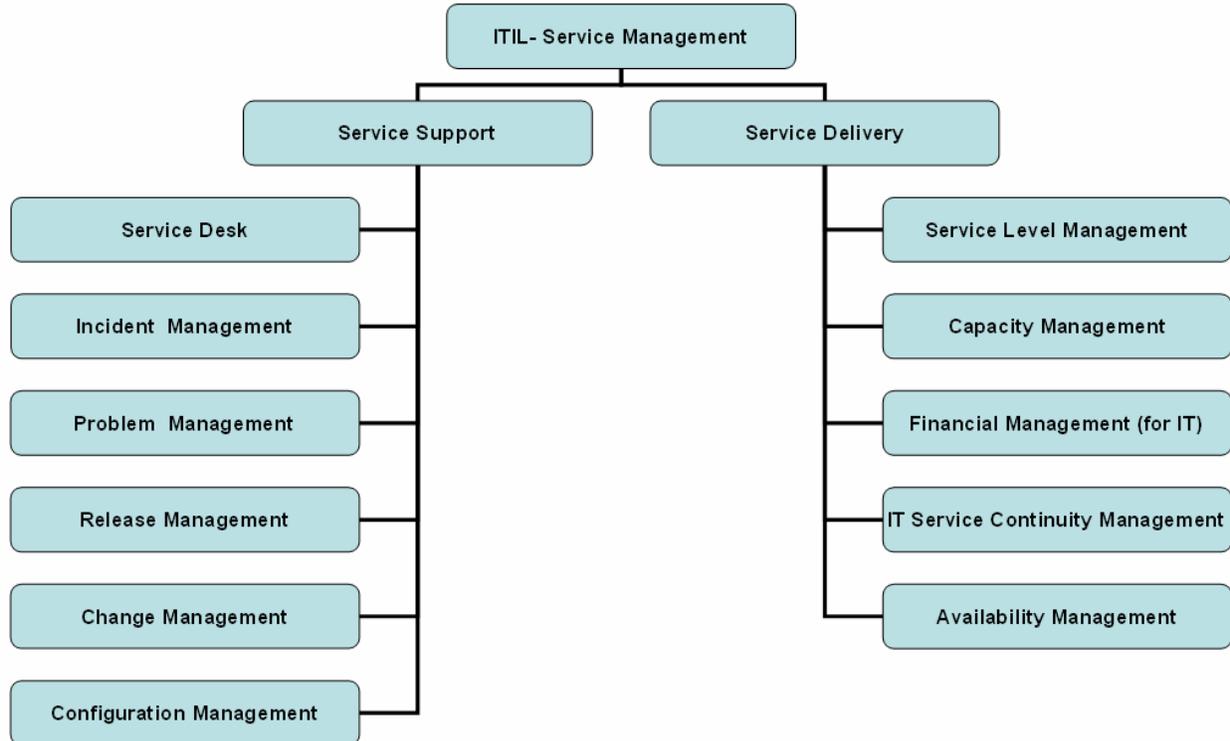
Information Technology Infrastructure Library abbreviated, as ITIL is a set of rules guiding organisations through a quality approach to achieve business effectiveness and efficiency in the use of information systems.

ITIL, a registered trademark and a community trademark of the Office of Government of Commerce, was developed in the late 1980's by CCTA (Central Computer and Telecommunications Agency) in Norwich, England, for the British government. Office of Government of Commerce presently is responsible for ITIL publications and related changes (OGC, 2000). Its popularity is due to its being a public domain framework. ITIL recognizes over forty processes and objects of the IT infrastructure. It defines IT infrastructure as the total of technological components, the system and application software, the documentation and all the procedures necessary to realize one or more IT services. The various publications on best practices by ITIL are shown in the Figure 2 (The ITIL Publication Framework (OGC, 2000, p6)) below.



**Figure 2: The ITIL Publication Framework (OGC, 2000, p6)**

ITIL also addresses the areas of application management, infrastructure management, business perspective, IT software asset management and security management (Hochstein et al., 2005). However, in the context of this research only the service management area is relevant; hence any reference to ITIL is to its service management aspect. The IT service management (ITSM) section of ITIL has 11 components split across two sections as shown below in Figure 3 (IT service management processes in ITIL).



**Figure 3: IT service management processes in ITIL (OGC, 2000)**

Technology impairment could be dreadful for businesses. ITIL adoption is spreading rapidly across big airlines, government departments, banks and insurance companies across North

America (Margulius, 2004a). ITIL is based on the concept of CMDB (Centralised configuration Management database) also called the nerve centre of truly autonomous utility that provides the flexibility of assessing the current and desired processes before selecting the tool. Reasons for the rapid adoption are said (Margulius, 2004b) to include:

- Improvement in service
- Reduction in costs
- Concept of corporate mergers and outsourcing require the use of common language. Meanwhile ITIL provides common language to work effectively between multiple corporations to provide end-to-end service delivery.
- Standardize the language, process and workflow by key operations.
- Framework is technologically agnostic and stops short of prescribing any particular technology (can be implemented with any technology)

There have been reasons why ITIL has not been able to spread effectively across all organisations. Firstly, there were no metrics (measures) to check how successfully a company has implemented ITIL, though, there is an official ITIL certification called BS15000 overseen by British Standards Institute, which is not commonly used. Secondly, not much work is available about how these standards should evolve in implementation (Margulius, 2004b).

In January 2000, Robert McDonough, an IT manager for process development and support for the state of Michigan in Lansing, introduced ITIL within two thousand staff IT dept (Cox, 2004). It was a successful implementation, but he emphasised that ITIL lacked a set of practices for its own adoption. Introducing ITIL saved the Michigan State thousands of dollars. One of the servers kept on disconnecting at night, thus pushing the state's overtime bill for the on-call staff to answer the above issue. Since there was no way to capture the data, the cause could not be established. The use of ITIL identified the cause and created a permanent fix. However, in ITIL, there is no specified tool to estimate the overall savings, where time and costs have been reduced dramatically in business continuity (Cox, 2004).

Niessink and Vliet (1998) identified non-availability of information about the implementation of different processes in ITIL and how to decide the best order of the implementation as one of its

major limitations. In addition, use of SLA is defined but not how to develop those SLA. As a solution, they proposed IT Service CMM –Information Technology Service Capability Maturity Model to be used to assess the maturity of IT service processes and identify directions for improvement. However, in his work there is no specific mention if this combination was ever implemented.

ITIL is a process framework involving people as much as technology (Margulius, 2004a). It is about dealing with cultural change in the business. Knowing there is always resistance to cultural change, it is important to articulate the benefits and define the right process space. Margulius (2004a) asserts that many IT managers stress that implementing ITIL does have a learning curve and productivity is initially not very strong, it requires immense patience in terms of time and cost, however it is all worth it.

Allen (2004) argues that ITIL solves problems by tackling causes not just their symptoms that needs to be adopted by such businesses. Every business is continuously upgrading their technological infrastructure. However, most of these IT infrastructures implemented in a business are more based on tactical problem solving rather than strategic approach. Tactical approaches refer to using the skill and manpower to solve a recurring problem whereas strategic approach is designed to prevent problems from occurring. Due to this fact, more effort is wasted in solving the recurring problems especially when the executive board is sceptical. ITIL represents a move away from reactive chaos towards a strategic and proactive way of working (Allen, 2004).

ITIL is used in a public domain. HP developed HP service management reference model, which is a derivative of ITIL. Axios Systems (Aitken, 2002), a UK based service management software vendor, claims to have built its flagship product called ASSYST, on the lines of ITIL. Many more vendors are following similar lines. With the implementation of major market players even software giants referring to ITIL in their new solutions, Forrester Research (Dubie, 2004) predicted ITIL to become a mainstream player in businesses by the year 2005.

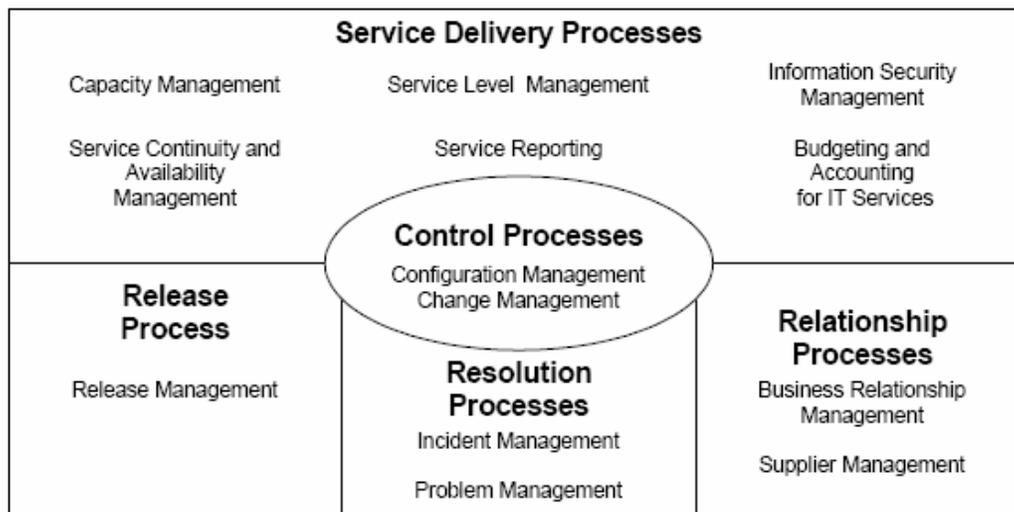
ITIL provides a common platform to analyse processes in organisations. Behr, et al. (2004) in their analysis of high-performing organisations' IT operations used ITIL to evaluate their

common practices. They found every organisation had its own way of defining and managing its IT infrastructure. However for a fair review, they wanted a common platform as offered by ITIL. Secondly ITIL is based on compilation of best practices provided without prioritisation or any prescriptive structure. ITIL provided a framework to name and normalise the practices that the high-performing organisations had in common.

Behr, et al. (2004) also firmly asserted that though all the organisations perform similar tasks when they have to communicate they could not speak a common language. With the use of ITIL, a common language enables them to understand each other and improve their interaction. Smitherman (2004) also insists that the organisations are still struggling to fight IT silos which believe in acquiring the best technology available provide best IT services. However, exchange of information within the organisation becomes a bottleneck, as there is no common configuration database. This becomes more critical when N-tier Application and multi vendor products are used (Smitherman, 2004). Many IT managers have a tough time committing high availability of IT services due to lack of integrated information. ITIL provides for this need this enabling better and high availability of services through a central database that could be used across the whole organisation.

With the wide acceptance of ITIL, there are few issues related to the overnight changes expected by some organisations thus leading to disappointment in some cases. Hochstein et al., (2005) believes the same and asserts that ITIL is realistically a common practice rather than a best practice framework, hence putting its perspective the expectation of ITIL.

Based on the ITIL principle, BS15000 and PD0005 are two publications by British Standards Institute as shown in Figure 4. BS 15000 called is the 'Specification for IT Service Management' and PD0005 is 'A Code of Practice for IT Service Management'. BS15000 standard divides ITIL disciplines into five key areas: Release Processes, Control Processes, Resolution Processes, Relationship Processes, and Service Delivery Processes. Recognising this international standard, Standards Australia (2004a, 2004b) released BS15000 as an Australian standard called AS8018, with the approval from British Standards for ICT management as shown in Figure 4.



**Figure 4: AS 8018 – Service Management Processes (Standards Australia, 2004a, p 1)**

These publications can also be used in conjunction with other British Standard publications and use of OGC published literature is recommended for further details (Standards Australia, 2004a). In part one it also proposes a methodology that is different to OGC literature along the lines of four main phases as Plan, Do, Check and Act. Further all the processes in ITIL are explained. The second part establishing the need for improved IT services, defines how the enhancement in the services through the ITIL processes can be achieved. It follows the four phases defined in part one for the adoption process. The processes defined in these standards are independent of any organisational form, size or structures and work very well for both small and large organisations (Standards Australia, 2004b).

Through this standard, Standards Australia (2004b) defines each process in BS 15000 framework as shown in Figure 4 (BS 15000 – Service Management Processes) leading to how each process should or must work in an ideal BS 15000 or for Australia, AS8018 environment. It also asserts that a need to have this standard recognised has emerged from the growing requirement by IT services customer for better facilities while keeping the costs to a minimum.

ITIL is very comprehensive and provides information that can be used by any size of organisation. Though ITIL has a strong control structure, it does not offer much information in the advances of technology with limited security management concepts (Macartney, 2005, p17). Pertaining to IT service management, there are similar frameworks that can be used independently in combination with ITIL.

## ***2.4 Control Objectives for Information and related Technology (COBIT)***

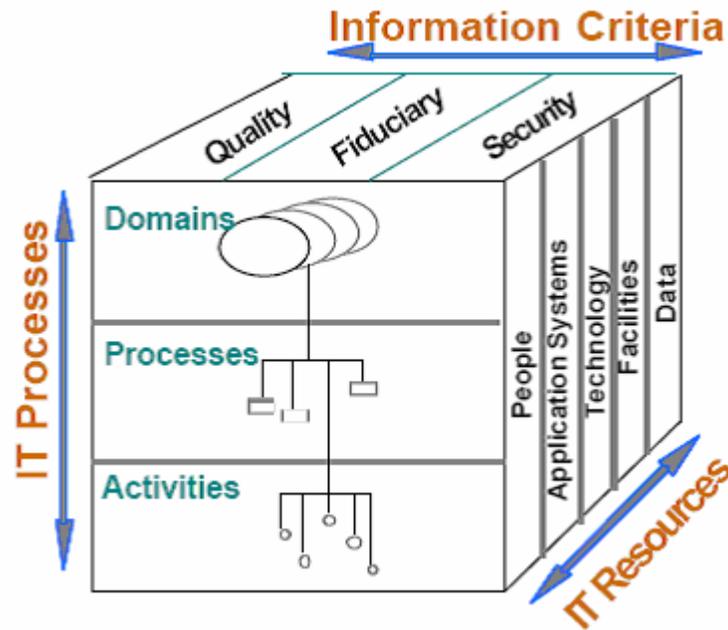
The establishment of best practices requires an on going process to evaluate and measure the performance status of the processes. With IT, processes are needed to assess the performance and decide the necessary steps for required change.

There are bodies/agencies to approve standards and to check the procedures and processes of organisations are relevant and comprehensive (ISACA, 2002). It is like accounts that need to be audited, and safety practices that need to be inspected. The health of modern companies rests upon the quality and availability of the IT services supporting the business process.

Since its inception in 1967, Information Systems Audit and Control Association (ISACA) today has more than 35,000 members worldwide. It was started by a small group of individuals with similar jobs who realized the need for a centralized source of information and guidance in the field. ISACA also undertakes large-scale research efforts to expand the knowledge and value of the IT Governance and control field. It publishes IS Auditing standards, a technical journal and hosts technical conferences on technical and managerial topics related to IS assurance, control, security and IT Governance professions (ISACA, 2002). It offers 2 certifications, CISA-Certified Information Systems Auditor and CISM-Certified Information Security Manager.

ISACA has developed a framework called COBIT – Control Objectives for Information and related technology (Grillo, 2003). COBIT is a framework that helps organisations balance their risks vs. returns in an IT environment and ensure alignment of business needs with overall IT processes. It includes 34 IT processes, referring IT resources, and the quality, fiduciary and security requirements for information.

Figure 5 shows another perspective, looking at COBIT is in terms of its hierarchical structure (ITGI, 2004a).



**Figure 5: COBIT Mapping by ITGI (ITGI, 2004a)**

Beginning with 4 domains, 34 control objectives in processes and 318 detailed activities or tasks, it also has Audit guidelines for each of the objectives. This enables an organisation to match the review of its existing IT processes against the recommendation based on the standard. COBIT mostly acts like a checklist for business process owners, especially when businesses are delegating more responsibility for every aspect of a process to the business process owners.

Carvajal-Vion and Garcia-Menendez (2003) assert that the control objectives provided in COBIT are more widely applicable and are closer to the organisation than other standards. However, they believe that COBIT could be considered for use in conjunction with other standards, depending on the requirements of the organisation. Considerations like organisation size, budget, and risks faced will determine to what degree they need to be implemented. Another major issue highlighted is the requirement to have a risk evaluation methodology to determine business impact in order to remove the gulf between the Information owners and the managers.

COBIT comprises ten IT control processes (Gelinas, et al., 2004, p255) also referred to as “management practice”. They define management’s responsibility for control in the organisation and the practices, or processes that assist the organisation in achieving its objectives. These control objectives are broadly categorised in 4 domains:

- Planning and organisation
- Acquisition and implementation
- Delivery and Support
- Monitoring

Delivery and Support domain defines a control process called ‘ensure security and continuous service’ which like any other risk analysis lays strong emphasis on security as a part of service continuity (Gelinas, et al., 2004, p264). It is crucial to establish a process, which is coordinated with the overall business continuity strategy in order to ensuring that sufficient IT services are available in the event of service disruption. This would include disaster recovery/ contingency planning for all IT resources internal/external. These controls not only established for disruptions for the organisations but also its business partners.

Most of the literature suggests COBIT is an IT Governance standard more than an IT service management framework. However COBIT has been known to bridge the gap between IT service management and IT auditors (Nijnattan, et al., 2002) making it a good control process to implement some processes for IT service management as well, because of the following features:

- It focuses on business more than IT enabling business to manage IT Governance.
- Its extensive repository for IT auditors ensuring their effectiveness to business.
- It is aligned with other popular models of such as ITIL, CMM (Capability Maturity Model) for software development, enabling its usage to assess their effectiveness.

In addition to these features, two of the most distinctive components in COBIT are the availability of Key Goal Indicators (KGIs) and Key Performance Indicators (KPIs), which aren’t available in other IT service management frameworks.

Byrum (2003) refers to COBIT as most commonly used standard that defines several controls related to contingency planning as one of its control objectives ensuring continuous service of the delivery and support. Further, the paper highlights three major components:

- IT continuity framework
- Maintaining the IT continuity plan
- Testing the IT continuity Plan.

Developing the contingency plan involves identification of threats; prioritisation of assets based on criticality; and the development of a detailed plan.

IT Governance Institute (2004a) in a review of different IT Governance frameworks claims that COBIT addresses all the IT Governance duties, whereas other standards publications describe the duties more comprehensively than COBIT. Hence those standards publications to be considered and used in conjunction with COBIT would facilitate its implementation.

Identifying and considering the needs of much smaller organisations and their much simpler strategic management in IT, ITGI has released a compact version of COBIT, called COBIT Quickstart as shown in Figure 6 (ITGI, 2003).

## COBIT Quickstart

### Suitability Assessment (1)

« Stay in the Blue Zone »

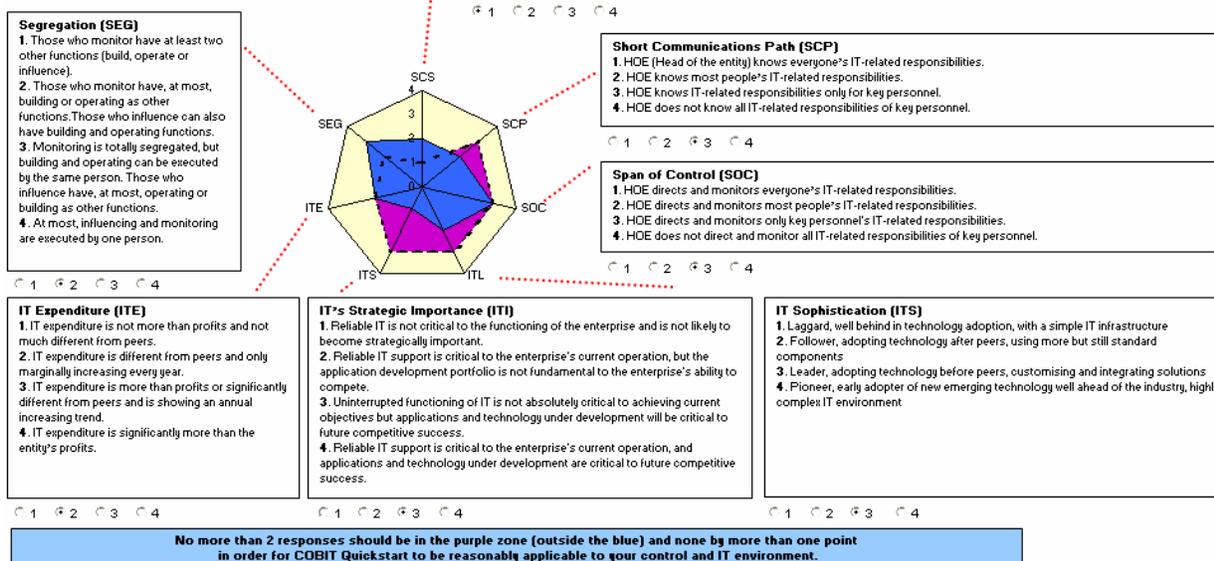


Figure 6: Self Assessment shows the COBIT Quickstart as defined by ITGI (ITGI, 2003)

COBIT Quickstart is generic and provides a selection of controls from the COBIT framework. It can very well be used as a starting point for organisations that are planning to achieve a level of control or IT Governance in the long run. It also provides tools to organisations to self assess and see if they require implementing COBIT in their environment. On comparison, COBIT Quickstart also has four domains, but only 30 processes and only 318 control objectives. The selection of these processes is made using the top down approach by IT Governance implementation guide.

Any smaller or medium organisations that has a level of control environment with a simple command structure, short command structure, short communication path, limited span of control, limited IT sophistication, less IT strategic importance, less IT expenditure and less segregation of responsibilities, can benefit from Quickstart. These are the factors that are considered while assessing if an organisation requires COBIT Quickstart. The implementation process of Quickstart is kept very simple through six major steps starting with Assess suitability, evaluate

current state, determine target state, analyse gaps, define improvement projects and finally, develop an integrated Governance implementation programme (ITGI, 2003).

## ***2.5 ISO17799 by International Standards Organisation***

The importance of information within organisations has given way to the emergence of set of controls to provide information security. Recognising this need and to provide a set of procedures to achieve information security and assist organisations retain that level, once achieved, International Standards Organisation has defined ISO17799: 'IT Code of practice for Information security management'. Following ISO footsteps, Standards Australia in collaboration with Standards New Zealand has published AS/NZS 7799. This standard is identical to ISO17799 (Standards Australia and Standards New Zealand, 2004).

ISO 17799 comprises comprehensive set of controls divided in ten sections, divided into:

- Systems development,
- Access controls,
- Business continuity,
- Compliance,
- Personal / physical security,
- Asset controls and,
- Related policies.

