A Meta-Study of SAP Financials in the Queensland Government

by

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Abstract

This thesis consists of three related studies: an ERP Major Issues Study; an Historical Study of the Queensland Government Financial Management System; and a Meta-Study that integrates these and other related studies conducted under the umbrella of the Cooperative ERP Lifecycle Knowledge Management research program.

This research provides a comprehensive view of ERP lifecycle issues encountered in SAP R/3 projects across the Queensland Government. This study follows a preliminary ERP issues study (Chang, 2002) conducted in five Queensland Government agencies. The Major Issues Study aims to achieve the following: (1) identify / explicate major issues in relation to the ES life-cycle in the public sector; (2) rank the importance of these issues; and, (3) highlight areas of consensus and dissent among stakeholder groups.

To provide a rich context for this study, this thesis includes an historical recount of the Queensland Government Financial Management System (QGFMS). This recount tells of its inception as a centralised system; the selection of SAP and subsequent decentralisation; and, its eventual recentralisation under the Shared Services Initiative and CorpTech. This historical recount gives an insight into the conditions that affected the selection and ongoing management and support of QGFMS.

This research forms part of a program entitled Cooperative ERP Lifecycle Knowledge Management. This thesis provides a concluding report for this research program by summarising related studies conducted in the Queensland Government SAP context: Chan (2003); Vayo et al (2002); Ng (2003); Timbrell et al (2001); Timbrell et al (2002); Chang (2002); Putra (1998); and, Niehus et al (1998). A study

of Oracle in the United Arab Emirates by Dhaheri (2002) is also included. The thesis then integrates the findings from these studies in an overarching Meta-Study.

The Meta-Study discusses key themes across all of these studies, creating an holistic report for the research program. Themes discussed in the meta-study include common issues found across the related studies; knowledge dynamics of the ERP lifecycle; ERP maintenance and support; and, the relationship between the key players in the ERP lifecycle.

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Statement of Original Authorship

I, Gregory Thomas Timbrell, a candidate for the Degree of Doctor of Philosophy at Queensland University of Technology, have not enrolled for another tertiary award during the term of my PhD candidature with the knowledge and approval of the University's Research Management Committee.

The work contained in this thesis has not been previously submitted for a degree or diploma at any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference in made.

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Signature

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Date

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Chapter One - Introduction and Overview of the Research

The purpose of this introductory chapter is to explain what this research is about, how it was done, why it was important and what contribution it makes to the body of knowledge. Section 1.1 explains the motivation for the research. Section 1.2 discusses the research questions and objectives. Section 1.3 describes the research methods used in the studies and the unit of analysis. Section 1.4 proposes the contributions that this thesis makes to the Information Systems (IS) body of knowledge. Finally, Section 1.5 sets out the structure of this thesis.

1.1 Research Motivation

Organisations world-wide are moving away from developing information systems in-house and are instead installing enterprise resource planning (ERP) systems and other packaged software (AMR Research, 1998). ERP systems experienced considerable market growth throughout the 1990s and into the new millennium. Revenues for SAP in 2000 were 6.2 billion euro growing to 7.5 million euro in 2004. In 2004, SAP represented a staggering 56% of the global ERP market share followed by Oracle/Peoplesoft at 23%. The 2004 revenue breakdown shows the three main earning activities to be maintenance (38%), software (31%) and consulting (26%). During 2004 maintenance and software revenues increased by 10% each (SAP AG, 2005).

This study deals with major ERP life cycle implementation, management and support issues in the context of the public sector. Although increasingly widespread, and despite warnings in the literature (Boston Consulting Group, 2000), many organisations appear to underestimate the issues and problems often encountered throughout the ERP life cycle. The sustained interest in ERP implementation and life cycle issues provide the rationale for this study. This need is espoused in Gable et al. (1997), Gable (1998) and Gable et al. (1998).

ERP life cycle-wide implementation, management, and support are ongoing concerns. As the number of organisations implementing ERP increases and ERP applications within organisations proliferate (Bancroft et al., 1998; Davenport, 1996;

Hiquet et al., 1998; Shtub, 1999), improved understanding of ERP life cycle management issues is required so that implementation, development, management, and training resources can be allocated effectively (Gable, 1998). Understanding life cycle management issues will also help direct the ERP research agenda.

Although deployment of ERP systems originated in the private sector, public sector organisations, driven largely by efficiency concerns, are increasingly adopting ERP to replace existing control and operational systems. The Queensland Government Financial Management System (QGFMS) was introduced in 1983 to provide a common financial management system to government agencies. In the subsequent decade, QGFMS continued to evolve to support new initiatives and changes in the business and public sector environments. In 1994, the Queensland Government selected SAP R/3 Financials to replace the existing QGFMS across all state government agencies. Later some agencies extended their SAP implementations with payroll and human resources modules under a separate central government initiative. The Queensland Government has not extended SAP R/3 software beyond Financials and Human Resources in any centrally planned way. By the end of 1999, most agencies had completed their initial implementation. A standard accounting environment driven by central government (Queensland Treasury) regulation combined with other centrally driven reporting requirements and standard software (SAP Financials) provides an excellent research opportunity. Despite SAP R/3 having been in place for a considerable period in some agencies, new issues associated with the ongoing support and evolution of SAP R/3 continue to arise. Unlike the traditional view of operational information systems, which describes a system life cycle in terms of development, implementation, and maintenance, examination of ERP systems reveals that their life cycle involves major iterations. Following the initial implementation, subsequent revisions and re-implementations go far beyond what would normally be considered system maintenance.

Many organisations underestimate the effort, cost and strain which an ERP implementation brings upon the organisation. The complexity of an ERP project is easily misjudged and the consequences are potentially grave. For many organisations, implementing ERP is the largest information systems project they have ever undertaken. For the Queensland Government, the implementation of SAP was one of their largest outlays on information systems. The total cost of the SAP

implementations is difficult to ascertain from government reports (mainly due to commercial-in-confidence arrangements with the vendor and implementation partners) but informal estimates range between $100M and $200M dollars. These ERP implementation projects involved hundreds of staff across the Queensland Government sector and a great deal of outside assistance. Organisations rarely set out on the ERP journey alone.

Where an organisation does not have the requisite knowledge or internal capacity to manage through the 'resource spike' caused by initial ERP implementation, it must obtain this knowledge and capacity from external sources. Implementation resources are predominantly knowledge based. This knowledge may be sourced from a consulting firm (knowledge vendor) which acts in the capacity of implementation partner. All the major consulting firms in Brisbane (Queensland's state capital) as well as several smaller firms were involved in the Queensland Government's SAP implementations. Among other things, the role of the implementation partner can include project manager, decision-maker, arbitrator and knowledge facilitator. In this way, a triumvirate is formed involving the client, vendor and implementation partner.

These three parties, the client, vendor and implementation partner, form a 'virtual organisation' to bring about the ERP project. These three parties are not isolated stakeholders, but important actors, and ostensibly partners, in a relationship that may span the life of the software. They work together across the ERP lifecycle to reify a design blueprint into a configured, working system supporting the business's processes and information needs. The relationship and interplay between the vendor, client and implementation partner is often not well understood: for example, do the vendor and implementation partner provide all the expertise needed for a client to implement a system? Do they share a common perspective on the issues that arise during the ERP lifecycle? Does the relationship change between the parties at different times in the lifecycle?

In the case of the Queensland Government, the interplay between the individual agencies creates another layer of complexity. Each agency is individually responsible for their own outcomes yet the policy for their financial systems, financial management and information technology generally was managed centrally. On a broader scale, the economic environment, and trends in government

administration and accountability, affected the Queensland Government and inevitably its financial systems. How did these environmental conditions affect the lifecycle management (choice, implementation, support, operations) of ERP in the Queensland Government?

A final motivation for this research is to understand the general themes that affect the ERP lifecycle. Often a number of individual research studies are conducted under the umbrella of a research program. In this case, ERP-related research projects in the Queensland Government were managed under a program called Cooperative ERP Lifecycle Knowledge Management, funded by the Australian Research Council and managed by the Principal Supervisor of this thesis, Professor Guy Gable. By bringing together the findings from all these projects, a deeper more integrated understanding of the ERP lifecycle is possible.

The research reported in this thesis was conducted by the author with the assistance and supervision of Professor Guy Gable, Professor Alan Underwood and Dr Taizan Chan. Research assistance for clerical tasks was provided from time to time by Karen Stark in our research centre. This is a follow-on study to Dr Alex Chang's preliminary study (Chang, 2001) and he was involved in some activities in this study – in example the executive workshop. Similarly, I was involved in his study activities as is evidenced in our early publications.

1.2 Research Questions and Objectives

This thesis describes and integrates a set of related studies conducted within the Queensland Government under the research program entitled Cooperative ERP Lifecycle Knowledge Management, funded by an Australian Research Council Linkage Grant. The main sections of the thesis consist of an historical recount of SAP in the Queensland Government; an ERP major issues study across Queensland Government agencies; and a meta-study report that integrates themes from related studies conduced under this research program. At least two of these three studies (historical recount and issues study) could easily have been the single subject of this thesis. A decision was taken midway through the research project to enlarge the scope of the thesis recognising that it would affect the depth of analysis in each study. My supervisory team and I decided to pursue the broader agenda and attend to deeper analysis once the thesis was complete. In particular, we intend to conduct

a deeper statistical analysis within the issues study, taking advantage of the full dataset collected. This decision was a difficult one because it meant postponing some valuable personal publication opportunities. In the end, my commitment to the whole research team's objectives took precedent.

In the pursuit of methodological action research, this thesis also attempts to reflect on and improve the research methods employed in these studies. In Chapter 3, the Historical Method and the Delphi Method are examined in detail. A simplified historical method for future information systems (IS) studies is developed based on the IS historical tradition established by Mason et al. (1997a) combined with the practices and perspectives of leading historiographers.

The three studies in this thesis are descriptive, exploratory, empirical and a theoretical. One associated study (Timbrell et al., 2001) used Szulanski's (1996) theory of barriers to best practice transfer to analyse data from the ERP issues study. Another associated study (Timbrell et al., 2003) tested Markus' (2001) Theory of Knowledge Re-Use in a Queensland Government context. In conjunction with further statistical analysis, future research will apply pertinent theory to understand better the results of the major issues study (Chapters 5 and 6 and Appendix E).

1.2.1 Research Questions - Historical Recount Study

The first study sets the context for the other two studies. In accordance with the historical method, the research question is a focusing one that gives the historian guidance on what to emphasise in the construction of the narrative and the balance between narrative and context. These questions develop as the historical problems evolve from the sources.

There are two parts to the historical recount. The first part describes events from 1983 to 1994 and focuses on the following question:

> *What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?*

The second part describes events from 1994 to 2003 focusing on the following question:

What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?

A focusing sub-question that helped to guide the historical narrative during this second part is

How did FISB's (Queensland Treasury's Financial Information Systems Branch) central management dilute over time?

1.2.2 Research Questions - Major Issues Study

The second research project in this thesis is a study of major issues in the ERP lifecycle set within the context of the Queensland Government. A modified three-round Delphi Method is employed to conduct this study. In Round One, potential respondents are asked:

What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?

These responses are aggregated into a master set of issues. In Round Two, respondents are asked to confirm the mapping of their responses to this master set of issues. Finally, in Round Three, respondents are asked to weight the importance of the issues across the phases of the ERP lifecycle.

Working with data collected from the stakeholder groups, the following research questions will guide the analysis:

(1) What are the major public sector ES implementation, management, and support issues faced by the stakeholder groups?

(2) How do stakeholders rate the relative importance of these issues?

(3) What are the points of consensus and dissent between the stakeholder groups?

1.2.3 Research Questions - Meta-Study

The third overarching research project in this thesis looks broadly across the issues and other research conduced within the Australian Research Council funded research program *ERP Lifecycle Knowledge Management.*

(1) How do issues from this ERP major issues study compare with ERP issues found by other researchers within the Queensland Government and in other contexts?

(2) What are the common themes and findings from this research program?

1.2.4 Research Questions - General

Finally, this thesis addresses two other questions pertaining to the three studies contained in this thesis. They are:

(1) What are the limitations of the studies?

(2) What are some directions for future research arising from the work in this thesis?

These research questions in sections 1.2.1, 1.2.2, 1.2.3 are addressed formally using the research methods described in the next section.

1.3 Research methods

This section will present the research methods employed in the historical study and the major issues study. It also provides a description of the Unit of Analysis for the three studies.

Two primary research methods were used in this thesis. These methods are the historical method, a qualitative method, and a modification of the Delphi Method, which includes quantitative analysis. Gable (1994) supports the combination of mixed methods (qualitative and quantitative) to examine a particular phenomenon.

1.3.1 Historical Method

The three major steps in the historical method developed for this study are: (1) Specification of the Subject; (2) Discovery and Critique of the Sources of Evidence; and, (3) Construction of the Narrative.

The specification of the subject includes the development of focusing questions; the determination of the historical period; deciding the balance between narrative and description; and the focus of the study. The discovery and critique of the evidence includes the identification and gathering of the sources of evidence; identification of informants; the critical review of the evidence for relevance, authenticity and provenance; and the arrangement of that evidence in preparation for the narrative

construction. The third part of the method is the construction of the narrative. This entails the synthesis of the material into an historical whole; the structuring of that evidence into a readable form; a formulation and explanation of possible causation; and, some explanation of the historical narrative.

This historical method is an ideal way to create a rich background and understanding of the context against which the other studies can be interpreted.

1.3.2 Delphi Method

This section summarises the modified Delphi Method employed in the ERP major issues study described in this thesis.

The Delphi-study involves three rounds. Round One seeks to inventory issues. The central question posed to the target respondents is "What do you consider have been the major issues in implementing, managing and/or supporting the Enterprise System in [agency name]?" We next synthesised their responses into a manageable, summary set of issues (approximately 40).

In Round Two, we validated our summary set of issues. Each response from Round One was mapped to the summary set of issues and returned to each respondent for confirmation of that mapping. Following this confirmation round, the research team held a workshop of senior ERP experts from Queensland Government. Using Nominal Group Technique, this group of experts helped define the final set of summary issues. In Round Three, respondents were asked to score or weight the relative importance of the summary issues. Factor analysis was conducted to identify the major issue categories.

This being an empirical, exploratory study to systematically identify, rationalise and determine the relative importance of ERP lifecycle issues, the Delphi Method was deemed the appropriate method to use.

1.3.3 Meta-Study

The meta-study looks across all studies in the research program using simple content analysis and pattern matching techniques. The objective of the meta-study is to report common themes found across related ERP studies (Niehus et al., 1998; Putra, 1998; Timbrell et al., 2001; Vayo et al., 2002; Chang, 2002; Dhaheri, 2002; Chan,

2003; Ng, 2003; Timbrell et al., 2003) conducted within the Cooperative ERP Lifecycle Management research program (Gable et al., 1998).

1.3.4 Unit of Analysis

The unit of analysis is the SAP R/3 systems implemented by Queensland Government agencies.

1.4 Contributions of this Thesis to the IS Literature

These studies make the following contributions to the information systems literature:

1) Historical narratives are relatively rare in information systems. This narrative is the first historical study of an ERP lifecycle. It provides a broad view of how market and organisational factors can affect the selection, operation and support of an ERP. It further gives the reader an understanding of what kinds of historical conditions can affect events during the ERP lifecycle.

2) The second contribution this thesis makes is the provision of a comprehensive, empirically sourced list of issues that concern participants in the ERP lifecycle. With the exception of the preliminary study by Chang, prior studies have not employed such a comprehensive and rigorous method in the derivation of these issues.

3) The third contribution this thesis makes is a discussion of broader issues that affect the ERP lifecycle. Such a discussion is only possible when a series of related studies are conducted within the same rich context. Executive management responsible for ERP systems can use these themes to assist in strategic and long-term planning.

4) The development of a simplified historical method is the fourth contribution this thesis makes to the information system body of knowledge.

5) The final contribution this thesis makes is the consistent knowledge perspective that permeates the discussion of the issues. The knowledge management theme is central to the ERP lifecycle. The management of ERP knowledge has great potential to improve ERP operations and better realise benefits from these systems.

1.5 Structure of this Thesis

Following this introductory chapter, this thesis presents a background review of ERP; the methods used in the research; a rich historical narrative to provide the reader an insight into the Queensland Government context; an ERP issues study conducted across Queensland Government agencies; and a discussion of findings and conclusions drawn from these studies and related studies (Niehus et al. 1998; Putra, 1998; Timbrell et al. 2001; Vayo et al. 2002; Chang, 2002; Dhaheri, 2002; Chan, 2003; Ng, 2003; Timbrell et al. 2003) conducted within the Cooperative ERP Lifecycle Management research program (Gable et al., 1998).

The chapters of this thesis are organised as follows:

Chapter 1 Overview of the Research – It discusses the motivation for the study and presents the research questions and objectives. It also provides an overview of the methods that will be used in this thesis and the unit of analysis. It also proposes the contributions that this study makes to the IS body of knowledge

Chapter 2 Literature Review – Some general concepts of ERP are presented including ERP characteristics, the state of the marketplace, a description of SAP, and some lifecycle models. To provide a background for the issues study, prior issues and critical success factor studies are reviewed. Short discussions of ERP maintenance and knowledge management are presented as background to the main themes arising in this thesis.

Chapter 3 Research Methods used in this Thesis – A comprehensive description of the research methods are presented in this chapter. The IS historical method developed by Mason et al. (1997b) is extended and simplified. The traditional Delphi Method is also comprehensively described, including the modifications to the traditional Delphi Method as employed in this thesis.

Chapter 4 Historical Recount of QGFMS – This is a rich historical narrative of the development of the Queensland Government Financial Management System from its inception in 1983 to the present time.

Chapter 5 Descriptive, Comparative and Reductive Statistics – Presents statistics and findings from the Delphi study of ERP major issues in the Queensland Government.

Chapter 6 Interpretation of the Delphi study issues – Presents an interpretation of the issues derived from the Delphi rounds for the knowledge-related issues.

Chapter 7 Meta-Study – This chapter restates findings from the historical study, and presents findings from the major issues study. It then presents findings from the Meta-study, drawing common themes and conclusions from the research projects conducted within the Cooperative ERP Lifecycle Knowledge Management research program.

Chapter 8 Conclusion – This chapter summarises and concludes the thesis, sets out implications for practice and research, and suggests further research.

Appendices A-D Contain example survey instruments.

E- Descriptions of Issues 3,6,2,1 and 7.

Chapter Two - Literature Review

2.1 Introduction

A new class of packaged application software has emerged over the past decade, ostensibly consolidating a multi-billion dollar industry that includes SAP AG, the world's fourth largest software vendor, and several others of the largest software firms and the world's largest management consulting organisations under a single banner. Rather than developing and maintaining customised mainframe applications for single business clients, IS professionals are involved in the implementation of large-scale, online, interactive, cross-functionally integrated, packaged systems that can provide a "total" solution to an organisation's information systems needs by addressing a large proportion of business functions on client-server platforms (Brown and Vessey, 1999).

Variously called Enterprise Resource Planning Systems (ERP), Commercial off-the-shelf Systems (COTS), Enterprise-Wide Systems (EWS), or simply Enterprise Systems (ES), these comprehensive packaged software solutions seek to integrate the complete range of a business' processes and functions in order to present a holistic view of the business from a single information and IT architecture (Gable et al., 1998; Klaus et al., 2000). Rowe (1999) aptly described ERP as representing the implementation of the old managerial dream of unifying and centralising all the information systems (IS) required by the firm into one single system.

The widespread adoption of Enterprise Resource Planning (ERP) in the 1990s was a significant development in the Information Technology (IT) industry (Markus et al., 2000b). Prior to this, companies had either developed their own systems and/or integrated systems from disparate vendors. The adoption of ERP packages by both medium and large-scaled companies allowed these firms to replace their existing legacy systems and opened opportunities to wield benefits such as the redefinition of strategic business advantages, customer services, and core competencies; improvement of system architectures; and the ability to plot future growth (Markus et al., 2000a; Transchannel, 2000).

This chapter provides a review of pertinent literature about ERP, its lifecycle and the issues that affect it. The purpose of this chapter is to set the technical context for this thesis and introduce some ERP related issues found in previous studies.

After describing the development of ERP in section 2.2, its definition, structure and characteristics are outlined in sections 2.3, 2.4 and 2.5 respectively. A brief explanation of why companies adopt ERP in section 2.6 is followed by an exposition of the major players in the marketplace in section 2.7 with emphasis on SAP. Following this is a discussion of the ERP implementation lifecycle in section 2.8. Having outlined the ERP lifecycle, discussion turns to studies of ERP critical success factors in section 2.9 and ERP issues and risks are listed in section 2.10. While issues, risks and critical success factor studies tend to focus on the implementation phase, section 2.11 discussing ERP benefits realisation and section 2.12, ERP maintenance, focuses on the post-implementation phase. Finally, the chapter introduces the knowledge dynamics of the ERP ecosystem in section 2.13. Section 2.14 summarises and concludes the literature review.

2.2 How ERP Developed

ERP can be traced back to the 1960s, where it evolved from basic inventory management systems (Chung and Snyder, 1999). In the 1970s, most of the organisational information technology (IT) systems did not have a common interface; instead, they created ‘islands of automation’ (Markus and Tanis, 2000). This made it difficult to analyse across these ‘islands’ e.g. comparing sales demand with manufacturing output. These different systems often contained duplicate data making them prone to error and, as a result, decision-making processes suffered. Additionally, costs mounted due to expensive maintenance activities required to preserve the mélange of redundant and overlapping systems (Markus and Tanis, 2000).

The term Enterprise Resource Planning systems or ‘ERP’ is generally thought to have derived from the terms Material Requirements Planning (MRP) systems and Manufacturing Resource Planning (MRPII) systems (Chung and Synder, 1999; Holland and Light, 1999). The Gartner Group, purported to have first coined the term ERP (Lopes, 1992), describe it as the technological evolution of MRP and MRPII through the

introduction of relational DBMSs, 4GL development tools and client/server architecture (Hochberg, 1999). While ERP may have been initially seen as an extension of manufacturing systems functionality, today it more generically describes integrated enterprise computing systems (Watson and Schneider, 1999; Gumaer, 1996).

Developed in the 1950's, MRP, along with General Ledger, was one of the first off-the-shelf business applications (Orlicky, 1975). MRP software supported the creation and maintenance of material master data and bill-of materials across all products and parts in one or more plants. Furthermore, bill-of-materials processors (demand-based planning) and forecasting algorithms (consumption-based planning) were typical parts of MRP. These early packages were able to process mass data, but only had a limited processing depth (Klaus et al., 2000).

During the 1970s, vendors extended MRP packages to offer complete support for the entire production planning and control cycle. MRPII was initially seen as the next logical step in efficient manufacturing planning: companies realised that profitability and customer satisfaction were objectives that applied to the entire enterprise extending beyond manufacturing, and encompassed finance, sales and distribution, and human resources. Although the MRP and MRPII systems dominated the manufacturing environment for many years, Chung and Snyder (1999) maintain that both MRP and MRPII lacked the ability to combine organisational business processes and IT into one integrated solution. As Davenport (2000b) suggests, "if a company's systems are fragmented, its business is fragmented" (p. 123).

During the 1980s and 1990s, large-scale integrated software packages developed in the USA and Europe giving rise to Computer Integrated Manufacturing (CIM). CIM is regarded as the next step in the progression of MRP and MRPII towards ERP. The goal of CIM was to create a system capable of meeting all of the information-processing needs of a company. It achieved this goal by using a single centralised database that enabled information to flow through the entire applications suite and automatically update inventory records (Markus and Tanis, 2000).

This concept led to the creation of totally integrated enterprise solutions that we call ERP. Klaus et al. (2000) believe that ERP did not necessarily derive from MRP/MRPII;

rather they were antecedents in its lineage. No matter what its ancestry, ERP systems have revolutionised business practice, providing organisations with the ability to fuse departmental information, eliminate redundancy, and optimise efficiency.

2.3 Defining ERP

2.3.1 Enterprise Systems

Before focusing on ERP systems, it is useful to address the similarities between two commonly used terms: Enterprise Systems (ES) and Enterprise Resource Planning systems.

An Enterprise System is an integrated information system that replaces legacy systems with a series of software modules. These modules communicate with each other seamlessly, and employ best-practice business processes described in reference models (Hernandez, 2000). IDC (2000) define an Enterprise System as an integrated application suite that could potentially automate an entire enterprise, including functions such as accounting, materials management, and human resources, as well as industry-specific modules. Algeo and Barkmeyer (2000) further describe Enterprise Systems as a class of commercially developed software applications that integrate an array of activities and information to support tactical operations and operations planning for an industrial enterprise.

Either way, they are a total package that incorporates all the data within an organisation's business processes and associated functional areas (McPherson, 1998). Enterprise System solutions allow an enterprise to establish one database and a standard interface to manage its information more effectively and efficiently. Information is entered into the system once, after which it can be deployed to any department or function. The Enterprise System processes the data in real time, and so data entered by one department will affect other departments' data concurrently. Enterprise Systems support business processes that span across functional barriers providing greater integration and efficient operations across the enterprise.

In this sense, they are systems which are enterprise-wide. Hernandez (2000) defines an Enterprise-Wide System, another common synonym for Enterprise Systems, in terms of

being an off-the-shelf package encapsulating an integrated suite of applications. This suite can provide both transaction processing and management information systems to the common core of business processes (Hernandez, 2000).

Dong and Ivey (2000) call ERP a 'typical example of an Enterprise System' (p. 1045). Various other authors (Davenport, 2000b; Markus and Tanis, 2000) also refer to ERP as Enterprise-Wide or Enterprise Systems because of their enterprise-wide scope (Kumar et al., 2003). References to Enterprise Systems (ES) in this thesis, therefore, generally refer to Enterprise Resource Planning (ERP) systems.

2.3.2 Enterprise Resource Planning Systems

Leading scholars define Enterprise Resource Planning (ERP) systems as integrated, customised, packaged application software solutions employed by organisations to integrate a range of processes and functions into a holistic view of the business from a single IT architecture (Watson and Schneider, 1999; Klaus et al., 2000). ERP serves as a controlled and coherent integrating tool across internal business units, regardless of geographical separation, and improves overall business processes and practices (see Hammer and Champy, 1996; Barnes, 1999; Bingi et al., 1999; Davenport, 1996; Sieber et al., 1999).

From a technological perspective, ERP unifies and centralises firm information by employing a single central database (Davenport, 2000a), a common user interface and integrated functionality (Klaus et al., 2000).