Including objectives and definitions there are 12 sections with 4 levels of controls in each section. The subsections encompass best practices in information security for implementing in the specific area for example for business continuity.

Managers and employees to achieve a controlled state of information security based on a set of controls can use this standard and it can be easily implemented in varied sized organisations. The standard provides a set of guidelines for initiating; implementing and maintaining must dos for information security management.

The standard also identifies the importance of developing a plan for the maintenance and recovery of business operations. This is a good security practice however not many organisations

have implemented as it's much of an external standard not well accepted. Meanwhile the method is very well put into use for risk management (Carvajal-Vion and Garcia-Menendez, 2003).

The role that ISO 17799 forms a subset of IT Service Management as its concentration is based on improving security management process. ISO 17799 is very comprehensive standard and hence involves direct resource involvement. Its usage in medium or smaller organisations is rarely seen, however organisations concerned with high level security need to comply with it (Carvajal-Vion and Garcia-Menendez, 2003).

## ***2.6 Extensions of ITIL by industry leaders***

Many IT industry leaders have introduced their own versions or extensions of ITIL. These extensions are aimed to benefit their clients from ITIL processes while using their technologies. Below is the review of three IT leaders: Microsoft, HP and IBM.

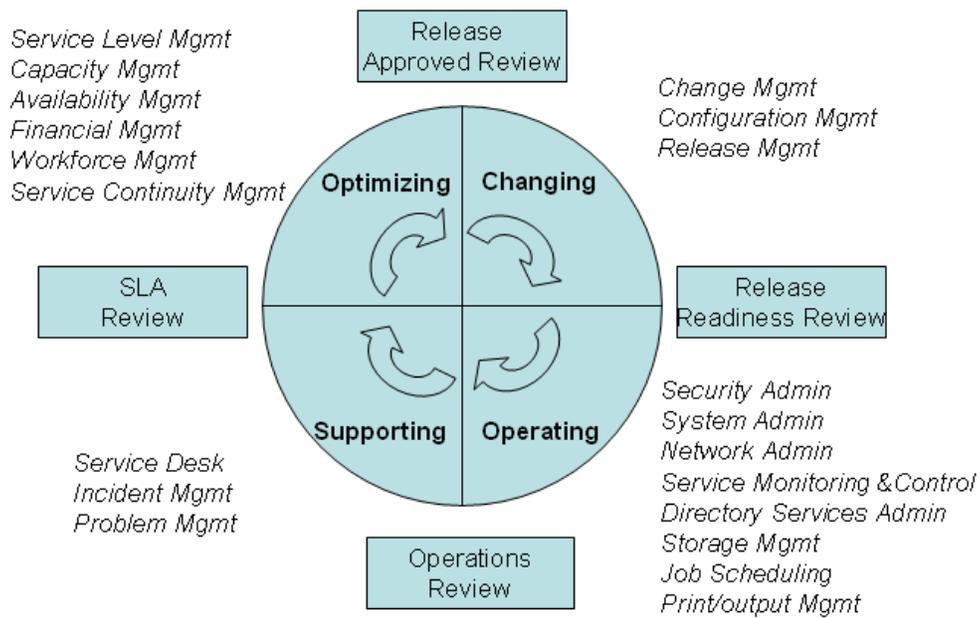
### **2.6.1 Microsoft Operations Framework (MOF)**

Van Bon (2002) explains MOF as one of the several organisation frameworks that have been developed by Microsoft. All are focused on supporting the complete IT lifecycle. Microsoft has distinguished phases in this lifecycle for Planning, Preparation, Building and Deployment and Operations. For each phase a framework is available. These are respectively, Planning Services, Readiness Framework, Solutions Framework, and Operations Framework.

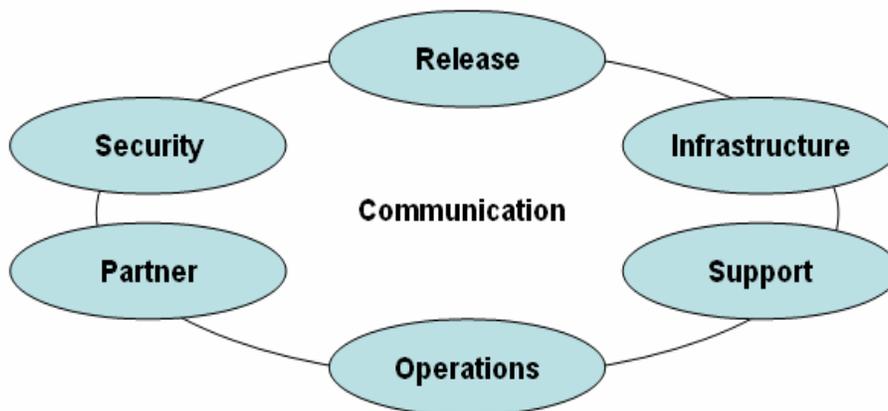
The MOF can best be described as a set of models, guidelines, and best practices. The similarities with ITIL are striking. For application hosting and management of distributed environments, MOF offers valuable enhancements to ITIL, such as NetIQ. Microsoft's acquisition of NetIQ's Operations Manager is an example of MOF supporting technology for Windows environments.

Microsoft articulated MOF (Microsoft Operations Framework) as an extension of ITIL, to address the growing dependence of business on mission critical IT systems (Pultorak, 2002). Microsoft products being so widely used in the industry were displaying varied performance satisfaction, as it was dependent on the way they were organized and managed. MOF was introduced to enable organisations using Microsoft products to articulate where they were and where they were heading in the business. MOF extends ITIL to support distributed IT environments (distributed computing) and emerging IT trends such as mobile-device computing, application hosting and E-commerce systems. One of the biggest dissemination, MOF is specifically designed for Microsoft products.

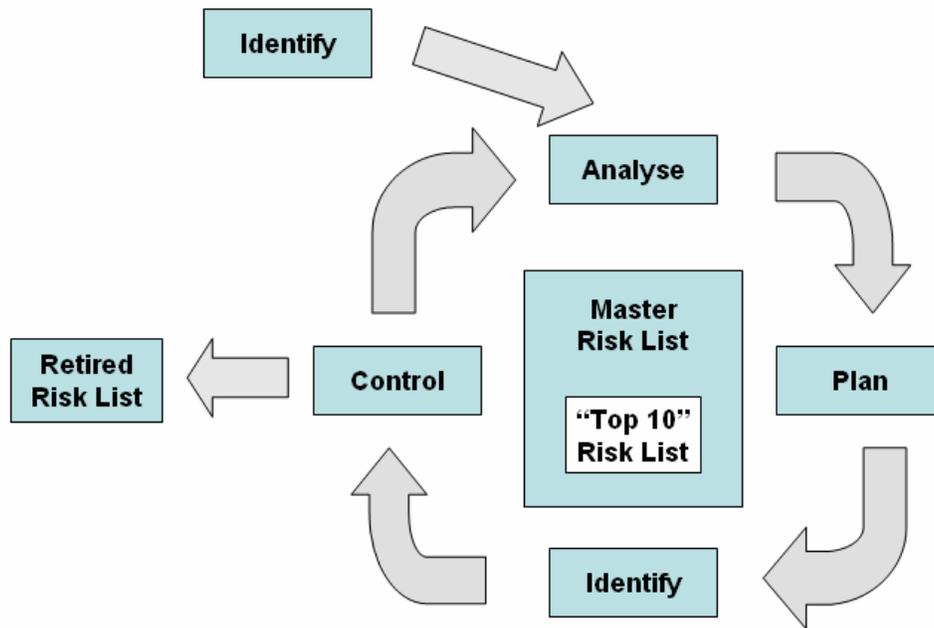
MOF constitutes of three core models: MOF process model, MOF team model and MOF risk model as shown in the Figures 7, 8 and 9 below.



**Figure 7: MOF Process Model (Van Bon, 2002, p 195)**



**Figure 8: MOF Team Model (Van Bon, 2002, p 196)**



**Figure 9: MOF Risk Model (Van Bon, 2002, p 197)**

Service delivery and Service support processes in ITIL are called as Service management Functions (SMFs) in MOF. There are few changes made in MOF, which basically extends ITIL and hence making contributions to IT service management. These contributions can be generally categorised as below:

- New and deeper SMFs: MOF uses the ITIL processes to extend them to include Microsoft specific practices and additional industry best practices. It also offers service solution as the central unit of work. Secondly it depicts operation as quadrants of concurrent operational activity with explicit review activities. Thirdly, operations as ordered activity along a life cycle that link with developing a design for operability.
- Team and risk models to complement the Process Model. Firstly MOF offers a clear mapping of order of implementation not just to process, but also to common sets of

operations activity, which isn't available in ITIL. Secondly, ITIL discusses risk in each IT operation process; MOF elevates management risk to its own process model enabling IT managers to consider risk assessment as an ongoing process.

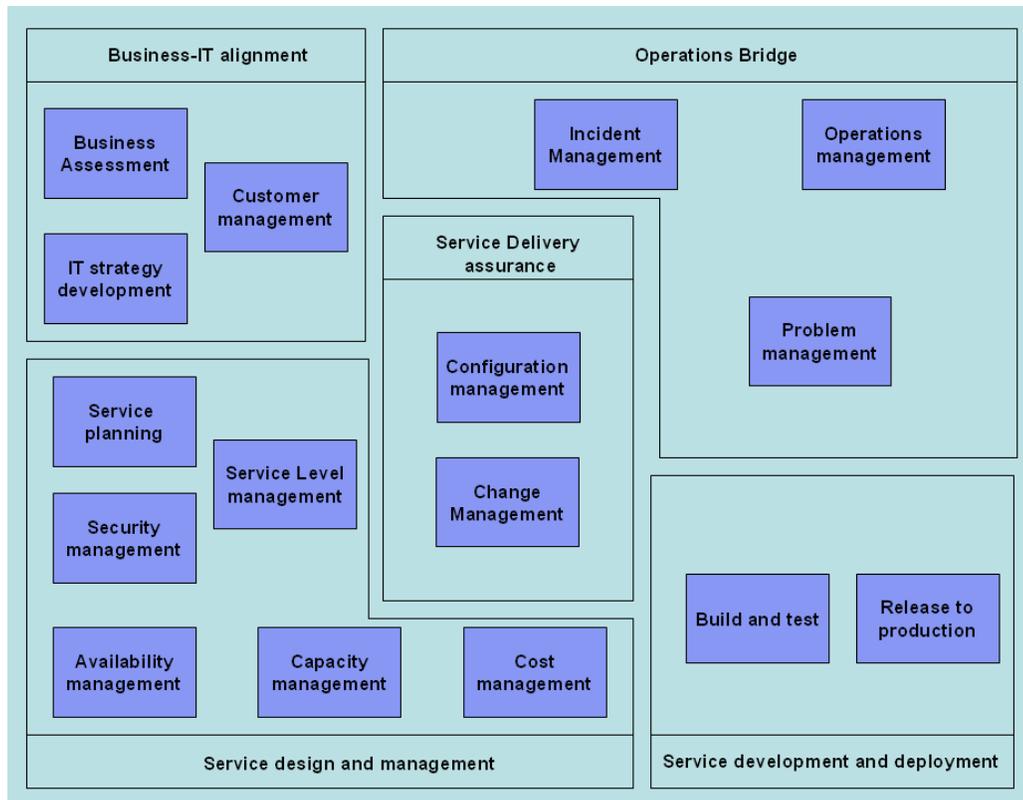
- More perspective, relevant, adaptable operations guidance: Since more and more organisations are becoming distributed, MOF offers templates, examples and sidebar to satisfy the specific needs of the IT service providers. IT is also available electronically providing ease of use and customization.

## **2.6.2 Hewlett Packard IT service management (HP ITSM)**

HP's IT service management reference model is an extension of ITIL which is a balanced combination of HP's experience in service management, ITIL and industry best practices. According to Smitherman (2004) HP ITSM has additional processes not available in ITIL and it focuses on IT as business rather than IT within business.

Sallé (2004) describes HP's ITSM as a coherent representation of IT processes and common language for defining IT processes requirements and solutions. HP function as a high level fully integrated IT process relationship map, in which the model can be adopted by an organisation regardless of its size and type. HP updates ITSM framework on a regular basis according to the changing needs in IT services. Recently, the new released version 3.0 comes with the security management to support the E-businesses needs. HP uses this model for interdivisional communication and both product and service development.

HP ITSM model (Van Bon, 2002) is used to guide customers as they refocus their efforts on service management instead of technology management and on customers instead of users, and on the integration of processes, people and technology. The HP reference model defines five process groups with processes in each group. These groups are service delivery assurance; business IT alignment; service design and management; service development and deployment; and operations bridge, as shown in the Figure 10 (Drake, 2002, p89) below.



**Figure 10: HP IT service management reference model processes (Darke, 2002, p 89)**

With the implementation, HP ITSM offers the flexibility for organisations to adopt their own particular process. Therefore there is no first and last process similar to ITIL processes (Van Bon, 2002).

HP has been known to be one of the first IT leaders to have developed the ITSM framework (Sallé, 2004). However, some anomalies with the release year of HP ITSM framework were seen in the literature reviewed. Van Bon (2002, p84) asserts that the release year for HP ITSM framework was year 2000, however Sallé (2004, p15) claims that HP released the first version of ITSM in 1997.

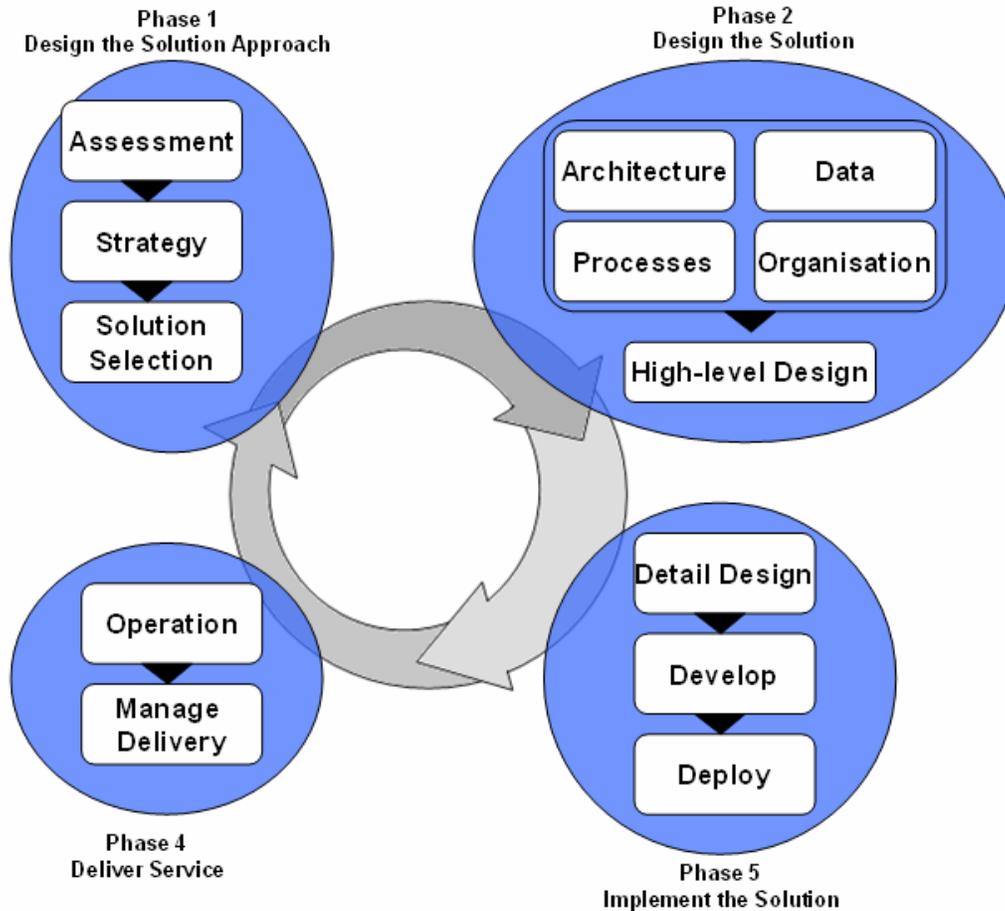
Smitherman (2004) provides a detailed review of how HP's IT management tool HP Openview complies with ITIL. He claims that HP Openview provides a true end-to-end strategy to realise the ITIL detail. HP solution maps its elements closely with ITIL processes in two sections of Service Delivery and Service Support. As in ITIL, HP Openview also views Service Desk as the central point corresponding to the common management database. Finally, he claims that HP Openview provides a solution that bridges the gap between IT and business assurance.

The integration of HP ITSM framework with other frameworks is also researched and suggested in a recent published work. Sallé and Rosenthal (2005), in their paper assess HP IT Program (ITP) using COBIT framework. Identifying that COBIT does provide KPIs (Key Performance Indicators) and KGIs (Key Goal Indicators) for control structure however it fails to specify implementation of each for the processes that could be done using ITP from HP. The authors conclude that a combination of COBIT framework with HP ITSM framework provides the IT management a strong solution to synchronise IT with business objectives.

### **2.6.3 IBM's Systems Management Solution Lifecycle (SMSL)**

IBM known as one of most prominent market leader in Information Technology has always been a key contributor to the development and enhancement of ITIL. Since the early years of ITIL emergence, IBM has provided key inputs from its knowledge and expertise on service management and recently was involved in quality assurance with OGC's publication on "Planning to implementing service management" (IBM, 2002). Another project taken up by IBM on ITIL, related to Project management co-authored with Microsoft.

Besides this, IBM has certified staff as ITIL service management instructors and exam reviewers. As a model, IBM has managed to adopt all the important ITIL processes into IBM's Systems Management Solution Lifecycle as shown in the Figure 11 (on the next page).



**Figure 11: IBM Systems Management Solution Lifecycle (IBM, 2002, p 6)**

To define its capabilities to support ITIL implementation, IBM defines them as a combination of skills assets and methods. Just like other vendors IBM also provide consultancy services with ITIL certified staff to assesses IT capabilities of organisation and create an appropriate service management strategy for them. They also provide design solutions to integrate the critical elements of service management that are aligned with ITIL processes. During implementation the IBM practitioners verify the ITIL concepts and best practices to be aligned.

A tool with IBM Infrastructure Resource Management services called IRM Accelerator has a set of pre-defined solutions including incident management, configuration management, change management and problem management which are derived from ITIL processes. As an enhancement, IBM has extended the configuration management processes from ITIL defined set. The new processes are a part of IRM Asset Management Solution, which defines the lifecycle of

an asset. This enables organisations to effectively manage infrastructure operations and to drive down ownership costs, but still maintain and improve service levels thus enabling new business capabilities. IBM is also making alliance with its clients such as Peregrine Systems; to incorporate and introduce new ITIL based solutions. IBM has been recognised as the Vendor of Record (VOR) with government of Ontario for providing ITIL process development, documentation and implementation services, ITSM project management services and ITIL training and skill development services (IBM, 2002).

IBM has also developed a wide range of tools and techniques for use with the IT Process Model in the analysis of IT organisations. Within IBM Service management framework design, IT Process Model (ITPM) can also be used as basis for designing the management framework. ITPM is a model for controlling IT in organisations. Many Dutch organisations have used IT Process Model in conjunction with ITIL to structure their IT management. Hertroys and Rooijen (2002) affirm that IT Process Model and ITIL complement each other. IT Process Model provides control of IT, indicating the relationships and information flows between processes, where ITIL describes the best practices and how these processes can be implemented.

## ***2.7 Industry implementations of IT service management frameworks***

Since ITIL's inception in the 1980's, many organisations in public and private sectors around the world have adopted the ITIL framework to improve their IT services. One of the first US Company to adopt ITIL was National Mutual Insurance Company. After the ITIL based re-engineering process, the company reported a decrease in downtime by 50,000 user minutes (Margulius, 2004b). Zurich Life help desk has let the company reduce the number of contracted IT staff needed to service 2,500 end-users in two buildings from 30 down to 10, enabling the company to save US \$85 per hour of contractor's pay. Another company to have implemented ITIL successfully is Procter and Gamble and thus reducing IT spending by tens of millions of dollars and boosting IT Service Delivery (Dubie, n.d.).

Within Australia, organisations such as Queensland Police and TransGrid have already benefited from the ITIL (Aalders, n.d.). According to the audit report by Australian National Audit Office (ANAO), the use of IT service continuity management process (ITSCM) in Centrelink has substantially assisted Centrelink to improve information technology and telecommunications business continuity management (Morris et. al., 2004, p6).

Australian universities are not left behind in implementing ITIL. Universities across Australia that have produced literature about their ITIL implementations include Deakin University, Monash University, RMIT, University of Ballarat and Edith Cowan University (Peasley and Fletcher, n.d.), Macquarie University, Queensland University of Technology, Griffith University, University of Sydney Library, Charles Sturt University and University of Melbourne.

A review of these universities and their implementation is undertaken as a part of research design later in Chapters 5 and 6 in the research.

## ***2.8 Literature review summary***

The adoption of ITIL is rapidly increasing in Australian universities. It is primarily evolving as the mainstream framework in IT service management and thus has been reported as having a very positive effect on alignment with the current heterogeneous and distributed IT services environment.

However there are concerns that were highlighted in the literature. Macartney (2005, p81) compares different Information Security capabilities of various IT frameworks including ITIL, COBIT and ISO17799. Macartney (2005, p81) in his review of these standards and claims that ITIL has not updated its security management processes since 1999 and therefore, there would be possibilities of current threats and issues not identified. Secondly, while ITIL offers security management suitable for any type of organisation, it does not provide ideal organisation wide security function. Instead ITIL itself refers to ISO17799 for organisations willing to implement stronger security management. The review also brings to attention that ISO17799 in comparison to COBIT provides much more depth in information security management (Colbert, et. al, n.d.).

Every standard is framed in a way to accomplish a certain objective. COBIT and ITIL are used for auditing processes from a business perspective. There also have been developments in the field of integrating these frameworks to provide a stronger approach to an environment that is well aligned as well as audited accordingly (LeBlanc, 2004a; LeBlanc, 2004b). With a similar objective in mind, ISACA realised the need to integrate standards like ITIL, ISO 17799, etc., within COBIT; and is working towards designing a framework to address the need of IT controls (Byrum, 2003).

All these frameworks can considerably add value to IT Infrastructures depending on the specific business needs of the organisation. However, Le Blanc (Aug 2004a) states that the most ideal combination benefiting an organisation would be to have COBIT for auditing, ITIL for improving and ISO17799 for securing. COBIT and ITIL predominantly perform an excellent job in separation of duties i.e. audit and improve. Australian National Audit office (ANAO) also

successfully used the control processes from COBIT, ISO 17799 and to a lesser extent ITIL along with its own Better Practice Guide (Morris, et al., 2004, p48).

However, Warland and Ridley (2005) in their research work on COBIT have identified the limited COBIT academic and non-academic research work available. This has been identified as a gap that can be achieved though future research on these standards. The literature analysed in this research work also portrays a similar trend, with large number of ITIL publications from commercial resources and white papers. This limitation is important since these standards are fairly recent with few implementations. More and more organisations are concerned about compliance issues. There is increasing concern with the usage of control processes for IT Governance in organisations, especially financial institutions. In July 2002, the Sarbanes Oxley Act (SOX) was introduced in the USA for strict audits for financial institutions and increasing the pressure on these institutions to be more complaint with the act (Kaarst-Brown, et. al, 2005; Waschke, 2005). Sarbanes Oxley Act is only applicable in United States; hence out of the scope of this research.

In Australian universities, the use of IT services has increased significantly over the past decade. This dependency has also occurred with concerns on regulatory compliance, systems centralisation and security. In order to create an environment for IT services where the business objectives are met with an effective and efficient IT support, the use of best practices specifically through ITIL is prominent. However, academic work in regard to ITIL implementation and review of different university environments has been minimal. The next section of this thesis proposes a theoretical framework for research to fill the identified gap in the literature concerning the adoption factors and implementation issues in ITIL in Australian universities.

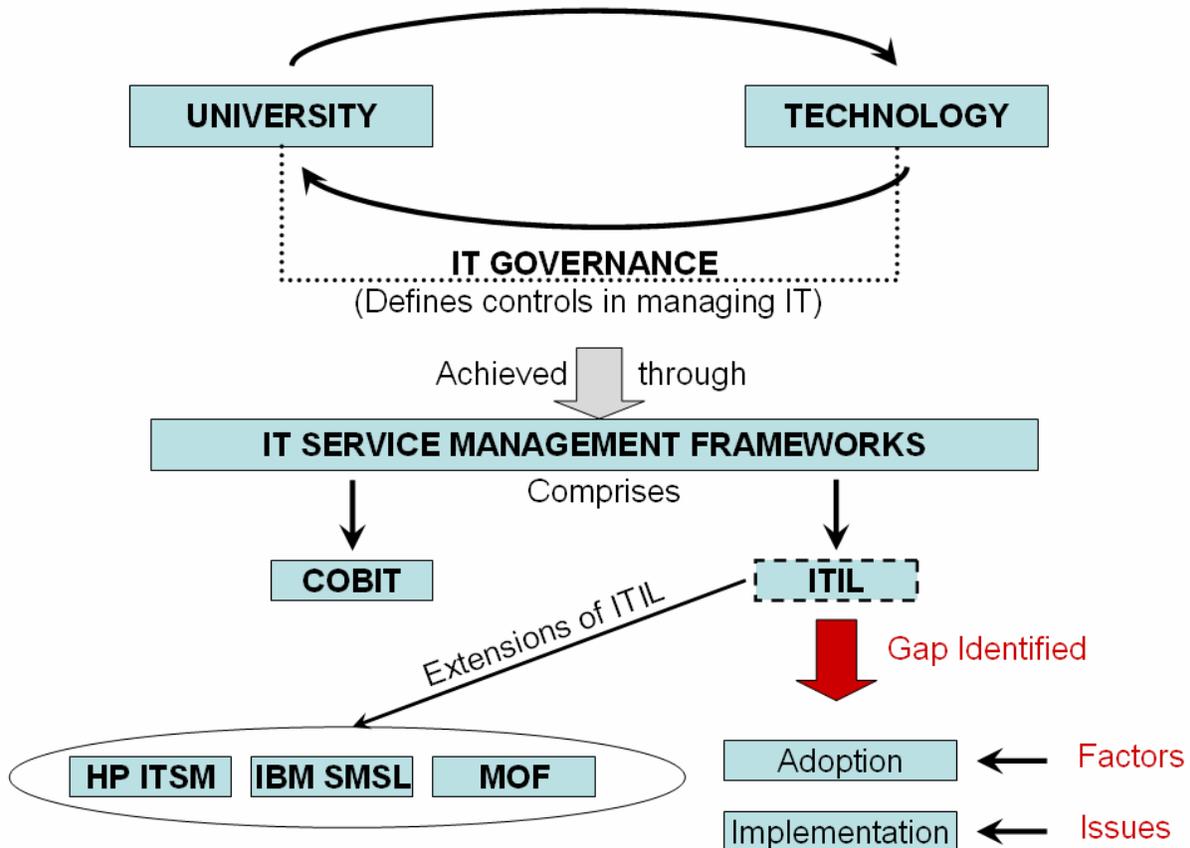
### 3. Theoretical Framework

The literature review defines IT Governance as the alignment of business objectives with IT services. Along with other organisations, universities feel the need to align their processes with IT services through IT Governance. The emergence of IT service management frameworks not only creates an environment with more efficient and effective IT services, it also promotes IT Governance. Among the frameworks and best practice models reviewed and analysed in the literature review, ITIL emerges as the most dominant and widely deployed across Australian Universities. Since ITIL is a framework emerging in the past two decades, academic research is limited especially in respect of implementation issues and for comparison with other IT service management frameworks.

A theoretical framework has been developed in this thesis to evaluate the context of ITIL frameworks in Australian universities. The partially unknown areas in this research are:

- Adoption of ITIL - the factors behind its adoption categorised as technological, organisational and environmental factors.
- Implementation - issues in the implementation processes including pre-implementation analysis, processes to be implemented, order of process implementation, hiring of external consultants, selection of tools.

In context to the research, the theoretical framework in Figure 12 shows IT service management as the central concept, i.e. implementing IT Governance to align university operations and technology. This framework is used to examine the experience of ITIL adoption in seven Australian universities, plus a detailed case study on one university's experience.



**Figure 12: Theoretical Framework**

The gap identified is the dearth of academic work comparing ITIL implementations in Australian universities. Gap identification leads to the definition of the review protocol with two categories. This categorisation forms the basis of the research design which is used as the protocol for review of all the universities. Results from the review are then used to assist the next stage of the research.

This chapter defined the theoretical framework, first identifying the problem area, then setting out research objectives. The next chapter defines the aims and approach to address the problem.

## **4. Research Objectives**

The theoretical framework identified the gap in the literature in the Australian University context regarding ITIL, IT service management framework. The purpose of this research is to analyse the adoption factors and implementation issues for ITIL that have not been well researched.

### ***4.1 Research Aim***

*The aim of this research is to determine:*

- 1. Factors influencing adoption of ITIL within Australian Universities.*
- 2. Issues related to the implementation of ITIL in Australian Universities.*

### ***4.2 Significance of Research***

Achieving the research aims would lead to a broader understanding of IT Governance and IT service management within Australian Universities. This contributes to theory building as well as developing empirical knowledge on IT service management. The protocol developed in this research to review selected cases, provides a structure that can be used as a technique for universities to examine their situation and issues relating to the experiences of others.

In particular, the significance of the research is that it can be used to:

- Better understand ITIL adoption process.
- Assist universities to examine their own situation through the research protocol developed for this research.

- Act as a benchmark to provide information about ITIL implementation in Australian universities.
- Improve the limited academic knowledge base in ITIL implementation.

### ***4.3 Research Approach***

To achieve the aim, the research will first explore the factors that enable / inhibit the decision to adopt ITIL. It classifies factors like resources, organisational needs, training, into three major categories: technological, organisational and environmental factors, which influence the decision (Hiew, 2002). Secondly, to determine the issues related to ITIL implementation, an examination of the issues and challenges will be analysed.

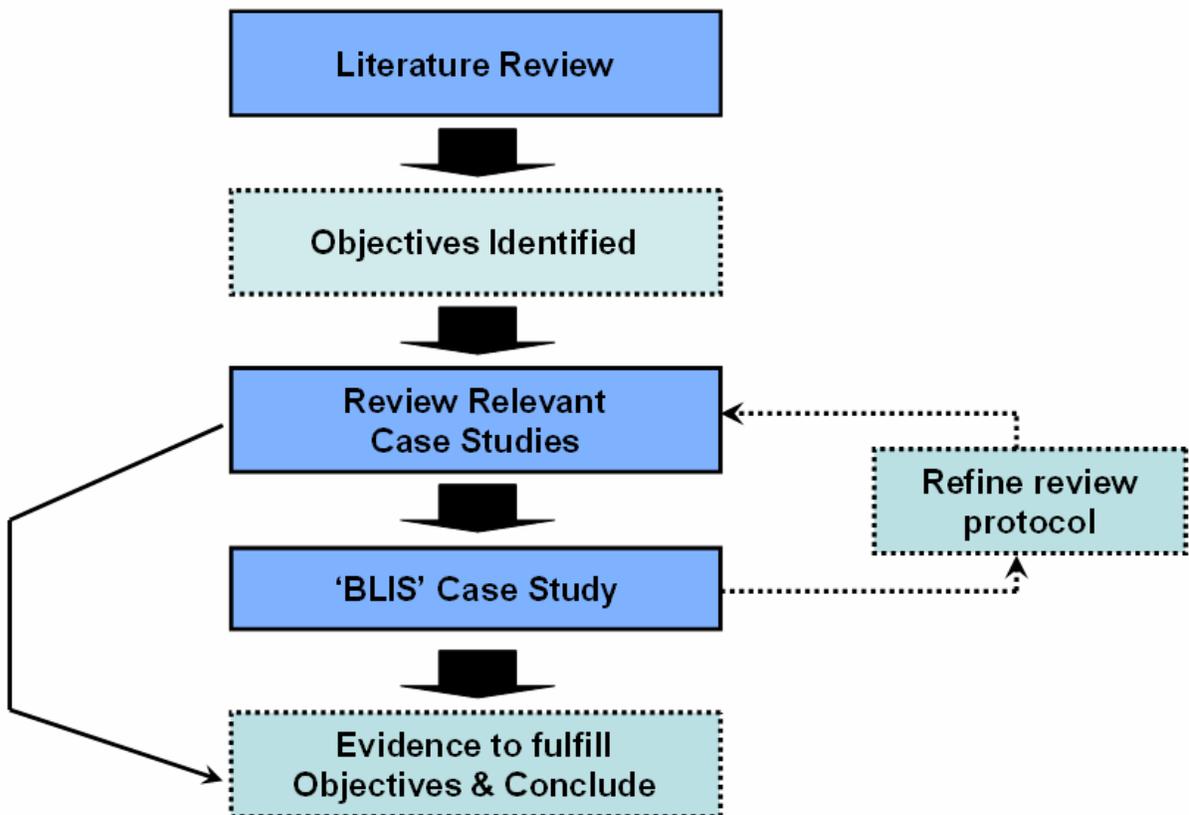
Further analysis is extended with the use of categorisation of factors and issues in the research design. The objective is to collect enough evidence to contribute to the knowledge base aimed at filling the identified gap. The analysis is reported in three separate chapters. Chapter 5 explains the research design and the methods and protocol deployed in the research work to ensure consistency i.e. review of case studies and a detailed in-depth case study. These case studies primarily include some Australian universities that have implemented or are in the implementation process of ITIL and one case is taken up for a detailed analysis. Chapter 6 reviews the seven university cases and Chapter 7 the detailed case study.

## 5. Research Design

This chapter describes the research design adopted to address the aim detailed in [Chapter 4](#).

The research design is in two major parts, as below and in Figure 13:

1. Analysis of independently published case studies.
2. In-depth case study of Division of Business, Law & Information Sciences (BLIS) at University of Canberra, ACT, Australia, to investigate findings from part 1.



**Figure 13: Research Design**

The review of published case studies was to provide the input to create an understanding of the issues relating to IT service management as prevailing in Australian Universities. It is only used

for analyses of ITIL implementation publications for evidence collection. Further, the authors of each publication were contacted for further updated information and feedback.

In the detailed case study, University of Canberra, BLIS IT services, was chosen because of its adoption of ITIL a few years ago. For this, multiple sources of evidence collection were undertaken. Interviews formed the major part and BLIS documentation, such as plans and management reports, IT project proposals and documentation, and reporting documents, were also analysed. The documentation provided the origin and background of the IT Governance and IT service management approaches and practices.

Besides the two methods used, some independent telephonic and personal interviews were also conducted from IT consultants for their advice and opinions. In order to enable a fair review all the evidence has to be seen from the same perspective in order to attain similar set of results. Thus, a common protocol is defined as below.

### ***5.1 Protocol for relevant case studies and detailed case study analysis***

One of the most important issues to be considered in multiple case reviews is to evaluate and consider each of them in the same light (Remenyi, et al., 1998, p182). Therefore the review of relevant case studies and the detailed case study is based on a common protocol that would assist in collecting similar data from different sources, categorise and then analyse results. The protocol is devised to avoid deviation from the aim of the case study and case study review. This protocol is used as a lens and has been derived from the literature review as well as the review of previous case studies. The adoption factors are based on the factors categorised by Allan et al., (2003) which seem to provide the right structure to define the different factors in an easy interpretable that is more general in the industry. However, for implementation, issues have been based on the analysis of previous case studies, which resulted in the issues as shown in Table 1.

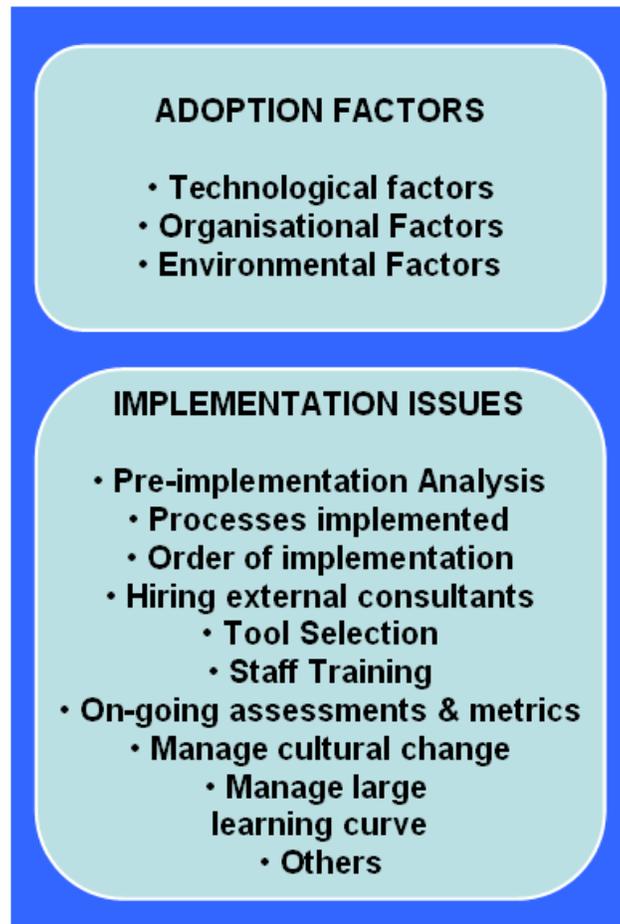
<div style="text-align: center;"><b>Universities</b></div> <div style="text-align: left;"><b>Issues</b></div>	Queensland University of Technology	Macquarie University	Griffith University	University of Sydney	University of Melbourne	Charles Sturt University	Curtin University
Pre-Implementation Process							
Processes Implemented							
Order of implementation							
Hiring external consultants							
Tool selection							
Staff training							
On-going assessments & metrics							
Manage cultural change							
Manage learning curve							
Resource strain							



**Issues found**

**Table 1: Implementation issues as derived from literature and review of case studies**

The different categories in the protocol are set out in the Figure 14 below. This protocol is designed based on the occurrence of various issues in the review of previous case studies.



**Figure 14: Research Design-Review Protocol**

- **Determine factors influencing adoption of IT Governance and IT service management through ITIL in Australian universities:** The review will include an introduction of the university and an outline of its organisational structure. A review of the factors or reasons that played a role in the adoption of IT Governance would assist in

collecting data and identifying similar trends in IT Governance adoption to solve common problems. These factors are further categorised into three sections: Technological, Organisational and Environmental factors.

- **Investigate implementation issues:** In order to analyse the adoption of IT Governance / IT service management frameworks, it becomes very important to investigate the implementing process related to it. Reviews of this would yield the issues and solutions in each scenario. Some of these issues include the cultural change experienced by these universities and how they handled it. Besides this there were issues such as staff training, tool selection and the processes to be implemented.

In the end, lessons learnt by these implementations would provide more information for other organisations and avoid similar errors or be faced by the long "trial and error" process. This protocol is used for analysis of the review of case studies as well as the detailed case study in the next two sections.

## ***5.2 Method 1: Reviewing relevant case studies***

Besides the literature review, there have been multiple case studies published by other universities that have adopted or implemented ITIL in one form or the other. As a part of theory building, it was considered that a review of these case studies would provide substantial evidence, which would be compelling and robust (Remenyi, et al., 1998) enough to support the second part of the research, i.e. the detailed case study and also enable clear results and findings. The scope of this thesis not only involved IT staff, but also various management and business related issues. Hence the use of multiple case study reviews made sense as the Remenyi, et al., (1998) asserts the wide range use of multiple case studies in business and management research.

### **5.2.1 The need for reviewing previous case studies**

Many Australian universities have published documentation of their ITIL implementation, the reviews of which not only are a good source for supporting the theoretical framework but also proved very helpful in supporting the research design and analysis. Williamson (2000) asserts that multiple case studies assist in investigating a particular phenomenon in diverse environments. Secondly, they also help in cross case analysis. In this case in-depth multiple case studies were not feasible due to the scope of the project. Hence, an in-depth analysis of previous published case studies would assist in predicting similar / contrasting results on the theme of this research. In addition they would also provide substantive evidence to support the theoretical framework and the findings of the detailed case study (Williamson, 2000, p97).

### **5.2.2 Limitations**

As with every research method, using multiple case studies poses one limitation, that might makes drawing results a harder process. Remenyi, et al. (1998) asserts that use of multiple case

studies may at times yield a large number of possible relevant variables, thus making the process to collect large samples very long and hard to draw statistical influence. However, if the case studies produce similar results, they offer compelling evidence for the initial set of hypotheses. In this research in order to overcome this limitation, a protocol was designed that would categorise the important information in the previous case studies to be reviewed in relation to the main aim of this research work.

Meanwhile, there is no hard and fast rule as to the number of cases undertaken in the research, as this is determined by the extent of research or in this case, the range of available sources. Since the implementation of ITIL in Australian Universities is a phenomenon that developed in the past few years, not many case studies have been undertaken and published.

### **5.2.3 Evidence collection**

Gillham (2000) firmly asserts the importance of evidence to support case study based research work. According to that author, a case study following a narrative logic and chronology of investigation and reasoning, presents key points, where evidence is required for development and direction of the narration. It becomes vital that impressions and assertions are substantiated in the same way.

For this review, previously published relevant case studies by other universities about their adoption and implementation process of ITIL, forms the basis for evidence collection. Electronic source was used for evidence collection for this research method for two reasons. First, this research identified a gap in that there is little academic literature available on ITIL implementation. Hence it was important to analyse the few available to substantiate the reasoning. Secondly, due to the limited scope of this research, in-depth analysis of each case was not feasible. Hence, the electronic sources were used as they also provide savings on time and cost (Gillham, 2000).

The Internet was used as the primary source, as it is readily available. Searches on universities in Australia yielded these publications. Additionally, some publications had references to other universities, which assisted in collecting further information. Contacts were made with authors that also enabled collection of up to date information on these publications and ascertain if any future work was being undertaken. Most of the publications are merely work of consultants publishing the changes they had introduced and how they went about it. Not many of these have been aimed at the academic field of research.

The second part of the research design deals with the detailed case study that forms the major part of this research work. This case study as defined in the next section was undertaken with a view to providing an in-depth analysis and confirmation of all the facts and observations from the literature review and the review of previous case studies.

### ***5.3 Method 2: Detailed case study***

Yin (2003) is of the view that the objective of research can be of significant influence in deciding the right research method. The questions asked within the objectives provide an apt understanding of how research aims form the basis of what methods could be appropriate. Questions, what, how, where, when, why, and why focus on main issues. As a guideline he provides a chart on research strategies and their attributes. I have used this chart as a guideline in deciding the right strategy for my research (Yin 2003, p 5)

<u>Strategy</u>	<u>Form of Research Question</u>	<u>Requires Control of Behavioural Events?</u>	<u>Focuses on Contemporary Events?</u>
<b>Experiment</b>	How, why?	Yes	Yes
<b>Survey</b>	Who, what, where, how many, how much?	No	Yes
<b>Archival Analysis</b>	Who, what, where, how many, how much?	No	Yes/No
<b>History</b>	How, why?	No	No
<b>Case Study</b>	How, why?	No	Yes

**Table 2: Relevant Situations for Different research Strategies (Yin 2003, p5)**

For this research, the case study proves to be the most relevant research method as shown in the Table 2 above.

This research is based on a framework that asks: Why is ITIL adopted for IT service management in Australian Universities? How do these universities tackle issues related to the implementation process? The main objective is: Why and how are Australian Universities adopting IT Governance and IT service management frameworks? If we look at the combination of "how" and "why", three strategies seem to be most appropriate: case study, experiment and history.

Next is analysing the second part of the aims. What is the focus of the research in terms of events, i.e. if it has focus on contemporary events or not. This research aims at industry standards that are current industry practices and implemented by many business groups recently. This research is intended to design a tool that would be used in the current scenario; hence the focus is no doubt contemporary. Since history would not be an option as it is not a strategy aimed at contemporary research, we have two most appropriate methods, i.e. case study and experiment.

Lastly we decide if the research requires control of Behavioural events. This study establishes how an organisation prepares its plans and, if using these industry standards would contribute to their overall IT services management. Since the analysis needs to be purely based in a situation unaltered, the way it is supposed to be, the behaviour requires no control. There we significantly rule out experiment as well.

Considering the chart provided by Yin (2003), I believe I would be able to achieve the aims as desired.

*Case Study* (Remenyi, et al., 1998) is an empirical enquiry to know when, how and why questions that form part of research aims. The researcher examines the context without having control over events. This is one reason for its popularity with business and management studies. The *case study* allows analysis of specific instances in order to identify processes that could be crucial and could not be observed on a large-scale analysis. It is known to present a multi-dimensional picture of a situation. It is a well-regarded method for business and management researchers and also with PhD and some Masters work.