From a business viewpoint, they support internal core and support activities including manufacturing, sales, finance, materials management, asset management and human resource management, (Laudon and Laudon, 2000; Bancroft et al., 1998) and external collaborative activities such as supply chain management, customer management, electronic commerce and collaborative planning (Davenport, 2000b). ERP systems provide the capability for multinational organisations to integrate their geographically dispersed subsidiaries with their central functions (headquarters) thereby providing a single uniform and coordinated information system and are, thus, able to coordinate and monitor their performance in real time (Rajagopal, 2002).

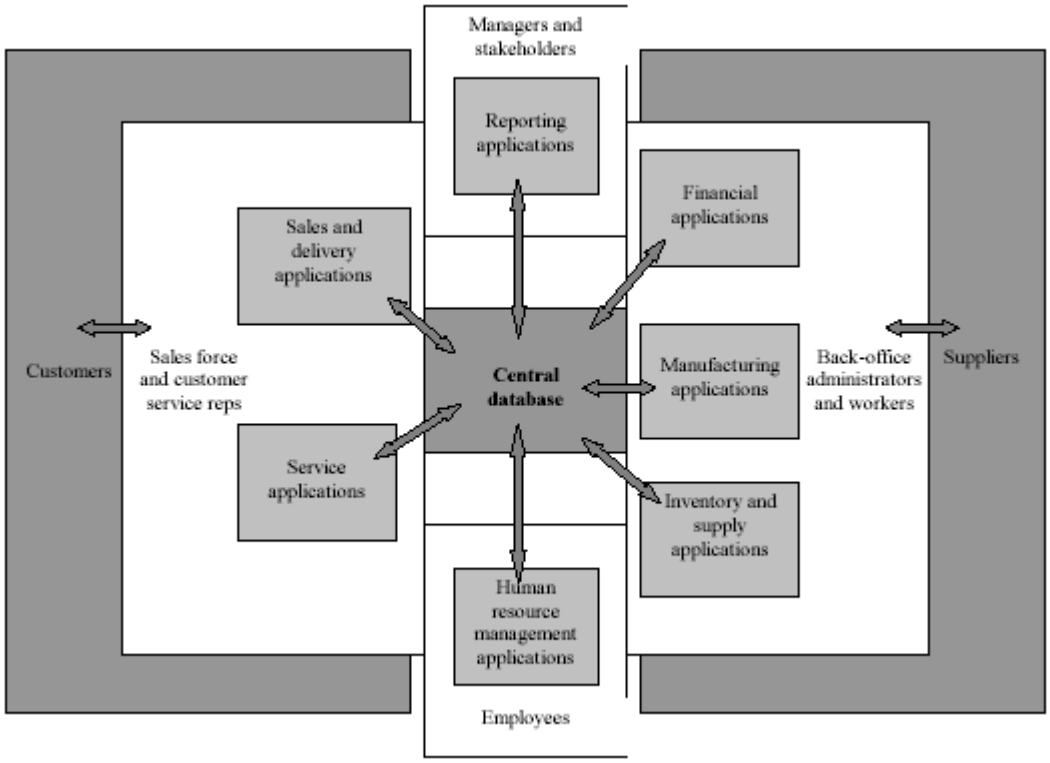
Enterprise Resource Planning (ERP) systems have promised to reshape business structures by solving the challenges of disconnected and uncoordinated business applications within organisational portfolios (Davenport, 2000a; Kumar et al., 2003). ERP software is the application of information technology to achieve the capability of planning and integrating enterprise-wide resources by integrating the applications and processes of the various functions and business units (Kumar et al., 2003). The main utility of ERP systems is to support the core business and administrative functions of an enterprise: orders, procurement, storage, assets, vendor contracts, production, maintenance, sales, distribution, financials, strategic planning and quality management are some of the functionalities it fulfills (Dahlen and Elfsson, 1999; Klaus et al., 2000).

More recently, and in the spirit of an Enterprise System, ERP systems have incorporated modules with extended functionality such as Supply Chain Management (SCM); Customer Relationship Management (CRM); Knowledge Management Systems (KMS); Enterprise Content Management (ECM); Human Resource Information Systems (HRIS); Data Warehousing (DW); and, Enterprise Application Integration (EAI). The next section explains how an ERP system is structured.

2.4 The Structure of an ERP System

Essentially, an ERP system consists of different modules. Dahlen and Elfsson (1999) state that, traditionally, a system must integrate three modules from the core group of manufacturing, distribution, finance, and human resources to belong to the ERP classification. Figure 2.1 below from Davenport (2000b) demonstrates the main structure of common ERP systems on the market.

Figure 2.1 - The ERP System (Davenport, 2000b)



As this figure demonstrates, the heart of an ERP system is the central database that feeds data between a series of applications supporting diverse enterprise functions. A single database provides consistency and serves to streamline the flow of information throughout a business (Dahlen and Elfsson, 1999).

The availability of a wide range of applications and modules in ERP packages has meant that user-organisations can satisfy most of their application needs with a single ERP. This has eliminated integration complexities associated with applications purchased from many vendors and has enhanced information flow among internal processes. An integrated and centralised system provides complete data visibility for all levels of organisational management, thereby facilitating corporate and strategic decision-making (Hicks and Stecke, 1995; King, 2000; Ross and Vitale, 2000).

2.5 The Characteristics of ERP

Defining the characteristics of an ERP is difficult and depends on the perspective one takes.

Klaus et al. (2000) consider ERP from three perspectives:

1) ERP is a commodity - a product in the form of computer software

2) ERP can be seen as a development objective of mapping all processes and data of an enterprise into a comprehensive, integrative structure

3) ERP can be seen as the key element of an infrastructure that delivers a solution to business.

The third perspective is considered one of the most important in the context of information systems. To further characterise ERP-software, Klaus et al. (2000) name three forms in which ERP exists: generic, pre-configured, and installed:

1) In its most comprehensive form, the software is generic, targets a range of industries, and must be configured before it can be used.

2) Packaged, pre-configured templates have been derived from the comprehensive software. These templates are tailored towards specific industry sectors or companies of certain sizes.

3) For most users, ERP-software presents itself as the operational *installation* after the generic or pre-configured package has been individualised according to the particular firm's requirements on site.

Having identified these three forms of ERP, Klaus et al. (2000) go on to state that only in its generic state can one characterise ERP with any real purpose, for any addition or reduction of components creates distinct instances of the product. The authors give several criteria to characterise the distinguishing features of generic ERP solutions. Klaus et al. (2000) describe each of these features:

1) *ERP software is a standard software package*. Implementing organisations usually tailor standard ERP packages to the specific requirements of the enterprise. The 'rich potential' for customising ERP software is what distinguishes it from other packages, allowing for individual configuration and unique ERP implementations.

2) *ERP-software is application software*. The application modules of ERP are integrated across the functions supported and the data involved.

3) *ERP software is based on an underlying integrated database.* The central database stores master and transactional data with controlled redundancy.

4) *High functionality is a major differentiator of ERP*. It supports all common business functions of an enterprise and often supports specific industry processes.

5) *ERP follows a process-oriented view of enterprises*. Although the main components of ERP solutions are organised in different functional models (e.g., financial accounting or sales), they still all follow a process-oriented view of enterprises. Typical business processes are supported seamlessly across functions.

6) *ERP uses reference models to describe functionality.* In addition to the usual software documentation, ERP systems use reference models to describe the supported process, organisational structures, and the structure of the data and objects.

7) *ERP targets multiple industries with different characteristics*. It is difficult to characterise ERP by simply listing its functions. ERP supports multiple industries in two ways: it can have the ability to support different industries within one solution (e.g., coexistence of manufacturing and retailing functionality); or it can provide pre-configured enterprise-individual solutions. PeopleSoft, for example, provide industry-specific solutions for numerous sectors, including telecommunications, government, healthcare, higher education, and manufacturing.

8) *ERP is designed for companies that operate in various countries*. It is a prerequisite for ERP to handle the specific requirements of different regions. This includes pre-configured country-specific chart-of-accounts, pre-formatted document types like quotes, delivery notes or invoices, or

human-resource-related rules (e.g. payroll rules). The ability to handle multiple currencies in all transactions is also a key feature.

9) *The frequency and repetition of ERP supported transactions is also a distinguishing feature*. ERP supports recurring business processes like procurement, and sales order processing or payment processes; it is not focused on less structured processes like marketing, product development or project management.

Klaus et al. (2000) also characterise ERP from a technical viewpoint. The key technical features they outline include:

1) Integrated applications and data

2) A consistent graphical user interface (GUI) across application areas. A user can subsequently perceive the ERP as a single application regardless of the module being used

3) A three-tier client-server architecture, involving database, applications, and presentation layers forming three logically independent levels

4) An ability to handle large volumes of transactions. This is a critical criterion in the technical perspective as it is usually more difficult to assess the efficiency (performance) of ERP rather than its effectiveness

5) Flexibility of software and hardware platforms. Most run under Windows, UNIX or Linux.

6) ERP systems generally include user administration, database configuration, system monitoring, and performance measurement. These functions are either part of the software or available as add-ons.

In an ERP, the existence of a single and centralised database constantly updated in real-time and the availability of maintenance support from a single vendor has allowed:

1) Operational cost reduction - for example reduction in time and cost associated with order re-entry errors, data entry, wrong shipment and administrative burden for the sales force

2) Savings in integration expenses for different applications from different vendors (Stein, 1999a; 1999b)

3) Shortened cycle times and reduced inventories (Minahan, 1998) and

4) Lower maintenance cost, as the cost is spread over many other users (Hicks and Stecke, 1995; Butler, 1999; Whearly, 1999).

2.6 Why Companies Adopt ERP

Dahlen and Elfsson (1999) identify several reasons why firms adopt ERP systems. The advantages that firms believe an ERP implementation will provide include:

1) The opportunity to see a holistic view of the entire company as one unit;

2) The strategic possibility to rationalise and gain better control of the company's information flow;

3) Replacing old systems that could not be developed, or too expensive to develop further, in order to support the company's processes; and

4) Reducing the maintenance cost of the information system environment by replacing several old systems with a single new one. This replacement also reduces the dependency on key users in non-integrated systems.

Furthermore, Dahlen and Elfsson (1999) believe companies invest in an ERP to create either a strategic business solution or a technical solution.

An ERP system becomes a part of a firm's strategic business solution when it is a part of the firm's broader strategy. An integrated ERP solution gives an organisation the opportunity to rationalise and develop standard global processes and routines and derive holistic management information to support future strategy formulation.

An ERP system is a technical solution when it replaces existing information systems because they are (technically) outdated. In example, drivers of ERP uptake in the 1990s included such technical issues were the Y2K[1] issue and the introduction of the Euro.

[1] Y2K or Year 2000 issue arose when it became apparent that systems needed to be replaced because their year-date systems were based on 2 digits rather than 4 digits thereby potentially creating problems in date arithmetic after the year 2000.

The Queensland Government adopted a single ERP, SAP R/3 to replace their ageing financial systems. The existing systems were not Y2K compliant nor could they adequately support the government's move to a hybrid cash/accrual accounting regime. Furthermore, the pressure of increased financial management requirements drove the need to extend systems functionality beyond traditional financial needs e.g. rental systems.

2.7 Major Players in the ERP Marketplace

In 2004, the top 5 ERP vendors were SAP, Oracle/PeopleSoft, Sage, Microsoft and SSA Global, accounting for 72% of all ERP software expenditures (AMR Research Group, 2005). Total revenue for the ERP market has grown over time. Consolidation and company failure has also changed the industry. In 1999, the top five vendors (J.D. Edwards, Baan, Oracle, PeopleSoft, and SAP) in the ERP market accounted for 59% of the industry's revenue. Their market revenue shares are listed in Table 2.1.

Table 2.1 - ERP Revenue Shares - Source: AMR Research Group (2005)

Company	**Revenue Share 2004**
1. SAP	40%
2. PeopleSoft	12%
3. Oracle *	10%
4. Sage Group	5%
5. Microsoft Business Solutions	3%
6. SSA Global	2%

Oracle is highlighted with an asterisk since on December 28, 2004, Oracle acquired PeopleSoft, after previously having purchased another large ERP vendor in JD Edwards. From these statistics however, it is clear the dominant company is SAP. They have had a stronghold on the marketplace for a decade and through their R/3 system, continue to be the preferred system for many companies around the world.

As SAP ERP software is the focus of this study, the following section presents background information on this company, SAP AG.

2.7.1 SAP AG

Based in Germany, SAP AG (SAP) was founded in 1972 and since that time has evolved into one of the world's dominant software vendors (Dahlen and Elfsson, 2000).

The company is one of the foremost leaders in providing collaborative business solutions across every major market, and for a diverse range of industries. SAP employs more than 34,000 people in more than 50 countries. It boasts 12 million users, 96,400 installations, and more than 1,500 partners. SAP delivers business solutions to more than 28,200 customers in more than 120 countries around the world (SAP AG, 2005a).

The major software package that SAP offers is their R/3 system. SAP enables firms to pursue and retain a competitive advantage by providing them with the flexibility to adapt rapidly to changing market conditions, improve customer response, and to keep pace with company growth. The client/server architecture of the SAP R/3 system provides businesses with speed and agility in building, deploying, and maintaining business solutions. The SAP R/3 system provides organisations with the capability to integrate their business processes across the entire supply chain - from supplier to customer - into a virtual network of shared information. The system is modular, scalable, flexible, and open, allowing firms to tailor it to their specific needs. SAP R/3 has the functional depth to be attractive to companies that are interested in gaining a competitive advantage through highly individualised business practices (Pereira, 1999).

When KPMG (2005) surveyed the use of SAP throughout Australia, they found that one-off implementation costs for SAP ranged from $650,000 to $80 million, with an average of $13.5 million across Australian organisations.

2.8 Selecting and Implementing an ERP

Organisations that have successfully adopted ERP systems view them as an important innovation that has realised substantial tangible and intangible improvements in a variety of areas (Davenport, 2000b; Markus and Tanis, 2000). However, there are a number of examples where organisations were not successful in reaping the potential benefits that initially motivated them to make large investments in ERP (Davenport, 2000b; Markus and Tanis, 2000). From a short to medium-term perspective, managers find ERP implementations to be difficult projects (Wilder and Davis, 1998). ERP projects are distinguished by their complexity, enterprise-wide scope, and by the challenges posed by accompanying large-scale organisational changes in transition to new systems and business processes. In the long-term, the impact on the organisation's

IT support and maintenance and organisational performance of ERP projects is still unknown (Glass, 1998). The recent development of an ERP success measurement model (Sedera et al., 2003) will provide comparable data in this area when it is more widely implemented.

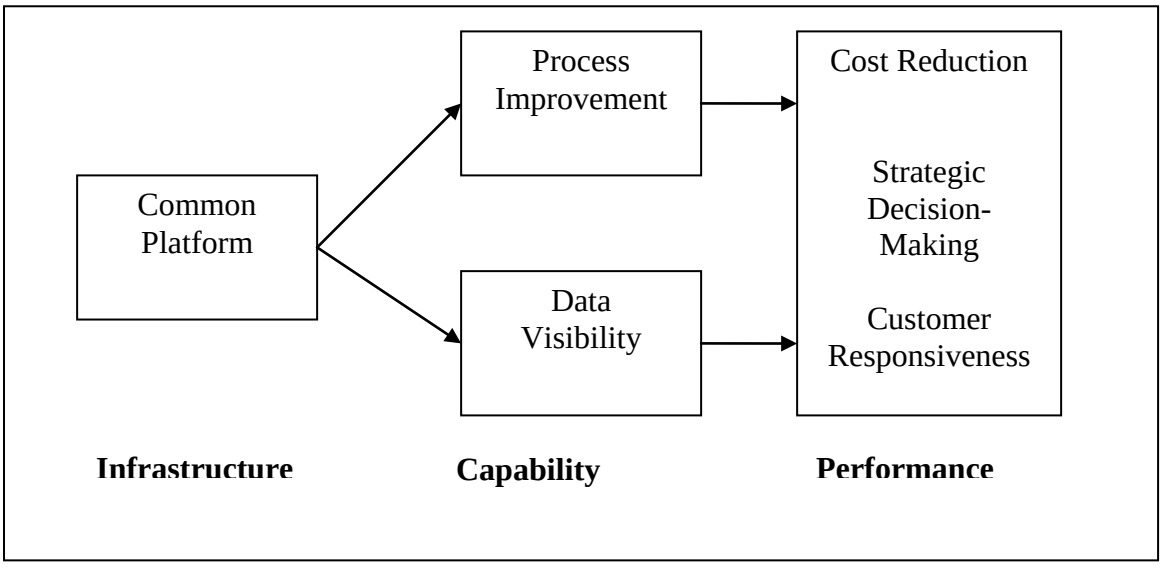
2.8.1 Selecting an ERP

ERP adoption is often a lengthy process. Implementation can involve high expenditures and rewards from implementation may be elusive. Ross and Vitale (2000) cite six common motivations for ERP adoption:

1) Need for a common platform
2) Process improvements
3) Data visibility
4) Operating cost reductions
5) Increased customer responsiveness
6) Improved strategic decision making.

Ross and Vitale (2000) further state that these reasons are interrelated: a new system's platform enables new capabilities, which in turn generate important performance outcomes. See Figure 2.2 below.

Figure 2.2 - Motivations for an ERP (Ross and Vitale, 2000, p. 234)



Since many organisations lack either the resources or the skills to design and implement their own integrated software package, adopting an ERP is often unavoidable (Oliver and Romm, 2000). The decision to select an ERP system is often a difficult one.

Selection of an ERP system involves choosing the software system (i.e. software functionality and its technological environment) that best fits an organisation's business practices or requirements. Its also requires selecting a vendor who is reliable, stable, has a sufficiently large installed base of customers to maintain a viable business, a good record of customer service, and ongoing maintenance support (Wilson, 1999; Jakovljevic, 2000a, b, c).

When companies are trying to decide which ERP to select, the qualities of the ERP system, the vendor profile, and financial risk are most relevant to them (Oliver and Romm, 2000). Bernroider and Koch (2000) believe that organisational size influences ERP choice.

For small-medium sized enterprises choosing ERP systems the dominant decision-making criteria are:

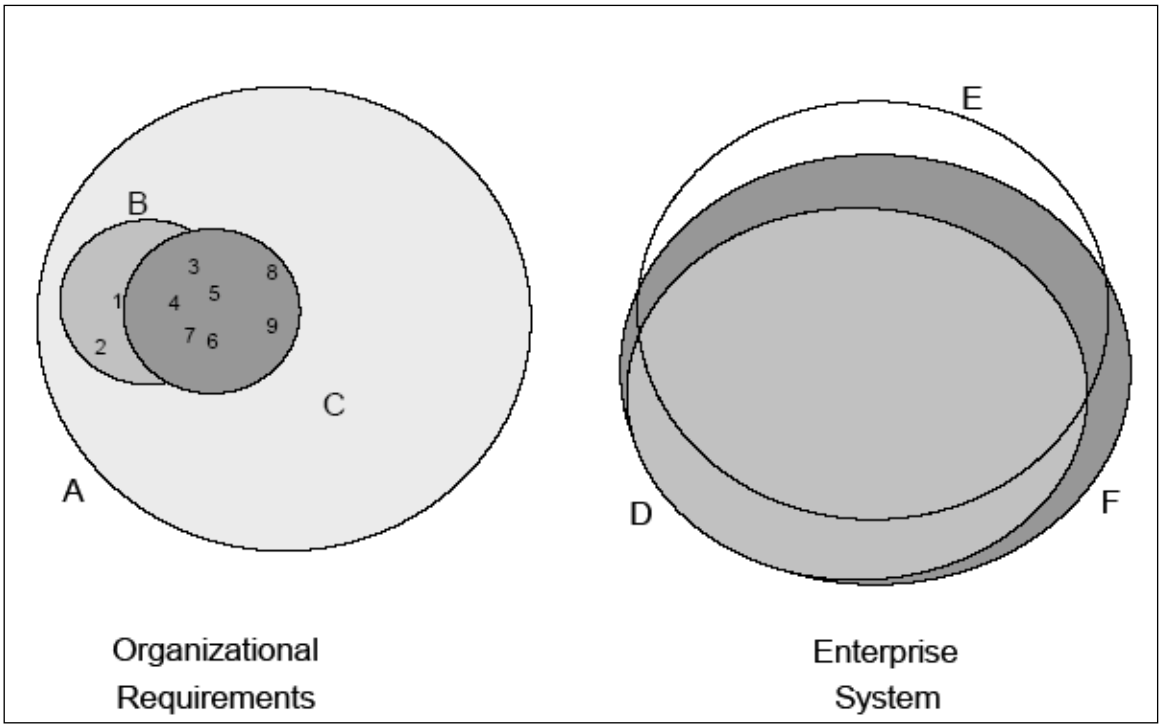
1) Adaptability and flexibility of software
2) Good support and
3) Short implementation time.

For large companies they found the most important criteria to be:

1) Good support
2) Process improvement and
3) Adaptability and flexibility of software.

Rosemann et al. (2004) examined the fit of Enterprise Systems software in organisations. They maintain that many organisations fail with their ES implementation because they do not understand how an ES package aligns with their needs. Rosemann et al. (2004) represent the gap between organisational requirements and actual system capabilities in the following diagram (Figure 2.3).

Figure 2.3 - Classifications of ontological distances (Rosemann et al., 2004, p. 441)



Circle A includes all organisational requirements that are necessary for the current stage of an implementation process, and all the requirements that have been deemed necessary by stakeholders during some stage of the selection and implementation process. In Circle B the requirements that have been 'perceived relevant at some point in time' are included (i.e., requirements 1-7). These are often key requirements used by organisational stakeholders to evaluate an ES package in the first place. In Circle C we find the requirements that are 'actually' relevant at the same point in time as those identified in Circle B. This selection could result from a discussion between experts in ES implementation and representatives from the organisation who possesses detailed knowledge about the company's strategies, objectives and expectations. This difference shows the potential impact of selecting irrelevant requirements.

After mapping the requirements to the ES, the system capabilities can be seen from three perspectives: actual capabilities (circle D), perceived capabilities (circle E) or the appropriated capabilities (circle F). The latter reflects the capabilities of the system from the users' point of view.

Having selected an ERP, organisations then face the challenge of implementation.

2.8.2 Implementing an ERP

In general, information systems implementations are notoriously difficult. ERP implementations pose more difficult technological and organisational challenges than a traditional IS implementation. For instance, a typical ERP (SAP) contains 8,000 to 10,000 configuration tables and 800 to 1,000 business processes (Alvarez, 2002).

Implementation of a large ERP system requires not only substantial time and effort, but also a wide range of expertise and knowledge (exclusive of knowledge of the organisational context) of the following: functional aspects of the package; system configuration and system integration; technical knowledge of the related hardware and software; project management and change management; managing knowledge transfer; and organising user-training. ERP-adopting organisations typically lack this expertise and usually outsource these activities to the ERP vendor, hardware vendor, and consulting firms (Simon, 1997; Holland et al., 1998; Sumner, 2000).

ERP implementation problems are well documented (Parr and Shanks, 2000a). Table 2.2 below presents the findings of The Standish Group on ERP implementations from companies that had more than $500 million in annual revenue.

Table 2.2 - Symptoms of ERP implementation failure (Buckhout et al., 1999 cited in Lian, 2001, p. 18)

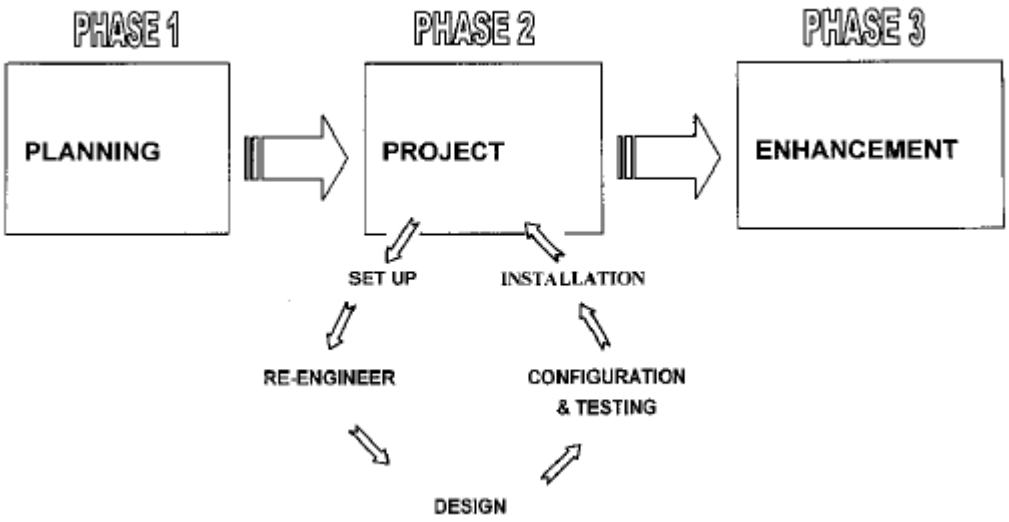
Stakeholder Expectations	Project management problem areas	Results of ERP implementations
Stay within budget	Cost	178% cost overrun
Finish on schedule	Time	230% longer
System performs well	Scope	59% less than expected

Different ERP implementation models have been created in an attempt to describe or remedy these difficulties. The following section describes three generic implementation models. These are the Project Phase Model; the Four-Phase Model of ERP implementation; and, the Five-Phase Model.

2.8.2.1 The Project Phase Model (PPM)

Parr and Shanks (2000a) synthesised existing ERP process models to create the ERP Project Phase Model. It includes planning and post-implementation stages but its primary focus is the implementation project and the factors which influence successful outcomes at each implementation phase. Parr and Shanks (2000a) state that "the implementation process of an ERP system is best conceptualised as a business project rather than the installation of a new software technology" (p. 290). Figure 2.4 below illustrates the process of the PPM.

Figure 2.4 - The PPM of ERP implementation (Parr and Shanks, 2000a, p. 292)



Parr and Shanks (2000a) justify highlighting the implementation phase as the focus of their model with three points:

1) Many problems in ERP literature relate to the actual implementation project;

2) The PPM model relates success factors to the phases of the ERP implementation process. These augment the model by linking factors leading to success with implementation stages; and

3) The purpose of a process model of implementation is to provide guidance for 'successful' ERP project implementation.

There are three major phases in Parr and Shanks (2000a) PPM model:

1) *Planning* involves selecting the ERP; assembly of a steering committee; determination of high-level project scope and broad implementation approach; selection of a project team manager; and resource administration.

2) *The project phase* is divided into five sub-phases:

   a) *Set-up* – includes selection and structuring of project teams with appropriate mix of technical and business expertise, and, clarification of reporting processes and guiding principles;

   b) *Re-engineering* – includes analysis of current business processes, installation of the ERP, mapping of the business processes on to the ERP functions and training of the project team(s);

   c) *Design* – consists of high-level design followed by detailed design subject to user acceptance;

   d) *Configuration and testing* – includes development of a comprehensive configuration, population of the test instance with real data, building and testing interfaces, writing and testing reports, system and user testing;

   e) *Installation* – comprises building networks, installing desktops and managing user training and support.

3) The *enhancement phase* goes on for many years and includes system repair, extension and transformation.

Critical success factors in each phase augment the PPM. The PPM provides practitioners with guidance in the planning and monitoring an ERP implementation (Parr and Shanks, 2000a).

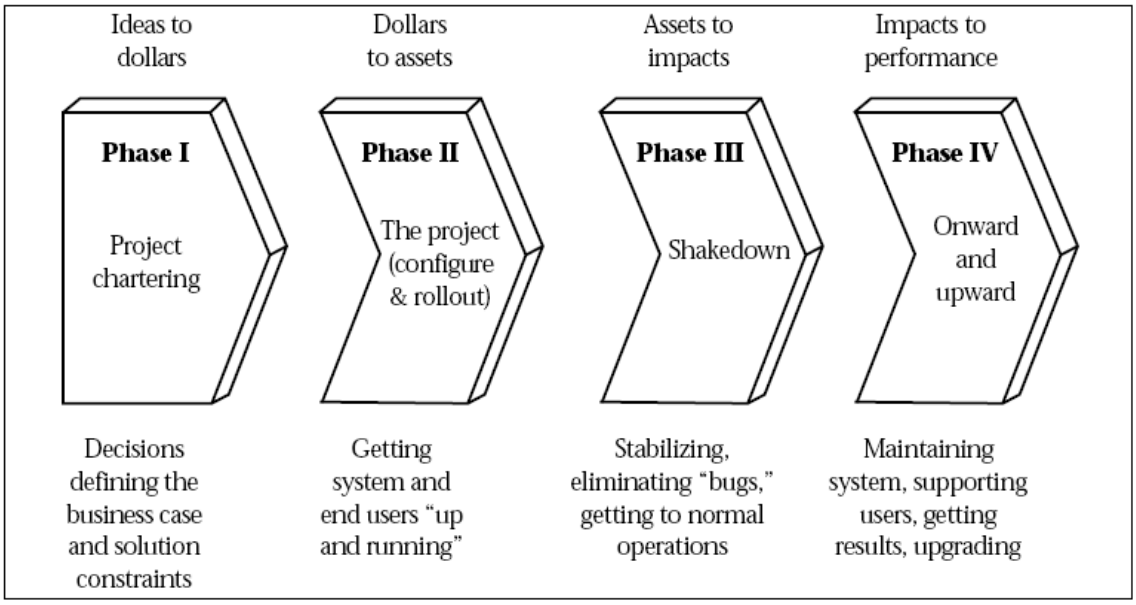
2.8.2.2 The Four-Phase Model of ERP Implementation

This Four-Phase Model (Markus and Tanis, 2000) builds on evolving process theory developed by Soh and Markus (1995). See Figure 2.5.

Markus and Tanis' (2000) model divides an ERP implementation into four phases:

1) *The chartering phase* includes decisions leading to funding of the ERP system project. The most important activities include building a business case for enterprise systems; selecting a software package; identifying a project manager; and, approving a budget and schedule. The outcome is a decision about whether to proceed with the project or not.

Figure 2.5 - Enterprise System Experience Cycle (Markus and Tanis, 2000, p. 189)



2) *The project phase* includes system configuration and rollout. Key activities here include software configuration, system integration, testing, data conversion, training, and rollout. Some companies cancel projects during this phase due to cost or schedule overruns.

3) *The shakedown phase* refers to the period from 'go live' until 'normal operations' has been achieved. Activities may include bug fixing and rework, system performance tuning, retraining, and staffing changes to handle temporary inefficiencies. Often, errors made in previous phases have an effect in this phase. If the project is not cancelled in this phase, 'normal operations' will commence.

4) *The onward and upward* stage refers to the maintenance and enhancement phase of the ERP lifecycle. It is in this phase that the benefits from the system will accrue to the organisation. This phase's activities include continuous business improvement, additional user skill building, and post-implementation benefit assessment.

2.8.2.3 The Five-Phase Model

Ross (1999) compares the concept of this model to that of a prisoner escaping from an island prison. After first planning the dive, he goes off the cliff and towards the bottom of the sea before resurfacing – hopeful that he won't run out of air or be shot first – and swims off to freedom. If successful, the diver will arrive at some distant shore, transformed from prisoner to free man. Figure 2.6 illustrates the process of Ross' (1999) five-phase ERP implementation model.

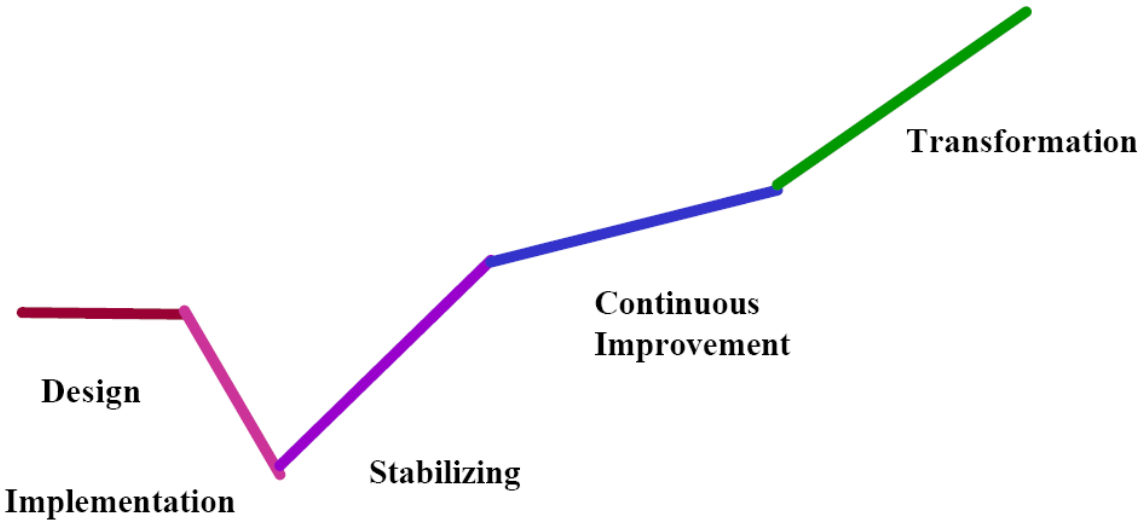
Ross (1999) studied fifteen major companies that had implemented ERPs such as SAP, Baan, PeopleSoft and Oracle. There are five phases in her lifecycle model. The following is a description of these five phases:

1) *The Approach - ERP Design***:** the company has to make two important decisions: whether or not to accept the process assumptions embedded in the software, and whether processes should be standardised in the entire firm or only within some subunits.

2) *The Dive – Implementation*: involves sudden and major organisational change. Most managers find that they have underestimated the extent to which personnel in the organisation are affected during this phase. Training in how the system will change business processes is an important consideration in this phase.

3) *Resurfacing – Stabilisation***:** here the organisation attempts to clean up processes, data and business rules (parameters) to adjust to the new environment. Most firms experience a decrease in performance in this period.

Figure 2.6 - Stages in an ERP Journey (Ross, 1999, p. 13)



4) *Swimming – Continuous Improvement*: companies may add modules and operating benefits become apparent through rationalisation. Companies further adopt the process orientation.

5) *Freedom – Transformation:* in this phase, system and organisational boundaries change. Companies seamlessly integrate with their suppliers and customers to provide a combination of products and services that customers demand or need. None of the firms studied by Ross had actually reached this stage, but several believed that ERP offered this opportunity.

ERP implementations are difficult and success elusive. These models of ERP implementations are helpful to assist in planning and ensuring a successful outcome. But what makes an ERP implementation successful?

2.9 ERP Implementation Critical Success Factors

There are many instances of failure in ERP projects (Davenport, 2000b). Good project managers are sensitive to those factors that are critical to the success of an ERP project.

These success factors are predominantly common issues, previously recognized by project managers as critical to the success of ERP projects. In other words, these factors start their life as lifecycle issues. Project managers may only recognize their criticality later in the lifecycle. Some of these success factors are more critical to success than others but few studies order these issues by criticality. One might argue that ERP risks are also issues recognised by project managers from past experience with either ERP or other types of information systems implementations. In considering issues in the ERP lifecycle, therefore, one must look to issue studies, studies of critical success factors and studies of risks.

A Critical Success Factor (CSF) is:

> *A situation that must go right for an Enterprise Goal to be achieved. Failure of a CSF results in failure to achieve the affected Goal(s).*

(Information Resource Management Glossary, 2005).

In 1979, Rockart proposed the CSF method to help CEOs specify their own information needs about issues that were critical to their organisations. This would guide information systems development in meeting those needs. Rockart (1979) defined CSFs as

> *The limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation.*

Many researchers use CSFs to study ERP implementations; more specifically, SAP implementations (Esteves and Pastor, 2001). Esteves and Pastor (2001) studied a series of studies of CSFs in ERP implementations and created a unified model of CSFs (see Table 2.3).

Table 2.3 - Unified Critical Success Factors Model (Esteves and Pastor, 2001)

	Strategic	**Tactical**
Organisational	✓ Sustained management support ✓ Effective organisational change management ✓ Adequate project team composition ✓ Good project scope management ✓ Comprehensive business re-engineering ✓ Adequate project champion role ✓ Trust between partners ✓ User involvement and participation	✓ Dedicated staff and consultants ✓ Appropriate usage of consultants ✓ Empowered decision makers ✓ Adequate training program ✓ Strong communication inwards and outwards ✓ Formalised project plan / schedule ✓ Reduce trouble shooting
Technological	✓ Avoid customisation ✓ Adequate ERP implementation strategy ✓ Adequate ERP version	✓ Adequate software configuration ✓ Adequate legacy systems knowledge

In a separate study, Somers and Nelson (2001) present twenty-two CSFs that are positively associated with ERP project and systems implementation success. Their resulting CSFs are in Table 2.4

Table 2.4 - ERP Critical Success Factors

Critical Success Factor	**Description**
Top management support	The roles of top management in IT implementations include developing an understanding of the capabilities and limitations of IT; establishing reasonable goals for IT systems; exhibiting strong commitment to the successful introduction of IT; and, communicating the corporate IT strategy to all employees (McKersie and Walton, 1991).
Project champion	By appointing an executive level individual with extensive knowledge of the organisation's operational processes, senior management can monitor the ERP system implementation, because the champion has direct responsibility for and is held accountable for the project outcome (Clemons, 1998).
User training and education	Lack of user training and failure to completely understand how enterprise applications change business processes frequently appear to be responsible for problem ERP implementations and failures (Crowley, 1999). At a minimum, everyone who uses ERP systems need to be trained on how they work and how they relate to the business process early in the implementation process (Somers and Nelson, 2001).
Management of expectations	Expectations of a company may exceed the capabilities of the system. ERP systems may fail to meet expectations despite positive contributions to the organisation if the systems are "oversold" by the vendor. Careful deliberation of success measurement as well as management of expectations by the implementation manager of ERP projects are important factors processes (Marion, 1999).

Vendor/customer partnerships	Research has shown that a better fit between the software vendor and user organisation is positively associated with packaged software implementation success (Janson and Subramanian, 1996) and that organisations should attempt to maximise their compatibility with their vendors (Sweat, 1999).
Use of vendors' development tools	Rapid implementation technologies and programs provided by the vendors can significantly reduce the cost and time of deploying ERP systems (Somers and Nelson, 2001).
Careful selection of the appropriate package	Choosing the right ERP packaged software that best matches the organisational information needs and processes is critical to ensure minimal modification and successful implementation and use (Janson and Subramanian, 1996).
Project management	The vast combination of hardware and software and the myriad of organisational, human and political issues make many ERP projects huge and inherently complex, requiring new project management skills (Ryan, 1999). Specifically, proper management of scope is critical to avoid schedule and cost overruns and necessitates having a plan and sticking to it.
Steering committee	A project management structure with a "steering committee" consisting of senior management from across different corporate functions, project management representatives, and end users, who will have daily contact with ERP, is an effective means of ensuring appropriate involvement (Chimni, 2000).
Use of consultants	Consultants may have experience in specific industries, comprehensive knowledge about certain modules, and may be better able to determine which suite will work best for a given company (Piturro, 1999).
Minimal customisation	Minimal customisation involves using the vendor's code as much as possible (even if this means sacrificing functionality) has been associated with successful ERP implementations (Robinson and Dilts, 1999).
Data analysis and conversion	A fundamental requirement for the effectiveness of ERP systems is the availability and timeliness of accurate data. Data problems can cause serious implementation delays, and as such, the management of data entering the ERP system represents a critical issue throughout the implementation process (Kapp, 1998).
Business process reengineering	An ERP system alone cannot improve organisational performance. To achieve the greatest benefits provided by an ERP system, it is imperative that the business processes are aligned with the ERP system (Somers and Nelson, 2001).
Defining the architecture	Key architectural considerations, which should occur very early in the implementation process, revolve around centralisation or decentralisation, compatibility of existing tools within the enterprise with the ERP system, and identification of bolt-ons such as data warehouses (Spangenberg, 1999).
Dedicated resources	Resource requirements need to be determined early in the project and often exceed initial estimates and the inability to secure resource commitments up front may doom project efforts (Reel, 1999).
Project team competence	Another decisive element of ERP implementation success or failure is related to the knowledge, skills, abilities, and experience of the project manager as well as selection of the right team members, which should not only be technologically competent but also understand the company and its business requirements (Kapp, 1998).

Change management	ERP systems introduce large-scale change that can cause resistance, confusion, redundancies, and errors. Companies need to adopt a comprehensive approach toward the large-scale process and system changes associated with ERP implementations and make change everyone's first priority (Markus and Benjamin, 1997).
Clear goals and objectives	The initial phase of any project should begin with a conceptualisation of the goals and possible ways to accomplish these goals (Slevin and Pinto, 1987). Goals should be clarified so they are specific and operational, and to indicate the general directions of the project (Cleland and King, 1983).
Education on new business processes	It is imperative for managers to educate and communicate their goals and long-term perspectives in order to win support of all members of the organisation affected by the changes (Mahrer, 1999).
Interdepartmental communication	Slevin and Pinto (1987) identified communication as a key component across all ten factors of their Project Implementation Profile and maintained that "communication is essential within the project team, between the team and the rest of the organisation, and with the client" (p. 60).
Interdepartmental cooperation	A key factor for the successful implementation of ERP systems requires a corporate culture that emphasises the value of sharing common goals over individual pursuits and the value of trust between partners, employees, managers and corporations (Stefanou, 1999).
Ongoing vendor support	There will always be new modules and versions to install and better fits to be achieved between business and system. Consequently, vendor support represents an important factor with any packaged software including extended technical assistance, emergency maintenance, updates, and special user training (Somers and Nelson, 2001).

Nah and Lau (2001) found eleven factors critical to ERP implementation success and ranked them as shown below:

1) ERP teamwork and composition
2) Top management support
3) Business plan and vision
4) Effective communication
5) Project management
6) Project champion
7) Appropriate business and legacy systems
8) Change management program and culture
9) Business process reengineering (BPR) and minimum customisation
10) Software development, testing and troubleshooting
11) Monitoring and evaluation of performance.

Nah and Lau (2001), Somers and Nelson (2001) and Esteves and Pastor (2001) all mapped their CSFs into Markus and Tanis' (2000) Four-Phase Model.

Ross (1999) found four organisational factors highly influential on ERP implementations. She examined how firms can generate business value from their investment in ERP implementations. These included:

1) Metrics – the ability to establish clear performance metrics in order to clarify the expectations of an organisation's ERP
2) Ongoing resource requirements – the importance of providing adequate resources for the post-implementation stage
3) Management reporting requirements – imperative for managers to access available ERP system data in order to determine how the business is performing
4) Addressing resistance – train and prepare people for change.

Murray and Coffin (2001) identify seven frequently cited factors of ERP implementation success. These are set out below:

Factor 1: Executive Support Is Pervasive and Accountability Measures for Success Are Applied

Executive support is a major factor for success in ERP system implementations. Such implementations tend to change business practices and the organisation in general (Prasad et al., 1999; Murray and Coffin, 2001). Management must be involved in the change process, monitor progress and provide ongoing direction (Prasad et al., 1999). ERP implementations test accountability, responsibility and communication (Koch et al., 1999). Measures of accountability must be formalised and tied directly to management performance plans (Murray and Coffin, 2001).

Factor 2: Business Processes/Rules Are Well Understood and Functional Requirements Built from These Processes Are Clearly Defined Before Selecting an ERP Product

ERP project abandonment frequently occurs when the system does not match current business practices (Koch et al., 1999). To establish a company's business processes and rules, Jenson and Johnson (1999) recommend using business modeling techniques; documenting business events; identifying tasks and who performs them; and

diagramming the flow of information, as well as conducting a gap analysis comparing current practices with those provided by the ERP system.

Factor 3: Minimal Customisation Is Utilised

As ERP systems are based on common-practice reference models, business processes may need to be changed to accommodate the software, or the software must be modified to accommodate business practices (Holland and Light, 1999). Harris (2000) suggests that organisations should avoid changes to the software. This will reduce the need for technical expertise in-house to both manage customised code and difficulties managing these modifications when new releases eventuate (Murray and Coffin, 2001). Managers should carefully consider all modifications including its impact on cost, maintenance and effect on other parts of the system evaluated (Harris, 2000).

Factor 4: ERP Is Treated as a Program Not a Project

Murray and Coffin (2001) explain that projects have a beginning and an end. Programs, comprising of multiple projects, tend to be ongoing and are managed differently (see Weill and Woodham, 2002). Managing an ERP implementation as a program will avoid the belief that once installation has reached its end, the project is considered at an end. Koch et al. (1999) found that one in four companies report a drop in productivity after their systems go live. Change to business processes takes time and as such, ERP should be considered an ongoing activity (Krumwiede, 2000).

Factor 5: Organisation Wide Education and Adequate Training Are Provided

Murray and Coffin (2001) note that lack of adequate training will result in significant numbers of workers not being able to use newly implemented systems properly. Wheatley (2000) says that education of the broad user community, including senior management is necessary and technical training is not enough. This training takes time and needs to be continuous (Prasad et al., 1999).

Factor 6: Realistic Expectations in Regards to ROI and Reduced IT/IS Costs Exist

Vickers (2000) reports that many Chief Information Officers have experienced difficulty justifying and realising a Return on Investment (ROI) from ERP. Improvements from

changed business processes take time and may be difficult to pinpoint. Vickers (2000) estimates it may take 2-3 years before an ERP system impacts the bottom line.

Factor 7: Realistic Deadlines for Implementation Are Set

Estimates of the time it takes to install an ERP solution range from 14 months to 4 years, with many implementations extending well beyond initial deadlines (Murray and Coffin, 2001). There are several factors affecting implementation time including the number of modules, scope, customisation, and interfaces (Prasad et al., 1999). Unrealistic deadlines may lead to reduced testing and training. These are vital functions for ERP success.

Assuring one attends to critical success factors should assist the organisation achieve a successful outcome. Avoiding known issues and managing risk is equally important. Many critical success factors recorded in the literature are based on the experiences of past implementations and therefore are actually the avoidance of past issues. This study is an issues study and so designed to guide future implementations by providing a list of perceived issues from various perspectives i.e. strategic vs. operational and government agency employee vs. implementation partner. Other studies have identified similar risks and these are set out in the next section.

2.10 ERP Issues and Risks

This section reviews ERP issue studies.

Chang (2002) conducted a preliminary study of issues in five Queensland Government agencies. Using a three-round modified Delphi method, the results were an ordered set of 10 major issue categories, consisting of 38 issues. The issues, listed in their major issue categories are:

1) Knowledge Management
    a. Difficulty retaining staff with SAP skills due to market pressure to leave
    b. Insufficient resources to develop in-house knowledge
    c. Training was inadequate and did not cover the diversity of circumstances encountered in normal daily operations

d. Shared knowledge among project team members was a problem – agency staff did not understand SAP and implementation personnel did not understand agency requirements
e. System documentation is inadequate, particularly regarding system design and controls

2) System Development
   a. The complexity of SAP means that few, if any, people understand SAP beyond a single module, thereby making overarching design decisions very difficult
   b. The frequency of SAP upgrades places a large burden on system maintenance
   c. The frequency with which requirements changed caused problems for developers
   d. Inadequate system testing left many errors in the implemented system
   e. Issues that arose during, or resulted from, the development phase
   f. Requested system functionality was sacrificed to meet implementation deadlines
   g. The project team was disbanded when the system was handed over, despite many issues remaining unresolved
   h. Too little effort was put into redesigning the underlying business processes, resulting in a system that represented a “technology swap” thereby constraining benefits realisable

3) Support
   a. Ongoing support for the SAP system is inadequate
   b. Support personnel are insufficiently trained

4) Data Conversion

   a. Errors were found in data converted from former Financial Management System:

5) Operational Deficiencies

a. The process of developing reports is difficult in SAP
b. Not all required reports were available at implementation time
c. Operational deficiencies impact on the accuracy and efficiency of operations and the ease of system use
d. Persistent minor errors and operational issues had not been rectified
e. SAP is not sufficiently integrated with other systems
f. SAP lacks some of the previous financial management system functionality
g. Security is difficult to maintain in SAP, resulting in some users being granted too much access and other not having access to data they need

6) Lack of Consultation
   a. Lack of consultation with operational level users meant that operational requirements were not met

7) Cost and Benefit
   a. The complexity (and therefore cost) of SAP exceeds the requirement of some agencies
   b. Complexity in their agency caused costs to be driven beyond reasonable limits
   c. The costs of SAP exceeded those of a financial management system without commensurate benefit
   d. The SAP implementation benefits do no justify costs

8) Organisational Context
   a. Differences in work ethics among project personnel
   b. Diversity of government systems makes integration difficult
   c. Implementation across multiple agencies which led to sub-optimisation of the system configuration
   d. Lack of leadership at senior levels
   e. Lack of ownership/responsibility by agency personnel at the project level
   f. Political issues which impacted negatively on the project

g. Poor communication between agencies
h. Inappropriate timing of implementation as a result of changes occurring with the public sector

9) Intransigence
   a. Organisation appears unable to unwilling to be responsive to requests for changes in the system to resolve operational problems

10) System Performance
   a. System performance is inadequate to meet operational requirements

In a case study of seven companies implementing enterprise-wide management information systems using SAP, Oracle and PeopleSoft, Sumner (2000) identifies several factors of risks unique to ERP implementation projects. These factors are listed in order of frequency of mentions. See Table 2.5 below.

Table 2.5 - Sumner's list of risks and issues

Risk	**Notes**
Failure to redesign business processes to fit the software	Project managers interviewed had learnt to avoid customising ERP software thereby circumventing cost and time overruns.
Lack of senior management support	Project objectives are more attainable with top management support and the alignment of those objectives with strategic business goals.
Insufficient training and re-skilling	Investment in training of the IT support team is important.
Lack of ability to recruit and retain qualified ERP systems developers	Organisations found it difficult to recruit and retain ERP specialists
Insufficient training of end-users	Need more re-skilling the end-users and supplementing 'generalised' user training with specific module training, in particular report generator skills.
Inability to obtain full-time commitment of 'customers' to project management and project activities	It is difficult getting business areas to dedicate sufficient people to resource the project.
Lack of integration	An enterprise-wide design approach is suggested.
Lack of a proper management structure	A centralised management structure would avoid duplication of effort.
Insufficient internal expertise	Most firms brought in the consultants to overcome challenges in design and implementation.
Lack of a champion	ERP projects need a 'champion' to market the project across the organisation.

Lack of 'business' analysts	A critical workforce requirement is analysts with both business and technology knowledge. These analysts need effective communication skills.
Failure to mix internal and external personnel	Organisations can grow the necessary technical skills for ERP systems design by mixing consulting and company staff.
Failure to emphasise reporting, including custom report development	The use of report generators and user training in reporting applications is critical. Insufficient end-user training in this area can generate resistance to the system.
Insufficient discipline and standardisation	This refers to adopting the processes that the standard ERP software was designed to support.
Ineffective communications	The activities, scope and objectives of the project should be communicated clearly.
Avoid technological bottlenecks	This relates to avoiding different 'technology' environments within an organisation that could potentially create delays in establishing consistency and coordination
Attempting to build bridges to legacy applications	Another form of technology bottleneck.

Sumner maps these risk factors to major categories of IS project risk factors and identifies those that are unique to an ERP environment in Table 2.6

Table 2.6 - Summary of risk factors in ERP projects (Sumner, 2000, p. 324).

Risk Category	**Risk Factor**	**Unique to ERP**
Organisational Fit	Failure to redesign business processes	Yes
	Failure to follow an enterprise-wide design which supports data integration	Yes
Skill Mix	Insufficient training and reskilling	Yes
	Insufficient internal expertise	Yes
	Lack of business analysts with business and technology knowledge	Yes
	Failure to mix internal and external expertise effectively	Yes
	Lack of ability to recruit and retain qualified ERP systems developers	
Management Structure and Strategy	Lack of senior management support	
	Lack of proper management control structure	
	Lack of a champion	
	Ineffective communications	
Software Systems Design	Failure to adhere to standardised specifications which the software supports	Yes
	Lack of integration	Yes
User Involvement and Training	Insufficient training of end-users	
	Ineffective communications	
	Lack of full-time commitment of customers to project management and project activities	
	Lack of sensitivity to user resistance	

	Failure to emphasise reporting	
Technology Planning/Integration	Inability to avoid technological bottlenecks	
	Attempting to build bridges to legacy applications	Yes

Having examined critical success factors, issues and risks it is time to turn our attention to the realisation of benefits from ERP projects.

2.11 Realising ERP Benefits

Since ERP implementation projects often span several years, their impacts have not been extensively documented in the literature. Some advantages may become visible immediately, while others are more elusive. Some firms have even found the impacts to have been negative (Robey et al., 2002).

The Delone and McLean (1992) IS success model is one of the most widely cited (Myers et al., 1998; Heo and Han 2003). Based on the work of Shannon and Weaver (1963) and Mason (1978), Delone and McLean propose an IS success model that reflects the systematic combination of previously reported individual measures. The model is an attempt to represent the interdependent, process nature of six IS success constructs; (1) System Quality, (2) Information Quality, (3) Use, (4) User Satisfaction, (5) Individual Impact, and (6) Organisational Impact (Sedera and Tan, 2005).