*Case study* (Williamson, 2000), when used to describe a phenomenon, develop and test a theory, provides evidence for hypothesis generation and exploration of areas where the knowledge is limited. Further it can be characterised as qualitative or quantitative based on data collection techniques.

### **5.3.1 The need for a detailed case study**

Another vital rationale behind doing a case study is that this research is aimed at in-depth understanding and knowledge of business processes and IT infrastructure. *Case study* provides suitable data collection methods and data analysis strategies for a detailed understanding.

Through multiple case studies, data collection based on survey / questionnaires or just interviews, documents analysis of variant situations could be compared to achieve a general reasoning/ theory (Williamson, 2000, p96). However, this research work aims at qualitative analysis of business processes, which makes multiple case studies not feasible for a master's thesis. One of the biggest drawbacks of a detailed case study is it being biased. In this research using small case studies of the universities that have also implemented ITIL in some form or the other, a pattern for analysis is built that eliminates this. One case study of a particular organisation, which is in the phase of implementation of all or some of these standards, would provide the evidence to compare patterns and to what extent they are prominent. This is a scenario of a unique case where all the conditions like organisation size (medium/ small) industry standard are followed; business continuity requirements are all met.

Since these standards are recent and it is mostly large organisations that have implemented them, it requires research with an in-depth understanding and description which is what detailed case study provides (Williamson, 2000, p97). In this case, exploratory research is undertaken, to provide a basis for developing explanations of why a phenomenon occurs, and which could be further used for other situations.

As a part of this research, evidence collection was through interviews and analysis of documents collected in the interviews. Interviews played an important role, as understanding of business processes requires recording and understanding of executive and senior management. This was done through structured interviews or facilitated group meetings.

### **5.3.2 Limitations of a Detailed Case Study**

However, as any other research strategy, *case study* has to focus on its strengths and overshadow its weaknesses.

First the researcher needs to be careful that the objectives of "why" and "how" are contemporary issues in the industry to facilitate the collection of evidence.

Secondly, (Remenyi, et al., 1998) with its positive usage features, there are few things that need to be taken care while a case study is performed. One limitation could arise from deciding the scope of case study. Specifically with organisations, it becomes hard for the researcher to decide at what level different business decisions, processes or organisational changes are inherent. Thus, it becomes quite significant for researcher to define the scope of business involved and further what organisation level or department the study relates to.

Another problematic area could be defining time boundaries in case of multiple case studies. One organisation might not be as time demanding as the others. This could become an issue while the researcher wishes to compare results. Hence, it is important as time definition assists in defining limits of evidence collection and analysis. The researcher also needs to take into consideration that the case studies compared fall in the same category. E.g. IT security investment in banking could be compared with IT security investment in educational institution, but the educational institutions could be privately or government owned. Similarly, time scales need to be defined and consistent. For example, if the study focuses on how IT security has evolved since the year 1960, then comparing a bank in the year 1960 and an educational institution in year 1990 would not be consistent.

Fourthly, one major prejudice about case studies is that they are known to be biased in comparison to surveys and experiments. Evidence collection and hypothesis could be influenced by a researcher's characteristics and background knowledge. However, (Remenyi, et al. 1998) this notion could be true for any method, depending on how it is handled. The researcher must make efforts to ensure that all the sides of analysis are accurate and published with all observations ethically. In addition these should be in a logical sequence and continuity throughout. Similarly, the issue of time, money and too much documentation also requires a thorough consideration by the researcher in advance.

### 5.3.3 Evidence collection

Evidence collection in case studies could be done by:

- Interviews
- Documents
- Direct observations
- Participant observation situation
- Physical artefacts
- Archival records

Interviews form an integral part of case study method for collecting evidence. Personal interviews, in comparison to focussed interviews or in the form of survey interview, are more commonly used with business and management researchers. This also helps researchers get the visual of the organisation structure through personal meetings with employees.

Imperative analysis shows the limitation of bias as well as poor and inaccurate articulation and listening, which could lead to serious issues. Hence, interviews should preferably be corroborated through verbal communication, company documents or observation.

However, Williamson (2000) asserts that from an information systems perspective, qualitative research is most widely used.

Comparing *case study* with other strategies:

- *Field study*, in comparison to case study, lacks knowledge depth with which the subject is studied.
- In contrast, *ethnographic study* relies on the researcher's interpretation and is not compared with a broader field.
- *Action research* is where the researcher becomes a participant, whereas in *case study* the participant is an independent observer of the situation.

## ***5.4 Summary***

The research design provided the structure for the analysis of case studies. It defined the protocol to analyse and review the case studies, thus providing a well-structured process to identify and evaluate all the cases from a similar perspective. In Chapter 6 and Chapter 7, the research design is followed for the analysis and collection of evidence to address the research question.

## 6. Review of relevant case studies

ITIL implementation knowledge within Australian universities is identified in the theoretical framework along with my approach to address the issues through the research design. Universities in Australia are employing more than before the potential of IT solutions and infrastructure to support their strategic vision. It is critical for IT and university strategies to remain aligned, updated and re-aligned in order to meet new strategic imperatives (O'Brien, Ryan, n.d.).

Therefore the ability to adopt and act strategically becomes a critical determinant in the survival and success of the universities. However, studies show that the goal to align IT with organisational strategies has not been well met (O'Brien and Ryan, n.d.), requiring the adoption of best practices to achieve alignment.

The following review analyses the adoption of ITIL in seven Australian universities. The review evaluates the implementations using the protocol in the research design and then analyse these results against the findings of the case study of one university in Chapter 7. The review is based on the publications by each university on their ITIL adoption. In order to collect updated information, all the authors of the publications were contacted, of whom a few responded.

In the analysis, there are some issues and categorisations defined in the research design, where data was not available in the case study reviews; hence they have been omitted in those particular sections.

## ***6.1 Queensland University of Technology (QUT)***

The following review is based on the document published on the ITIL implementation in Queensland University of Technology (QUT), in Queensland, Australia. QUT implemented ITIL to effectively and efficiently be able to manage and respond to the different risks faced by the IT infrastructure within QUT (McCormack, 2004).

In QUT, one of the most critical objectives of ITIL implementation was to prepare the environment for change. QUT organisational structure is based on devolved structure with 30 discrete IT areas supporting nine faculties and six divisions for 3,300 staff and 40,000 students. The project not just required the involvement of the technical staff, but business managers and process owners were also included to integrate better the business processes. The biggest challenge faced by the university was to implement the same processes throughout the whole university.

### **6.1.1 Adoption Factors**

For QUT, ITIL implementation was aimed twofold: firstly to be able to propagate to every devolving corner and secondly be simple enough to be understood by each member of IT staff (almost 300 staff). The implementation was initiated based on the review of the current situation and the identified gaps in the current systems. Besides this there were various factors that motivated the adoption of ITIL.

Technologically, QUT felt a need to improve operational responsiveness; operationally the IT services wanted to collaborate collectively with the business to achieve benefits at the organisational level; and environmentally, IT services wanted to deal with environmental threats eg. risks and vulnerability assessments.

Organisationally, ITIL emerged as the optimum choice facilitating the need for generic framework for all IT areas in the university independent of the technology, which was well provided by ITIL. Secondly, ITIL provided enough details to cover fully the requirements for self-assessment benchmarks. Thirdly, ITIL was simple enough to be distributed and adopted easily by 300 IT staff.

### **6.1.2 Implementation Issues**

- **Pre-implementation Analysis**

The pre-implementation review embarked on the IT managers a task to integrate and coordinate communications channels in the dissolved IT structure in whole of QUT. QUT operates in a federated environment and ITIL was used to help to integrate the devolved IT teams. There was no move to develop a central structure, but to make the federated structure work more seamlessly across the boundaries. In order to resolve this issue, QUT implemented many strategies to introduce a matrix communication structure across the university that was built on the existing business relationships.

Steps were taken both at strategic and operational level to improve the level of communication. Strategically, prior to ITIL initiation, an IT Consultative group was already in place, with representations from each area, to formulate IT direction and thus promoting standardisation and collaboration across university. Though the IT Consultative group was not formed as a part of the ITIL project, it proved to be essential in the success of the ITIL project. At the operational level, ITIL provided the right framework to follow to define these communication channels.

- **Processes implemented**

ITIL implementation in its initial phases started off with two processes: incident management and problem management along with the service desk function. These processes offered an

immediate solution for both the IT services and the business. Project was initiated beginning with self-evaluation.

IT services department in QUT had been two-way communication with the faculty and division spanning all levels including information sessions and updates for the whole staff. This provided a very strong strategic communication; however there was dire need to establish a similar operational communication to deal with environmental threats and to collaborate in order to benefit at the organisation level.

- **Order of implementation**

The ITIL implementation was planned in stages with initially Incident management and problem management processes along with Service desk function implemented. As per McCormack's (2004) initial publication, it was planned that the next phase was the implementation of Security Management however; on discussion with McCormack (through email) the next phase includes Change, Release and Configuration Management. This phase is expected to complete by May 2006. Incident and problem management were selected as the first processes as they would provide the much required quick win and also delivering benefits from IT and business perspective.

- **Hiring external consultants**

QUT did manage to approve the funding for a project manager after the training for some IT staff was completed. Initially the project manager position was advertised externally, however, an internal staff filled it in. There were no external consultants that were used in the whole ITIL implementation project.

- **Tool Selection**

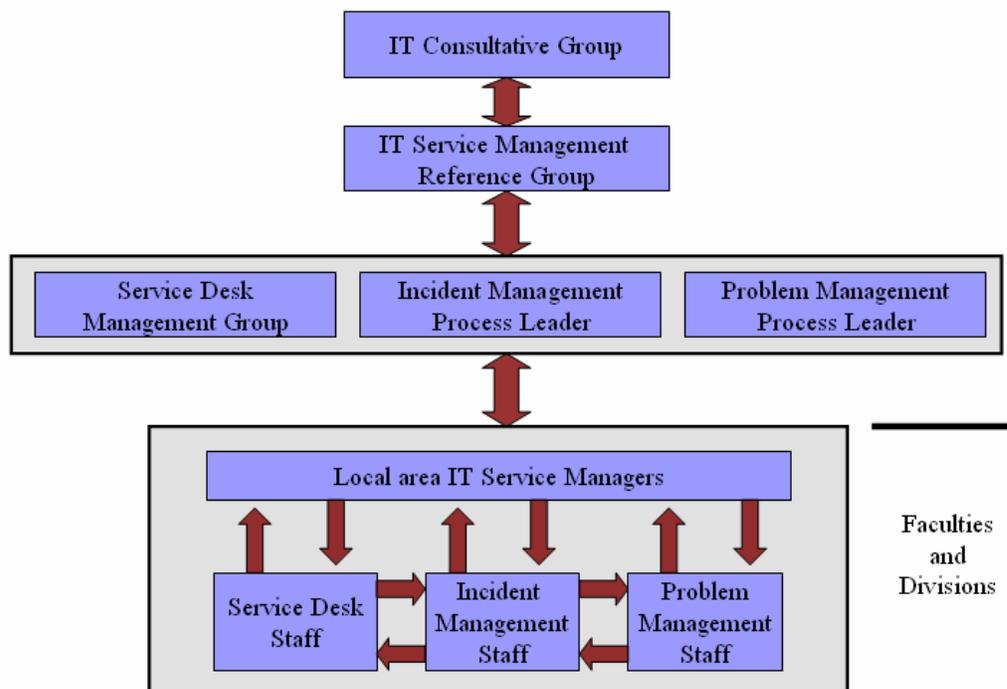
For Service Desk function, a software tool is required that is ITIL compliant and aligns with the needs of the organisation. In case of QUT, new tool was not acquired, however a separate project was initiated to align existing tool to ITIL. Nevertheless, on further discussion with Mark McCormack I was told that with the maturity of processes, it is felt now that the tool is not meeting the needs of the University, hence, there are plans to replace it in year 2006.

- **Staff Training**

Implementation of ITIL started with the support of the IT consultative group and training of 32 staff members for ITIL foundation course. Majority of the staff was from the consultative group, as that would provide the decision makers all the necessary information to go forward with ITIL in QUT. A team was formed with representation from every section of the university in order to make the change process smoother. A further 193 staff was trained with the same certifications.

- **Acceptance of Cultural Change**

A Special Interest Group was created that benefited QUT in introducing ITIL they were able to see first hand the benefits of the new system. This special interest group still remains active and driven by the project manager. This group was a voluntary effort of the faculty and staff. Staff members were assigned with process leaders to act as a point of reference for any discussions in the subject. The reframing of the interest group brought the following change in the organisational structure within the IT services across QUT (McCormack, 2004) as shown in Figure 15 ITIL Support group in QUT.



**Figure 15: ITIL Support group in QUT (McCormack, 2004, p6)**

In order to build the ever-devolving structure of the organisation, separate reference material on Incident and Problem management catered for the service managers. The second part of the reference material consisted of specific rules for all the IT staff. These reference materials were put together as implementation kits containing:

- A step-by-step guide on steps to implement Incident and Problem Management process each with references on resources to complete the implementation, measure progress and provide feedback.
- An IT service management Reference Guide included overview of IT service management and how it fits with QUT structure in addition to ITIL self assessments allowing benchmarking against other organisation implementing ITIL. In order monitor progress central tracking system information was also provided.
- Incident and Problem Management Reference Guides containing process maps for each processes and process rules with summarised main requirements of each subsection.

Communicating change across QUT contributed to another double-sided document listing all the process rules of Incident and Problem management across the whole IT Staff. The process rules were kept brief to aid communication. Process rules usage also allowed incremental change before the full adoption of ITIL. In the successful implementation of ITIL in QUT, three major resources have been helpful including itSMF (IT service management Forum), IT service management User Group (created by QUT) and QUT Email list. IT service management User group is a group of state government, local government and university contacts that are implementing ITIL, which forms a basis for information sharing.

- **On-going assessments & metrics**

The only reference for the ongoing assessments was made in the IT service management guides created for each divisional IT services. These included sections on reporting on areas

to measure their compliance with the processes. The use of ITIL self-assessments were also mentioned so that they could measure themselves against other universities. In order to establish a system accessible by everyone, relevant information was provided how each team could access the statistics from the central job tracking system. Mark mentioned that areas are measured annually on each process implemented. Meanwhile, no clear reference was made as to how often these assessments were to be made and if all the teams have to be audited on the basis of these assessments.

QUT's plan to implement a unified system proved very beneficial and true to ITIL. This collaboration within the university assisted the university to fill in the gap of lack of information. Secondly, process rules kept brief to develop communication among the staff on the change process. Thus, allowing the changes to happen progressively from individual work to full adoption. However, the university felt the need for more information availability on ITIL implementation in university environment. According to QUT, the only information available was very generic and made ITIL projects much harder.

## ***6.2 Macquarie University Library***

Known to be one of the Australia's prestigious educational institutions, Macquarie University, provides a wide range of undergraduate and postgraduate courses with a strong student support system. The university library plays a vital role in catering for the information needs of academics and students. The resources deployed in electronic services within the library are more than half the total expenditure of Macquarie University on all the services. This is due to the increasing usage of electronic material and services by the students and the academics. Electronic services come with user expectations of round the clock availability of service, thus laying emphasis on minimal or no downtime. Similar was the expectation by the users of Macquarie library. Below is the analysis of ITIL implementation as published by Fletcher & Peasley (2005).

### **6.2.1 Adoption Factors**

The library services within Macquarie University felt a need to improve its IT services. On review of international recognised IT service management framework, ITIL emerged as a popular and well accepted framework within other Australian Universities. However there were many other factors that influenced the adoption of ITIL by the university.

Technologically, the university library wanted to use a framework that was independent of technology while supporting heterogenous systems and this was well provided by ITIL.

At the organisational level, the project was focused on service delivery and ITIL provided all the necessary processes to implement that. Secondly, ITIL also provided integration with other quality standards that could be in future or were already being used in the university. Thirdly, ITIL's adaptability to be implemented in small or large organisations encouraged university library to initiate its adoption. Fourthly, ITIL offered improved service culture for users where they can expect defined and consistent service through ongoing communication with service providers.

Environmental factors like the increasing adoption of ITIL in Australian Government departments also had its influence on universities' decision.

### **6.2.2 Implementation issues**

The deployed framework was expected to serve two purposes, i.e. managing the technology smartly and concentrating on development and delivery of new services.

- **Pre-implementation Analysis**

As a first step a vision, mission, and purpose was created where the project was aimed to focus on identified goals applying both to library and IT services. Next step involved analysing the current situation based on the maturity, penetration, efficiency and effectiveness of the current processes. As a result, the weaknesses and strengths of the processes within the library were identified. This was followed by an assessment of processes that would be most beneficial in improving the overall services, by involving all the stakeholders: library staff and clients including those who had undertaken ITIL training.

- **Processes implemented**

As a result, the project was aimed to implement four major processes initially including Service Desk/ Incident Management (SD), Service Level Management (SLM), Problem Management (PM) and Change/Release Management (CM).

Actual implementation initiated change in business processes within the university library. Prince 2 was adopted as a project management methodology and scaled down to suit library needs and the size of the projects. Hence, initialising a process for identifying, approving and resource provision for projects was established that provided a management framework, not existing before. New methodology introduced accountability and full resource availability for identified projects with specified communication plan.

The Change within the library was influenced by the IT service management framework leading to the establishment of a virtual Project Office to manage, staff and resource projects as one of the first changes. Library change process has accepted the change of implementing IT Service Desk to manage incidents and service requests for staff and students.

SD PROJECT: All the four major projects resulted in a positive effect on the library with the most significant success in the cohesive IT service Desk for both the staff and students helpdesk functions. The distinctive functioning earlier was due to the use of Remedy (BMC Software) by customer services team and none of these existed in the IT team. The unification of these teams led to dramatic improvement in services, improvement in cost effectiveness, and broadened staff knowledge and expertise on both IT and management areas.

SLM PROJECT: This project enabled library to extensively review IT services. As a result of these projects, the emphasis on customer satisfaction was achieved through the introduction of service catalogue. Managers of each library department being customers of the service desk viewed the services quite different to what the provider's viewed it as. Hence the comprehensive service catalogue was based on customer understanding. Introduction of Service Level Agreements (SLAs) bridged the gap between the IT department and the customers to agree on each service provision not just within the IT department, but among the external IT vendors as well.

PM & CM PROJECT: This has enabled the library to review in depth its ability and the way it manages the IT operations that have been difficult in the past. Problem management focused not just on the resolution of a problem but also emphasised on the investigation of why the problem occurred. Change / release management ensured that any changes (decisions and actions) to be made are updated after a thorough discussion with the relevant teams to be affected by the change.

- **Hiring external consultants**

Implementation of ITIL was quite new to the library staff; an external consultant was hired to complete the project.

- **Tool Selection**

One of the most challenging parts of the implementation was to configure the service management tool. Remedy purchased a few years back, to reflect the ITIL processes. However the system required additional modules to reflect all the processes from ITIL. The issue worsened as the university did not have a development server, thus involving costs for system upgrades and purchase of ITIL compliant modules. Considering its budget limitations, the University decided to compromise on long-term efficiency by not implementing some modules such as monitoring problems thus increasing staff costs which were marginally less compared to purchasing a development server and modules.

- **Staff Training**

To date, seventeen staff members have undergone an IT service Management Essentials Foundation Certificate course, thus providing them with a common understanding and language to interact on services.

- **Acceptance of Cultural Change**

The implementation of these ITIL processes has laid the foundation for a cultural change within the library of improving service delivery through a new service desk, service catalogue with SLAs but also introduced problem and change/release management. This cultural change would enable them to take this beyond IT and implement similar best practices in other services. As future directions, the similar principles of ITIL processes are aimed to benefit the other business processes within the library. One of such projects is the creation of a service catalogue of library services, similar on the lines of IT service catalogue created for the IT team. This library services catalogue would “define all the services offered by the library to the students and the community and how those services link and are supported internally”.

- **Resource Strain**

The ITIL project was expensive but cost effective in the long term to provide consistent and timely service. Meanwhile ITIL does require a substantial amount of commitment in first year of its implementation. These include the initial costs of purchasing and upgrading a service management tool, in addition to staff training costs and hiring external consultants for advice and direction.

ITIL requires commitment of financial resources, time and involvement of business and IT staff, but is a very realistic approach for a supportable and reliable service delivery. It provides a solid base of expansion and an ability to offer seamless services.

### ***6.3 Griffith University (GU)***

Griffith University started an ITIL framework implementation project in the middle of 2003. This project aimed to implement different ITIL processes by the Division of Information Services. As published by Griffith University, a very detailed report on Change Management is available on the web as published by Callow (2004); however publications on other processes were not available. Henceforth in the following review, this particular publication is analysed based on the protocol defined in the research design.

#### **6.3.1 Adoption Factors**

The publication provides some of the reasons why the high availability and capability was an increasing requirement in electronic infrastructure. However, there is no specification of the factors leading to the adoption. Meanwhile, some examples were given.

Increasing demand by students for a round the clock access to learning materials and administrative functions, which is possibly an organisational factor. Secondly, research requires extensive electronic resources, and unable to provide this to students, could jeopardise research grants and funding.

Environmentally, the financial and possibly legal impacts of non-availability of services for current and prospective students became a major factor. Secondly, the competition to provide high quality and reliable electronic infrastructure to attract new students also contributed to the need for improvement.

### 6.3.2 Implementation issues

- **Pre-implementation analysis**

There seem to be no direct reference to a pre-implementation review undertaken. However the project was initiated with an aim to introduce change management process from ITIL within the team. Henceforth, the objectives of the project were as under:

- To enable IT staff manage and control changes in the infrastructure production environment.
- To enable reduction to a minimum level in the disruptions to the business that could have been caused by the changes.
- To reduce to a minimum the occurrence and impact of change related problems.

- **Processes implemented**

Change Management process was one of the processes in the package of other ITIL framework processes implemented in Griffith University. Timeframe for this process was of six months from September 2003 to March 2004 which included Planning, Design & build process, Aligning of the tool, Pilot and Review, Training and the going LIVE process. The implementation process is explained as a very smooth transition and a very well accepted new process by the IT staff. In order for the staff to channel their energy towards the productivity and improvement of services, effort was made to define the change categories and priority level to the simplest levels. For category classification four major categories were defined as major, medium, minor and standard. Changes that could be processes as defined in the categories and associated target approvals (authorisations) were prioritised as normal. Meanwhile, changes that are required immediate action, in order to fix an outage that is affecting the business processes or unit, but still do require approval and can be scheduled at any time and were prioritised as emergency changes.