Rigorous research into ES success and benefits is sparse. Shang and Seddon (2000) introduced one of the few existing ES benefits frameworks after completing in-depth case studies of four Australian utility companies. The Shang and Seddon (2000) framework classifies potential ERP benefits into 21 lower level measures organised around 5 main categories: Operational benefits, Managerial benefits, Strategic benefits, IT infrastructure benefits and Organisational benefits. The framework does not consider cost, but focuses on benefits only. A lack of existing literature identifying specific types of ERP benefits required the authors to rely on trade-press articles and vendor-published "success stories" from the web. Their framework, presented in Table 2.7, has yet to be operationalised.

Table 2.7 - Proposed enterprise system benefits framework (Shang and Seddon, 2002, p. 277)

Dimenstions	**Subdimensions**
Operational	1.1 Cost reduction
	1.2 Cycle time reduction
	1.3 Productivity improvement
	1.4 Customer service improvement
Managerial	2.1 Better resource management
	2.2 Improved decision making and planning
	2.3 Performance improvement
Strategic	3.1 Support for business growth
	3.2 Support for business alliance
	3.3 Building business innovations
	3.4 Building cost leasership
	3.5 Generating product differation
	3.6 Building external linkages
IT Infrastructure	4.1 Building business flexibility for current and future changes
	4.2 IT cost reduction
	4.3 Increased IT infrastructure capability
Organisational	5.1 Changing work patterns
	5.2 Facilitating organisational learning
	5.3 Empowerment
	5.4 Building common vision

In 2001, Sedera et al. (2003) used an initial exploratory inventory survey to identify a salient set of ES success dimensions to include in the a priori ES success measurement model. The purpose of this exploratory survey was to inventory impacts of the SAP R/3 system, as perceived by staff at all levels of 27 Government agencies in Australia. 137 responses were received, citing a total of 485 impacts (Sedera et al., 2003). The research team then synthesised the citations of the inventory survey into a useful, meaningful, and coherent classification of success dimensions and measures. An attempt was made to map the first-round survey 'citations' into both the Delone and McLean IS success model (1992; 2002; 2003) – supplemented with the Myers et al. (1998) IS assessment selection model, and the Shang and Seddon ERP benefits framework (2000) mentioned above. The synthesis identified the constructs and underlying measures of the Delone and McLean (1992) model and the associated measures from Myers et al. (1998), as the most suitable taxonomy of ES success (Sedera et al., 2003). The Delone and McLean success dimensions and measures were then adapted to the context of ES

Having started with the Delone and McLean constructs and measures (supplemented by Myers et al., 1998) and having adapted their framework through review of the literature,

the inventory survey, and a series of expert workshops, Sedera et al. (2003) proposed an a priori model of ES success with 41 mutually exclusive measures. Unlike the original Delone and McLean model, the a priori model is simply a measurement model for assessing the multidimensional phenomenon of ES success using four separate dimensions of success (constructs): system quality, information quality, individual impact, and organisational impact. The model does not purport any causality among the dimensions; rather, the dimensions are posited to be correlated and additive of the same multidimensional phenomenon - ES success.

The realisation of benefits and the measurement of success are activities undertaken after the implementation of the system. The other principal activity that dominates the post-implementation period is maintenance.

2.12 ERP Maintenance

Annual maintenance costs for ERP systems approximate 25% of initial ERP implementation costs, and upgrade costs as much as 25-33% of the initial ERP implementation. Yet, many organisations lack experience and expertise in managing ERP maintenance and upgrade effectively (Ng, 2003).

Until Ng (2003), there was no standard ERP maintenance model that could provide practitioners with guidelines on planning, implementing and upgrading an ERP. While standard software maintenance models exist, they have been found to be insufficient for ERP maintenance and upgrade processes. In order to bridge this gap in literature and practice, Ng (2003) proposed a preliminary ERP maintenance model, reflecting fundamental ERP maintenance and upgrade activities. They conducted a detailed case study to gather empirical data for developing their model. From the case study and data collected, they observed the following distinctions of ERP maintenance:

1) The ERP-using organisation, in addition to addressing internally originated change-requests, also implements maintenance introduced by the vendor

2) Requests for user-support concerning the ERP system behavior, function and training constitute a main part of ERP maintenance activity and

3) Similar to the in-house software environment, enhancement is the major maintenance activity in the ERP environment, encompassing almost 64% of the total change-request effort.

In light of these and other findings, Ng (2003) ultimately:

1) Propose a clear and precise definition of ERP maintenance;

2) Conclude that ERP maintenance cannot be sufficiently described by existing software maintenance taxonomies; and

3) Propose a benefits-oriented taxonomy, which better represents ERP maintenance activities. Three salient dimensions (for characterising requests) incorporated in the proposed ERP maintenance taxonomy are:

   a) Who is the maintenance source?

   b) Why is it important to service the request? and

   c) What/whether there is any impact of implementing the request on the installed module(s)?

The proposed ERP maintenance taxonomy represents an extension beyond the modern view of maintenance-activity typology, in two ways:

1) It covers vendor-initiated maintenance activities, and

2) It classifies the relevant maintenance activities based on the benefit-perspective.

The benefit-perspective of the classification ultimately allows ERP-using organisations to:

1) Prioritise the maintenance requests based on the importance of the benefit to the organisations business objectives, and

2) Choose the most appropriate version of ERP to upgrade, which can eventually reduce the total maintenance cost in the future, and the total cost of ownership for ERP software (Ng, 2003).

A matter ranging across all phases of the ERP lifecycle, including the maintenance phase, is the management of ERP related knowledge within the implementing organisation and across associated organisations including the vendor and implementation partners.

2.13 ERP Lifecycle Knowledge Management[2]

This section discusses the importance of knowledge management in the ERP context and briefly discusses the role of, and knowledge processes used within, ERP implementation partners.

According to Chan (1999), ES implementations require a wide range of knowledge including project knowledge (how to implement ES, business process engineering, change management, training and education); technical knowledge (such as programming, system and database administration); product knowledge (specifics of the ES); and business knowledge (… of the business, its culture and people). Where an organisation does not have the requisite knowledge, it will often seek this implementation knowledge from third-party providers. Implementation resources are predominantly knowledge based. This knowledge may be sourced from a (typically large) consulting firm (knowledge vendor) which acts in the capacity of implementation partner. Sharing the joint objective of successful implementation and, in some cases, ongoing management an alliance is formed between the client organisation, the ES software vendor, and this third-party. For example, a client organisation will choose a vendor, such as SAP, and an implementation partner (consultant) who is familiar with, and experienced in, the implementation of SAP.

The term SAP Services Eco-system, first coined by the Gartner Group (1999), refers to the group of firms and professionals worldwide who derive their livelihood from the supply of SAP related products and services. Though discussion on the ecosystem could extend to other important players and relationships (e.g. SAP's hardware partners) the emphasis herein is on systems-integration service partners of SAP whom we refer to as 'consultants' or 'implementation partners'. We place particular emphasis on the large,

[2] This discussion is largely sourced from Timbrell and Gable (2001).

regional and international consulting firms most often selected as ‘implementation partner’ by ERP clients.

It is proposed that the need for post-implementation external support will largely depend on the ERP knowledge transferred and developed during the implementation period. Other factors affecting post-implementation external support requirements might include key staff losses, major upgrades, major configuration changes, and changes to the business process models. The client, therefore, from the very outset needs to carefully consider from where, to what extent, and how they are going to source the knowledge required to ensure the ongoing vitality of their ERP. In other words, they need to develop an ERP lifecycle-wide 'knowledge sourcing strategy' (Timbrell and Gable, 2001).

The three key players in the SAP ecosystem, the client, the vendor and the implementation partner stand to benefit from effective ERP knowledge management. The vendor, SAP, seeks to improve client support and satisfaction, and to redress negative perceptions that SAP implementation duration and cost is difficult to manage. The consulting firms seek to streamline implementation and share in the savings with clients. Both SAP and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. The client will benefit through better-planned lifecycle management and more effective implementation outcomes. In addition, to the extent that SAP and its partners can capture key knowledge during implementation, they will be well placed to further support clients throughout the ERP life cycle (Timbrell and Gable, 2001).

These differing but aligned objectives will drive the separate knowledge strategies of each of the three key players. Zack (1999) defines knowledge strategy, as balancing knowledge-based resources and capabilities with the knowledge required for providing products or services in ways superior to those of competitors. Zack (1999) further defines a firm as having an aggressive knowledge strategy when it closely integrates knowledge exploitation and exploration (innovation) using knowledge sources both internal and external to its organisational boundaries. In the SAP services ecosystem, when the business objectives of the three players either compete or overlap there is

potential for the players' knowledge strategies to conflict. We call this 'knowledge strategy friction'. Knowledge strategy friction may exist in a particular implementation or may be perceived by any party to exist.

Having engaged a suitable implementation partner, the client completes the implementation process, goes live with the ES and moves into the post-implementation maintenance and upgrade cycle. At the end of the implementation phase, the consultant usually withdraws from the organisation. Responsibility for managing the ES falls back to the client. Continuing success of the ES becomes reliant on the client's skill and knowledge in operating, maintaining and upgrading the ES. In order to keep the ES 'live' and relevant, the client must either draw from their ES capabilities transferred in during the implementation period or seek expert support (knowledge) externally. Such external support is usually available from the vendor, the implementation partner and other third parties and is often expensive.

Organisations planning to support the ES in-house (insourcing) face the issue of attracting or developing, then retaining staff with the necessary knowledge. Where the client plans to outsource its ES to an Application Service Provider (ASP), post-implementation ES knowledge self-sufficiency may not be necessary. ASP vendors cite this alleviation of 'future skills risk' as one of their competitive advantages (Bennett and Timbrell, 2000). On the other hand, should the organisation follow an insourcing strategy, it will often aspire to post-implementation ES knowledge self-sufficiency (see Timbrell et al., 2004 for a thorough discussion of knowledge self-sufficiency) in order to reduce reliance on third-party support and the associated high costs of that support. Knowledge management, and knowledge sharing in particular, offers significant potential commercial and practical benefits throughout the ES life cycle (Gable et al., 1998). It can be argued, therefore, that knowledge transfer from vendor and implementation partner to the client organisation is an important factor in ES life-cycle management. In the case of a client organisation outsourcing their ES to an ASP, Feeny and Willcocks (1998) suggest that consideration be given to what knowledge or competencies should be developed or retained in-house.

According to Davenport (2000b), client organisations often experience poor ES implementations because they regard the project as a one-time exercise and so fail to attend to ES knowledge management issues, such as requesting (contracting for) knowledge transfers from consultants, or adequately maintaining the transferred knowledge. While the current literature falls short of empirically demonstrating causal links between effective knowledge transfer and successful ES implementations, the expectation is that knowledge transfers leave the client organisation better positioned to maintain and evolve their system, and to generate returns from the ES investment (Davenport, 2000a).

However, the mere possession of transferred knowledge is unlikely to be sufficient to meet a client's independence objectives. Effective knowledge transfer requires not only transmission, but also knowledge absorption and use (Davenport and Prusak, 1998). Developing the capability to effectively maintain and leverage knowledge will depend on the client's ability to either integrate new ES knowledge with knowledge of the business or combine it with existing capabilities. This knowledge must then be used to create appropriate routines and capabilities in support of business objectives (Andreu and Ciborra, 1996; Kogut and Zander, 1992; Inkpen and Dinur, 1998). Organisational capability emerges over time through a process of organisational learning (Levitt and March, 1988). It is informative then to examine the literature regarding the transfer of knowledge into and within the firm for purposes of organisational learning.

2.13.1 Knowledge Transfer

According to Nonaka (1994), organisational learning depends fundamentally on the internalisation of knowledge where explicit (formalised, explicated) knowledge is converted into tacit forms such as individual know-how and organisational routines. The knowledge is literally absorbed through action or experience.

Inkpen (1996) extends this notion by arguing that capability development in an alliance-context is therefore dependent on the integration of internalised knowledge from external sources into organisational routines. Thus, in an ES implementation, knowledge sourced from the implementation partner and the vendor must be translated, adapted and

combined with knowledge of the organisation's business processes, then internalised into new organisational routines specific to the organisation's context.

The resource-based view of the firm emphasises leveraging of the firm's resources to develop organisational capabilities, and exploiting these to the firm's advantage. Andreu and Ciborra (1996) discuss the importance of situated learning and knowledge accumulation in the capability development process. Their work is notable for its focus on the role of context in organisational learning loops. They posit that the more path-dependent the learning process to develop work practices, routines and capabilities, the more idiosyncratic they are to the firm, and therefore the less generalisable and transferable to different organisational contexts. Over time, business environments and ERPs develop firm specific peculiarities.

Constantly faced with implementing ERP in unique and distinctive business environments, consultants sift their experiences in a systematic way to extract idiosyncrasies from their ERP client encounters thereby providing broad methodologies for general application to future ERP clients. The combination, however, of this de-contextualisation of past implementation experiences into such methodologies and other knowledge reservoirs, and the use of inexperienced staff within a complex environment can give rise to perceived ES lifecycle management issues.

2.13.2 Knowledge Management in Consulting Firms

Knowledge can be tacit or explicit (Polanyi, 1958; Nonaka and Takeuchi, 1995). Explicit (or codified) knowledge can be transmitted in formal systematic language, is faster to transfer, and thereby provides economic benefits from re-use. Tacit knowledge is more personal, difficult to communicate, rooted in action and experience and resides within the minds of people (Polanyi, 1958; Nonaka, 1994). Tacit knowledge is slower to transfer and requires face-to-face or other rich communication mediums. Consulting firms explicate as much implementation experience as possible to provide more efficient implementation experiences for their clients, and to improve the retention effectiveness and recall efficiency of their knowledge base.

The consulting sector, and in particular the larger firms, are amongst the most knowledge intensive. Being 'knowledge organisations', several of these firms are, not

surprisingly, already highly active in knowledge management. For example, Ernst & Young spends 6% of revenues on knowledge management and measures the amount of knowledge it reuses in the form of proposals, presentations and deliverables and the contributions of its knowledge repository to closing sales (Davenport, 1997). For some large consulting companies, SAP expertise and related knowledge management represents the largest investment they have ever made.

Consulting firms go to great lengths and expense to externalise ERP knowledge in order to achieve a comparative advantage and to leverage their costly people. In the early 90's, Ernst & Young initiated a knowledge strategy whereby it captured and leveraged knowledge from consulting engagements. They established a number of research centres to explicate consultants' knowledge into standard methodologies, and to record and refine experiences from consulting assignments (Davenport 1997).

PriceWaterhouseCoopers, KPMG and Arthur Andersen also adopted ERP knowledge explication strategies, using technologies such as Lotus Notes. In addition, knowledge transfer is facilitated through telephone, e-mail access to experienced consultants, and the rise of specialised internal practice networks. This ability to source knowledge quickly within in the firm is a basis for the consultants' competitive advantage. Dash (in Im and Hars, 1998) defined knowledge management as an attempt to put processes in place that capture and reuse an organisation's knowledge so it can be applied to generate revenue. The generation, codification, transfer and use of ERP implementation knowledge by large consulting firms conform to this particular definition.

Clients pay, for not only access to codified knowledge, but also for access to the uncodified knowledge held by the consultant's staff. Consulting firms attract good people with ERP knowledge away from clients by offering more money and more diverse or challenging experiences. This valuable and scarce ERP knowledge can be leveraged across multiple implementations. In a marketplace where demand outstrips supply, it can be uneconomic for a client to retain this knowledge in-house to support a single ERP implementation.

Maister (1993) describes three different types of consulting practices: the expertise practice which employs considerable raw brain power to solve frontier (unique,

'bleeding-edge', new) problems; the experience practice which has dealt with similar situations in previous assignments; and efficiency based firms which can demonstrate established procedures and systems to handle specific problems cost effectively. These three types of practice are not discrete but form a spectrum along which consulting firms establish various aspects of their practice. Choo (1998) describes the same three types as background knowledge framework, practical know-how and rule-based procedures. The various consulting practices each emphasise differing knowledge management strategies. Two important knowledge services provided by consulting firms when implementing ERP systems are technical product knowledge and product related implementation procedural knowledge (methodologies) i.e. implementation project management.

While expert practices certainly play a role in ERP implementations such as providing zero-based re-engineering services, it is the experience and efficiency type practices that principally conduct ERP implementations. ERP experience, the knowledge of and practised skill in ERP implementations held tacitly by consultants is in short supply.

ERP implementation partners position themselves towards the experience/efficiency end of Maister's spectrum. Efficiency practices have traditionally based their competitive advantage on proprietary implementation methodologies. Clients of these consulting firms realise they must pay a significant premium for these firms' knowledge-base, as it is difficult and costly for consulting firms to capture, externalise and store this knowledge. Clients would not get the same value from capturing and explicating this ERP knowledge themselves because in many cases it would only be used once. If, however, clients plan to roll out further ERP implementations (e.g. geographically or across divisions), a knowledge retention strategy is worthy of consideration.

2.13.3 How Consultants Store ERP Knowledge

Consultants have sought means of leveraging their knowledge by storing it in 'repositories', also call 'reservoirs' (Argote and Ingram, 2000) that can be drawn from in future. By storing knowledge, consulting firms can leverage their limited people resources, expedite projects and reduce the negative effects of 'knowledge drain.'

The research team suggests there are four key means by which consultants have sought to store knowledge relating to ERP: software templates, methodologies, configurable

electronic knowledge repositories, and education and training materials (Timbrell and Gable, 2001).

Consultants use several techniques to guide client knowledge sourcing during an ERP implementation. It is important to note that the consulting team 'source' the various types of knowledge from their knowledge base of software templates, methodologies, configurable electronic knowledge repositories, and education and training materials. The consultants combine these explicated knowledge stores with their tacitly held experience reserves to guide the client's knowledge sourcing strategy.

2.13.4 Knowledge Sourcing and Consultants

Consulting firms can also be facilitators of clients' ERP knowledge creation and discovery. Their ability to help a firm implement an ERP stems not only from their technical expertise in the ERP system but also their ability to 'facilitate' the client's knowledge sourcing strategy. Consulting firms use techniques such as guided learning, formal training and knowledge creation activities to direct clients to the necessary knowledge required for a successful implementation. This guidance saves the client considerable time and effort in knowledge search costs.

Consulting firms, therefore, must develop a sophisticated knowledge sourcing strategy to support their efforts in facilitating their clients' knowledge sourcing activities in achieving an effective implementation outcome. Not only do they require sophisticated implementation knowledge repositories but they also need the expertise in applying these repositories to meet their clients' business objectives. To provide perceived value to the client, their knowledge sourcing capability in the ERP implementation knowledge domain must be superior to the client's capability. Consulting organisations employ software templates, methodologies, configurable electronic knowledge repositories, and education and training materials combined with sophisticated internal knowledge management to achieve this superiority.

The purpose of this discussion is to demonstrate the knowledge intensity of ES lifecycle management. The suggestion from this discussion is that a primary element of ES lifecycle management is ES lifecycle knowledge management. In performing a study

of issues arising during the ES lifecycle it is expected that several will be knowledge related.

2.14 Conclusion

This chapter defines and characterises ERP. It sets out the management issues that affect it over the course of its lifecycle from studies outside of this research program. Post-implementation considerations such as ERP benefits are introduced as is the knowledge-based view of the ERP 'ecosystem'. The next Chapter (3) will review in detail the literature describing the methods used in this thesis.

Chapter Three – Research Methods

In this Chapter, Part 1 describes the Historical Method, used to write the historical monograph in Chapter 4. Part 2 describes the Delphi Method and the variant used to conduct the major issues study set out in Chapters 5, 6 and 7. Part 2 also briefly describes the Nominal Group method, used in conjunction with the Modified Delphi Method in the issues study.

Part 1 - The Historical Method in Information Systems Research

3.1 Introduction

In an information-technology-based business history, information technology (IT) is viewed as a reservoir of potential power, a metaphorical fount from which change can spring. IT makes some significant kinds of social change possible. Furthermore, it establishes the constraints of feasibility and possibility within which other kinds of social change can take place (Mason et al., 1997a). It is important to record these stories from an information systems (IS) perspective. These tales can be both instructive and interesting. The historical method is the appropriate tool to facilitate this goal. This formal method helps to differentiate the chronicles of our IS experiences from the fairy-tales and legends that reside in our industry.

3.1.1 The Application of the Historical Method in IS Research

Short historical stories are widespread in information system research. For example, it is common for case studies to include an explanation of preceding events leading up to the 'contemporary phenomenon within its real-life context' (Yin, 1994). But these short historical pieces are adjunctions to the core research approaches and do not always apply proper historical methods. Similarly, recording the history of technology is common, but there is a paucity of methodically-based historical monographs in the field of information systems.

The history of technology is an established field of study boasting such associations as the Society for the History of Technology. This society, formed in 1958, publishes the learned journal *Technology and Culture*. A scan of this journal's

articles since inception includes only one historical account of information systems. This is a fascinating treatise entitled '*Data Processing and Technological Change: The Post Office Savings Bank, 1861-1930'* (Campbell-Kelly, 1998). Campbell-Kelly's (1998) account was very much an information systems study, describing the development and impact of technology on this English bank's employees and customers through mechanisation and process improvements. The absence of modern computers in this study, however, reduces its import to contemporary information systems scholars as the computer age had yet to begin.

John Pinkerton commissioned the first commercial computer application, a payroll, on the LEO 1 in 1951 (Bird, 1994). Contemporary IS history essentially begins at this point but it took another thirty years before this history was systematically recorded by the IS community.

The formal study of IS history effectively stems from a research colloquium held at Harvard University's Graduate School of Business Administration in 1984. The colloquium, entitled 'The Information Systems Research Challenge' (McFarlan, 1984) identified a need to develop an historical tradition in IS research. In 1988, the Harvard Management Information Systems (MIS) History Project began and a group of individuals, all who had been active in technology since the 1950s came together to undertake several major information systems historical studies, including Bank of America (McKenney et al., 1997), American Airlines (Copeland and McKenney, 1988) and American Hospital Supply (McKenney et al., 1995). During these historical studies, the group identified the need to develop a methodology for doing MIS historical research (Mason et al., 1997a; 1997b). Richard Mason, James McKenney and Duncan Copeland, three founders of the Harvard MIS History project, produced such a methodology in 1997.

This section will describe the IS historical method proposed by Mason (et al., 1997a; 1997b) and discuss it in within a broader context of historiography. The purpose of the section is to provide the reader with a wider understanding of the philosophy and practice of the historical method within information systems, so that they better understand the process through which the historical monograph in Chapter Four was constructed. This discussion is also intended as a contribution to the development of the IS historical method, continuing the work of Mason, McKenney and Copeland.

Part 1 of this methods chapter follows the following structure: Section 1 describes the development of the historical method in the IS discipline. Section 2 discusses the philosophical approaches to history writing. Section 3 uses a comparison between the historical method and the case study method, a method more familiar to those in the IS discipline, to explain the salient characteristics of the historical method. Section 4 summarily lists the steps in Mason's (1997a; 1997b) historical method and sets out methodological steps employed by leading traditional historiographers. These step methods are discussed in more detail and synthesised in section 5 to create a proposed simplified three-step IS historical method. The three steps are: (1) Specification of the subject; (2) Discovery and Critique of the Sources of Evidence; and (3) Construction of the Narrative. Section 6 summarises and concludes Part One.

3.2 History in MIS research

Mason (1997a) cites Schumpeter's (1934) notion that any field of inquiry that earns the distinction of being called a "discipline" must provide to the world four kinds of knowledge: (1) empirical data, observations and facts, (2) theories and paradigms, (3) ethics, and (4) history. A study of history is necessary to provide a temporal and contextual meaning for each of the other three forms of knowledge.

Researchers of information systems recognise the need for, and benefits of, multiple research methods (Hirschheim et al., forthcoming; Gable, 1994; Kraemer and Dutton, 1991). For example, Gable (1994) discusses the benefits arising from combining survey research with case studies. This research project examines a series of sub-studies undertaken in the Queensland Government each looking at various aspects of the Governments experiences with managing its Enterprise Systems. These sub-studies employ a variety of methods including case study, survey and modified Delphi technique. Providing a broad historical context as background helps to understand these sub-studies better, both individually and in relationship to each other. Mason (1997b) believes the greatest value of historical studies to the MIS (Management Information Systems) discipline is realised from the synergy they produce with results obtained by using other methods. Richard Neustadt and Ernest May (1986) further argue that history helps endow knowledge

with wisdom so that it can be used effectively by leaders and decision makers. Francis Bacon (1561-1626) also supports this notion in one of his famous quotations

> *Histories make men wise; poets, witty; the mathematics, subtle; natural philosophy, deep; moral, grave; logic and rhetoric, able to contend.*

As members of the IS field, Mason et al. (1997a; 1997b) believe that, we have an ethical obligation to understand what has changed in our society as a result of our activities, and to identify those things in society that have persisted in spite of our concerted efforts to change them. This is among the challenges we face as an academic field today, and meeting this challenge is exactly why an historical tradition in MIS research is called for at the present time (Mason et al., 1997a). Before we understand how history is properly recorded, however, we must examine its very nature.

3.3 What is History

The British poet W. H. Auden (1975) once said,

> *History is, strictly speaking, the study of questions; the study of answers belongs to anthropology and sociology.*

There are currently two (opposing) views of the philosophy of history: the Post-modern view (e.g. writings of White, 1994) and a "traditional" view (e.g. writings of Marwick, 1989; 2001). The former understands history in terms of a continuous dialectic of social base/superstructure (the base being economic factors and the superstructure is culture). The latter is an empirical view of history writing. It differentiates between "history" and the "past" and puts history in the domain of sciences, promoting a methodology but rejecting theorisation. This discussion of an historical method adopts the traditional view.

In the traditional view, history as an 'event' is the unfolding of a phenomenon in a time and place. Historians, journalists and others record these events, colouring them with their cultural and other prejudices, creating 'history as narrative'. This 'history as narrative' can influence 'history as event' in a later period (Stanford, 1994) e.g. where, in our context, the narratives of a disastrous implementation of particular software can influence the action of other firms.

Historians seek to study questions of social continuity and change by analysing such events and contemplating data gleaned from a wide variety of empirical sources including remains, records, and recollections (Mason et al., 1997b). The essence of historical enquiry is selection – of 'relevant' sources, of 'historical' facts and of 'significant' interpretations. In this sense, historical knowledge is not, and cannot be, 'objective' i.e. empirically derived in its entirety from the object of the enquiry (Tosh, 1984, p. 117). The purpose and ambition of professional history is to understand a given problem from the inside (Elton, 1969, p. 31). Such a purpose needs support from sound methodological practices.

An historical method is a recognised and tested way of extracting from what the past has left: the true facts and events of that past, and so far as possible their true meaning and interrelation, the whole governed by the first principle of historical understanding, namely that the past must be studied in its own right, for its own sake, and on its own terms (Elton, 1969, p. 86).

Elton (1969, p. 65) also recommends we must first explain in what manner the past can truly be studied – that is, we must accept the tenet that the past must be studied for its own sake – and then enquire whether this study has any contribution to make to the present. Historical knowledge gives solidity to the understanding of the present and may suggest guiding lines for the future (op cit, p. 67) As Neustadt and May (1986, p. xv) put it, "Seeing the past can help one envision the future".

3.3.1 Historical Method vs. Case Study

Since members of the information systems discipline are more familiar with the case study method, an appropriate point to begin is a comparison of the historical method with the case study method. In particular, this discussion will include a comparison between case study and its closest historiographical 'cousin', the contemporary history.

Yin (1994, p. 6) identifies the use of history as an explanatory research strategy. He says that case study focuses on contemporary events while history deals with events of the past.

Often we find a case study includes some background in the form of a short history that adds to an understanding of how the contemporary events came to be. The

following discussion looks at case study and the historical method, pointing out their similarities and differences.

Hirschheim et al. (forthcoming) purport that historical research is a type of interpretive field study similar to but distinct from ethnography and in-depth case study. Hirschheim et al. (forthcoming) distinguish ethnographic research from historical methods in the following way: ethnographic research relies more heavily on observational sources of evidence while historical method relies more heavily on historical sources. Hirschheim et al. (forthcoming) set out their detailed comparison between the historical method and case study method in Table 3.1:

Table 3.1 - Comparison of the Historical Method and Case Study

	Historical Method	**Case Study**
Objective/ Focus	Reconstruction and Interpretation	Sense Making and Explanation
Process	Investigates a phenomenon based on chronology. Researchers distill, reconstruct, and interpret circumstances, changes, and events within the time frame in which the history occurred (Munhall and Oiler, 1986). It helps us understand the source of contemporary problems, tells us what it has been, how it arose and how its characteristics unfolded through time (Mason et al., 1997b). The historical method usually looks beyond immediate causes of events to determine underlying one as well (Gottschalk, 1969; Shafer, 1974).	Investigates a contemporary phenomenon (an instance, an event or a process) within its real-life setting (Yin, 1994). Case study research normally concentrates on the immediate causes of events. In the process of understanding the contemporary phenomena, researchers may provide an account of a significant fragment of the past (i.e., the background information or history) to describe current phenomena. In this sense, history is not the main focus, rather history is treated as antecedent to explain current events
Time period	Long term, often decades or centuries The timeline is a key methodological tool needed to guide discussion and to organise data. As such, historical investigations must begin far enough back in time to determine the role that distant causes played in generating the current observed effects.	Varies, but typically much shorter term period Chronological timeline may be used but is not the main focus, rather, the focus in on the uniqueness of a particular event or an instance.
Data	Evidence comes mainly from historical sources such as textual documents, participants' recollection and reflection.	Evidence comes mainly from interviews and participants' expression of what they believed had happened. May also use secondary documents although these are not a primary focus. Data come from the investigation process

	Data are more 'static' in nature, and are already 'out there' where they are open to public scrutiny and criticism. Researchers use an analytical approach and reexamine respective records "…to check their assertions against evidence or data about a world that is or once was…" (Hexter, 1971, p. 13) According to Golder (2000) "The overriding characteristic of historical method is that all evidence is approached critically and skeptically" (p. 158).	and are more 'dynamic' in nature focusing on explaining or gaining an understanding of the current phenomenon "Data" are human constructions; they are the interpretations of the study's participants and are used to make sense of the subject of study. The researcher does not focus on 'proving' that data are 'correct'.
Research Questions	Historical question and research procedures follow from historical data. According to Smith and Lux (1993) adjusting research questions after beginning data collection is not only desirable, but constitute the basis for the research design. In fact, the key to historical question framing is found in tailoring successive iterations of specific research questions to developments in research results. Success with historical analysis rests on fitting the research question to that story. Mason et al. (1997b) eschew the notion of 'research questions' suggesting instead the use of 'focusing questions'. These are a broad set of questions that provide the researcher with an idea of where to start.	Questions are asked and procedures selected before data collection begins. Adjusting research questions after beginning data collection is considered inappropriate in most circumstances.
Context	Broader and more detailed in nature. Context is used to help the historian understand the causes of events and to assess their relative importance (Gottschalk, 1969). Events must be understood in their full context (Elton, 1969)	Narrower, and typically focus on a particular event or situation. Context is used to help understand the particular event/situation but is not a primary focus.
Research validity	Historians seek to generate knowledge that is falsifiable and provide "an analytical understanding of human behavior…[and where] historical analysis is used for seeking causal analysis of change through time" (Smith and Lux, 1993, p. 597). The nature of 'proof' in history is like the legal model in which events are established beyond a reasonable doubt, … similar to the five percent statistical significance rule [where]	Case researcher does not focus on falsification, but rather on the insight that the case study generates. Three evaluative aspects are considered: intelligibility, novelty and believability. *Intelligibility* relates to the question how well the research approach and results are comprehensible, i.e. how closely others can follow them with similar qualifications. *Novelty* can be judged in at least three ways: (i) by the amount of new insight added; (ii) by the significance of

	knowledge is accepted when it is highly likely rather than certainly true" (Golder, 2000, p. 157).	the research reported in terms of the implications it has for seeing important matters in a new light and/or provide a new way of thinking about the phenomenon under study; (iii) by the completeness and coherence of the research report(s). Can the author provide an overall picture so that its components link up to each other without major holes in the picture that is being painted? *Believability*, on the other hand, relates to how well the research arguments make sense in light of our total knowledge (Hirschheim and Klein, 2000).

Notwithstanding the differences listed in Table 3.1 above, Hirschheim et al. (forthcoming) believe historical and case study methods have much in common.

3.3.2 Contemporary History and Case Study

There are similarities between the contemporary history and case study. Firstly, at the time of writing a contemporary history or a case study the events are unfolding over a specific period. Therefore, unlike the traditional notion of history i.e. "What happened?" the contemporary history embraces "What is happening?" A contemporary history, therefore, may have some of the eye-witness quality of a primary record.

Contemporary histories fall into two types: those written in the normal, detached (as far as this is ever possible) fashion of any reputable historian writing about any period; or in the manner of an eye-witness account written by a participant in the events (Marwick, 2001). Contemporary histories are of most value when dealing autobiographically with events with which they themselves are intimately associated, and where, demonstrably unreliable on detail, they nonetheless convey something of the atmosphere of the time in which they lived, something of the excitement of direct involvement, something of that quality of seeing events as they seemed to contemporaries, which historians must labour for years to attain (Marwick, 1989, p. 200).

The notion of chronological time is central to history because time is the way in which we determine a 'before' and 'after'. The notion of 'before' and 'after' defines 'cause' and 'effect' assuming that 'causes' come 'before' and 'effects', 'after'. The notion of time is therefore essential to any explanatory research pursuing notions of

cause and effect. In Table 3.1 above, Hirschheim et al. (forthcoming) purport that case studies examine the "immediate causes of events" while history looks beyond those "immediate causes of events". Yet they also admit to case studies generally including some brief historical note viz:

> *In the process of understanding the contemporary phenomena, researchers may provide an account of a significant fragment of the past (i.e., the background information or history) to describe current phenomena. In this sense, history is not the main focus; rather history is treated as antecedent to explain current events.*

On the one hand, they are saying that the "history as narrative" portion of a case study assists the explanation of current events but the "history as event", the snapshot in time or the contemporary events, is the focus in the case study method. This is similar to the notion the contemporary history.

In writing history, one considers two axes of significance (Stanford, 1986, p. 29). The horizontal axis represents the contemporary situation surrounding an event. The vertical axis represents the preceding and succeeding related events. The historical significance occurs at the intersection of the horizontal and vertical axes. The same event may therefore have different historical significance and interpretation depending on the makeup of these horizontal and vertical axes of significance. Choosing a different horizontal axis, or interpreting the events from a different view of the contemporary situation (e.g. technical, political, organisational, social) can result in differing conclusions about the historical significance of the events. These differing contexts provide differing interpretations.

The same principles can apply to a case study. Hirschheim et al. (forthcoming) and Yin (1994) state that case studies focus on contemporary events that are unique or peculiar (different from the norm and therefore worthy of note). The case study researcher gathers evidence primarily from interviews of people's perceptions of what has or is happening around this event. Again, this is similar to the writer of contemporary history.

The main difference between the case study and the historical approach according to Hirschheim et al. (forthcoming) is the focus on context. Mason (1997b) uses the distinction between idiographic and nomothetic and combines this with ontological

assumptions about the similarity of people and events to present four research possibilities (see Table 3.2 below). Those focusing on the richness of reality employ what is known as "idiographic" methodological approaches. They stress the unique value of the particular within cultural and human settings (Marceil, 1977). Philosophers call the control-oriented approach "nomothetic" because it uses only procedures admitted by the exact sciences and it is used to seek general laws (Hempel, 1965).

Table 3.2 – Types of research

Method Assumptions	**Ontological Assumptions**	
	People and events are more alike (A)	People and events are Unique (U)
Nomothetic: selective examination of many subjects (N)	NA = Statistical Research yielding central tendencies	NU = Cluster or Factor Analysis, Outlier Examination
Idiographic: intensive examination of just a few subjects (I)	IA = Comparative Case Studies	IU = Historical Research

Mason et al. (1997b) sees IS Historical Research falling into quadrant IU, focusing on uniqueness and emphasising the trail of events such as the role of decision making in shaping events. Interestingly Mason et al. (1997a) tends to emphasise similarity in essential historical roles when discussing a contingency framework for IT-Based Business Histories (p. 262) and even relays a possible broad plot line to describe IT histories where companies have achieved some competitive advantage from IT (p. 270). Again, it is difficult to distinguish clearly between comparative case study analysis and the historical method in these apparently conflicting descriptions.

An important difference between case study method and historical method is the development of the research questions. In the historical method, Mason et al. (1997b) recommends the formulation of 'focusing questions'. Cattell (1966) states that these focusing questions are often misunderstood as being "well-formulated research questions" or "hypotheses". Hirschheim at el. (forthcoming) believe these questions can be as vague as "curiosity" arising from observations about circumstances in the real world, theories or the written word. At a later stage, the research can generate more formal questions or hypotheses following analysis founded in inductive reasoning. In case study research, the questions are formulated prior to data gathering and analysis and it is regarded as poor form to change these

over the course of the research program. The development of research questions within the historical method will be discussed in greater detail in the next section. In this following section we will discuss the steps a researcher takes when using an historical method.

3.4 Existing Historical Methods

The main purpose of Part One of this chapter is to further develop the historical method for IS. Mason et al. (1997b) described an eight-step method they used in their Bank of America (McKenney et al., 1997) and other studies. This section will review and extend the Mason et al. (1997b) eight-step method using historiographical concepts from leading historians such as Marwick (1989; 2001), Stanford (1986; 1994), Elton (1969), Shafer (1974), Tosh (1984) and Clark (1958).

In this section, first we will compare the Mason et al. (1997b) eight-step method with other historiographical approaches. Following this will be a detailed discussion of each of the activities required to construct a historical document. Finally, we will suggest a three-step method for application in IS historical studies.

3.4.1 The IS Historical Method

The Mason et al. (1997b) method used in their IS historical narratives consists of eight steps. These steps are:

1) Begin with Focusing Questions
2) Specify the Domain
3) Gather Evidence
4) Critique the Evidence
5) Determine Patterns
6) Establish Empathy
7) Tell the Story – the account
8) Write the Transcript.

3.4.2 Traditional Historical Methods

Leading historians take a simpler view of this process. For example Marwick (1989, p. 236) suggests that schematically historians have four tasks:

1) They have to find their sources

2) To these sources they have to apply both their existing expertise in the society being studies

3) And the techniques of source criticism and

4) From this they have to produce interpretation in the form of a piece of written history.

Michael Stanford (1994, p. 148), another leading historian, lists the following stages of history development in logical (not chronological) order:

1) The choice of subject

2) The selection and, where necessary, the preparation of the evidence

3) An alert and thorough reading, or other study, of the sources

4) The tentative construction of a mental picture or model to fit the subject

5) A firm version of this construction in a way that is fit to be made public.

Shafer (1974, pp. 23-35) provides what he regards as three well-agreed-upon elements of the historical method:

1) Learning what the categories of evidence are, the critical elements that differentiate them, and what these mean to investigators

2) Collecting evidence. Much but not all, of this collection must occur early in the research effort.

3) The communication of evidence is also a subject that can in important measure be taught according to well-accepted standards, at least in its essence, which is lucidity.

There are two common and interrelated steps running through these various approaches to writing history. These common steps are the discovery and critique of sources and the careful construction of the narrative. The other requisite step in the method is the specification of the subject of interest. In the next section we shall review, discuss and extend the Mason et al. (1997a; 1997b) tradition of the historical method by presenting an historical method comprising these three steps:

1) Specification of the Subject

2) Discovery and critique of the sources of evidence and

3) Construction of the narrative.

3.5 A Simpler Historical Method for IS

This section presents a simplified three-step historical method for IS.

3.5.1 Specification of the Subject

Mason et al. (1997b) state that historical studies, as with all research, must begin with a question or questions that serve to focus the enquiry. Mason et al. (1997b) choose the term 'focusing question' to differentiate it from the notion of a formal research question. They quote Bouchard (1976) who in describing field methods puts it more directly:

> *The key to good research lies not in choosing the right method, but rather in asking the right question and picking the most powerful method for answering that particular question.*

Carr (1961), in his classic *What is History,* explains:

> *The study of history is a study of causes. The historian continuously asks the question: Why? And, so long as he hopes for an answer, he cannot rest (p. 113).*

But the question "why" is not always the principal focusing question in which historians are interested. Sometimes they might ask "what was it like" or "how did it happen". These questions not only focus the historian but can also dictate the method and construction of the resulting historical work. This will be discussed further in section 3.5.1.1.

The historical recount in Chapter 4 is broken into two parts. Part One narrates the series of events that led up to the choice of SAP R/3 by the Queensland Government as its common ERP software. The focusing question for Part One is:

> *What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?*

Part Two describes the adoption of the SAP R/3 software by the Queensland Government and the consequential management regimes that supported this adoption and ongoing management. The focusing questions for part two are:

> *What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?*

A sub-question for part two is:

> *How did FISB's (Queensland Treasury's Financial Information Systems Branch) central management dilute over time?*

3.5.1.1 Narrative vs. Description and Analysis

When writing their articles and books, historians must provide a clear sense of the sequence of developments and events, that is to say the order in which things happened (narrative); while, as and where necessary, providing description and, most important, analysis (Marwick, 2001, p. 206). Description and analysis are likely to arrange the available material by topics, running repeatedly over the same period of time. Narrative uses time as the main backbone of its structure and may have to refer repeatedly to the same point or issue as they reappear in the course of the story (Elton, 1969, p. 151).

In the main, the question historical description and analysis addresses is 'what was it like', while narrative concentrates on the question 'how did it happen'. The descriptive and analytical method takes a problem, or a complex of problems, and investigates them by dissecting them into their component parts and their relationships. Narrative, on the other hand, tells the story. The first, therefore, requires a table of topics; it organises its subject matter under headings and deals with each head in turn. The second arranges things in a series of happenings and divides its matter in the main into chronologically consecutive segments. Both are legitimate methods and both must consider significant questions (Elton, 1969, p. 161). The historical recount in this study is in the narrative form.

Good historical writing should present a balance between narrative and analysis, between a chronological approach and an approach by topic, and, a balance

between both of these, and passages of pure description. On the whole, however, it can be said that any historical writer (whether at the undergraduate or the highest professional level) who entirely reduced their subject to chronological narrative would incur the risk of being accused of intellectual naivety. On the other hand, it may be possible to produce an excellent historical study based entirely on analysis by topic (Marwick, 1989, pp. 242-243).

In the interplay of description, analysis and narrative, knowledge gained and questions broached during the process forces historians to review earlier phases of the research. In the light of new discoveries or insights, they must often pose new or refined research questions, collect additional factual data, make further checks of validity, or reinterpret the findings obtained thus far. The writing of history is always an active and dynamic process (Mason et al., 1997b). The development and subsequent reworking of focusing questions is one part of the specification of the topic of interest. The Mason et al. (1997b) second step, 'Specifying the Domain' is also part of this general step of "Specifying the Subject".

Clark (1958) suggests that when considering the subject of an historical work it may be best to choose a domain and decide the general direction which your inquiry ought to take; in effect, being prepared to let the historical problems suggest themselves. In other words, one might start on a broad front and then to narrow it down, to focus attention on the problems which then seem to be worth pursuing. In any case if, before you started your work, you had decided what were the most important problems to be investigated or which theory best covered the facts, it would be well to hold these conclusions lightly, realising that you will almost certainly have to modify them or may very well have to abandon them altogether. To write good history it is necessary that not only your results, but even the issues to which your results relate, should be dictated by the evidence, and not imposed by you on the evidence (Clark, 1958, p. 11). The specification of the subject, the focusing questions that guide the study, and the sources of evidence available to the historian are inextricably linked.

Tosh (1984) believes that, ultimately, the principles governing the direction of original research can be reduced to just two. The first is where the historian takes one source or a group of sources (of evidence) which fall within his or her

general area of interest and extracts whatever is of value, allowing the content of the source to determine the nature of the enquiry. The second or problem-oriented approach is the exact opposite. A specific historical question is formulated, usually prompted by a reading of the secondary authorities, and the relevant primary sources are then studied: the bearing which these sources may have on other issues is ignored, the researcher proceeding as directly as possible to the point where he or she can present some conclusions. Each method encounters difficulties. The source-oriented approach, although appropriate for a newly discovered source, may yield only an incoherent jumble of data. The problem-oriented approach sounds like commonsense and probably corresponds to most people's idea of research. But it is often difficult to tell in advance what sources are relevant. The most improbable sources are sometimes found to be illuminating, while the obvious ones may lead the historian into too close an identification with the concerns of the organisation that produced them (Tosh, 1984, pp. 48-49).

Elton (1969) believes the historian must make one initial choice in selecting their main area of study or line of approach; but he adds, after that, the historian becomes the servant of the evidence, from which they will, or should, ask no specific questions until having absorbed what the evidence says. At least, their questions should remain general, varied, and flexible: the historian opens their mind to the evidence both passively (listening) and actively (asking) (Elton, 1969, p. 83).

The specification of the subject is the first step in this simplified historical method for information systems. The second step is the discovery and critiques of the sources of evidence.

3.5.2 Discovery and Critique of the Sources of Evidence

The second step of this simplified historical method for IS comprises the discovery of the sources of evidence and their critique. This section discusses the types of sources and the important considerations in their critical analysis.

3.5.2.1 Gathering Evidence

Hirschheim et al. (forthcoming) state that heavy reliance on previously recorded 'materials' is central to the historical method. Marwick (1989) believes that historians produce reconstructions of the past: in doing this, their essential 'raw material' is the accounts, relics, traces and sources left by the past itself. One of the problems historians encounter when using traditional methods is the same one that anthropologists face: it is difficult of find and qualify reliable informants (Mason et al., 1997a).

The process of evidence collection begins with "the selection and marshalling of facts" and the turning of them into "historical facts". "Accidents" must be distinguished from consequential "historical facts" but with an open mind, since "any fact may, so to speak, be promoted to the status of historical fact once its relevance and significance is discerned" (Mason et al., 1997a, p. 134-135). The central activity of historians is teasing out the interpretations from sources thereby creating new knowledge within the domain of history (Marwick, 1989, p. 198).

When considering sources of evidence Stanford asks four questions:

1) What sort of problem requires evidence for its solution?

2) What sort of evidence is appropriate to a particular problem?

3) What weight of evidence is adequate for a decision?

4) For whom must it be adequate? (Stanford, 1994, p. 136).

The historian must turn to their sources of evidence and consider their applicability to meeting the historical objective at hand. These historical sources of evidence are usually referred to as just historical 'sources'.

3.5.2.2 Types of Historical Sources

An historian will normally derive their narrative from a wide variety of sources. Drawing on multiple sources of evidence is important for two principal reasons. First, it allows the study to address a wider range of historical, attitudinal, and observational issues (Bloch, 1953, p. 67). Second, as will be covered more

thoroughly in section 5.2.3, by providing different measures of the same phenomenon it permits cross examination and the development of converging lines of inquiry through triangulation, thereby increasing the construct validity of the study (Jick, 1979, p. 608).

Historians distinguish between two types of sources. Primary sources are sources that came into existence during the period of the past that the historian is studying (Marwick, 1989, p. 199). They are not deliberately created for the benefit of a historian and are generally 'unprocessed' (Stanford, 1994). Secondary sources are those accounts written during or after the event for the express purpose of recording those events for historical purposes. In other words, they are a formal study of the period under review or some aspect of it. While secondary sources need to be reviewed in the process of developing historical narrative, serious and scholarly history is more usually based on primary sources. (Marwick, 1989, p. 200)

3.5.2.2.1 Primary Sources

Primary sources are sources that came into existence during the period of the past that the historian is studying and were not deliberately designed to benefit any future historian. Marwick (1989) suggests that a primary source is most valuable when the purpose for which it was compiled is at the furthest remove from the purpose of the historian.

Mason et al. (1997b) state that primary source material comes in four general forms:

1) Written, in the form of official documents, unpublished documents, diaries, memoirs, letters, memos, clippings, and the like
2) Material, in the form of objects, artefacts, and visiting of actual sites
3) Traditional, the form of stories of the past repeated by secondary sources and
4) Eye-witness testimony. The first three are appropriate for all types of historical research; the last, of course, only for research done during the lifetime of some of the key participants.

Schafer (1974) cites an early work of John Vincent (1934) who divided historical sources into consciously and unconsciously transmitted historical evidence. These are set out in the Table 3.3:

Table 3.3 - Vincent's types of historical evidence

Consciously Transmitted	**Unconsciously Transmitted**
Written: annals, chronicles, some inscriptions, diaries, memoirs, genealogies	Written: "mere" records (e.g., business, military, government)
Oral: Traditional: ballads, tales, sagas; and contemporary interviews	Oral: e.g., wiretapped conversation
Art work: historical paintings and mosaics, portraits, scenic sculpture, coins, medals, some films	Artefacts: Artistic works, Tools.
	Human remains
	Language
	Customs and Institutions

Vincent's (1934) types are similar to the concepts of '*witting*' and '*unwitting*' testimony. '*Witting testimony*' is the deliberate or intentional message (more often than merely 'intentional record') of a document or other source; the '*unwitting testimony*' is the unintentional evidence that it also contains. *Witting testimony*, then, is the information or impression that the person or persons who originally compiled or create the document or source intended to convey, or in some cases, to record (Marwick, 1989, p. 216).

Marwick (1989, pp. 208-210) developed a list of Primary Source types that included:

1) Documents of record
2) Surveys and reports
3) Chronicles and histories
4) Family and personal sources
5) Polemical documents
6) Media of communication and artefacts of popular culture
7) Guides and works of reference

8) Archaeology, industrial archaeology, history-on-the-ground, and physical artefacts

9) Literary and artistic sources

10) Sources that are techniques as much as sources

11) Oral history and oral traditions and

12) Observed behaviour.

It is in the nature of historical sources that the concerns of their originators differ greatly from those of the historians who study them. Men in past ages invariably did not have our interest in the historical problems we study today, and therefore tended not to leave the kind of primary source material which would yield answers to them. Frequently this can mean that historians concerned with such problems have to deduce their interpretations in very indirect ways (Marwick, 1989, pp. 232-233).

The testimony of primary sources and the interpretation of these sources is difficult. Once combined and interpreted for historical purposes, however, they become historical narratives and, when used by others, they are regarded as secondary sources.

3.5.2.2.2 Secondary Sources

Secondary sources are those accounts written later by historians looking back upon a period in the past. They are, as Stanford puts it, 'history as narrative'. The study of secondary sources is absolutely essential in evolving a strategy for an historical research project. Such a strategy entails a mastery of the existing secondary sources; identification of the questions that require answering and the problems that need solving; and, at least, a provisional inventory of the types of sources to be examined (Marwick, 2001, p. 163-164).

Secondary sources, however valuable though they may be, are generally inadequate by themselves (Mason et al., 1997a). Each type of source possesses certain strengths and weaknesses but considered together and compared one against the other, there is at least a chance that they will reveal the true facts, or something very close to them. This is why mastery of a variety of sources is one of the hallmarks of historical scholarship (Tosh, 1984, p. 58).

When historians can rely only on 'history as narrative' for their sources, the interpretation of these recorded sources can be problematic because of the possibility of inbuilt bias. Access to participants in more recent history ('as event') provides an opportunity to better explore the social, physical and cultural context of past actions. The categorisation between primary and secondary sources is not neat because a primary source from one point of view may be a secondary source from another perspective: for example, the contemporary history. This is a type of history narrative (secondary source) written during the period being studied and having the eyewitness quality of a primary record (Marwick, 1989). As mentioned previously, in writing a contemporary history, one may either be detached from, or a participant in, the events as they unfold.

In this case, the author of this (historical) research project participated in the events narrated in Chapter 4 for a period of two years between December 1992 and December 1994 while working at the Financial Information Systems Branch (FISB) in Queensland Treasury. FISB was the section of Queensland Treasury responsible for the management of the Queensland Government Financial Management System for the period beginning 1983 until 1998. During the rest of the period, the author could be described as being in close contact with the events (in his capacity as Manager of the Payroll and Human Resource Information Systems, a central agency located in the Department of Public Works and Housing), peripheral contact (working in an information technology policy role in another Queensland Government agency), or detached (as a lecturer and university researcher in Queensland).

The narrative in Chapter Four is based on a variety of primary and secondary sources, including transcripts of recollections by personnel involved in the events, transcripts of parliamentary proceedings, Queensland Government reports and plans, past studies and personal diary entries.

3.5.2.3 Critique of Sources

Elton (1969) believes that the historian must not go against the first conditions of his calling: his knowledge of the past is governed by the evidence of that past, and that evidence must be criticised and interpreted by the established canons of historical scholarship. New methods may improve his handling of that evidence,

but they can do so only if they are controlled by the historical method, which grounds detail upon evidence and generalisation upon detail (Elton, 1969, p. 51).

Marwick (1989, pp. 221-224) sets out a numbered list of the points which have to be established, or questions answered, before a historian can use, interpret, derive, information or meanings from, a particular primary source. These are:

1) Is the source authentic; is it what it purports to be?

2) Where did the source come from, where was it originally found?

3) When exactly was the source produced?

4) What type of source is it?

5) What person, or group of persons, created the source? How far is the author of the source really in a good position to provide first-hand information on the particular topic the historian is interested in?