Roles and responsibilities were distributed among employees from change manager as the owner of the processes to the stakeholders who would be affected by the changes. This assisted the university in defining the levels of authorisation and approvals that would enable

them working within the appropriate level of Governance but the same time avoid unnecessary bureaucracy.

- **Hiring external consultants**

For the purpose of project management an external consultant was hired who also assisted in process design. He worked along with a team of eight experienced staff across the Information services team supporting process design configuration and roll out.

- **Staff Training**

Every team member of the project team was trained for the ITIL Essentials Courses to ensure common understanding of terminology and ITIL framework. However, the total number of staff was not mentioned.

- **Acceptance of Cultural Change**

Though initially there was no reference to the cultural change acceptance in the university, it was asserted that the staff were very keen and willing to understand the new processes. Nevertheless, as the processes were implemented the staff required an on going coaching to progress, that was important for the success of the project.

- **Resource Strain**

In order to solve the issue of funding, an Associate Director supported resources. The process design was structured and designed by an external consultant who assisted in project management. It was also felt that in terms of implementation full resources required, however, for long-term maintenance costs, the university identified 25 (approximately) of an experienced resource vital to maintain the operation of the framework.

Above all the benefits, the new change management process based on ITIL framework, provided Griffith University with a strategy for risk mitigation and also assisted influencing the cultural changes and habits within the organisation. The university learnt that keeping the pilot process short before going live proved to be extremely helpful in finalising the design

and supporting tool. The author also asserts that the success of this project also proved that the change management processes could also be implemented on its own if that's what the organisations need to improve on.

## ***6.4 University of Sydney Library (USL)***

Australia's first university, The University of Sydney, founded in 1850, has an international reputation for its outstanding teaching and as a centre of research excellence. Supporting the needs of the university staff, students and members of the public, The University of Sydney Library is a network of 22 libraries across all campuses. The USL provides desktop, public access gateway, printing, reporting, and document delivery services, which are dependent on various hardware and software components.

ITIL adoption by USL has assisted them to reduce costs, increase the level of service and increase cost effectiveness; provided stability and flexibility and freed resources for enhancements. Following is a review of Andrea Stern's publication on ITIL adoption in University of Sydney library in EDUCAUSE Quarterly (Stern, 2001).

### **6.4.1 Adoption Factors**

ITIL adoption within USL was based on the many benefits it offered towards IT service management. For USL, more than any other category of factors most of them seemed to be the organisational benefits that ITIL promised.

Organisationally, ITIL provided the alignment of IT services with the organisations' strategic plans. Secondly, it assisted organisations in making consistent decisions about IT to meet organisations needs. Thirdly, IT technical staff and users agreeing to meet and fund the user's rising demand for services and measuring the services on agreed targets. Fourthly, ITIL provides an approach where the roles and responsibilities for each process are allocated to individuals in an organisation, which is useful in process improvement.

## 6.4.2 Implementation issues

Implementing ITIL for IT service management was based on the very benefit it provides to increasing an organisations chance in realising its goals for IT services.

- **Processes implemented**

USL's approach was central to providing concrete and well-defined SLAs. The process called SLM within ITIL was used to define what an organisation intends to achieve through an IT service and also determine its value in order to support its (organisation's) objectives.

Along with SLM, for service delivery four more processes were implemented. These include the following:

- **Availability Management:** This process was aimed to define to ensure that the SLAs defined services are available to the user. Availability was based on the factors including reliability, complexity, serviceability and maintainability of the hardware, software, contracts and procedures.
- **Contingency Management:** To ensure the IT services are provided and recovered during emergency procedures in the event of disruption or failure. It involves Impact Analysis, backups, redundancy management and emergency power supply.
- **Cost Management:** The process enabled USL to ensure cost-benefit analysis and changing for processes.

For controlling IT infrastructure, the following processes were implemented:

- **Configuration Management with the use of CMDB (Configuration Management Database):** This process was used to identify, manage and report on

hardware/software, communication technology, policies, procedures, SLAs, roles and responsibilities required in the provision of services.

- Change Management: Change Management process initiated a scenario where the changes were well managed in IT Services. It also enabled the IT staff to access the effect of these changes, negative or positive, on IT services. The risk factor identification was also possible through this process where the stakeholder were identified thus providing the right balance between flexibility and stability.
- Incident Management: Incident Management process was based on the objective of identifying error and restoring service to the users. It acted on the Service Desk as a central function to collect all this data.
- Problem Management: This process was introduced to enable the incidents recorded in the incident management process to be reviewed for the root cause and making sure they do not recur.

Although all these processes to some extent work independently, however having them implemented and available at the same time, gives many fold benefited to USL.

- **Acceptance of Cultural Change**

The staff was encouraged to change their approach towards IT service provision, thus redesigning the processes embossing the new model. This new model not only maintained the enthusiasm within the IT staff as they designed it, it also benefited the customers. With the maturity of the model better and more cost effective service was provided. The interface with users changed with them been able to see all the services being provided and agreed on.

- **Resource Strain**

In the implementation process, the organisations generally adopt an approach, which is based on funding as the first step and then followed by the progressive cultural change. However, in USL, the approach was in the opposite direction. First there was constant effort to alter the

way of thinking about the IT services within the division and the staff. Once the base was created with a good understanding, the funding was approved and the projects were taken aboard. The resultant of the new IT services and the IT staff and other users accepted change in the model and they realised the long-term benefit and cost savings. This provided sound support for the funding of the project to introduce the new ITIL based IT services.

The adoption of ITIL has brought improvement in IT services and their management. In the analysis below, the benefits realised along with some examples as provided as published (Stern, 2001).

- Improved quality of services supporting better the organisations business. Eg. Saving fire fighting time and funnelling that towards enhancing services, by increasing this time to 50%.
- Improved planning with better understanding of current IT capabilities and costs. Eg. The IT services staff gained full control of assets, including support and leasing information.
- More flexibility in adapting to changing needs and opportunities. Eg. The incidents reported in the current ITIL implementation were far less complex to the previous situation.
- More motivated and satisfied IT staff, as expectations were clear, frustrations were lowered. Eg. Use of remote management enabled IT staff to reduce time to travel to site and use that time and skills to troubleshoot the desktops.
- Enhanced customer satisfaction because expectations were clearer, well-defined and shared through the IT services web portal. Eg. The incident call rate to the helpdesk was halved despite an extension in IT services.
- Increased productivity of IT and user staff. Eg. There was an incredible reduction in the backlogs of the IT staff and they were not inundated by the requests as before.
- With ITIL, there were defined factors that enabled the IT staff to provide measurable service quality. Eg. This is seen by resolution and response time to be reduced by 50%.

## ***6.5 University of Melbourne (UM)***

University of Melbourne is recognised internationally for its high quality educational reputation. In the year 2003, Gartner IT Landscape Study reviewed University of Melbourne identifying that the university required enhancements in its IT strategy in order to provide improved and aligned strategic decision making from business and IT perspectives. To resolve the issue, the University introduced service improvement and COBIT as a governance framework. As a result of the review, the Information Division led and supported the change process for the ITIL implementation.

Below is a review of the publication on the ITIL adoption factors and implementation process in University of Melbourne as published by O'Brien and Ryan (n.d.).

### **6.5.1 Adoption Factors**

Organisationally, it was felt within the university that there was no clearly articulated information strategy to provide a framework to set planning priorities. ITIL provided the right framework that would enable them to do so. Secondly, Gartner IT landscape review for Melbourne University revealed IT strategy required enhancements in order to provide improved and aligned strategic decision making from business and IT standpoint. Gartner Review suggested use of ITIL for the following reasons:

- Duplicated IT operations support,
- Decentralised and independent IT help-desk services,
- Inconsistent install, move, add and change services, and
- Computer systems management efficiency opportunities within the Information Division and across the university.

Thirdly, the university's Governance relationship was unclear and had to be made more transparent. Non-existent of information strategy resulted in unclear, non-transparent and

unsustainable budget decisions. Fourthly, the uncertainty in decision input rights and decision rights of stakeholder, resulted in the need for IT service management.

### **6.5.2 Implementation issues**

To address the above issues for Governance ABEF (Australian Business Excellence Framework) and IT service management through ITIL were used in conjunction. ITIL was used for IT service management as many of the benefits of ITIL support the ABEF principles. Both recognise the custom need of improving services.

Going further, the publication did not provide any clear indication or review of ITIL project or its implementation. Henceforth, this review is limited to the information available.

The adoption of ITIL enabled the University of Melbourne to clearly articulate information strategy, which is a high level plan of information and communication technologies for the university management. It also provided architectures to include stakeholders that were to be developed as the project progressed.

## ***6.6 Charles Sturt University (CSU)***

Charles Sturt University (CSU), which has the most extensive distance education facility in Australia, has 33,000 students and 1500 staff members. Out of this, 150 staff are responsible for IT services across the university. Dependence on web services, from admissions to results, enhanced the need to have well structured and managed technology. The article published on the adoption of CSU does not provide further details of any requirement analysis before the adoption of ITIL change management. Hence this review is very limited based on the information published (Sefton, 2005).

### **6.6.1 Adoption Factors**

Technologically, the university required a web-based tool, which was easy to implement and use, yet flexible enough to suit the process flows of CSU. The ITIL complaint tools provided the features required. Secondly, the software used did not require any installations and was full web based.

At the organisational level, they required the ease to train the users on the applications.

### **6.6.2 Implementation issues**

Very limited information on the implementation process is available in the publication, since the publication is just an article published by the service provider who provider the software to the university.

- **Tool Selection**

The organisation adopted change management and for this reason purchased software from IntaChange from a UK based company IntraSoft.

- **Acceptance of Cultural Change**

In the case of CSU, the change came in very smooth with the new application moving rapidly from development to production. Since the scope of the application implementation was very limited it is believed that cultural change was not a major issue.

ITIL brought new ways for managing non-standard changes with various benefits. Introduction of ITIL provided flexibility to make changes to process flow easily and with minimal training. Secondly, changes in the process flows were well categorised based on ITIL definition of minor, medium, major and emergency changes. The division of IT was able to control data entry; access rights to change and modify information and controls to ensure right people enter the right data at the right time.

## ***6.7 Curtin University of Technology (CUT)***

Curtin University of Technology is Western Australia's largest university with more than 31,000 students and offering more than 850 undergraduate and post-graduate courses. The Division of Information Management Services (IMS) supports the university's information and communication technology infrastructure, application and desktop services and provides a central helpdesk. The following review is based on the publication "*Improving the quality of IT processes using the Cobit IT Governance framework*" by Hill (2003) *This analysis is aimed to understand implementation of COBIT in an Australian university as compared to other universities implementing only ITIL for IT service management.*

### **6.7.1 Adoption Factors**

The university planned to introduce IT Governance within its IT services. From the review of various frameworks, COBIT emerged as a comprehensive IT Governance methodology that would substantially increase acceptance and reduce time needed to implement IT Governance program.

COBIT's adoption was driven by the university's need to introduce IT Governance program.

### **6.7.2 Implementation issues**

- **Hiring external consultants**

An external consultant with a wider knowledge base on COBIT was hired during the implementation phase. This enabled the staff first hand training on the different COBIT concepts and introduction of processes. However the involvement of the internal staff was very significant and COBIT does require a high resource commitment for internal audits. For Curtin University of Technology this commitment has been for over a year and a half,

meanwhile this commitment is ongoing. However above all the efforts and assistance of external consultants, personal leadership skills of the IMS general manager have proved significant to the success of COBIT implementation.

- **Staff Training**

There seemed to be no formal training or certification that staff had to undertake. Nevertheless, the internal audit team was provided with copies of COBIT's Control Objectives and Management guidelines enabling staff to increase their understanding. Based on this, small teams were created to identify objectives and then develop estimates on the maturity levels of each process. As the processes matured, in 2001, staff performed reviews based on the COBIT Audit guidelines, thus reviewing the objectives and plan improvements accordingly.

Besides this an on going encouragement and monitoring of the IT staff has been important throughout the process.

## ***6.8 Case Study Review Findings***

Gillham (2000) claims that there is no one detailed way to present the findings report and one can use multiple styles while doing so. Meanwhile, he states that the emphasis should always be to highlight findings of relevance to the research presenting a coherent, interpretive summary of the observations based on the evidence. The author presents five approaches i.e., chronological, logically coherent, retrospective to research aims, response to research questions and theorising or explanation of issues. With this understanding, the protocol designed for the analysis of the case studies was designed to be coherent answering the research questions and explained issues.

As I progress with reporting the findings, a combination of coherent structure defined in tabular form, with response to the research questions will be utilised. Following the collection of findings, the tabular formation is divided in two tables. Table 3 lists all the major factors influencing the adoption of ITIL, including COBIT in case of Curtin University of Technology. Table 4 lists all the processes as implemented by each university case evaluated.

<b>Factors</b>	<b>Technological</b>	<b>Organisational</b>	<b>Environmental</b>
<b>Universities</b>			
<b>Queensland University of Technology</b>	<ul style="list-style-type: none"> <li>• Need to improve operational responsiveness</li> </ul>	<ul style="list-style-type: none"> <li>• To collaborate IT services collectively with the business to achieve benefits at organisational level.</li> </ul>	<ul style="list-style-type: none"> <li>• IT services wanted to deal with environmental threats eg. Risks and vulnerability assessments.</li> </ul>
<b>Macquarie University</b>	<ul style="list-style-type: none"> <li>• A framework that was independent of technology while supporting heterogenous systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Need to improve IT services through service delivery processes.</li> <li>• ITIL also provided integration with other quality standards.</li> <li>• ITIL's adaptability to be implemented in small or large organisations.</li> <li>• ITIL offered improved service culture for users through ongoing communication with service provider.</li> </ul>	<ul style="list-style-type: none"> <li>• Adoption of ITIL in Australian Government departments.</li> </ul>

<b>Factors Universities</b>	<b>Technological</b>	<b>Organisational</b>	<b>Environmental</b>
<b>Griffith University</b>	<ul style="list-style-type: none"> <li>• Increasing demand by students for a round the clock access.</li> </ul>	<ul style="list-style-type: none"> <li>• Unavailability of electronic resources could jeopardise research grants and funding.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial and possibly legal impacts of non-availability of services for current and prospective students.</li> <li>• Competition to provide high quality and reliable electronic infrastructure to attract new students.</li> </ul>
<b>University of Sydney</b>		<ul style="list-style-type: none"> <li>• ITIL provided the alignment of IT services with the organisations' strategic plans.</li> <li>• Would assist in consistent decision-making about IT to meet organisations needs.</li> <li>• To meet and fund the user's rising demand for services and measuring the services on agreed targets.</li> <li>• Define roles and responsibilities for each process to individuals.</li> </ul>	

Factors Universities	Technological	Organisational	Environmental
University of Melbourne		<ul style="list-style-type: none"> <li>• Required clearly articulated information strategy to set planning priorities</li> <li>• Gartner IT landscape review revealed IT strategy-required enhancements in order to provide improved and aligned strategic decision making from business and IT standpoint.</li> <li>• University's Governance had to be made more transparent.</li> <li>• Uncertainty in decision input rights and decision rights of stakeholder.</li> </ul>	
Charles Sturt University	<ul style="list-style-type: none"> <li>• Easy to implement and use</li> <li>• Flexible enough to suit the process flows</li> </ul>	<ul style="list-style-type: none"> <li>• Required solution that provided ease to train the users on the applications.</li> </ul>	
Curtin University		<p><b>(FOR COBIT)</b></p> <ul style="list-style-type: none"> <li>• Need to have an IT Governance structure in place.</li> </ul>	

**Table 3: Factors influencing the adoption of ITIL in different Australian Universities**

	Queensland University of Technology	Macquarie University	Griffith University	University of Sydney	University of Melbourne	Charles Sturt University	Curtin University of Technology
<b>Service Support</b>							
Incident Management	Blue	Blue		Blue	Blue		
Problem Management	Blue	Blue		Blue			
Change Management	Green	Blue	Blue	Blue	Blue	Blue	
Release Management	Green	Blue					
Configuration Management	Green			Blue			
<b>Service Delivery</b>							
Service Level Management		Blue		Blue			
Capacity Management		Green					
Availability Management		Green		Blue			

	<b>Queensland University of Technology</b>	<b>Macquarie University</b>	<b>Griffith University</b>	<b>University of Sydney</b>	<b>University of Melbourne</b>	<b>Charles Sturt University</b>	<b>Curtin University of Technology</b>
Financial Management (IT)							
IT Service Continuity Management							



Process Already Implemented



In Implementation/ Future plans

**Table 4: ITIL processes implemented in Australian universities**

The review of case studies shows that the most prominent factors for ITIL adoption were organisational rather than technological or environmental. Only one university, Curtin University, implemented COBIT, while others chose ITIL. Review of Curtin University enabled analysis of various factors involved behind the variant adoption. Reviewing the Table 3, the common factors for the implementations are identified. However, it is important to remember that all the information is based on the published work by each university. Hence, this research is not able to identify all the factors due to the limited information published and also due to the scope of each project.

Implementing ITIL involves adopting various processes and Table 4 lists all the processes adopted by different Australian Universities. The table presents an overview of processes most commonly adopted. It is seen that, out of all the processes, *incident management* and *problem management* are most commonly implemented rather than *security management*, *capacity management* and *IT service continuity*. It was also seen that the maturity of these processes is another perspective how each university considers adopting more processes. Some Universities, such as the University of Sydney, preferred implementing multiple processes in parallel, whereas other universities adopted one process at a time.

Identification of these factors is based on the analysis of available literature and the above case studies. These factors have been put together for evaluation and will be discussed in detail in Chapter 8 with a critical analysis of the literature review and results from the detailed case study.

## 6.9 Summary

It is seen in Table 4 that the highest number of implementations in the Australian universities has been of *incident management* through ITIL, with further precedence given to *problem management*. With the University of Sydney library having the maximum number of ITIL processes implemented, only Curtin University has adopted COBIT.

A contact was made through email to relevant publication authors at each university. The three replies received provided an insight into the current situation of the university. According to Mark McCormack from QUT is currently in the second stage of ITIL implementation. Initially, *incident* and *problem management* were implemented, and currently the focus is on *change, release* and *configuration management*. In QUT, ITIL implementation has assisted discrete IT support teams to work in coordination. Andrea Stern from the University of Sydney library moved to an academic position and no longer is involved in the ITIL implementation, so is unable to provide information on further developments. The third response was received from Janet Fletcher of Macquarie University library, which has experienced better workload management with more organised and effective IT services due to the ITIL implementation. However, due to an internal restructure in the library, further implementation of ITIL processes has slowed to enable IT services to be integrated accordingly. Nonetheless, on-going staff training is carried out to provide further ITIL understanding in the library.

The evidence from the review of the previous eight case studies provided vital evidence to support the research design. With this knowledge, in [Chapter 7](#), one university is analysed in detail using the same protocol used in the review of other case studies.

## **7. Major Case Study: BLIS IT Services, University of Canberra**

A detailed case study is directed at a detailed data point or a detailed respondent. Yin (2003) proposes a protocol to carry out a detailed case study either singly or as part of multiple case studies. The protocol is intended to increase the reliability of case study research and guide the researcher carrying out the investigation. The protocol proposed for analysis for the case study is defined as a part of the research design and would be taken up as a part of the field procedures in the case study.

This case study is undertaken with an aim to collect evidence supporting the identified gap in the theoretical framework that is defined as a problem in the research questions. This would be determined through the analysis of evidence through the lens of the protocol in the research design. The protocol defines the questions that form a major part of the case study as they assist the researcher to focus on the required information. The researcher is saved from collecting information that would not give relevant input to the study.

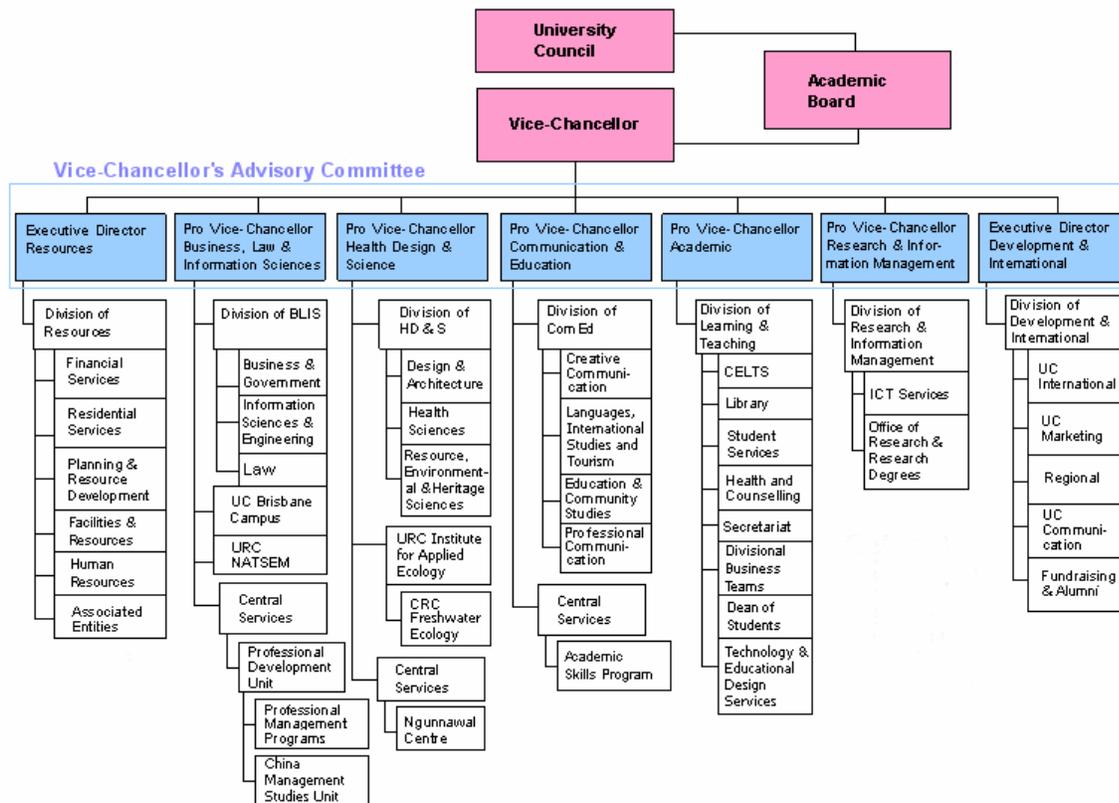
### ***7.1 Data Collection: Access to case study site***

Most of the case study evidence is recorded through interview process with the BLIS IT manager who was responsible for the ITIL project incorporation and maintenance. Mr Renzo Gobbin, IT manager BLIS IT services agreed to be personally interviewed for this research work. These interviews were pre-organised appointments held at the manager's office over the period of six months. In the interview sessions, multiple documents were also acquired that provided evidence and an insight of the implementation process. These documents have been analysed and included with the prior permission of the IT manager and the complied discretion of information is well maintained. These documents were used only for the research work and shared between the researcher and the concerned supervisors.