6) How exactly was the document understood by contemporaries?

For this historical research project, each of Marwick's questions is addressed below. For clarity, this section includes a commentary of their application to the sources used in this research.

1) *Authenticity*: the first step in evaluating a document is to test its authenticity: this is sometimes known as external criticism. Are the author, the place and the data of writing what they purport to be? In this research, each document has been checked to ensure it is what it purports to be. An associated attribute to authenticity is provenance.

2) *Provenance*: each source originates from credible records. Several of the records in this study were officially released by Queensland Government agencies under an administrative covenant at the request of the author. Other records are publicly available through Queensland Government websites (for example, parliamentary proceedings/Hansard).

3) *Time period*: Many of the records of government used in the narrative were outputs of meetings or reports of events after the fact. Estimates Committee proceedings and Auditor-General reports are formal parliamentary processes of review. They relate to time periods in the recent past e.g. last financial year. Some strategic plans were used as primary sources. Such documents were designed to be forward looking but also provided descriptions of current events and situations.

4) Different types of sources are treated differently in the creation of this historical recount. Some secondary sources (prior studies in this series of work on QGFMS) have been found to be inaccurate, contradicting more reliable primary sources. One might speculate that the authors relied on common beliefs and myths rather than reliable primary sources and the testimony of eye-witnesses. For example, Putra (1998) believed that the policy of mandatory adoption of SAP R/3 was instigated in 1994 around the time of its selection. In fact, this was not the case, as evidenced by primary sources and the testimony of key witnesses. Putra had merely misinterpreted a major policy document from that period (Financial Management Strategy) without cross-referencing its contents to other reputable primary sources.

5) *Reliability* is another important attribute and sources need careful evaluation to ensure their contents are reliable. To do this, the researcher must decide to what extent the author of the source can provide first hand knowledge of the events. Documents used for this historical recount are mostly official records, recorded by public officers. Some special records such as parliamentary transcripts, Estimate Committee reports and Auditor-General reports are considered testimony under parliamentary rules and must always be provided truthfully and faithfully. It should be noted that many ministerial and parliamentary statements are based on formal advice, usually in the form of briefing notes and in some

cases provided directly by departmental experts on behalf of the minister.

6) Being relatively contemporary, the researcher does not face the challenges of other historians considering life in a different time period or cultural setting. The sources are all quite understandable.

While historians are dependent on their sources to dictate the success or otherwise of the resultant historical narrative, Stanford (1994) reminds us that the sources historians use are “imperfect, fragmentary and intractable”.

Schafer (1974, pp. 156-158) also presents a list of questions or steps to use in connection with a piece of evidence. These are presented for completeness and to complement Marwick’s questions above:

1) Is the real meaning of the statement different from its literal meaning?
2) How well could the author observe the thing he reports?
3) How did the author report?
    a. Were they biased?
    b. When did they report in relation to their observation?
    c. What was the author’s intention in reporting?
    d. Are there additional clues to intended veracity?
4) Do their statements seem inherently improbable?
    a. Remember that some types of information are easier to observe and report on than others.
5) Are there inner contradictions in the document?
6) Are your own biases or preconceptions distorting your view of the document or the exact statement in it?
7) Does one need to consult reference works to resolve doubts?
8) Does the statement leave you sufficiently confident of your knowledge of that detail so that no corroboration is required?

In Mason et al. (1997b) they noted that secondary sources provided them 'with an espoused view of events but they revealed very little about the real underlying managerial processes involved. Nor did they say anything about the trials and tribulations, false starts, and shenanigans that led up to these announcements. For these we had to go to primary sources'.

Given questionable or untested evidence, several analytical processes can be called into play. These include

1) Applying basic logic
2) Determining the credibility of the sources
3) Counting the number of times the same observation is repeated and
4) Assessing the overall coherence of the entire collection of evidence.

By means of these processes, an effort is made to determine the internal consistency of the evidence and the degree to which it agrees with evidence accumulated from external and other sources (Mason et al., 1997b).

Having gathered all the sources and critiqued them adequately it is time to construct and write the narrative.

3.5.3 Construction of the Narrative

In all narrative there is an essential background that has to be described and explained in order for the reader to be able to follow the tale. This becomes more necessary when elements of the background (e.g. a natural catastrophe or organisational restructure) come into the foreground and play such a major part in the story that they have to be acknowledged as causal factors of some importance (Stanford, 1994, p. 103). Evidence, then, has to be 'placed': the historian has to put it where it belongs in the course of the narrative. This requires careful decisions about what evidence is more descriptive of the context, i.e. in the horizontal axis of significance, and what is core to the main sequence of events, i.e. in the vertical axis of significance (Stanford, 1994, p. 153). Public sources are valuable for establishing an authentic timeline of critical events but may mislead the reader by providing an espoused view of those events (Mason et

al., 1997b). The timeline is a key methodological tool in writing the narrative and needs support from both secondary and primary sources.

In this research project, a timeline of critical events was constructed from secondary sources. This timeline was then used to organise the primary sources. When interviewing subjects about the events, the timeline was used as a memory aid. Subjects were asked to talk about the critical events, what might have led up to their occurrence and what happened afterwards. While these interview subjects were not necessarily clear on the chronological nature of the events, i.e. which month or year they happened, they could remember quite well the actual event and the context surrounding that event. These interviews helped to synthesise the other primary sources, aiding the construction of the final narrative.

3.5.3.1 Synthesis

The function of synthesis in historiography is to restore the historical whole – the events, process, and so on. When making complete analysis a historian breaks the subject down into what he or she considers are its constituent parts; only by understanding how the pieces acted upon one another will they be able to grasp the total event (Stanford, 1986, p. 18). Thoughtful historians will decide before or during their research what sort of factors are fundamental to their nominated period of interest: the more fundamental the factors, the greater their explanatory power. Nevertheless, there is likely to be conflict - the events may appear most susceptible to one view, while contemporaries favour another (Stanford, 1986, p. 128). Without making judgements about the significance of events, without judging the nature of causal forces in history, of necessity and sufficiency, and of the relative importance of this or that causal factor, the historian cannot work at all. Such judgements constitute the very essence of history (Stanford, 1994, p. 204).

It is in the act of writing that historians make sense of their research experience and bring into focus whatever insights into the past they have gained. The reality of any historical conjuncture as revealed in the sources is so complex, and sometimes so contradictory, that only the discipline of seeking to express it in continuous prose with a beginning and an end enables the researcher to grasp the

connections between one area of historical experience and another. Historical writing is essential to historical understanding, and those who shrink from undertaking it are something less than historians (Tosh, 1984, pp. 93-94). The writing of the narrative requires a synthesis of the sequence of events and the context. This synthesis is the basis for the final structure of the narrative.

Shafer (1974, p. 184) developed 15 elements in synthesis across five categories. These are presented in Table 3.4:

Table 3.4 - Schafer's elements of synthesis

Category 1 We may think of the elements in this category as being essentially preliminary to synthesis:	(1) literal and real meaning (2-3) observation and reporting of the detail (4) bias and subjectivity
Category 2 We will label this primary synthesis:	(5) corroboration, contradiction, and measurement (6) probability, plausibility, and certainty (7) working hypothesis
Category 3 We will label this secondary synthesis:	(8) causation (9) motivation (10) individuals and institutions (11) contingency (12) facts as values, ideas, objects.
Category 4 Final synthesis	(13) inference which supplies the ultimate speculative connectives.
Category 5 Which is really the implementation of synthesis:	(14) relevance, often used earlier in the process also, but now operating at the highest or final level of synthesis (15) arrangement.

Intertwined with the mechanism of synthesis is the development of structure.

3.5.3.2 Structure

Mason et al. (1997b) suggest two ways of understanding and ultimately structuring an historical narrative. These include the development of conceptual frameworks, generalising the events into some pattern; and the causal chain approach, which focuses on the sequence of events and its inherent causal patterns. The historical narrative in this research uses the sequence of events and the implicit causal chain therein. Readers expect historians to explain how and why things happened as they did. The way in which this expectation is satisfied often reveals a lot about both historians and their public – or at least the public they envisage (Stanford, 1986, p. 127).

Stanford (1986, pp. 23-24) deems that structure is important but does not think that history should be forced under any single structure. He believes, firstly, any form of knowledge needs some sort of structure before the mind can make much sense of it. Secondly, history as a discipline consists largely of propositional knowledge, which implies a complex structure involving both language and society. And thirdly, historical thinking rests neither on a priori judgements (as in mathematics) nor on empirical observations (as in natural history) but, as in science, on judgements, though, sui generis, are seen to be more or less reliable.

Stanford (1986) further states that evidence may be distorted by any of a multitude of factors so that it by no means accurately represents the structure of the actual events. Historians can also be misled by the structure of existing historical accounts and are advised to make a thorough historiographical survey of their topic. Another consideration is the structures that exist within the historian's mind - anyone who works in isolation cannot hope to transcend these but must always be their prisoner, and, perhaps their dupe. Lastly, the historical construction may be affected by the structures of future publicans and the practical limits of the work – limits of access, time, energy, money and material (Stanford, 1986, pp. 106-107).

The very act of writing any history involves some sort of patterning. No work of history can hope to record everything that happened, however restricted or expansive the scope of that work. Ultimately, the historian selects some facts for inclusion and rejects others. The grounds for his selection are that the 'favoured' facts are the most significant and constitute a recognisable pattern. The historian must believe that they correctly represent the course of events rather as a map represents, in miniature, a given tract of land (Stanford, 1994, pp. 243-244).

Stanford (1986) has made an initial attempt to identify and classify structures into six types within two groups of 'inherent' and 'imposed'.

First of the inherent structures are the logical, mathematical and, less certainly, epistemological and semantic structures that seem to be basic to the universe. The second are the physiological and neurological structures of the human organism. The third are the structures of 'the world' – that objective reality with which science purports to deal – which are cosmological, metaphysical and

perhaps historical structures. All of these types, though often relating to humanity, seem to lie beyond the human will: they confront us.

The second trio of structural types are created by the human mind and imposed upon the world in attempts to understand and change it. In a world without human life they would not exist. Thus, fourth, there are social structures – how we perceive, represent and organise our environment (both natural and human). Built from experience rather than conscious design, these structures are, in an important respect, constituted and reinforced by language. Hence there arise the cognitive structures, the almost intuitive understanding of social life that is basic to historical understanding. Fifth are theoretical structures, based on a conscious and explicit schema or theory often derived from another discipline (law, theology, economics, sociology) and then applied to history. Sixth, there is historians' own structuring of history by dynasty, geographical proximity, institutions or social groups, or abstract notions of subject matter – local, military, political or even sex or 'gender'. There are also the more esoteric structures of philosophers or theologians – various 'ages', cultures, civilisations or epochs, sometimes under a tutelary spirit or 'idea' (Stanford, 1986, p. 108).

Inherent in the structuring of historical narrative is the notion of causation. In selecting the appropriate series of events and context for inclusion in the narrative (thereby leaving out events and facts the historian deems irrelevant) the historian implicitly, or via explicit explanation, may impute causation into these events.

3.5.3.3 Causation

Some early IS historical studies took the form of economic analysis or mathematical model building exercises in which deductive logic was used to analyse problem situations. This had the advantage of bringing more rigour to the task of uncovering the structure of situations, but it often did so at the cost of reductionism. Researchers were inclined to explain very complex phenomena by means of just a few relatively simple principles and assumptions (Mason et al., 1997a). Events are not the product of simple causes but of complex situations in which a variety of people and circumstances participate, but this does not mean that they are produced by factors - a word to be forgotten (Elton, 1969, p. 129).

Historical investigations must begin far enough back in time to determine the role that distant causes played in generating the current observed effects (Mason et al., 1997a). The historical understanding of a particular occurrence proceeds by enlarging the inventory of causes, while at the same time trying to place them in some sort of pecking order. Narrative is entirely inimical to this pattern of enquiry. It can keep only two or three threads going at once, so that only a few causes or results will be made apparent. Moreover, these are not likely to be the most significant ones, being associated with the sequence of day-to-day events rather than long-term structural factors (Tosh, 1984, p. 97). Yet the greater problem in citing a set of jointly sufficient causes is to know where to stop: how can the conscientious historian be sure that they have omitted nothing relevant (Stanford, 1994, p. 201)?

In short, the historian is led beyond the "precipitating" or "immediate" cause to look at the "underlying" causes. The historian cannot hope to ferret out all of the causes of complex events nor can they always demonstrate that their explanations of the relationships between data is causal (Shafer, 1974, pp. 48-50). In practice, historians often take refuge in plurality - that is, failing to find any single condition that can, with certainty, be sufficient for a given result, they talk instead of a set of conditions that jointly were sufficient to bring about the effect, though none would have done so by themselves. Often this approach seems more convincing to readers, for it avoids a generalisation ('X is the sort of thing that always starts a revolt, wins an election, etc.') that can usually be disproved by counter-instances (Stanford, 1994, p. 200).

The problem of causation, the most vexatious facing the historian, is beyond "solution". Is there any absolute way of determining decision causes? Probably not: it depends fundamentally on value systems. Nevertheless, to abandon the search for causes would be antithetical to our basic human curiosity and it would leave us with formless and meaningless historical literature (Shafer, 1974, p. 52).

Consequences are important too. There are some grounds for arguing that, from the perspective of posterity, they are more important than causes; historians too easily forget this (Tosh, 1984, p. 98). The problem with contemporary history is that one does not have the benefit of examining long or often short-term consequences. History as event has a remarkable ability to surprise and few

historians are brave enough to predict or even speculate on future events. Consequences enlighten the historian providing better perspective for their analysis and explanation of events. Irrespective of the historian's access to consequences, the drive to explain the events in question is powerful indeed.

3.5.3.4 Explanations

The standing of explanations put forward by historians is very much inferior to that of scientific explanation. It may be that scientific explanations are no more than provisional hypotheses, but they are, for the most part, hypotheses on which all people qualified to judge are in agreement. They may be superseded one day, but for the time being they represent the nearest possible approximation to the truth, and are commonly recognised as such. In matters of historical explanation, on the other hand, a scholarly consensus scarcely exists. The known facts may not be in doubt, but how to interpret or explain them is a matter of endless debate (Tosh, 1984, p. 116).

In Marwick's (2001, p.204) view, one cannot go beyond a broad hierarchy of explanatory factors, which is then almost infinitely adaptable to the particular topic being discussed. That hierarchy is:

1) Structural, ideological, and institutional circumstances
2) Events
3) Human agencies and
4) Convergence and contingency.

One thing is certain: an explanation, whether full or only partial, must rest on reality. Ruben (in Stanford, 1994) rightly insists that 'explanation is an epistemological concept', but it has 'a solid metaphysical basis' (pp. 212-213).

3.6 Summary – History methodology

Part One of this methodology chapter describes the historical method used in Chapter Four to describe firstly '*What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?'* and to determine secondly, '*What conditions drove the*

decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?' and, finally '*How did FISB's (Queensland Treasury's Financial Information Systems Branch) central management dilute over time?'*

After describing the development of the historical method in the IS discipline in section 1, Part One discusses the philosophical approaches to history writing in section 2. Section 3 uses a comparison between the historical method and the case study method, a method more familiar to those in the IS discipline, to explain the salient characteristics of the historical method. Section 4 summarily lists the steps in Mason et al.'s (1997b) historical method and sets out methodological steps employed by leading traditional historiographers. These step methods are synthesised in section 5 into a proposed simplified three-step IS historical method. The three steps are: (1) Specification of the subject; (2) Discovery and Critique of the Sources of Evidence; and (3) Construction of the Narrative. This section (6) summarises and concludes Part One.

In a final note, Stanford (1994, p. 46) suggests three cardinal sins to avoid at all costs in the construction of history:

1) Subordinating history to any non-historical theory or ideology, whether it be religious, economic, philosophical, sociological or political

2) Neglecting breadth (i.e. failing to take all considerations into account) and failing to do justice to all concerned

3) Ignoring or suppressing evidence.

Part 2 of this chapter on the methodologies used in this thesis is a thorough description of the Delphi Method and the variant used in the major issues study described in Chapters 5 and 6.

Part 2 The Delphi Method

3.7 Introduction[1]

During the past thirty years Information Technology/Information Systems (IT/IS) has played an influential role in organisations. The rapidly changing character of information systems demands an ongoing assessment of major issues in the IS field. The IS literature in the last twenty years contain several excellent studies of the relative importance of IS issues (e.g. Deans et al., 1991; Watson and Brancheau, 1991; Watson et al., 1997). Eight of the more influential of these studies have used the Delphi method to survey the perceptions of IS executives (i.e., Dickson and Nechis, 1984; Brancheau and Wetherbe, 1987; Watson, 1989; Niederman et al., 1991; Dexter et al., 1993; Pervan, 1993; Brancheau et al., 1996; Dekleve and Zupancic, 1996).

Similarities among these major IS studies include the following: (1) a sample list of issues is provided; (2) a heterogeneous respondent group is surveyed; (3) 3-4 consensus rounds are applied; (4) a 10-point item scale is used; (5) reasonable consensus is achieved; and (6) a final list of 20-30 issues is summarised.

3.8 The Delphi Method

3.8.1 Definition

The Delphi method, developed by the Rand Corporation in the 1950s, is a data collection approach designed to structure group opinion and discussion (Goodman, 1987; Snyder-Halpern et al., 2000). Its use has been broadly based and prolific throughout many parts of the world, but especially in the US, Asia, Europe and Japan (Linstone, 1999). The Delphi Method structures a group communication process that effectively allows a group of individuals (as a whole) to deal with complex problems (Linstone and Turoff, 1975, p. 3). It makes discussion between experts possible without the hindrance of certain social behaviours in normal group discussion that hamper consensus opinion

[1] This introduction was previously published in paper by the research team: Chang, S-I, Gable, G., Smythe, E., Timbrell, G. (2000) "Methods for distilling key issues using a delphi approach" in the 11th Australasian Conference on Information Systems, 6-8 December 2000, Brisbane, Australia

forming (Wissema, 1982). Powell (2003, p. 381) notes the method's benefit from being a democratic and structured approach that harnesses the collective wisdom of participants.

Mohapatra et al. (1984, p. 159) suggest that a Delphi study is usually directed to four broad categories of issues. These are:

1. Normative issues such as `goal setting'
2. Narrative issues such as `problem statements'
3. Predictive issues such as:
    a. Forecasting occurrence of new events
    b. Forecasting point values and trends of key parameters
4. Suggestive issues such as:
    a. Developing causal models and
    b. Formulating new policies.

The category that this study falls into is the 'narrative issues such as problem statements'. The survey asked respondents:

> *What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?*

Their responses were essentially problem statements. Furthermore, it could be possible, with further analysis of the resulting statistics, to derive a preliminary causal model based on the responses but this is outside the scope of this research project. A future research project will address this.

3.8.2 Purpose

The purpose of the Delphi method is to facilitate problem solving, planning, and decision-making. It is an opinion-capturing method used by planners and futurists (Lang, 1995). The method provides "a set of procedures for formulating a group judgment for subject matter where precise information is lacking" (Dalkey et al., 1972; Dalkey, 1967; Brown, 1968; Lang, 1995). It is a way

whereby a consensus and position of a group of experts is reached after eliciting their opinions on a defined issue and it relies on the "informed intuitive opinions of specialists" (Helmer, 1983, p. 134; Lang, 1995).

The Delphi Method is a structured process for collecting and distilling knowledge from a group of geographically dispersed experts by means of a series of questionnaires interspersed with controlled opinion feedback (Adler and Ziglio, 1996). It is a communication structure aimed at producing detailed critical examination and discussion, not at forcing a quick compromise. Certainly quantification is a property, but only to serve the goal of quickly identifying agreement and disagreement in order to focus attention (Turoff and Hiltz, 1996).

When using the Delphi Method we are interested in:

1) Informing the respondents about what they are really saying, and how it compares to the group as a whole

2) Promoting changes in viewpoints and the other items we measure, if it will promote reaching a superior group view of the situation and

3) Detecting and exposing hidden factors or relationships of which the group may not be completely aware (Turoff and Hiltz, 1996).

Therefore, the Delphi technique, due to its flexibility, is best suited to the exploration of issues that involve a mixture of scientific evidence and social values (Webler et al., 1991, p. 256; Lang, 1995). It lends itself to problems without “precise analytical techniques that can benefit from subjective judgments on a collective basis” (Linstone and Turoff, 1975, p. 4).

3.8.3 Proponents of the Delphi Method

Douglas MacGregor undertook a study in 1936 and formulated what came to be known as the `MacGregor effect'. This refers to his finding that predictions made by a group of people are more likely to be right than predictions made by the same individuals working alone (Loye, 1978; Lang, 1995). Later Dalkey (1977) found that statistical factor models applied to a large sample of expert judgements could produce performance that was consistently in the upper quarter of the performance distribution curve. Such models did not suffer from

"regression to the mean" and could result in matching the best decisions by the best experts in the group.

Their findings support the notion of "collective intelligence" (Hiltz and Turoff, 1978) or, the ability of a group to produce a better quality result than any single individual in the group could achieve acting alone. This rarely occurs in face-to-face groups (Turoff and Hiltz, 1996). In other words, the Delphi Method operates on the principle that several heads are better than one in making subjective conjectures about the future and that experts will make conjectures based upon rational judgement rather than merely guessing (Weaver, 1971, cited in Ludwig, 1997). This collective judgment of experts, although made up of subjective opinions, is considered to be more reliable than individual statements and is thus more objective in its outcomes (Johnson and King, 1988; Helmer, cited in Masini, 1993; Lang, 1995). Furthermore, prior research has shown that face-to-face meetings have several problems such as:

1) One or a few individuals dominating proceedings
2) Falling into a rut of pursuing a single train of thought for long periods
3) Exerting considerable pressure on participants to conform and,
4) Regularly becoming overburdened with peripheral information (Preble, 1983; Riggs, 1983; Lang, 1995).

3.8.4 Opponents of the Delphi Method

Rowe et al. (1991) do not support the Delphi Method. They maintain that prior research has not shown consistently that results produced from the Delphi Method are any better than those achieved through other structured judgmental techniques (Rowe et al., 1991). Sackman (1974, p. 74) agrees, attacking it on the grounds that the Delphi Method is unscientific and its application was highly questionable. Sackmans' (1974) view is that the method lacks the necessary rigor to be taken seriously as a scientific methodology. His criticism, however, is partly based on studies wherein Delphi surveys were often designed and executed by people without sufficient expertise to conduct rigorous research.

Linstone and Turoff (1975, p. 6) outline some of the common reasons for failure of the Delphi. These are:

1) Imposing monitor views and preconceptions of a problem upon the respondent group by over specifying the structure of the Delphi and not allowing for the contribution of other perspectives related to the problem

2) Assuming that Delphi can be a surrogate for all other human communications in a given situation

3) Poor techniques of summarising and presenting the group response and ensuring common interpretations of the evaluation scales utilised in the exercises

4) Ignoring and not exploring disagreements, so that discouraged dissenters drop out and an artificial consensus is generated and

5) Underestimating the demanding nature of a Delphi and the fact that the respondents should be recognised as consultants and be properly compensated for their time if the Delphi is not an integral part of their job function (Linstone and Turoff, 1975).

Another weakness is proposed by Masini (1993). He believes a Delphi study is at the mercy of the world view and the biases of the coordinating or monitoring team. This is because the coordinating team often chooses the respondents, interprets the returned information and structures the questions. Masini asks whether the coordinating group should be chosen from within or outside the organisation initiating the study and whether they should be experienced in the subject area of the study in question (Masini, 1993).

Another weakness of the Delphi Method is that the process and questionnaire structure can lead to a bias. People may give responses they think the monitoring group wants to hear, or they may not respond at all. Thus, the cultural background of respondents ultimately influences the results (Linstone, 1978). Furthermore, in the process of achieving consensus, extreme points of views run the risk of being suppressed, when in fact they may provide important new information or insights (Lang, 1995).

Variants of the Delphi Method address some of these weaknesses.

3.8.5 Variants of the Delphi Method

Although there appears to be agreement among researchers and practitioners on the advantages of the Delphi method, considerable variance is possible in Delphi method design and implementation (Linstone and Turoff, 1975; Delbecq et al., 1986).

In particular, variations in the administration of Delphi-type studies have revolved around the following issues:

1) Respondent group targeted
2) Alternative mechanisms for communicating with respondents
3) Anonymity of the respondent group members
4) Use of either open-ended or structured questions to elicit responses
5) Appropriate number of survey rounds
6) Number of items carried over to subsequent surveys
7) Procedures used to synthesise responses into a summary list of issues.

The Delphi Method has been modified to the point where we now have a family of Delphi-Inspired Methods in a broad range of applications (Martino, 1973; van Dijk, 1990). Apart from the the Conventional Delphi there is also the Policy Delphi, and the Decision Delphi (Woudenberg, 1991; van Dijk, 1990; Lang, 1995). We refer to the variant used in this study as a 'Modified Delphi Method'.

The Policy Delphi is an interesting Delphi structure in that its objective is not to produce a consensus, but to expose the strongest pro and con arguments about differing resolutions of a policy issue. It provides a decision maker with the strongest arguments on each side of the issue. Usually one chooses respondents who have the strongest opposing views (Turoff and Hiltz, 1996).

Organisations use the Decision Delphi to reach decisions amongst a diverse group of people with different investments in the solution. The subject of the decision for which the Delphi is used as a resolution mechanism is usually

contested harshly and complex, and thus a structured group communication process is deemed effective (Lang, 1995).

The Delphi Method and its variants are applied widely in organisational and government settings.

3.8.6 Application of the Delphi Method

Linstone and Turoff (1975, p. 4) provide a comprehensive list of situations where it would be best to employ the Delphi technique. These are when:

1) The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis;

2) The individuals need to contribute to the examination of a broad or complex problem but have no history of adequate communication and represent diverse backgrounds with respect to experience or expertise;

3) More individuals are needed than can effectively interact in a face-to-face exchange;

4) Time and cost make frequent group meetings infeasible;

5) The efficiency of face to face meeting can be increased by a supplemental group communication process;

6) Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured.

7) The heterogeneity for the participants must be preserved to assure validity of the results i.e. avoidance of domination by quantity or by strength of personality (sometimes called the *`bandwagon effect'*).

Delphi, as a tool, has reached a stage of maturity where it is used extensively in organisational settings in combination with face-to-face meetings and Nominal Group Techniques (Turoff and Hiltz, 1996). Some examples of uses of the Delphi Method are set out in Table 3.5:

Table 3.5 - Examples of Delphi Method usage

Application Area	**Examples**
Health/Medical	Health care standards and policy development: Gallagher, et al., 1996; Moussa and Bridges-Webb, 1994; Snyder-Halpern et al., 2000. Medical developments: Fish and Osborn, 1992; Adams et al., 1992.
Education	Curriculum development: Sullivan and Brye, 1983.
Technology	Technology planning: Waissbluth and Gortari, 1990; Madu et al., 1991;
Information Systems	Deans et al., 1991; Watson and Brancheau, 1991; Watson et al., 1997; Dickson and Nechis, 1984; Brancheau and Wetherbe, 1987; Watson, 1989; Niederman et al., 1991; Dexter et al., 1993; Pervan, 1993; Brancheau et al., 1996; Dekleve and Zupancic, 1996; Chang, 2002.
Government	Regulatory processes: Benaire, 1988
Economics	Economic trends: Cicarelli, 1984

3.9 Summary of the Delphi Method processes used in this Research Project

This section provides a brief overview of the 'Modified Delphi Technique' employed in this research. More detail is provided in Chapter 5, which reports the descriptive statistics from the study. This Delphi study consisted of three rounds. Round One asked respondents the following research question:

> *What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?*

The research team used email as the communication medium rather than the more traditional paper and pencil. Multiple coders collated and synthesised the responses into a master list of 41 major issues. This process is examined in detail in the next section (9).

In Round Two, the confirmation round, the coordinating team sent each respondent their submitted issues and the mapping of those issues into the synthesised master list of 41 issues. Respondents verified the mapping or alternately suggested mapping their issue to another issue in the master set. After this confirmation round, and continued analysis of the master set of issues, the

coding team derived a final master set of 37 major issues. This final master set was used in Round Three.

Round Three of the modified Delphi Method asked respondents to score the importance of the issues listed in the master set of issues synthesised from the earlier rounds. Respondents scored the importance of these issues in each of six phases: Planning, Designing and Building, Testing, Implementing and Installing, Knowledge Management and Up-and-Running.

3.10 Data Analysis Issues in the Application of the Delphi Method[2]

The strengths and weaknesses of the Delphi method in the context of IS key issues studies have been addressed previously (Chang and Gable, 2000a; Chang et al., 2000b). Despite the background literature concerning the application of the Delphi method to IS key issues studies, the actual step-by-step processes for generating a comprehensive and meaningful set of major IS issues from diverse survey responses is a continually developing area. Researchers contemplating the use of a Delphi approach are confronted with a range of methodological issues and find little in the literature to guide their choices with respect to data analysis. They face such questions as:

1) How to deal with a large amount of nonnumeric, unstructured, and rich data?

2) How to select between alternative coding/indexing systems?

3) How to ensure those issues identified accurately reflect the respondents' intentions?

4) How computer tools can be used to manage textual data to support the process of qualitative concept building, typology construction, and theory development?

5) Whether to use methods such as the Nominal Group Technique?

[2] This introduction was previously published in paper by the research team: Chang, S-I, Gable, G., Smythe, E., Timbrell, G. (2000a) "Methods for distilling key issues using a delphi approach" in the 11th Australasian Conference on Information Systems, 6-8 December 2000, Brisbane, Australia

The following is typical of discussion, in published papers, on the process employed to consolidate first round responses of a Delphi survey:

> *This first round resulted in eighteen pages of issues and trends. In most instances, respondents provided ratings for an issue or trend heading, and then added substantial comments that elaborated on that dimension. Based on these replies, the research council devised issue categories into which the various comments were grouped. In addition, predicted changes were linked with specific corporate responses. This consolidation of comments served to eliminate overlaps, and made the wealth of information more amenable for evaluation and discussion in the subsequent rounds. (Czinkota and Ronkainen, 1997)*

The processes used to transform raw responses from first-round Delphi questionnaires into consolidated issues that typically comprise second round questionnaires would benefit from greater clarity. For studies that use a relatively small number of respondents who generate responses around a small set of well defined constructs, this process can be rather trivial. Other studies, perhaps using less homogeneous respondent groups and/or more open-ended initial questions, may generate extensive lists of loosely related responses, the sorting and classifying of which can be a highly ambiguous task. The objective of this section is to illuminate some of the data analysis concerns encountered in applying the Delphi method for IS key issues studies.

The following discussion describes two approaches to developing a set of key issues from responses to a Delphi survey. The discussion includes a comparison of the strengths and weaknesses of each method.

3.10.1 Addressing the Issues with Data Analysis

The data analysis complexities in this study stemmed from two main sources. First, in order to get broad coverage of the ERP lifecycle management issues, the respondent group was intentionally diverse. The respondent group included managers involved with the project, internal IS personnel, personnel from the external implementation partners, agency personnel involved with the development, and user groups. Second, in order to yield issues across the full

ERP lifecycle implementation, management, and support, the initial survey question was deliberately general in scope. Responses to the first round of the survey were consequently diverse, making data analysis more complex than is the case for simpler Delphi studies. The research team found little in the extant Delphi literature to direct the data synthesis efforts.

A typical response to dealing with complexity is to impose some form of structure. Three methods considered for providing structure to the issues in the preliminary study conducted by Chang et al. (2000a) were – structuring the problem, structuring the analysis, and structuring the process. Structuring the problem refers to breaking the problem up into manageable tasks. Structuring the analysis refers to selecting a suitable framework for analysis and imposing the structure provided by that framework. Structuring the process refers to selecting a methodology that prescribes specific steps to follow in conducting the analysis. The tasks, frameworks, and processes considered are described in the following sections.

3.10.1.1 Guidance from the Qualitative Research Literature

The qualitative research literature can serve as a guide to coping with the types of coding issues that confront Delphi method researchers. Qualitative data analysis concerns data that is nonnumeric, generally unstructured, and often rich in perceptions. The concept, however, is attributed different meanings in different contexts of research: not only does the nature of the data vary (responses to open-ended questions, narrative field notes, interview transcripts, personal diaries, public documents, etc.) but so too the strategies employed by researchers in the analysis of these data. The choice of strategy may be driven by research objectives, the nature of the data themselves, and the epistemological frameworks that influence the research generally (Tesch, 1991). Although researchers are never free from bias, they can converge on the meaning of text through immersion (Ramm, 1970; Lacity and Janson, 1994). A researcher can build a better understanding of the respondent's intentions through the iterative process of reading and interpreting text material (Gadamer, 1977; Gadamer, 1985; Husserl, 1985; Winograd and Flores, 1986). Because Delphi studies are

predicated on grouping like responses, one of the core activities is the determination of the meaning that lies behind each survey response.

The responses to a Delphi survey can range from simple rankings of alternatives where researchers supply the list, to lengthy and complex narrative responses.. Although one can generally easily deal with the former types of response, the latter present more significant difficulties and clearly fall within the domain of qualitative methods. The techniques described in this section target the more complex types of textual responses.

There are many traditions in qualitative data analysis, but most fit within one of two broad categories: holistic or atomistic (Willis and Jost, 1999). Atomistic approaches generally involve breaking the data down into segments, adding codes to the data segments, and then looking at relationships between the codes. Holistic approaches, on the other hand, tend to leave the data intact and emphasise that meaning must be derived from a contextual reading of the data rather than the extraction of data segments for detailed analysis. The choice of one approach over the other is typically determined by the research objectives. The two approaches and their major points in Willis and Jost (1999) are summarised in Table 3.6.

Table 3.6 - Two approaches to using code-and-retrieve data analysis methods

	Atomistic/Empirical	Holistic/Interpretive
Codes are	Facts that lead to theories Logically, objectively derived	Efforts to make meaning Tentative, emergent, theory laden
Codes are created	Before data analysis	As you go along
Codes can be used to	Test hypotheses derived from existing/emerging theories	Build understanding
Hypotheses are	Empirically testable statements	Tentative, imprecise conjectures

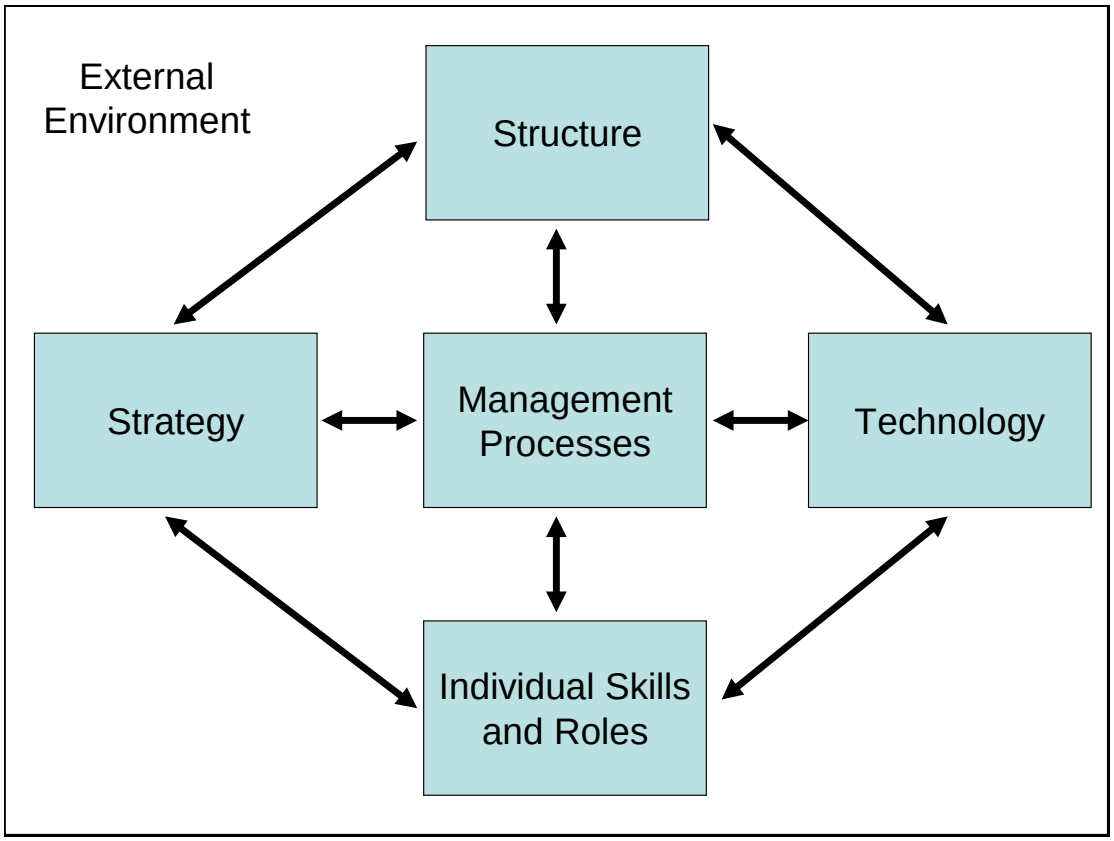
Perspectives on the strengths and weaknesses of the two approaches, and on the circumstances in which each approach might be most appropriate, vary and often run to the heart of the philosophy of science. The positivist school of MIS researchers has (until relatively recently) tended to avoid qualitative research. Often qualitative research has been more of the atomistic type, relying on traditional concepts of validity and reliability. Researchers more in the

subjectivist tradition, on the other hand, have readily adopted qualitative data as evidence and have tended to embrace the more holistic approaches. The question of whether the differences are ones of philosophy or of fit between research questions and research methods (or some combination of the two) is an important one, but one that is beyond the scope of this thesis. Interested readers are directed to the many excellent reference works (e.g., Gadamer, 1985; Lacity and Janson, 1994) that both deal with the philosophical issues and qualitative analysis more specifically.

3.10.1.2 Coding Method #1 – Fitting the Data to a Framework

In the preliminary Delphi study carried out in five related Queensland Government agencies (see Chang and Gable and also the summary of this study in Chapter 7), the research team first employed a coding method that used a predefined framework to structure the responses. This approach is in the tradition of atomistic styles of qualitative analysis but its use in this context is revelatory rather than for hypothesis testing (although post hoc hypothesis testing is possible). The coding scheme drew upon the MIT Management for the 1990s Framework (Scott-Morton, 1991). This framework views an organisation's performance as being contingent on the appropriate fit of six key factors: external environment, strategy, structure, technology, management processes, and individual skills and roles (Figure 3.1). Although the original purpose of the framework was to understand the impact of IT on organisations, it was selected for this research to serve as a conceptual map - a means of categorising issues and examining possible relationships between them. The researchers chose this particular model because it purported to represent the organisational impacts of IT deployment and because it had been used in an earlier single pilot case study of ERP implementation (Niehus et al., 1998).

Figure 3.1 - MIT90s framework (Scott-Morton, 1991)



The first step in using any predefined framework is to ensure the constructs in the model are well defined. Preliminary coding rules were then determined for each of the constructs to facilitate coding the responses. The research team developed a simple coding database application to expedite the coding, storage, and reporting of results. The approach to coding used for this study differed from that usually described in qualitative research methods - rather than attaching labels (that represent constructs) to responses according to specified coding rules, the coding rules themselves were attached to the responses. This process was developed with a view to allowing multiple frameworks to be fitted to the response data, by coding rules to responses, and then mapping the rules to the constructs in whatever framework was of interest. The preliminary rules were modified and supplemented in the coding of a randomly selected sample of responses. Ten rules were sufficient to code these responses to the six constructs in the model. Concerns about coding reliability can be dealt with by using multiple coders or a test-retest approach.

The first round of coding resulted in the vast majority of responses coding to the *Technology* category. This problem illustrates the requisite variety problems associated with coding to a predefined framework. The ability to represent the diversity of issues within a coding sample is limited by the variety in the framework itself. Few, if any, models are sufficiently detailed to capture the richness of the responses to a broad IS survey. For the coding to facilitate a meaningful analysis the constructs must be further broken down into a hierarchy of sub-constructs. A candidate model for such a coding scheme might resemble the familiar MISQ keyword classification scheme (Barki et al., 1993a) which presents areas of IS interest at several levels of detail.

The benefits of coding to a predefined framework are substantial. The categorisation of issues is grounded in the theory that underlies the reference framework. Category definitions are therefore less arbitrary than might otherwise be the case. The categorisation scheme is independent of the study in question, increasing the extent to which propositions made from the data are generalisable to other domains. The framework may also be applied to data from several surveys, permitting comparison of findings across studies.

3.10.1.3 Coding Method #2 – Open Coding

The second coding method described uses the data to define the coding categories. This form of coding is in the tradition of the holistic/interpretive methods described earlier. When coding responses by this method the process begins with no predefined categories. The relevant categories emerge from the meaning attributed to the responses by the researchers. The determination of categories is therefore much more subjective than the first coding method described above.

A manual procedure was adopted because spatial characteristics of the coding procedure appeared to ease the coding task: that is, the researchers were more easily able to perform the task when they could visually identify the categories of responses. This preference may have been idiosyncratic to the researchers involved. The research team printed each issue on a card showing the text of the issue, the detailed description provided by the respondent, and an identification

number. The research team randomised the cards before the first round of sorting.

The first round procedure for sorting involved three steps: (1) selecting a card; (2) reading the issue and the description on that card; and (3) placing the card into a category. Category selection was determined by the meaning of the issue as described on each card. Groups of 'like' issues formed and these developed into categories as the sorting process continued. As the researchers examined new cards, the nature of some of the groupings was amended slightly to accommodate new issues. There were no formal rules for resolving whether an issue fell into one grouping or another; the distinctions were based solely on the text of the issues as they appeared on each card.

When all of the cards had been placed into groups, the cards in each grouping were examined once more for the meaning represented by the groups, and the groups were then given preliminary labels. In the second round of sorting, each of the groups from the first round was examined in turn. For each group the cards were examined again and sorted into 'like' groups. Subgroups for most of the initial groups were quite easily determined with several issues being clearly alike, and different from other issues in that group. As for the first round, the groupings were again examined and appropriate labels attached. As no groups were suggestive of third-level groupings the sort procedure ended with the second round. The groups of issues were inspected a final time and minor revisions made where appropriate. The coding of responses to groups were then entered into the project database.

Using a variation of the Nominal Group Technique, the validity of the categories was tested by having a panel of experts (senior representatives from Government agencies) examine the issues and allocate them to categories of their choosing. The coding results from the researchers and the panel members were then compared, differences evaluated, and changes made where appropriate.

A more appropriate method of determining reliability for the open coding procedure is to use a two-step procedure, by firstly having multiple coders work through the open coding procedure described above and then comparing the results from each coder and resolving the differences. The second step is to

conduct additional rounds of coding, following the procedure described in method #1 above, using the categories determined in the first round of open coding as prespecified constructs, and checking for reliability using an appropriate statistic (e.g. Cronbach's α or Cohen's κ).

The major strength of the open coding approach is that this form of coding is data driven – the categories so formed reflect the range of issues that were collected as data rather than some pre-defined scheme. Unlike the first method described above, the open coding approach is extensible to any number of distinct categories. Because the categories are determined from the data themselves, respondents should easily comprehend them when the second round of the Delphi survey is implemented. A corresponding weakness of this method is that, because the coding scheme is specific to a set of data, it may not be generalisable to other data sets. Because there is no theory underlying the categories it is more difficult to identify the relationships that may exist between them.

3.10.1.4 Summary of the Data Analysis Approach

This section has described two methods for distilling IS key issues from Delphi survey data. The approach taken in this work is perhaps best described as methodological action research. The research team found little in the literature describing the Delphi method that provided substantive guidance when confronted with major research design concerns in the context of IS key issues studies. The concerns in this study stemmed largely from the need to deal with unstructured responses from a heterogeneous survey population. The topics covered in this section are a partial record of efforts to develop effective methods for addressing such concerns.

The two methods described for coding survey responses were the use of a rules-based approach of coding to a predefined framework and an open coding approach in which coding categories are developed from the data themselves. Ultimately the open coding method was adopted for further rounds of this Delphi Study both in the preliminary study and the study described in Chapters 5 and 6. Table 3.7 presents a summary of the results of this methodological action research effort:

Table 3.7 - Summary of the approach taken to code responses

Tasks	Who involved
• Distil a structured set of preliminary issues from the individual raw issues using either a predefined coding scheme or an open coding approach. o Code the responses o Apply appropriate checks for validity and reliability o Revise as necessary	Research team members
• Examine the resulting structured set of preliminary issues and attempt to understand the interrelationships between categories o Contrast and compare the results of alternative coding methods o Combine and map the researchers' results into a coherent master set of issues	Review panel
• Seek confirmation of the resulting master set of issues	Review panel
• Finalise the master set of issues	Research team

The next section provides a detailed description of the traditional Delphi Method and includes commentary on the variant application of the Delphi Method employed in this research project.

3.11 The Delphi Method: Steps

Stitt-Gohdes and Crews (2004) set out the following steps for the Delphi Method. In this section, I will discuss these steps and describe how they were applied in the research project.

Step 1: Formation of a Team to undertake a Delphi Study

The first step of a Delphi Study is to form a team to undertake the study. It is advised that the coordinating team are to be inter-disciplinarian with at least one person on the monitoring team having a working knowledge of the issue in question (Lang, 1995). The remainder of the team should have some familiarity with the Delphi process. By having people less knowledgeable in the subject area, a certain amount of objectivity can also be ensured. At least two people should act as moderator, so that when materials are edited, they can be cross checked for accuracy of interpretation (Lang, 1995).

A Delphi coordinator should have no vested interest in the outcome and should be in a facilitation role. The facilitator may feel it is desirable to encourage individuals with extreme positions to explain them. Sometimes the observation

that one is in a minority position can negatively affect participation unless there is such encouragement (Turoff and Hiltz, 1996).

In this research program, there were two Delphi studies run. A preliminary Delphi study was conducted in five Queensland Government agencies that jointly implemented SAP R/3 under the guidance of the Corporate Services Agency (Chang, 2002). A second Delphi study was conducted in the remaining Queensland Government agencies. This Delphi study is described in detail in Chapters 5 and 6 of this thesis.

The team consisted of Alex Chang, who conducted the preliminary study and the author who conducted the follow-up study. The study was supervised by Professor Guy Gable. Two research assistants, Errol Smythe and Karen Stark, helped follow up respondents and code the results. Two additional expert coders from the Queensland Government were also of great assistance. The team comprised a balanced mix of people. Some had experience with the Delphi Method while others had experience with the issues and context.

Step 2: Selection of Respondents

The traditional Delphi technique is conducted with a homogeneous panel of experts as participants (Martino, 1973; Snyder-Halpern et al., 2000). Considering membership of the panel is perhaps the most critical point in using the Delphi. The effective selection of the panel not only maximises the quality of responses, but also gives the results of the study credibility with a wider audience (Bjil, 1992).

The panel of respondents should consist of a group of people who are either experts in the area of focus (Turoff and Hiltz, 1996) or representative of the target group (Rothwell and Kazanas, 1997). Jairath and Weinstein (1994) suggest that study participants be experts who are knowledgeable about current information and perceptions regarding the topic under investigation but are open-minded to the findings. Respondents should be tailored to the issue. They should have reasonable familiarity with the area but also come from varied backgrounds within the subject under investigation (Rowe et al., 1991; Masser and Foley, 1987).

Scheele (1975) has suggested that when formulating the panel, the membership needs to include three different groups. First, there should be the stakeholders i.e. those who are or will be directly affected by the issue in question. Second, it should include those with the expert knowledge. Third, there should be those who act as facilitators and have the skills to stimulate and clarify those with alternative views (Lang, 1995). By having as diverse a panel as possible, biases are able to be minimised (Masini, 1993, Webler et al., 1991).

In this study, the coordinating team selected the panel of respondents in the following manner. Firstly, the coordinating team sought sponsorship from the Queensland Government. Mr Rob Freeman, Chair of the Queensland Government Financial Management Systems (QGFMS) Strategic Advisory Board, agreed to sponsor the study.

Mr Freeman wrote firstly to Directors-General and Chief Executive Officers of the Queensland Government agencies and asked that they nominate a senior officer in their agency to help construct a list of respondents. Having identified the senior officer, Mr Freeman and Professor Guy Gable jointly wrote to that senior officer requesting they create a list of suitable respondents for the survey. See Appendix A.

The following list of several alternative characteristics of appropriate respondents to include in their starting contact list was provided to the senior officers:

- Have had substantive involvement with SAP Financials at any level (e.g., Strategic and Operational users);
- Have had involvement in any phase of the SAP Financials lifecycle (e.g., Plan, Design and Build, Testing, Implement, Knowledge Management and Up-and-Running);
- Have had involvement with any of the modules implemented (e.g., General Ledger, Accounts receivable, Accounts Payable, Fixed Assets, Controlling, etc.);
- Have been involved in any of various roles (e.g., Project Management, Change Management, Development, Configuration, Internal Audit, etc.);

- Have been involved with SAP Financials in the Agency as a representative of either:
    1) The Agency;
    2) An Implementation Partner; or
    3) The Vendor (SAP).

The primary advantages of using a recruitment process prior to actual implementation of the study are to:

1) gain commitment from eligible individuals to be panel members;
2) obtain written agreement to participate in the study; and
3) minimise data collection time and costs associated with sending random mailings to individuals not interested in participating in the study (Snyder-Halpern et al., 2000).

The recruitment strategy used in this study depended on the support of the senior officers in the Queensland Government agencies to encourage their staff to participate. It did not actually ask the individuals their permission to engage in the study prior to the first survey round.

The research team also sought existing mailing lists of QGFMS users from the Financial Information Systems Branch (e.g. newsletter, training participants). Additionally, each first round Delphi survey asked respondents to name other potential respondents.

The coordinating team compiled these lists into a master database (Microsoft Access) of possible respondents and gave each individual respondent an identification number. Thereafter the coordinating team emailed each potential respondent a First Round Survey.

Step 3: Development of the First Round Delphi Questionnaire

This step entails developing a questionnaire focusing on identified issues: problems, causes, solutions, and/or actions. The intent is for each respondent to list ideas regarding the specified issue. The question may be *structured*, in which

a written questionnaire "based on the training needs or human performance problems to be investigated" (Rothwell and Kazanas, 1997, p. 66); or *unstructured*, in which an open-ended invitation to comment on the issues of interest (Lang, 1995). The use of structured questionnaires minimises both panellist response time and burden. This is especially important given the demanding schedules of panellists (Snyder-Halpern et al., 2000). One must pay close attention to the structure and content of the first round question(s). It influences the rest of the study.

In this research, the question was:

> *What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?*

It is important that the coordinating team give respondents a brief account of the origin of the research topic that the Delphi study is focusing on, and the investigation procedures used.

Delbecq et al. (1975, p. 88) argue that the most important issue in this process is the understanding of the aim of the Delphi exercise by all participants. In this way, participants will be better informed about the rationale for the study and the questions (Lang, 1995). A rationale and explanation of the study is provided in the forward of the Round One survey instrument as well as instructions for its use. The survey is attached in Appendix B.

Step 4: Distribution of first Questionnaire (Round One)

In this step, the coordinating team sends the first questionnaire to potential respondents or panellists. The questionnaire asks each participant to engage in individual brainstorming so as to generate as many ideas as possible for identifying or dealing with the issue. The coordinating team asks each panel expert to respond independently to a question(s) designed to elicit opinions, estimates, or predictions regarding the topic (Snyder-Halpern et al., 2000).

Traditionally, coordinating teams surveyed panellists using postal mail. Today one can also survey via e-mail, or use web-based systems that automate much of the process. Using specialist email software, simultaneous e-mail messages can

be sent to and received by all potential panellists instantaneously. The use of email for the Delphi Method has several advantages as noted by Snyder-Halpern et al. (2000):

1) Response time to e-mail inquiries is faster than the time generally observed with mailed solicitations.

2) Cost savings were a major plus since the cost of an individual e-mail message was negligible. Using email reduces or eliminates the cost of postage and/or phone calls.

3) Responses are more legible. The respondents type their responses reducing the time to clarify responses and eliminating the rejection of data due to illegibility.

4) Data entry is easier. In many cases, a spreadsheet column could simply be copied from the returned file to the central file removing the need for data entry. This decreased data entry time and errors.

5) There is a decrease in response turnaround time. For mailed questionnaires, delivery times are usually 3-4 days in the U.S. (similar in Australia) and longer for international mailings. E-mail delivery usually occurred within an hour, even for international mailings. Some e-mail programs also supported tracking of e-mail transmission status, and alerted investigators when an e-mail message was undeliverable due to an incorrect address.

6) The final advantage is cost savings. Because there were no questionnaire duplication or postage costs, and e-mail was a pre-existing service, study costs were limited to investigator time. Thus data collection costs were much lower than costs typically associated with use of a traditional Delphi approach (Waltz et al., 1991; Snyder-Halpern et al., 2000).