IT services in University of Canberra are decentralised with every division supporting its divisional IT services. Meanwhile, the central ICT team supports the IT needs of all the university students. The ICT team is also in the process of implementing ITIL. Hence, one interview was also arranged with the systems support manager and one interview with IT Director at ICT. These interviews assisted in analysing the approach within the same university environment with a decentralised structure. ICT team is currently in its initial phases of implementation and has recently trained its staff with ITIL certifications, so many variant issues appeared in terms of the interaction of the BLIS IT services and the ICT team. These were analysed further following the research design protocol.

## 7.2 Overview of case site

The University of Canberra is a very good example of an Australian University with a large and complex IT infrastructure. The organisational structure for the University of Canberra is defined in Figure 16 (University of Canberra Organisational Structure 2006). The organisational chart shows all the divisions and schools in the University, including the division of Business Law and Information Sciences (BLIS) that has implemented ITIL for its IT services.

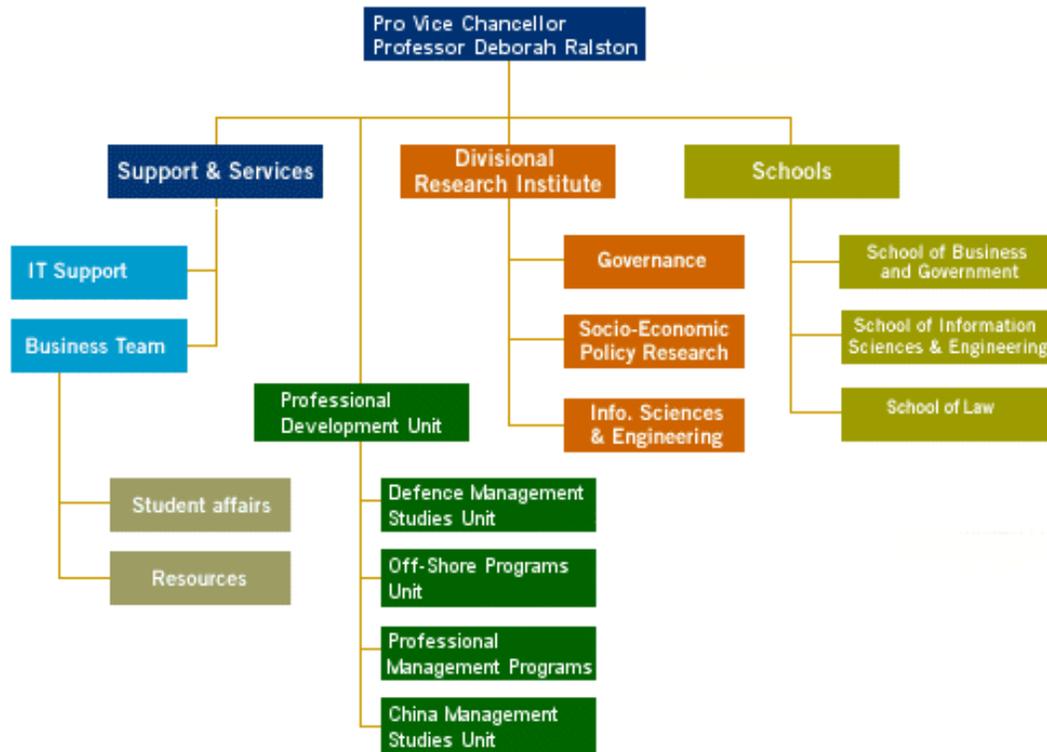


**Figure 16: University of Canberra Organisational structure 2006**

(<http://www.canberra.edu.au/university/organisation-chart.html>)

BLIS has over 3,000 students in multiple disciplines including management and policy studies, accounting, electronics, telecommunications engineering, computer engineering and software engineering, marketing, banking and finance, law, and information technology. BLIS IT services

team not only provides IT support to the students but also the academic and administrative staff. The IT services team is one of the support teams, which provides divisional IT services.



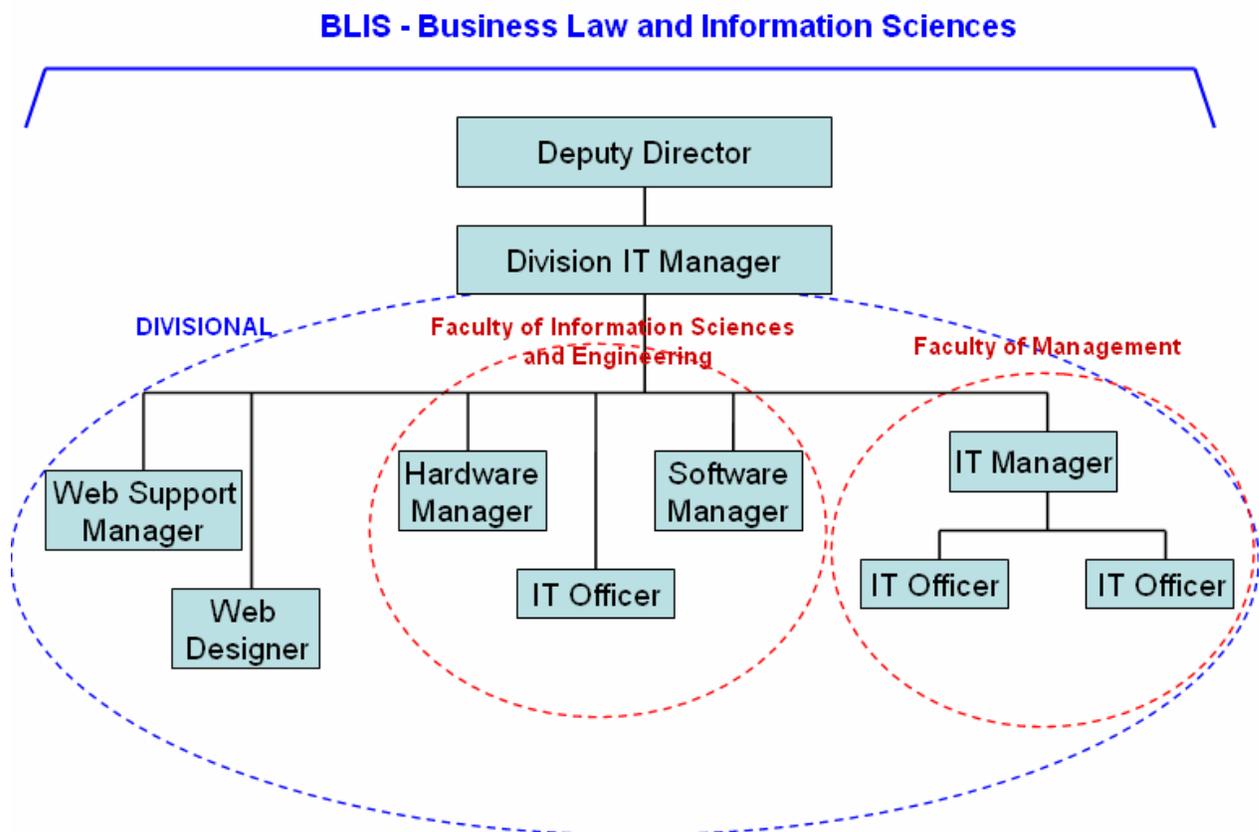
**Figure 17: BLIS Organisational Structure (University of Canberra website, 2005, URL: <http://www.canberra.edu.au/divisions/blis/structure-admin/organisation-chart>)**

BLIS IT services, as shown in Figure 17 The organisational structure as IT support, extends from academic to general staff and students from both coursework and research courses. These services are extensively used in every function of the division. As listed by the team these services include account management, file/printer services, internet, Wireless, LAN/WAN access, Email/calendar, audio visual, websites and teaching software.

This case study provided the ideal situation where ITIL had recently been introduced. The analysis includes the university's experiences of the implementation processes and how they resolved the issues to reflect the university objectives.

### 7.3 Field procedures

The field procedure based on the protocol would help us understand the initiation, implementation and the ongoing process with every facet of ITIL in BLIS IT services. Before the planning or proposal of ITIL adoption, BLIS division had just been through a merger of faculties. In 1999-2000, faculties of management and Information Sciences and Engineering merged to form BLIS, refer Figure 18 (BLIS Merger of Faculty of Information and Systems Engineering and Faculty of Management).



**Figure 18: BLIS Merger of Faculty of Information and Systems Engineering and Faculty of Management (pers comm).**

This merger brought with it some new issues related to the management and provision of IT services. These also formed a basis or reasoning for the need to have a best practice framework. A document prepared after the merger listed these issues as below:

- Merging separate network domain, mailing systems and staff/student filling system from two different infrastructures was a challenge.
- Difference in the management of accounts, security and disaster recovery in separate faculties.
- Managing the increased load of IT services staff was not enough.
- Separate IT services culture and working places had to be merged on common agreed terms.
- Improper division of workload among IT staff.
- Inadequate recording of support calls.
- Absence of standard platform across the division.

In order to resolve these issues, both long and short-term goals were identified in order to overhaul whole IT services. This included appointing new staff, defining roles and responsibilities and using a helpdesk call recording systems. The proposed plan included the following goals:

- Introduction to IT services best practices.
- A long term IT services strategic plan 2003-2006.
- The creation of detailed hardware and software platform across the division.
- The creation of a higher performance IT service culture.

A holistic approach was required to resolve these issues and to achieve the goals specified in the IT services review. Based on the review of the different IT service management frameworks and the university needs, ITIL was proposed for adoption. Many factors were responsible for this adoption, which are discussed in the next section.

### 7.3.1 Adoption factors

Besides the issues brought in by the amalgamation, there were other factors that influenced the adoption of ITIL. These issues are listed and categorised as per the research design protocol for analysis.

- **Technological Factors**

- Due to the organisational merger and the expansion of services, multiple technologies and softwares existed in the infrastructure. The ITIL framework provided a set of guidelines independent of any technology, which seemed the solution for BLIS IT services.
- Students and academics rely on the complex mesh of IT services and a small outage would parallelise the normal functioning of the university. This dependence and vulnerability of IT systems increased the need for IT Governance which was well provided in ITIL.
- ITIL provided an inbuilt process control that worked very well for IT auditing by making processes transparent.

- **Organisational Factors**

- The technology in BLIS IT services was not controlled effectively and efficiently to reflect the business processes, resulting in loss of revenue and resources. There was no minimal IT Governance in place.
- IT services in UC were based on the legacy infrastructure in place for years and had to be updated to improve the services.
- ITIL provided the flexibility to implement the process according to university needs rather than the challenge to adopt all the processes.

- **Environmental Factors**

- ITIL provided a common platform among different organisations and since many other universities were using ITIL, it was perceived to be a good practice to use what was known in the similar sector and thus facilitate interaction in the sector.
- ITIL is known for IT services improvement in Europe, then spreading to United States and the rest of the world, including Australia.
- Australian government departments had also benefited from the ITIL. Universities interact with government departments on various levels, hence it was realised that using similar framework would enable them to be able to work at the same level with other departments. For example Centrelink implemented ITIL. Centrelink interacts and exchanges information with universities on student records. This relationship could also benefit with the use of ITIL on both sides.

### **7.3.2 Implementation Issues**

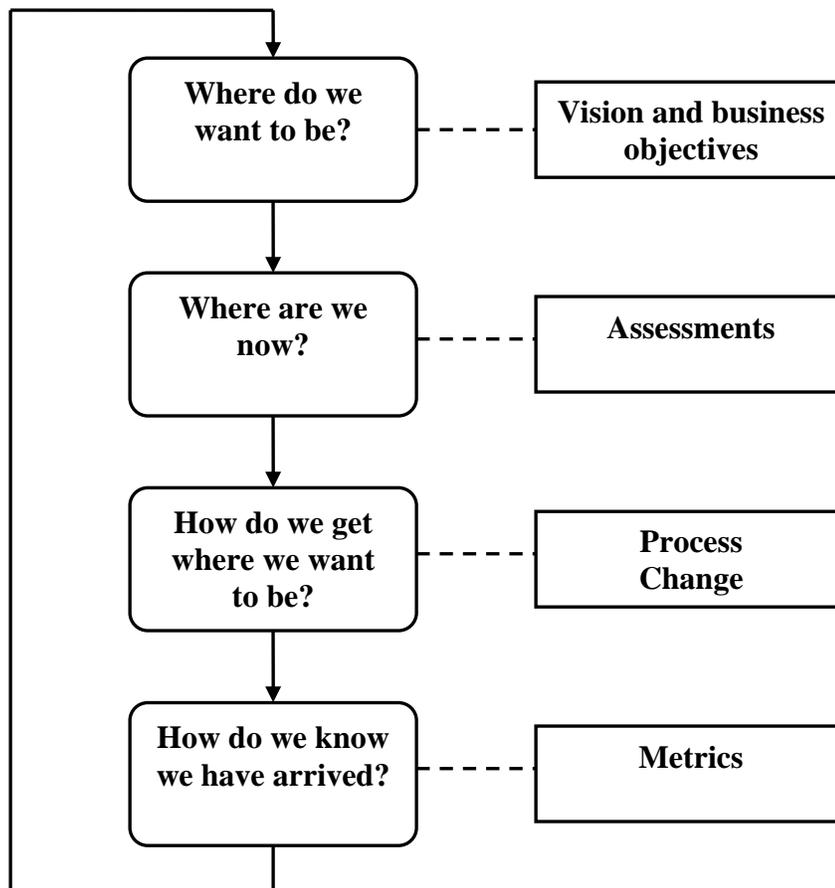
ITIL implementation project was initiated in 2002-2003 under the supervision of IT manager Mr. Renzo Gobbin who is ITIL certified. An initial assessment and requirements analysis was undertaken to assess the maturity level of processes. Similar to other Australian universities, legacy IT infrastructure existed in University of Canberra.

Based on the results, a project plan was formatted and approved through the divisional directors before a technical plan was implemented. Service Desk function was proposed as the first process to be implemented and then advance to other processes. Besides this, the proposal identified some challenges that had to be addressed for the success of the project, these included the following (pers comm):

- Learning cost to the user with the adoption of ITIL complaint tools.

- Teamwork (collaborative social behaviour) could be affected due to the variations in organisational work practices.
  - The revenue costs related to the training the staff and distribution of knowledge base across the team could be substantial.
- **Pre-implementation Process**

The pre-implementation process in BLIS IT was based on the procedures defined by the OGC literature (OGC, 2002). The process flow chart is depicted in the Figure 19 Process improvement model.

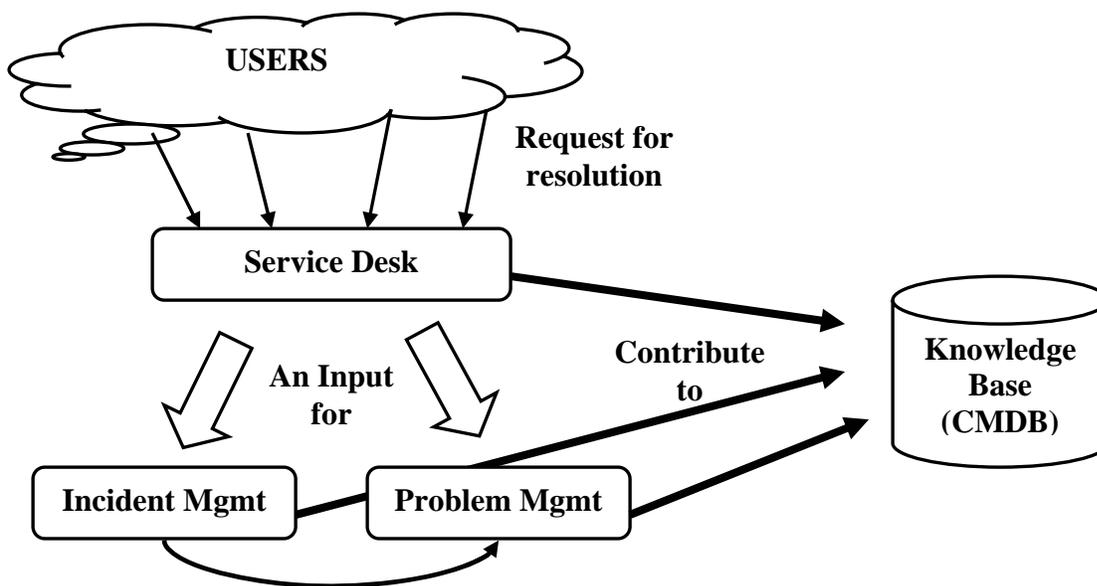


**Figure 19: Process improvement model (OGC, 2001, p 18)**

The review provided the vision and direction for BLIS in improving its IT services through ITIL processes. In the first review the document released highlighted the need of the division and its expectations from the planned change. The manager provided a copy of the divisional document that reflected these changes, for analysis in the case study. Further assessments were made of the processes and procedures currently being followed in the IT services team; this enabled the team to analyse and understand the eminent changes that need to be made in achieving the service improvement process. The review of these services and the best practices put together formed the third phase that was used to bridge the gap to achieve the process improvement. This was formed the official project proposal (pers comm).

- **Processes implemented**

BLIS IT services embarked on the ITIL project with basic Incident management process through the Service Desk function. Service Desk acts as the central point of contact for reporting issues and problems and the enabling the team to use this information later for further analysis. As incident management matured, Problem management was introduced. Problem management uses data from the incident management for further review in order to avoid recurring problems. It was important to implement incident management and problem management as the initial processes as they provided the knowledge base of the problem areas, which are further use by many other processes like availability management and security management. Incident management and problem management in BLIS IT services is shown in Figure 20 (Incident Management and Problem management implemented in BLIS IT).



**Figure 20: Initial Incident Management and Problem management implemented in BLISIT**

- **Order of implementation**

Service Desk function was created for the Incident management process, with a planned extension to introduce problem management as the processes matured. The incident management was based on the flow of process as specified in the OGC books. The decision to implement incident management was based on the fact that in order to improve the services and also implement other ITIL processes, recording of the incidents and resolving these issues was eminent. This could have been only being possible to have a Service Desk in place.

As a future plan, BLIS IT services are expanding its adoption of ITIL processes by introducing Service Catalogue for the customers. Other projects in planning include Change management and financial management.

- **Hiring external expertise**

Most of the organisations employ external consultants for implementing ITIL projects. However, for BLIS IT this expense on the resource was saved, as the IT manager- Renzo

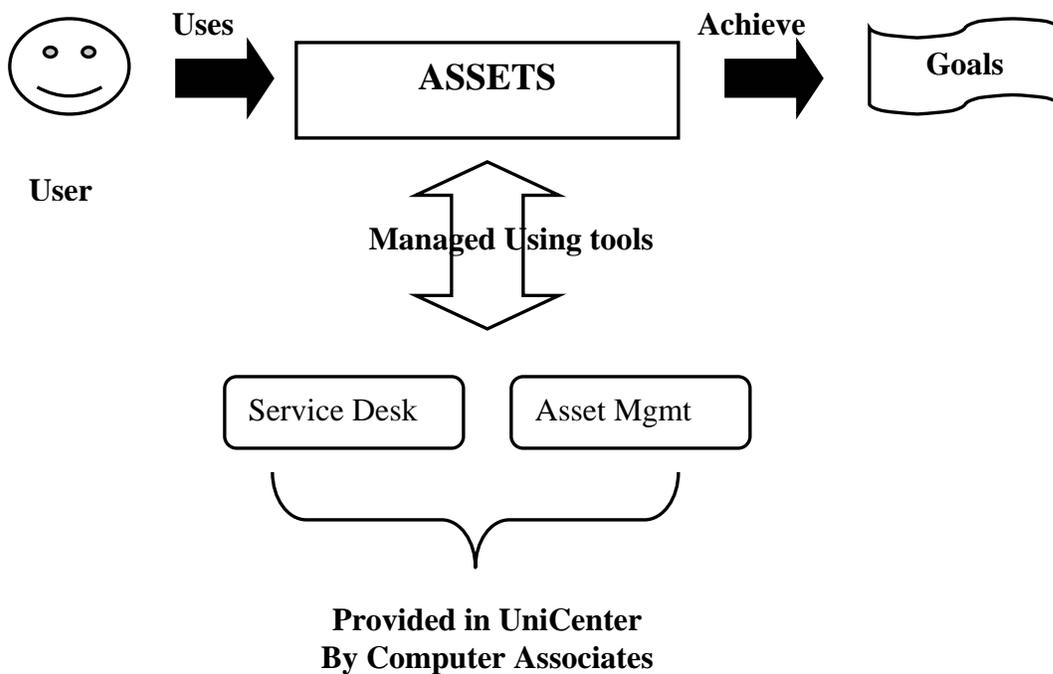
Gobbin was previously ITIL certified. This provided BLIS IT with an additional advantage of not having to get the university staff to explain their processes to an external consultant.

- **Tool Selection**

BLIS IT used Computer Associates (CA) UniCenter software to implement Service Desk. There were many choices available in the industry; however UniCenter was the most suitable option for BLIS due to the following reasons:

- CA provided local support compared to other software companies.
- CA had been well renowned for its benefits in reviews published by ItSMF.
- Thirdly, the most important reason was that all the processes and services within BLIS IT could easily be reflected in this software, thus removing the doubt of deviation.

As the incident management process progressed, Asset Management was also implemented through the same CA UniCenter software. Both these functions as reflected in BLIS IT services are depicted in the Figure 21 (Incident and asset management functions in BLIS IT Services).



**Figure 21: Incident and asset management functions in BLIS IT Services.**

- **Staff Training**

In the initial review one of the major challenges was to train all the IT staff with ITIL, but also with the new software for the service desk. Staff was trained through a two-day ITIL foundation course to be able to work comfortably with the new system, along with training on the Computer Associates UniCenter.

- **On going assessment and metrics**

BLIS IT services state that before the implementation of ITIL, there was no recoding of data on IT support call numbers and types. This formed a major factor in the adoption of ITIL. However, due to this reason, there is no sufficient data available to make an assessment on the improvement in IT services since ITIL implementation. Meanwhile, current service desk function records all the data that would provide for the need to have regular assessments and metrics created. One such form of data provided in the interviews was the incident activity report with details of the time taken to resolve and the closed incidents. Nevertheless, there is no documented procedure provided by BLIS IT services that adopts an ongoing metrics system. On going assessments have not been seen in practice yet in BLIS IT services as the processes are in their early stages and this would be taken up in the future.

- **Manage cultural change**

The biggest challenge with implementing ITIL is the cultural change. There is a huge resistance towards changing the everyday process. Staff and users have to be convinced based on the logical reasoning. These processes might require organising regular information seminars and involving the staff and the customers as much as possible in this transition. The adoption of ITIL in BLIS IT services was faced with much of resistance. This resistance still seem to be present with some staff not quite convinced if the change has brought any improvements.

However, ITIL within BLIS has triggered the other divisions at UC to think and consider the potential benefits it promises for their IT services. As a result of this, other divisions have

started sharing the service desk facilities with BLIS. Communication and Education division has recently started using the services of BLIS IT services Service Desk. With these changes, all the IT services within University of Canberra talk one language. The university is moving towards developing a central IT services with an integrated Service Desk (Cheetham, 2003). This integration is expected to enable better allocation of resources and accountability across the university.

- **Learning curve**

BLIS IT services recently implemented ITIL and the maturity levels are evolving with time, and hence require constant monitoring and improvement. During and after the implementation the Staff was faced with the challenge to adapt to new processes which requires constant motivation and convincing. This resistance was seen with both technical and non-technical staff. Initially, it was a tough challenge as legacy IT infrastructure did not define much interaction between the process owners and the IT support staff.

- **Resource Strain**

Justifying IT costs have also posed a huge challenge in projects. Implementing ITIL processes required commitment of required resources. Major part of the resource utilisation is felt in acquiring ITIL complaint Service Desk tool and training the staff. However, ITIL offered the benefits of implementing one processes at a time thus university did not need to stretch the budget. This provided the IT services team to get accustomed to the new system and realise its benefits before implementing more processes. The cost savings that are hoped from the initial implementations can be planned to be utilised to expand and introduce more processes.

- **Sources of information**

The information available on ITIL was usually through OGC publications, however recently some commercial consultancies and independent forums published a wide range of white papers and books. BLIS IT used these sources to gain an insight in the process, as there are no rigid guidelines for ITIL implementation. These sources are listed as below.

- Foremost source has been the OGC books, which provide the insight of ITIL and its processes. The books are very descriptive, however too long to read. Also they just provide information about ITIL, limiting much information of how ITIL could be actually incorporated in an organisation.
  
- ItSMF is a non-profit organisation that publishes information on IT Governance and IT Service management. BLIS IT is a corporate member of itSMF. Another benefit of itSMF is that it provides a platform for all the organisations implementing these frameworks to network, exchange information and benefit from each other's experiences.
  
- In addition to that, publications by IT Governance Institute and Pink Elephant on ITIL have been very helpful in the implementation process.

## ***7.4 Findings***

ITIL implementation has been driven by improvement in IT services along with risk management and change control, which has been an area of concern. The fruits are evident in BLIS, where it has already been implemented. Service Management is another issue that is on the priority list and aims to be achieved in the process.

Nonetheless, issues of organisational structure pose a challenge to the integration of IT services in University of Canberra. Since the organisational structure is decentralised with some IT service teams not using ITIL, BLIS is unable to perform to its very best due to dependence on other IT teams. It also makes issues like escalations and problem logging more complex.

Nonetheless, University of Canberra plans to integrate the separate IT services teams into a detailed central ICT infrastructure team; there emerges the issue of interoperability. BLIS IT already has ITIL implemented and ICT team on its way to implementation, giving rise to the difference in maturity levels between these teams. Initially the merger might bring in the loss of service quality to clients catered by BLIS since BLIS IT would be at the highest level of maturity than other teams due to earlier implementations. Hence, a well-synchronised management program will be necessary to coordinate the integration of different maturity level divisional IT support teams to be able to work together.

Though there were multiple sources information including OGC books and some commercially available information, limited academic work published in ITIL implementations was used by BLIS staff. There was immense support form the ItSMF publications and regular seminars. Most of the commercial white papers had to be dealt with extra care, as they did not provide an unbiased view.

Through the detailed case study, substantial evidence has been collected that supports the theoretical framework and also aligns well with the observations in the review of the previous

case studies. In the BLIS IT services case study, the findings have been summarised in the Table 5 and Table 6.

<b>Factors</b>	<b>Technological</b>	<b>Organisational</b>	<b>Environmental</b>
<b>BLIS University of Canberra</b>	<ul style="list-style-type: none"> <li>• Increased vulnerability due to the dependence on IT services required some form of IT Governance to reduce the disruption time in IT service delivery.</li> <li>• ITIL also provides an inbuilt process control that works very well for IT auditing.</li> <li>• Merger in schools required a framework to integrate different technologies that provides guidelines independent of any technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Effectively and efficiently to reflect the business processes in IT services.</li> <li>• Other organisations were also using ITIL and this would provide a common platform for interaction.</li> <li>• Legacy organisational structure needed updating to improve services after the merger.</li> <li>• ITIL provided the flexibility to implement the required processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Many organisations around the world have benefited from ITIL processes</li> <li>• In Australia besides other organisations, many government departments and universities have already adopted ITIL and benefited from it.</li> </ul>

**Table 5: Factors influencing the adoption of ITIL in BLIS IT services, University of Canberra.**

ITIL Processes	BLIS University of Canberra
<b>Service Support</b>	
Incident Management	■
Problem Management	■
Change Management	■
Release Management	■
Configuration Management	■
<b>Service Delivery</b>	
Service Level Management	■
Capacity Management	
Availability Management	■
Financial Management (IT)	
IT Service Continuity Management	

Process Already Implemented
 
 In Implementation/ Future plans

**Table 6: ITIL processes implemented or in the phase of implementation in BLIS IT services, University of Canberra**

## **8. Discussion**

The analysis of previous case studies and the results of the detailed case study in Chapter 6 and Chapter 7 respectively, led to the identification of factors for adoption and issues in ITIL implementation. This chapter provides insight on the similarity and dissimilarity of these factors and issues as seen in the case studies. Issues identified are further analysed against the literature and proposed solutions by other industry leaders. In order to understand and evaluate these issues, this section uses the same research design. However, a possible categorisation based on the organisational flow of control can also be used for the analysis, by defining the techniques at the strategic, operational or tactical level in the organisations. In the context of this research, the distinction is ruled out, as the clarity of these frameworks is not well evolved within the organisational structure of the cases reviewed.

### ***8.1 Effectiveness of Research Design***

The research design protocol has worked well as it provided the precise framework to analyse an assortment of issues in a structured form. The protocol enabled to analyse the factors into generic categorisation (as technological, organisational and environmental), which other researchers and partitioners can relate to. The second part of the protocol was designed based on factors from the literature review and the analysis of previous case study highlighting various issues. They were categorised based on the occurrence and the importance in the literature as shown in Table 1 (in Chapter 5).

During the analysis, various benefits were identified due to the use of the research design. They include the following:

- All the data is easily identified and well categorised.
- Case studies are about story telling; however use of categorisation enabled emphasis on important issues.

## ***8.2 Adoption Factors***

It was observed in the case studies that the most popular reason or factor influencing ITIL adoption has been more organisational than technological or environmental. Technologically, the universities already had solutions deployed across the university in a heterogenous environment. The organisational issues such as persuasion from the business and customer base towards more reliable services seemed to be one of the main driving forces behind these implementations. The persuasion from business was based on improved services and importantly IT investment justification. The focus remains towards the IT service delivery and support. This is consistent with study by Dubie (2004) asserting the right alignment that ITIL offers between the IT services and the customer focus becomes one of the major factors in its adoption by wide range of organisations. With organisations focusing much more on reliable IT services but still having very limited budgets, ITIL seem to offer the right balance. Gartner claims a saving of 20% costs saving with the use of ITIL best practices in IT services (Margulius, 2004b). Organisational pressure from the business to justify the investment on IT support services is another factor that has contributed to the adoption of ITIL in case of Sydney University library (Stern, 2001). Aalders (n.d.) also asserts that the use of ITIL brings service improvement through best practices resulting in long term cost saving.

Technologically, ITIL with its best practices aims at improving the delivery of services and still being independent of technology. This has resulted in ITIL's wide acceptance across multi platform IT services (Fletcher & Peasley, 2005; McCormack, 2004).

Another significant factor is environmental. ITIL is being widely used successfully in just not university environment, but also in government departments and many commercial organisations. A large number of universities in Australia had been adopting this framework and other universities did not want to be left out in improving their services.

Conversely, as a factor for adoption, none of the case studies refer to any implications due to their interaction with other organisations such as government departments that already have ITIL

implemented. Macquarie University did have this as one of the factors responsible (Fletcher & Peasley, 2005); however it was just mentioned in the interview with BLIS IT manager but not revealed in any of the documents. Centrelink has recently implemented ITIL and directly deals with Australian universities on different levels. This could be a strong environmental factor, with universities adopting ITIL to be compliant with the same framework as other larger government agencies they interact with. ITIL provides a common language for communication between organisations thus assists the organisations to communicate better (Behr, et al., 2004).

Literature highlighted that the adoption of ITIL in the United States and similar frameworks is a driver to implement auditable control points in IT services. This was due to the increasing pressure of compliance and introduction of governmental regulations such as Sarbanes Oxley Act of 2002 (ITGI, 2004b). Meanwhile, in this research, this factor does not seem to be prominent, maybe because the research was limited to university environments and these acts, especially Sarbanes Oxley Act relevant in United States, are designed for financial institutions for accountability. Cater-Steel and Tan (2005) claim that among the 110 respondents of their survey of Australian organisations implementing ITIL, 64 (30 for external compliance + 34 for internal compliance) respondents implemented ITIL (or were in the process of implementations) due to compliance issues.

In addition, other factors at organisational level are put forward. In the case of University of Sydney library, the driving force was towards achieving alignment of business and IT services as was the case in Charles Sturt University. However for QUT, operational responsiveness became the main aim rather than the work at strategic level. In the case of BLIS IT, the motivation came from the merger of multiple schools that had separate IT services and different approaches in managing IT services; hence ITIL was used to define common practice among the whole team.

There is no doubt to some extent these universities can also survive like other organisations without ITIL, however Aalders (n.d.) emphasises that with the ever limiting IT budgets and increasing expectations from IT services, organisations resort to nothing less than the best practices.

Based on these outcomes, it can be argued that in all the cases, universities aimed to fill in the gaps by using the best practices to improve the interoperability and alignment between the business objectives and IT services and thus improve IT services while minimizing the long term support costs.

### ***8.3 Implementation Issues***

Decisions to implement ITIL were based on many factors that assisted the universities identify their needs and aims from the project. At the same time, there was a long and complex task ahead to initiate the implementation process. The universities were faced with issues in regard to funding, staff training and adaptability to new system. In the following section, we review the issues that they faced and how they managed to resolve them. Views from literature and other interviews are also put together to analyse the different possibilities in varied environments.

#### **8.3.1 Pre-Implementation Analysis**

OGC (2000) recommends an initial analysis of the processes and procedure before the implementation of ITIL is initiated. This allows the project managers to identify the gaps and focus on the main objective of implementation rather than just implementing for change. This is very evident in Macquarie University where an initial analysis provided a much clear vision of the project.

Pre-implementation processes seem to be a widespread concern with all these universities. Out of all the universities analysed, BLIS IT services clearly specifies that the process flow as defined by OGC (2002, p 16) and Van Bon (2004, p 26) be adopted in the review. Following this strategy and process flow enables each university to also interact with each other on feedback and learn from each other's experiences. Perhaps it could also form the basis of trend evaluation and prediction to compare at every how each university performed.

#### **8.3.2 Processes implemented**

With the ever increasing popularity of ITIL and its benefits in IT service management, organisations are overwhelmed with the task to implement ITIL, however most of the recent work published has been commercially used rather than independent researches (McCormack, 2004). Dubie (2002) has a similar view, emphasising that this forms one of the major reasons for

many organisations to rethink ITIL adoption. There are support groups like itSMF and IT Governance institute, however not enough literature nor implementation issues is available.

At the same time, most of the reviewed Australian universities implemented incident management as the first process through Service Desk function with just two universities, Charles Sturt and University of Melbourne adopting change management processes. This seems to imply that universities, just like other organisations, placed greater emphasis on operational level by analysing and fixing problem areas as also recognised by Behr and et al (2004). Incident management provides the central base and all other processes are dependent on the data and information collected through the Service Desk. However, every university has a different environment and varied set of heterogenous information systems. Their needs would be different and other processes in place due to their high importance to the business.

Supporting the above argument, we have seen that both Charles Sturt University and University of Melbourne managed great success by implementing change management process. This shows that processes that are not dependent on other processes can be adopted independently. ITIL offers the flexibility of choosing the right process according to needs and requirements in process improvement.

### **8.3.3 Order of implementation**

The processes adopted by most of the universities follow the same trend. *Incident management* is seen as the foremost and most critical to start with, which further leads to *problem management* and *change management*. The reasoning behind this is very well explained by OGC (2002). There are no hard and fast rules as to what processes an organisation should implement. This is dependent on the requirement of the university; the processes that are critical towards achieving objectives and need improvement should be given priority. Nevertheless, consideration must be given about the interdependency of ITIL processes. For example, *problem management* cannot be implemented without *incident management* processes, as the data required by *problem management* is collected through *incident management's* service desk function.

This is evident in the case of Charles Sturt University just implementing ITIL *change management* to improve its web services, without having to implement *incident management* and *problem management* as done by other universities.

### **8.3.4 Hiring External Consultants**

Another observation concludes that most of the universities used the services of external consultants for ITIL implementation. This decision was based on the fact that many industry leaders in IT service management believe that ITIL implementation is a very difficult and complex process (Dubie, 2004). The IT services in most Australian universities have limited knowledge and expertise on these processes, since ITIL is a very recent framework, unlike other organisations and government departments where it has been significant in the last decade. This is seen in Macquarie and Queensland University.

Furthermore, none of the universities' IT services, except University of Canberra, had internal expertise solely to take on board the ITIL adoption project. QUT, Sydney University Library and Macquarie University employed external consultants for the ITIL implementation project. The external consultants provided a wide range of services from the pre implementation review to the whole process of implementing ITIL and integrating every process. These contractors provided the right expertise with their wide knowledge and experience in variant environments. They initiate an analysis of the university objectives and IT services to provide an alignment through ITIL processes. However, BLIS IT from University of Canberra had been the only university with an internal employee as a Masters certification in ITIL. The IT manager possessing ITIL certification was appointed as the project manager and was responsible for carrying out the whole project. With assistance from forums and his past knowledge he was able to deliver the ITIL project while having the advantage to understand the internal processes and business thoroughly.

It appears that majority of the universities analysed were assisted by external consultants. The external consultants provided better knowledge of having worked in different environments and are more aware of various implementation related issues. On the other hand, an internal IT

services team member interacts with customers and business; hence has better understanding of university processes.

However, the best or better approach for all universities is something very ambiguous and depends on the each university's needs and its approach to implementation.

### **8.3.5 Tool selection**

Another important issue seen with the selection of tools while implementing ITIL is the fact that at times the tools takes more attention in realising the benefits of ITIL than the ITIL processes and best practices themselves. This is quite similar to what is happening around in businesses. Technology over time has taken control of the requirements of the business and just become a way to stay in par with the latest trends. In this case the business objectives are generally compromised or not considered in the big picture. This misconception needs to be well taken care and one reason why ITIL is adopted is to work above the technology and try to achieve the business objectives.

There were two major approaches seen in selection of tools in the implementation of ITIL. One way was to use the previous tools with processes aligned to ITIL. This was done by Macquarie University, which used the same tool in the new service desk function based on ITIL, thus reducing the cost on purchasing the new software tool. However, the university upgraded the software to the new version, which was more ITIL complaint. The second approach was based on acquiring new tools and thus brought tremendous pressure on finances. Nevertheless the first approach would limit the functionality, as some old tools do not support all the processes of ITIL, so compromises are made. Paul Donald from Lucid IT specialising in ITIL consultancy, in a telephonic interview asserted that both the approaches are very well accepted and successful across the industry. Initially, the organisations can begin the transition process with the old tool, as initially just the basic procedures are implemented. However, the organisations need to seriously consider an upgrade if available or purchase a new tool as the maturity levels of the processes move towards optimum levels.

Even in the case of BLIS IT services, there was a thorough review that involved different aspects of need before deciding on particular software. However, it can not be ruled out that most of the outdated softwares do not really provide the ITIL process mapping and thus need to be replaced or require a lot of work. It depends on the organisation and its needs. There is no "one fit all" solution in this case. There are various factors that need to be considered such as BLIS IT services which acquired the tool that mapped very closely to the business processes and also offered local support systems along with integrated programs that would further lead to extensions when the IT services plan to implement other processes of ITIL.

Meanwhile, one very interesting development in the case of tool selection has appeared within the University of Canberra. Following the footsteps of BLIS IT services, the central ICT team is also in the initial phases of ITIL conversion. Considering the case of BLIS IT services, Computer Associates software UniCenter has been used and comfortably adopted to the customised needs of the team. However, the ICT team believes that the cost of using CA software is not feasible. According to them, the software is based on a per user licence and since the ICT team has a larger number of IT staff than BLIS IT services, CA software is not the first choice. This seems to bring up some serious issues of interoperability. The university is working towards unified central IT services for the whole campus. Considering this, all the services and data from BLIS IT and other divisions need to be moved across to the new platform. In this case both the teams would be using different tools, thus making this task much more complex and harder to achieve. However the use of one tool across the university would facilitate the staff to interact and work together.

Tool selection has been much discussed and controversially acclaimed in ITIL processes. In the review of the literature, many industry leaders such as HP, Microsoft and IBM not only provide services on ITIL but also have extended frameworks from ITIL (Sallé, 2004). In addition, they have tools like HP's Openview that is ITIL compliant and caters to the needs of organisations wishing to improve IT services. Pragmatically, there is no such study that would compare the level of ITIL process support that any industry tool provides. In the words of Neville Turbit, an independent IT consultant, the tool selection should be based on the requirement that the organisations specify. Also since ITIL is technology independent, there should not be any

difference with any organisations implementing any particular industry tool unless it meets the ITIL process flow.

Evaluating the different approaches the impact of using the first approach is that the costs are much lower and probably a better way to save financial resources. However the second approach, although expensive, yields faster results.

### **8.3.6 Staff Training**

The training of staff on ITIL foundation courses is a topic of uncertainty. Within the team, there are staff working at various levels from service desk officer to the IT services manager. It seems quite unambiguous to find that none of these training courses specified the training and certifications based on the set of roles. This is an independent observation, that I have not seen in the literature reviewed. However, it is evident that ITIL certification does have levels, but it is not very clear who must undertake the different levels of certifications according to their position and duties in the organisations. Possibly this is something that these organisation and IT managers would realise with the maturity of these processes when the roles and responsibilities become much more clear and accountable.

In terms of limitations, initial costs involved in these projects show a similar trend with long term cost effectiveness. This could be one reason for its limited adoption in much smaller organisations where the initial costs are not readily justifiable. In addition factors like staff training and external consultant hire also bear a strain on the organisation resources. Modification or restructuring of the software within the organisations to reflect ITIL processes also identifies another issue for implementation.

In the University of Canberra, the ICT team has recently trained its IT staff with ITIL foundation course. Currently, the ICT team is working with external consultants to prepare the service desk tool, where the ITIL processes are being used. Hence, by the time ITIL service desk goes live, most of the staff would have forgotten the ITIL training. Thus creating a huge gap and would involve a huge learning curve.

### 8.3.7 On-going assessments and metrics

Out of all these case studies only University of Melbourne's review by Gartner proposed the use of ITIL and COBIT; ITIL at the service level to implement processes based on best practices and COBIT at the audit level to check the effectiveness and efficiency achieved in the implementation. Supporting this finding is the survey results of Cater-Steel and Tan (2005), who also found that organisations have implemented ITIL in larger numbers with a very few implementing COBIT after the ITIL processes are in place.

Another major issue that has emerged is the governing bodies within or outside the universities. For example, in the case of the University of Canberra, the processes in IT services are based on some of the guidelines and benchmarking of DEET (Department of Employment, Education and Training) that controls its functioning. Considering this, the IT services and the practices in other organisations would be quite different. A government body called AUQA (Australian Universities Quality Agency ([www.auqa.edu.au](http://www.auqa.edu.au))) is responsible auditing the functioning of Australian universities, but they do not have any indication of audits or controls for the IT services within these universities.

This issue can be resolved by regular maintenance of metrics (measures on services supported) from pre-implementations process and then as an on-going process in order to identify the problem areas and also provide the stakeholders an overview of the improvement in services.

Among the universities evaluated, only two used COBIT for audit purposes in IT services. However in rest of the universities, awareness of the need for an audit process is emerging with the increasing adoption of IT service management.

Another important observation is seen in regard to ITIL literature as published by Standards Australia. The Australian Standards version of BS15000 is called AS8018. In the universities reviewed, there has been no direct or indirect reference to the use of literature and publications by Standards Australia. Similarly, not much specification is seen on the use of DTEYA guidelines for managing IT services. DETYA and AS8018 documents have not been referred to in much of these implementations or any implications on IT service management in the Australian university context.

It was also seen in QUT that there existed a level of IT Governance, which has not been much referred to in other universities. Fraser and Tweedale (2003), provide an overview of the IT Governance structure with the improvements that the university is working towards. QUT has identified that there is substantial work that needs to be done in the field of metrics assessment metrics. QUT recognised the need to align its IT infrastructure with effective benchmarking by CAUDIT & EDUCASE that define the Australian framework IT benchmarking across the higher education sector. Further emphasis was laid on the measurement of outcomes of IT implementations or benefit realisation. As a matter of fact this seems to be the case with other universities as well. Benefit realisation must be addressed as a priority.

In the review of previously published case studies, only the USL case study has specified the actual figures that reflect the improvement in IT services. This could be because USL started implemented these processes before other universities. This is an issue of maturity level. Meanwhile, other universities have not published any figures that can actually show the percentage or the level of improvement.

None of the universities seem to have published an ongoing assessment plan or any indication of it. In one of the interviews, IT services manager at BLIS IT services mentioned that since OGC (2000, 2001, 2002, 2003, and 2004) does not provide a specific set of checklists for on-going improvement, many industry vendors prefer to use their own. As an example some published work is done by Pink Elephant, one ITIL implementation vendor. It was made evident in the interview that those checklists were also followed within BLIS; however, there seems to be no such indication in any of the documents provided in the interview. Another major factor was the internal assessments or audits done in the university which have their own set of procedures, which have not still been aligned with ITIL. BLIS IT services claim that the non-availability of the metrics is due to the reason that primitive systems did not have procedure for logging metrics. Hence there is no previous data available for comparing the new metrics (measures) and assess improvement in services.

Another gap identified in ITIL implementation was the need felt by these organisations to have an ongoing assessment process to evaluate where they stand in terms of their goals. Based on that analysis they could initiate improvement processes. As a solution this could be a model presented by Niessink and Vliet (1998), called IT Service Capability Maturity Model (ITCMM). This model is based on the Software Maturity Model Version 1.1 and has a similar structure with five maturity levels with key process areas. Any organisation willing to achieve a certain maturity level would need to implement the entire key processes of that level as well the lower levels. The maturity levels are defined as initial, repeatable, defined, managed and optimized. IT service management CMM is focused on delivery of service to enable IT service providers to assess their capabilities in IT Service delivery and to provide them with directions to improve that capability.

It is believed in the industry that many services are much harder to measure as there are no parameters to do so e.g. customer satisfaction/frustration. These are qualitative parameters that have to be evaluated separately.

### **8.3.8 Manage cultural change**

Both in Queensland University of Technology and University of Sydney Library (USL), the issue of cultural change and acceptance was resolved using a similar approach. QUT created committee and discussion groups so that staff could gain more knowledge and acceptance of ITIL. Similarly USL involved the key IT staff in every phase of ITIL implementation to change their mental mode towards IT services and IT provisioning. Later, the processes were redesigned based on the new model. Using this approach, USL also resolved the issue of funding, as the IT staff were able to see the cost-effective analysis results that would also improve service in the long term. For USL it resulted in two-fold benefits: cost effective with better services and better understanding of services by the users.

In comparison to other universities there was not much cultural resistance towards change in Griffith University. However, the staff did realise the need for dedicated resources with an on-

going change process. BLIS project has been more inclined towards the ongoing improvement in the processes. The constraints of funding have also been highlighted.

Cultural challenges have been prominent in BLIS at University of Canberra, Sydney University Library and QUT. In Griffith University, however, the scenario was totally different according to the publication; no reference to any cultural issues was mentioned, thus implying that there have been cases where cultural change has not been a major issue or it was overlooked in the publication by Griffith University. Meanwhile, Griffith University faced the challenge to keep the staff motivated and constant coaching was required for the success of the project.

One of the major issues involved the acceptance of cultural change. This is also seen in the literature, Margulius (2004a) asserts a similar view. Adoption of any IT service management or IT Governance frameworks like ITIL is a challenge in itself; it is not just about technology change which is not dependent on technology, it is about the whole organisational cultural acceptance.

Meanwhile, the success of implementation depends largely on the acceptance of change as cultural issues have been seen as a major hurdle in the ITIL adoption process. In the case of Sydney University Library and Queensland University of Technology, discussion groups and seminars were introduced to raise awareness among the IT staff as well as the stakeholders. This provided satisfaction that everyone's requirements were also well addressed.

The approach in University of Canberra, BLIS IT services still seems to face issues with the cultural change and acceptance of new processes with in the divisional IT services. Just like other universities it was expected that this issue would have been resolved through appropriate measures before or during the implementation. Nevertheless, with other universities resolving the cultural issue, clearly demonstrates that adopting the right strategy is equally important as having the ITIL processes.

### **8.3.9 Manage learning curve**

It is not an overnight change that some IT staff or departments expect to work like magic and solve all the processes. The initial development of the processes requires considerable patience. According to Macquarie University the full impact of ITIL implementations takes some time to be assessed. Supporting this claim is Margulius (2004a) who asserts that the organisations need to be prepared for low productivity in the initial phase of implementation. There is a huge learning curve that is based on an ongoing improvement process that matures with time.

With Macquarie University, the problem of funding was increased, as the university did not have a developmental server before, thus resulting in costs for a new server and also buying ITIL compliant modules. One possible solution, in Macquarie University, was not to adopt parts of the processes eg, monitoring of problems. This resulted in increased staff costs and low cost effectiveness in the long run.

Griffith was faced with two major issues of training and resources (funding) for the project during the implementation process. Training had to be provided to all the staff in the division through the ITIL essential certification in order for all of them to have a common platform of understanding. In order to solve the issue of funding, an Associate Director supported resources. The process design was structured and designed by an external consultant who assisted in project management. In addition to that, a team of eight experienced staff was formed to provide support on design, configuration and rollouts.

Griffith University also estimated that about 0.25% of the total resources would be required for the ongoing operation and maintenance of the framework, requiring fully dedicated resources during its implementation.

### **8.3.10 Resource Strain**

USL is a very good example of not following the common way of approving the budget and other project requirements before having cultural acceptance. Rather, the IT staff prepared the business and the IT services team, before any action on the implementation was taken. This provides a

very good input on how alternative ways are also beneficial. It has been seen that many universities like Macquarie University have identified huge financial resource usage for ITIL implementation. Even in the case of Curtin University of Technology, though COBIT was implemented, the same issue of resource strain is seen in the case of staff requirements and commitments to the project.

### **8.3.11 Source of Information**

Analysis also revealed an observation in regard to the relationship of university's corporate Governance and IT Governance. These organisations aimed to achieve some sort of IT Governance through the implementation of ITIL in IT service management. However these implementations were based on a bottom up approach where more work was at the tactical or operational level with not much reference to the university's Governance principles. Meanwhile over time this is believed to integrate as it spreads to various parts in the organisations and also show positive results around.

In addition, the Australian government organisation DEST that involves itself in setting guidelines and evaluating the progress of the universities, has itself not clearly defined much on IT service management. This leads to actually two different perceived concepts in IT management. One that focuses on how the Governance in the university works and secondly following the best practices as defined in ITIL.

One of the most important elements in ITIL adoption is the use of clear and concise documentation of each process implemented, thus providing a structure that is well organised and much more convenient in auditing. However, none of the universities have actually specified in any form if any of the processes implemented also had a structured documentation for support. Nevertheless, Macquarie University seem to be the only one among all the universities that actually prepared manuals for the IT service managers and IT staff.

Another trend visible in these case studies is information support from the itSMF forum for ITIL implementation. Due to the limited published work on ITIL implementations, itSMF acts as a networking point for most of these organisations for updates through seminars, conferences and published white papers. University Canberra and Queensland University of Technology both have corporate membership of itSMF.

On the negative side, QUT felt that the information available for ITIL implementation is very generic and not very helpful for a university environment. In most cases, the project planners have to learn from their own experiences while implementing these processes. This leaves the organisations to decide their own implementation issues; however based on the analysis of ITIL implementation in similar situations a packaged solution ready to be implemented could be formulated.

### **8.3.12 Centralised and decentralised IT services**

With ITIL, the move towards a centralised and integrated IT services is seen in most of the universities. As seen they primarily have distributed services, with every division having their own IT services unit.

QUT realised the importance of a unified service desk as explained in ITIL and thus planned relevant strategic and operational procedures to implement ITIL in all the areas across the university, with all the teams working in a decentralised environment. Other universities have only implemented ITIL in some services or a division, which limits the real positive effect of ITIL in service management. Collaboration within the university has proved very useful to fill in the gap of lack of information. Secondly, use of process rules had two benefits:

- Process rules explicitly were kept brief to communicate to each staff on the change process.
- This also allowed the changes to be implemented incrementally starting from individual work areas till the full adoption.

Smitherman (2004) insists that the organisations are still struggling to fight IT silos which believe in acquiring the best technology available in support to provide best IT services. However, exchange of information within the organisation becomes a bottleneck, as there is no common configuration database. This becomes more critical when N-tier Application and multi vendor products are used. Many IT managers have a tough time committing high availability of IT services due to lack of integrated information. ITIL enables better and high availability of services through a central database that could be used across the whole organisation.

Queensland University of Technology followed a decentralised structure, with every team in the division implementing their own ITIL based IT services, although they followed a similar structure and reference guides. Therefore the systems that evolved were talking the same language, improving the interaction between the various divisions. Smitherman (2004) also predicted the same effect in improvement of internal communication of staff with the introduction of ITIL processes.

## ***8.4 Summary***

My findings coincide with another recent survey on ITIL implementation in Australian organisations by Cater-Steel and Tan (2005). However, it must be kept in mind that this survey includes all types of organisations while my research only concentrated on the Australian universities implementing ITIL. Authors also found that a larger number of organisations gave priority to the implementation of a Service Desk while progressing towards other processes as also seen in the university environment in this research. Above all, the approach remains similar across universities. Initially universities implement basic processes and later adopt new processes with maturity.

This research finds that issues such as tool selection (technology) and hiring consultants were not as significant in ITIL implementation as were cultural change and IT staff training. Similarly Cater-Steel and Tan (2005) assert that these factors did not directly affect the success of ITIL implementation. Results affirm that issues of tool selection and hiring external expertise have only been stressed on by some industry practitioners and consultants benefiting their personal cause. CAUT and DETYA seem to form a significant part of Australian Universities' Governance (McLane, 2003). Meanwhile, the research findings show no specific reference to the use of these standards in the implementation of ITIL or similar IT Governance frameworks in these universities.

Above all, any form of change demands time and resources which is equally true for ITIL. If implemented wrongly, ITIL projects might lead to disappointment for customers and also affect the morale of the staff. Issues such as fund management and justification suffer significantly due to unpopularity. Mentoring the staff is a process that the project team needs to be prepared for.

## **9. Conclusion**

The literature review discussed the Australian universities adoption of various frameworks deployed to improve IT services. The review led to the identification of a gap in the academic research within the Australian university context. A theoretical framework was designed to define the problem area and a research design developed to address the problem. The case study method analysed a range of adoption factors and implementation issues.

The authors of the published case studies were contacted on the completion of the case study review for this research. Their feedback provided the update on ITIL implementation in the current situation.

### ***9.1 Satisfying the Research aims***

This research set two aims. First, to examine factors influencing the adoption of IT service management through ITIL in Australian Universities; secondly, to determine the issues related to the ITIL implementation. The adoption of ITIL in Australian universities was influenced by many factors. Through this research work, those factors have been classified into three categories providing a comparison between the universities and their reasoning behind the implementations.

Issues related to implementation processes were determined for each university. This research identified the key issues, i.e. pre-implementation processes, processes implemented, order of implementation, hiring external expertise, tool selection, staff training, ongoing assessments, managing cultural change, managing learning curve and resource strain. Findings confirm that Australian universities see a need for managing IT services and have used ITIL to meet this need. The implementation issues described may be beneficial to other universities which are implementing ITIL.

Broadly, each Australian university has a unique IT infrastructure, but they have similar reasons to improve these services in order to meet the university objectives. Evaluation of IT service management has been a much-debated topic, specifically with the increasing pressure to improve IT investment benefits. The IT industry is moving towards a control based service oriented approach and further research is required in IT service management and IT Governance frameworks.

Case study results show the various factors involved in the adoption of ITIL within Australian Universities. These results assist in determining how similar universities can utilise this information in order to achieve similar objectives within their environment. It is very evident that Australian universities have inclined towards best practice concepts and most particularly use of ITIL; few universities have begun to work towards more governance based structure through COBIT. Furthermore, the results demonstrate the most common approach is to implement a single ITIL process at a time and introduce more as the process matures. It is seen that ITIL within Australian Universities is at an early stage with most of the universities adopting only a few processes currently.

Most of the literature to date had been of an exploratory nature by commercial organisations, with little empirical research on the role service management frameworks play in the university environment. A large pool of commercial publications is available, though there is an increasing need to have similar academic researches to shed light on the diversified context.

The categories protocol used for analysis in this research was very generic and hence establishes a basis that could be used for analysis of ITIL implementation not just in educational, but in other similar organisations. It is hoped that the analysis and comparison of ITIL implementation in various different Australian Universities environment will provide future direction to other universities and similar organisations interested in ITIL adoption. It is also expected that this would open avenues for areas in ITIL for future research.

The research has successfully analysed various facets of ITIL implementation in Australian universities, thus contributing towards narrowing the gap in literature identified in the research aims. The theoretical framework in itself provides a strong basis for understanding IT service management factors and issues in implementation in the Australian university context. This would enable other universities to benefit from the analysis of these issues in their environment and prepare for the similar challenges. Besides the universities, many other organisations are adopting ITIL and COBIT. The factors and issues analysed in this research work could also be analysed from the perspective of commercial organisations.

## ***9.2 Research constraints***

All research work, though making an evident contribution towards the knowledge base, inevitably has some limitations. One of the biggest constraints was identifying organisations or universities for case studies, as ITIL and COBIT implementation is limited.

Secondly, while reviewing the previous literature, it was seen that publications on ITIL related implementation in Australian universities had not been academic. This “grey literature” reliance on work and white papers published by project managers, which was in most cases commercially driven, had to be used with care.

Finally, issues such as funding, assessments and benefit realisations are very sensitive issues within any university.

However, every possible attempt has been made to instil utmost rigour in collecting all the possible information, to provide a review that is not biased and to critically analyse the findings against the literature.

### ***9.3 Future Work***

Besides bridging the gap identified in the theoretical framework, there are further avenues open for research. For future work, researchers can pursue multiple directions as under:

- Compare and evaluate whether factors for adoption are similar or different in other organisations, for eg, banking, telecommunications.
- Replicate these factors and issues for universities in other countries.
- Evaluate how IT Governance and corporate Governance interrelate in universities and other organisations.

Future work would benefit from the increasing use of IT service management frameworks enabling more in-depth analysis.

#### ***9.4 Final Summary***

To conclude, this research provides an insight into the area of IT service management and IT governance through ITIL implementation in Australian universities. This research contributes to the empirical body of knowledge in this area by reporting on the experience of a range of Australian universities and detailing the experience of one in depth.

The research produced an evaluation of the *adoption factors* and *implementation issues* involved in ITIL adoption in Australian universities.

The research produced a protocol to evaluate the *adoption factors* and *implementation issues* involved in ITIL adoption. The protocol provides a structure that can be used by universities to examine their own situations, and to compare their experiences and issues with other organisations.

IT service management and its adoption in Australian universities is a new field which has been the subject of few academic research projects. So this research is also significant in formulating a knowledge base for further academic work.

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## **Appendices**

### ***1. Abbreviations***

ABS: Australian Bureau of Statistics.

ANAO: Australian National Audit Office.

AS8018: Australian Standard 8018.

ATO: Australian Taxation office.

ATUC: Australian Universities Teaching Committee.

BCM: Business Continuity Management

BCP: Business Continuity Plan

BLIS: Business, Law and Information Sciences.

BPG: Better Practice Guide

BS15000: British Standard 15000.

CAUT: Committee for the Advancement of University Teaching.

CCTA: Central Computer and Telecommunications Agency.

CIO: Chief Information Officer.

CISA: Certified Information Systems Auditor.

CISM: Certified Information Security Manager.

CMDB: Centralised configuration Management database.

CMM: Capability Maturity Model.

COBIT: Control Objectives for Information and related Technology

COSO: the Committee of Sponsoring Organisations of the Treadway Commission.

CSIP: Continuous Service Improvement Process.

CUTSD: Committee for University Teaching and Staff Development.

DEET: Department of Employment, Education and Training.

DEST: Department of Education Science and Training.

DETYA: Department of Education Training and Youth Affairs.

DRII: Disaster Recovery Institute International

DRP: Disaster Recovery Plan/Planning

HP IT service management: Hewlett Packard Information Technology Service Management

IBM SMSL: IBM Systems Management Solution Lifecycle

ICT: Information and Communication Technology

IS: Information Systems

ISACA: Information Systems Audit and Control Association.

ISO: International Standards Organisation

IT: Information Technology

ITGI: IT Governance Institute.

ITIL: Information Technology Infrastructure Library

ITSCM: Information Technology Service Continuity Management

ITSGC: Information Technology Strategic Governance Committee.

itSMF: Information Technology Service Management Forum

KGI: Key Goal Indicators.

KPI: Key Performance Indicators.

MOF: Microsoft Operations Framework

OGC: Office of Government of Commerce.

PVC-IAS: Pro-Vice Chancellor of Information and Academic Services.

QUT: Queensland University of Technology.

SLA: Service Level Agreement.

SLM: Service Level Management.

SMF: Service management functions.

UC: University of Canberra.

USL: University of Sydney Library.

UTS: University of Technology Sydney.

VOR: Vendor of Record

## **2. Glossary**

**Asset:** An asset is defined as any resource needed to plan, design, build, and operate the networks that the security professionals are trying to protect. It includes tangible (software, hardware, personnel, software, manuals, databases, applications and facility) and intangible assets (plans, organisations, external factors and technical factors).

**Availability:** Relates to information being available when required by the business process now and in the future. It also concerns the safeguarding of necessary resources and associated capabilities.

**Balanced Scoreboard:** A methodology for assessing an organisation's business performance via four components: (1) financial, (2) internal business processes, (3) customers, and (4) innovation and improvement activities.

**Business Impact Analysis:** A management level analysis, which identifies the impacts of losing company resources. The BIA measures the effect of resource loss and escalating losses over time in order to provide senior management with reliable data upon which to base decisions on risk mitigation and continuity planning.

**Business process (/es):** A business process is a set of business events that together enable the creation and delivery of an organisation's products or services to its customers.

**Business Process:** An activity that the business undertakes to accomplish the goals of the business.

**Business Processes:** Key Business processes are those processes essential to delivery of outputs and achievement of business objectives.

**Business Recovery:** Recovering core business processes and support functions minimal for business survival.

**Business:** (As used to distinguish from IT). The non-IT parts of accompany or other organisation.

**Compliance:** Deals with complying with those laws, regulations, and contractual obligations wot which the business process is subject (i.e., externally imposed business criteria).

**Contingency Planning:** IT contingency planning refers to the dynamic development of a coordinated recovery strategy for IT systems (major application or general support system), operations, and data after a disruption. The planning process requires seven steps: develop contingency planning policy statement; conduct the business impact analysis (BIA); identify preventive controls; develop recovery strategies; develop the IT contingency plan; test and exercise the plan and train personnel; and maintain the plan.

**Cost benefit analysis:** Determines which design alternative accomplishes the user's goals for the least cost (or greatest benefit).

**Data:** Facts and figures in raw form. Data represents the measurements or observations of objects and events.

**Disaster Recovery Plan:** Disaster Recovery Plan is an IT focused plan designed to restore operability of the target systems, applications, or computer facility at an alternate sire after an emergency.

**Disaster Recovery Planning:** Disaster Recovery Planning is the process of developing a disaster recovery plan.

**Effective:** Producing or capable of producing an intended result or having a striking effect.

**Efficiency:** Concerns optimal use of resources for best results.

**Help Desk:** A group of people and systems responsible for taking support calls, emails, etc., from business people, clients, and customers or from automated monitoring systems.

**Information and Communications Technology (ICT):** It is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning

**Information security:** Security preservation of confidentiality, integrity and availability of information.

**Information System:** All the electronic and human components involved in the collection, processing, storage, transmission, display, dissemination, and disposition of information. An IS may be automated (e.g., a computerized information system) or manual (e.g., a library's card catalogue).

**Information Technology:** The broad subject concerned with all aspects of managing and processing information, especially within a large organisation or company.

**Information:** Data presented in a form that is useful in a decision-making activity.

**Internet:** A massive interconnection of computer networks worldwide that enables communication between dissimilar technology platforms.

**IT Departments:** Because computers are central to information management, computer departments within companies and universities are often called IT departments. Some companies refer to this department as IS (Information Services) or MIS (Management Information Services).

**IT Governance:** IT Governance *specifies an accountability framework to encourage desirable behavior in the use of IT.*

**IT infrastructure:** The underlying technological components that constitute an organisation's systems architecture. The seven components of IT infrastructure are hardware, operating system, network, database, development environment, user interface and application.

**IT Management:** The administration of IT in order to preserve the IT assets and processes.

**IT service management:** IT service management is defined as those processes which work together to ensure the quality available IT services based on the agreed service levels with the customer.

**Key Goal Indicator:** Key Goal Indicator is a measurable indicator, representing the process goal is a measure of 'what' has to be accomplished.

**Key Performance Indicator:** Key Performance Indicators are short focuses and measurable indicators of performance of the enabling factors of the IT processes indicating how well the process enables the goal to be reached.

**N-Tier Applications:** An n-tier (meaning 'some number of tiers') application program is one that is distributed among three or more separate computers in a distributed network. The most common form of n-tier is the 3-tier application. N-tier application structure implies the client/server program model. Where there are more than three distribution levels or tiers involved, the additional tiers in the application are usually associated with the business logic tier.

**Organisation:** A company, form, enterprise or association or other legal entity or part thereof, whether incorporated or not, public or private, that has its own function(s) and administration.

**Outsourcing:** The assignment of an internal function to an outside vendor.

**Problem:** Something that is not wanted or the inability to do something wanted.

**Process:** A series of actions or operations leading to a particular and usually desirable result.

**Resumption:** Enables an organisation to survive a disaster and to re-establish normal business operations.

**Risk Management:** Risk Management refers to the culture, processes and structures that are directed towards realising potential opportunities whilst managing adverse effects.

**Risk:** A risk is the probability that a particular security threat will exploit system vulnerability. The impact of risk on each asset varies—from very little to very high.

**Safeguard:** An adequate safeguard is a security control which, when in place, is used to reduce or mitigate the organisation's loss if a threat occurs or to eliminate the threat altogether, if possible.

**Service Level Agreement:** A formal agreement between business and IT for the purpose of managing IT services.

**Service Level Management:** A formal process of negotiated objective setting between business and IT for the purpose of managing IT services.

**Stakeholders:** Those people and organisations who may affect, be affected by, or perceive themselves to be affected by, a decision or activity.

**Threat:** A threat is defined as a potential harm to the system, including enterprise-wide network failures, local disk damage and facility destruction. It is an event that can happen at any time.

**Vendor of Record:** The Vendor of Record list is a mandatory list of vendors for the government of Ontario and its subsidiaries.

**Vulnerability:** Vulnerability is a weakness that would allow a threat to happen or materialize.

Transcripts of interviews omitted due to privacy legislation.