Snyder-Halpern et al. (2000) also discovered several disadvantages in using email. In their use of email in the Delphi Method they found:

1) When using email as a solicitation method it was difficult to know if a non-response indicated no interest or if the potential panellist

did not receive the e-mail message. When e-mail addresses are incorrect, it requires extra effort to locate a current address.

2) The second technical disadvantage was the unreliability of panellist e-mail capabilities. This resulted in several panellists being unable to participate in some rounds and one panellist could not participate at all due to unresolved institutional e-mail problems.

3) A third technical disadvantage related to e-mail attachments. Several of the panellists were unable to retrieve attachments in their original format so requested that the questionnaire be included in the body of the e-mail message. Others either did not have access to Microsoft Word and Excel applications, or had a version that was incompatible with the investigator's version. Finally, some respondents encountered problems with mime encryption processes used by their Internet Service Provider.

4) The final disadvantage that arose concerned the circulation of the Melissa virus during the data collection process. Several panellists indicated that they would not open attachments and requested that questionnaires be embedded in the e-mail message.

In this research, the research team sent respondents an email with the survey attached (as a Microsoft Word Document). If the potential respondents did not have an email address, the team faxed or mailed the covering letter and survey instrument. (see Appendix B).

During this Delphi study, the research team encountered some of the problems cited by Snyder-Halpern et al. (2000). Incorrect email addresses or constant changes to respondent email addresses meant that the research team had to contact the potential respondents to ascertain their current contact details. Several respondents had trouble opening the Microsoft Word attachment because of the technical environment in their organisation. Luckily, no viruses adversely affected this study.

Ultimately, the questionnaire should be pre-tested prior to distribution to the participants to ensure that all the questions are clearly understood (Lang, 1995).

The research team thoroughly tested this questionnaire in the preliminary study (see Chang, 2002).

Step 5: Respondents return the Questionnaires.

In response to first questionnaire, each participant independently generates and lists his/her ideas in a brief, concise manner and returns the list anonymously to the Coordinator. These ideas need not be fully developed: in fact, it is preferable to have each idea expressed in one brief sentence or phrase. No attempt should be made to evaluate or justify these ideas at this point in time (Stitt-Gohdes and Crews, 2004).

In the modified Delphi Method applied in this research, the research team asked respondents to provide a list of issues they had faced in implementing, managing or supporting SAP R/3 in their agency. The respondents were fully identified; this was a non-anonymous survey. The research team asked respondents to label the issue and provide a full description of that issue.

For this stage of the Delphi Method we developed a series of process steps to manage the survey returns. These steps are set out in Table 3.8:

Table 3.8 - Routines for processing returned surveys.

Routine for Survey Returns	
1)	Open the attachment and check that it is completed.
2)	Save the completed survey in the Survey Returns folder as 'same name'R.doc (where 'same name' is the name given to the survey sent to that person eg EDUa survey23)
3)	Print the completed survey
4)	Print the email. This has comments, the correct email address and sometimes the person's job designation.
5)	Indicate on the original Department spreadsheet that the person has sent a completed survey by highlighting the record in yellow.
6)	Record the survey return on my SurveyResponse.xls spreadsheet by copying the record from the Department spreadsheet into the Completed Surveys section.
7)	Send a note of thanks to the person and indicate the date that this was done on the persons Survey Response record.
8)	File the printed survey and email in a folder under the Department it describes.
9)	Record the survey number on the Department title page of the file. If a survey went out as one Department and came back as another e.g. someone initially from Health returned a survey for Police it is recorded in both places. On the Health title page it is recorded as returned and marked as filed with Police. On the Police title page it is added to the end of the list.
10)	Make sure the email is filed in the '1st Round Returns' mailbox.
Routine for Bounces	

1)	Highlight the record in the Department spreadsheet in orange to indicate a bounce.
2)	Copy the record from the Department spreadsheet to the *SurveyResponse* spreadsheet under Bounces
3)	Make sure the email record of the bounce is filed in the *Bounces* mailbox
Routine for Other Responses	
1)	Highlight the record in the *Department* spreadsheet in blue.
2)	Copy the record onto the *SurveyResponse* spreadsheet under '*Other*'.
3)	Record the persons excuse etc in the *Response* column of the record.
4)	Record this action in the *Action* column of the record. For example, an action might be an email encouraging the person to respond despite the fact that they no longer use SAP.
5)	Record any further correspondence with the person in other columns. If a completed survey is eventually sent, highlight the record in yellow and copy the record into the Completed Surveys section.
6)	Make sure the email is filed in either the *Excuses* or *Other* mailboxes

Step 6: Analysis of the first round responses

This step entails the collation and categorisation of suggestions (Stitt-Gohdes and Crews, 2004). Panel responses are aggregated, tabulated, summarised, and returned to the experts in a series of data collection rounds (Snyder-Halpern et al., 2000).

In this research project, the responses were printed and split into individual issues. Coders from the team sorted the issues into an initial set of major issues e.g. Reporting, System and Technical, Cost. Eventually, the issues were broken up into 41 preliminary issue categories. These 41 issues formed the basis of the second round survey instrument.

Step 7: Develop a second Questionnaire for the respondent group

Normally, the second questionnaire would ask respondents to prioritise or rank input from the first round. The panel now have the chance to consider arguments made by others and adjust their opinions. If their opinion falls outside of the middle range (i.e. upper or lower quartile), they are especially encouraged to provide reasons.

This is where the Modified Delphi Method employed in this research varies from the traditional Delphi Method. In the second round, the research team asked respondents to confirm that the issue(s) they had submitted fell into the major

issue category to which the coders had allocated it. A sample of the confirmation round survey is provided in Appendix C.

Step 8: Send the second Questionnaire to participants

The second questionnaire is sent to the respondents. In this research, the mechanism for sending the second questionnaire was by email. For this stage, Worldmerge software was employed. This software enabled the original issues and the categories to which they were applied, to be extracted from the Access database and merged with a standard email template and then sent automatically to the correct respondents.

Step 9: Completion and return of Round Two Questionnaire

In this step, respondents anonymously record their responses to the second round questionnaire and return them to the Coordinator. Respondents review the feedback report, independently rate the priority of ideas in the second questionnaire, and return the response.

In this Modified Delphi Method, the respondents merely confirmed that the issue they had submitted in Round One (Inventory Round) was allocated to the correct major issue category. Respondents also had two other response options: 1) suggesting that their issue be re-allocated to another major issue category; or, (2) suggesting a new major issue category. While some respondents opted for re-allocation, no respondent suggested a new major issue category. This gave the research team some confidence that the list of major issues was comprehensive. The confirmation survey was only sent to those who had returned a Round One Survey instrument.

Step 10: Collation of scores for each suggestion

In this step, the second round responses are analysed. Steps seven to nine are reiterated as long as desired or as necessary to achieve stability in the results.

In the Modified Delphi Method used in this research project, the research only conducted the Second Round (Confirmation Round) once.

Step 11: Construction of third Questionnaire

Normally the third round questionnaire is similar to the second round questionnaire but with individual and group scores for each suggestion from Round Two incorporated (Stitt-Gohdes and Crews, 2004). Using the aggregated responses of all panel experts from the preceding round, each expert again predicts, comments, and responds to the information in the new round This is subsequently returned to the investigator for analysis (Snyder-Halpern et al., 2000).

In this study, following the results of the confirmation round, the research team reduced the number of major issue categories to 37. The Round Three questionnaire sought weights of importance for each of these 37 issues for each stage in the Enterprise System lifecycle: Plan, Build, Test, Install, Know and Run. A copy of the Round Three survey instrument can be found in Appendix D. The Round Three questionnaire also asked respondents to indicate in which phases they were involved.

Step 12: Send the third Questionnaire

The coordinator creates and sends a third questionnaire that summarises the input from the previous step and asks for additional clarifications, strengths, weaknesses, and new ideas (Stitt-Gohdes and Crews, 2004).

In this research project, the Round Three survey was emailed to everyone in the research project database.

Step 13: Completion and return of Round Three Questionnaire

Respondents complete and return the Round Three survey instrument. For this research project, to increase the numbers of returns, a research assistant contacted every potential respondent and encouraged them to complete the survey.

Step 14: Collation of scores for each issue/suggestion

Stitt-Gohdes and Crew (2004) suggest in this step that the scores for each issue or suggestion are recalculated. This and the following two steps were not performed in this Modified Delphi Method. The research team used the responses from Round Three to make final calculations of the measures of importance. Chapter 5 reports these findings in detail.

Step 15: Conduct Further Rounds

The coordinator conducts possible further rounds of voting and requests for rationale and comments for more extreme scores Stitt-Gohdes and Crew (2004). This iterative process is repeated (Snyder-Halpern et al., 2000) until consensus is reached (Step 16). Whether agreement is reached or not, an advantage of Delphi over standard group voting is it provides not only a majority opinion but also a measure of the range of opinion (uncertainty).

In this research project, the aim was not to reach consensus but rather to survey the range of opinion and measure of importance of the major issue categories.

Step 16: General agreement is reached

A general agreement is reached on problems, causes, solutions and/or actions. The final data should reflect a consensus of opinions, predictions, or beliefs among all of the panel experts (Snyder-Halpern et al., 2000). It is at this point no new ideas emerge and all strengths, weakness, and opinions are identified. The researchers should by this step have achieved a group consensus with accompanying calculation of summary statistics: maximum, minimum, and range of scores for each suggestion (Stitt-Gohdes and Crew, 2004).

Step 17: Report prepared and distributed to respondents

The research team prepares and distributes a final summary and feedback report to respondents. The feedback reports throughout this process allow for the exchange of opinions and priorities, and often result in individual changes in opinions and priorities after respondents evaluate the group's perspectives (Stitt-Gohdes and Crew, 2004).

For this research project, this thesis is the final summary and feedback report. The research team has also provided feedback to the Queensland Government through public seminars and publications (e.g. Timbrell and Chan (2003) and Timbrell, 2004).

3.12 Summary – Delphi Method

The Delphi Method is a proven and appropriate approach for IS issue studies with large and diverse groups of respondents. While some commentators have their reservations about the method, it has had wide application across a variety of fields.

This Part 2 of the chapter looked at the definition and characteristics of the Delphi Method. It examined different perspectives of the method and described multiple examples of its application across diverse fields such as Education, Health and Technology. Part 2 also discussed the issues faced with qualitative data analysis of issues gathered during the Delphi Method. Finally, it described in detail the steps of a traditional Delphi Method process and noted the variations employed in this research program.

3.13 Nominal Group Technique

The Nominal Group Technique was originally developed by Delbecq et al. (1975) as an organisational decision-making technique that overcame the shortcomings of the more traditional but unstructured 'focus group'. It consists of five stages (de Ruyter, 1996):

1) First, the session moderator presents the topic under discussion and makes sure the participants fully understand the (written) problem statement

2) Second, the session moderator asks group members in a random order to mention one of the items that they have written down and writes each item on a flipchart visible to all participants. If needed, a concise explanation can be offered so that it is clear to all respondents what is meant by the item. This operation is repeated until all participants have had the opportunity to bring forward one

response. Subsequently, the whole process is repeated until all items of each group member have been recorded on the flipchart. No verbal interaction between group members takes place

3) Third, the group reviews the complete set of items and the moderator who makes sure that all responses are clearly understood by all group members and eliminates duplications. Discussion for the purpose of clarification may take place. After this revision, a code (e.g. a number or a letter of the alphabet) is assigned to each item of the set of ideas.

4) Fourth, the relative importance or priority of each item is established by a voting procedure. This is usually done by asking each participant to select five items that (s)he considers to be the most important and subsequently rank them by assigning points.

5) Finally, the results are compiled and the items on the flipchart are assigned an aggregate score on the basis of the individual scores. During this stage, respondents are given the opportunity to adjust their individual scores based on earlier evaluations and this may lead to a second round of compilation of scores.

The nominal grouping technique is thus a structured approach to collecting data whereby the interaction is under strict control of the session moderator. Discussion is kept at a minimum and used only for the purpose of clarification. Finally, the process of scoring allows for intra- and inter-group analysis of differences in the case of multiple groups.

A variation of the Nominal Group Technique was used in the workshop of senior Government staff. The application of this variation of the Nominal Group Technique and the subsequent results is described in Chapter 5 (section 5.2.3).

3.14 Chapter Summary

This Chapter consists of two parts. Part 1 describes the historical method used in Chapter 4. It reviews the IS historical method developed by Mason et al. (1997a; 1997b) and combines this with traditional approaches to historiography to develop a simplified three-step method for IS history narrative development.

Part 2 describes and discusses the Delphi Method and its variant used in the issues study described in Chapters 5 and 6. This method was also used in the preliminary study by the research team (see Chang and Gable, 2000b).

Finally, for completeness, a short summary of the Nominal Group Technique is described in Part 2. The Nominal Group Technique was used to inform the research team on possible major issue categories for the issues study described in Chapters 5 and 6 and Appendix E.

These discussions on the methods employed in this thesis reflect the policy of methodological action research within our research group. It is intended to be a contribution to these methods in IS research.

The next Chapter (4) is the application of the first method (historical) described herein. Chapters 5 and 6 are the application of the second method, the Delphi Method.

Chapter Four - An Historical Recount of the Queensland Government Financial Management System (QGFMS) – 1983 to 2005

4.0 Introduction

This chapter recounts the tale of the Queensland Government Financial Management System (QGFMS) from its inception in 1983 to current times. QGFMS is the name given to the standardised financial system implemented across Queensland Government Agencies. The purpose of this historical narrative is to provide a rich background to promote better understanding across all studies conducted in the context of the Queensland Government and QGFMS in particular Chang, 2002; Ng, 2003; Putra, 1998; Chan, 2003; Niehus et al., 1998; Timbrell et al., 2001; and Timbrell et al., 2003.

The narrative employs the information systems historical method outlined in detail in Chapter 3. The narrative is split into two parts. Part One recounts the birth of QGFMS, its early development and the contemporaneous development of the Financial Information Systems Branch, the group in the Queensland Treasury Department set up to support the system across the Queensland Government. It tells the story of the lead up and choice of SAP R/3, a client-server based Enterprise Resource Planning system, which replaced the initial centralised standard financial system from Management Sciences America (MSA).

Part Two describes the rollout of SAP R/3 and the subsequent decentralisation of its management. It also recounts the effect of this decentralisation on FISB, whose responsibility it was to manage QGFMS. Finally, it describes the recentralisation of both the system and its management.

In accordance with the historical method described in Chapter 3, the historical narratives in Part One and Part Two have focusing questions. Each focusing question is presented at the beginning of the two narratives. The two questions differ to reflect the important historical foci of each period.

While traditionally historical narratives do not necessarily include analysis or discussion (for example, Mason et al. (1997a; 1997b) and other prior information systems historical narratives do not include analysis or discussion but merely recount the story) this chapter does so in accordance with the historical philosophy that history without analysis is not history at all (Stanford, 1994).

Following each Part, there is a discussion and analysis around the focusing question(s) for each Part. For Part One the focusing question is:

> *What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?*

The ensuing discussion provides four themes or groups of conditions that led to this change. These groups are:

1) Business Environment Conditions
2) Governance Conditions
3) Technical Conditions and
4) Political Conditions.

The focusing questions for Part Two were:

> *What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?*

A sub-focusing question for Part Two is:

> *How did FISB's central management dilute over time?*

These four themes from Part One are used again in the discussion of the second narrative. In this second discussion, the Governance and Political Conditions are discussed together.

Finally there is a brief summary of the chapter and a short discussion of the suggested conditions that affected the development of the QGFMS over its life.

Part 1: Early times to the Choice of SAP/R3 – 1983 to 1994

Focusing Question: What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?

4.1 1983: The birth of QGFMS

Following an evaluation of available financial software during 1982 and 1983 the Queensland Government signed an agreement with Management Sciences America (MSA) to provide financial management software (Mason, 1992). The Queensland Government contemporaneously introduced policy to standardise its financial systems requiring each agency to implement the common software known thereafter as the Queensland Government Financial Management System (QGFMS) (QGFMS Strategic Plan, 1998). This was the first common financial system adopted by any State Government in Australia.

The agreement with MSA encompassed three modules including General Ledger, Accounts Payable and Budgetary Control (Mason, 1992). The agreement with MSA and the central coordination and support for QGFMS fell to the Financial Systems Support Group (FSSG) in Queensland Treasury.

The FSSG led the implementation of MSA into Queensland Government Agencies commencing in 1983 and completing this project in December 1986 (Putra, 1998). This group supported the operating environment, maintained the software, provided help desk services to agencies, coordinated the licence arrangements with MSA and trained agency personnel in the use and operation of the modules.

The MSA software was installed on an IBM3090J mainframe computer at the State Government Computing Centre in Brisbane, which in 1987 became the Centre for Information Technology (CITEC) (CITEC, 2003). The operating system was MVS/ESA with online access through CICS (Customer Information Control System – a proprietary IBM) and a VSAM (Virtual Storage Access Method) based file system (i.e. not a database). The system employed batch updates that ran during the day for functions such as cheque processing and overnight for file updates. Each agency accessed its own suite of data files, system policy and security. The reporting function was typical of mainframe-based financial systems of

the period. Users generated reports using a proprietary fourth generation language called Information Expert (IE). Treasury and agencies held these IE programs in 'libraries' and tailored them to suit individual agency needs (Niehus et al., 1998). QGFMS and its management were very stable until there was a change in government in Queensland.

4.2 1989: Labor Government elected in Queensland

On 2nd December 1989, after 32 years in opposition, the Labor Party ousted the National Party and commenced a series of reforms including the governance of the information technology assets of the Queensland Government. Early in its first term, the Labour Government implemented fundamental Machinery of Government (MoG) reforms and rationalised the 28 agencies under the previous National Party Government to 18. These MoG reforms included amalgamating the agencies of Main Roads and Transport into one department (Transport).

The new Labor Government also commissioned an Information Technology Review believing that the coordination of the management and use of technology, and the sharing of information stored in databases maintained by government agencies, are essential factors in achieving the strategic goals of Government, reducing or removing duplication of effort, developing new client-oriented services and providing cross-agency systems which offer strategic and other benefits to the Government as a whole (Cooke, 1991). The new government also introduced financial reforms that would eventually impact financial systems.

4.3 1990: The Public Finance Standards

On July 1, 1990 the new Financial Management and Systems Division of Treasury, responsible for financial management practices as well as QGFMS, introduced the Public Finance Standards under the auspices of the Financial Administration and Audit Act 1977 (Hansard PAC, 25 May 1992). These Standards required 'business entities' in the Queensland Government, such as Queensland Forestry and Water Resources (State Water Projects), to introduce accrual accounting based reporting by 30 June 1993 (Hansard PAC, 26 May 1992). The Standard required the balance of QG agencies to report on an accrual basis under Australian Accounting Standard 29 by the 1996-7 financial reporting period (Queensland Government Financial

Management Strategy, 1994).

The Public Finance Standards also introduced ‘user-charging’. This meant that the Queensland Government no longer funded QGFMS centrally. The Information Policy Board’s (IPB) added the concept of user charging into its [standard] Charter for Lead Agencies for Strategic Systems (1991a). Under the user-charging scheme, the Queensland Government allocated funds to agencies through the budget process. The agencies would then pay the two major QGFMS providers from this budget allocation for QGFMS related services: Treasury for support, training and software coordination and CITEC for facilities management. There was a difference between the two providers. FSSG was essentially a core government non-profit business who only required sufficient funds to cover staff and related costs. CITEC, on the other hand, was a semi-corporate Queensland Government entity in a monopoly position looking to maximise profits.

More importantly, perhaps, is the fact that the Public Finance Standards replaced the long standing ‘Treasurer’s Instructions’ signalling a change of management style from a central directive approach to one of individual agency accountability to parliament. One could surmise that decentralising accountability in financial matters would someday be reflected in the financial systems management environment. Financial policy was not the only area being reformed. Information policy was also being addressed.

4.4 1990 – 1991: The Information Policy Board

Arising from the Information Technology Review in 1990, the Labor Government formed an Information Policy Board (IPB) within the Department of the Premier and Cabinet responsible for the stewardship of Whole-Of-Government information management issues (Department of Premier, Economic and Trade Development, 1995; Mincom, 2003). The IPB created formal Information Standards for compliance by Agencies.

Information Standard No. 2 (Information Policy Board, 1991c) created the concept of the ‘Lead Agency’. The general rule was that all relevant agencies within the IPB’s sphere of interest must adopt, implement or move progressively towards adoption or implementation of mandated information management functions with

lead agency endorsement (Information Policy Board, 1991c). A Lead Agency would manage a 'Strategic System', an information system that, because of its information content, is critical to the administration of Government as a whole. The responsibilities of the Lead Agencies included the following key requirements (Cooke, 1991):

1) Strategic and business plans: including consideration of alternatives, future direction, user liaison and training, post-implementation and operational performance reviews, product enhancements, value-added services and funding

2) An appropriate management structure for the total system; including establishment of a separately identified operational entity within the lead agency to conduct the management of the system.

The IPB endorsed QGFMS as a Strategic System and designated Queensland Treasury as the Lead Agency for Financial Management Systems. QGFMS would be compulsory for agencies operating on the Public Accounts (18 Agencies and the Legislative Assembly); other budget sector bodies including Queensland Corrective Services Commission; sub-departments and instrumentalities such as TAFE colleges, Queensland Treasury Corporation; and budget dependent statutory bodies (subject to exemption) such as the Criminal Justice Commission and Public Trust Office. Bodies currently operating under QGFMS (e.g. Queensland Rail and the Queensland Electricity Commission) who would be required to operate under conditions of commercialisation and competitive neutrality (i.e. market forces) would have the option to seek alternatives to QGFMS (Queensland Treasury – FISB QGFMS Strategic Plan, 1992).

Driven by these policy changes an reviews, FSSG changed its name to the Financial Information Systems Branch (FISB) and set out to implement a new management structure, cost recovery, expansion of the core modules, implement service policy and agreements, identify client needs, develop an education program, revamp the support desk, establish an interdepartmental client group and develop a long term strategy for QGFMS (Cooke, 1991).

Not only did Queensland Treasury have the IPB's mandate for a central role, it also had influence in financial systems policy through its broader role in

financial management policy. Also, its controlling role in the government budget process, whereby Treasury allocated funds to agencies on an annual basis, made it a very powerful agency. Furthermore, the Treasurer was also the Deputy-Premier in the new Labor Government. As a result, FISB as a Lead Agency, situated in Treasury, was in a position of power compared with, for example, the Human Resource Management System (HRMS) Lead Agency that the IPB appointed to the Department of Employment, Vocational Education, Training and Industrial Relations (DEVETIR). This lead agency eventually disappeared.

Information Standard No. 3 (Information Policy Board, 1991d) established guidelines under which agencies would be exempt from Lead Agency management:

> *An application for exemption from the Lead Agency system was considered when it is apparent that for reasons of functionality or incompatibility, adoption by an agency of a Lead Agency system would have significantly adverse effects on the agency (IPB Information Standard 3, 1991d).*

Agencies would initially build a business case for exemption and submit it to the Lead Agency for consideration. Should the Lead Agency reject the exemption application, the Agency could then submit the application to Cabinet through the IPB with both the IPB and Lead Agency advice on the matter. On the whole, Treasury as Lead Agency for QGFMS was reluctant to give such an exemption to agencies. As Lead Agency, FISB had provided one exemption from QGFMS to the Premiers Department, unquestionably the most powerful agency, who were running a DataFlex (-based) financial system.

4.5 1991-1992: The Central Finance System

QGFMS supported the government's cash–based accounting method. Having centralised financial management software enabled Queensland Treasury to consolidate the whole government's cash position on a daily basis. The Queensland Government has centralised banking arrangements, initially with the Reserve Bank and later with the Commonwealth Bank. In 1991-1992, the Financial Management and Systems Division built adjunct software to QGFMS called the Central Finance System (CFS). Using daily information 'swept' from QGFMS ledgers, the Central

Finance System calculated the agencies' revenues and impending expenditures, enabling Treasury to manage its cash reserves and place any excess on the short-term money market (Niehus et al., 1998). The CFS strengthened the pivotal position of QGFMS.

The QGFMS common software strategy was not only a technical centralisation strategy but also a knowledge-based strategy. It enabled centralised and standardised training, centralised support and easy movement of accounting financial systems staff across agencies because of the systems commonality. With the introduction of the Central Finance System, the efficient management of the government's cash position added another dimension to the benefits accruing to QGFMS. The Government could identify measurable cash benefits arising from the CFS. Agencies moving to other systems, therefore, impacted on the efficiency and tight integration of the CFS. The CFS, financial policy and QGFMS were all run from the Financial Management and Systems Division within Treasury.

4.6 1992: Financial Information Systems Branch

The final form of FISB, the restructured internal Treasury group that managed QGFMS, arose from the following activities: the Public Sector Management Commission review (initiated by the incoming Labor Government) of Treasury; some initial strategic planning in September 1991 by the former director of FSSG, Bill Cooke; an internal evaluation by Queensland Treasury of the Financial Information Systems sub-program concurrent with a Structural Efficiency Principles exercise; and, consultation across Queensland Government agencies with QGFMS clients and selected external organisations with an interest in Financial Management in Queensland Government (Queensland Treasury – FISB, QGFMS Strategic Plan, 1992).

Around September 1992, the new structure of the Financial Information Systems Branch (FISB) was in place and management had recruited and filled all positions within that structure. The Financial Management and Systems Division, led by Assistant Under-Treasurer Graham Carpenter, was ready to manage its three important sub-programs: Financial Information Systems, Financial Management Policy and Public Accounts, the latter group controlling the daily cash position (CFS) and consolidated government financial reporting (Queensland

Treasury Annual Report, 1992). Treasury appointed John Mason, who became a major player in the development of QGFMS, as Director of FISB. Bill Cooke, who had steered QGFMS from its inception, retired at this time.

FISB comprised four groups covering three functions: software support (2 groups), technical support, and a group combining the management of training, market relations with clients and quality management. Previously CITEC had provided technical support and overnight monitoring but 'indistinct' communications led to CITEC relocating five computer systems officers into FISB to rationalise and centralise this QGFMS function (Queensland Treasury-FISB QGFMS Strategic Plan, 1992).

FISB set new strategies for QGFMS including: a review of existing software products (MSA had been in place for nine years), providing opportunities for improved business and accounting processes, and consideration of the government's adoption of an open systems strategy. These strategies were designed to respond to expected developments in the next 3-5 years that included: greater resource management responsibilities encompassing assets, inventory, 'user pays' for services; commercialisation/corporatisation including the introduction of accrual accounting; cash flow management embracing treasury functionality and CFS integration, payables and receivables, receipting and revenue collection; electronic trading mechanisms such as Electronic Funds Transfer, Corporate Card, electronic purchasing and electronic data interchange (EDI); increased accountability reporting including budget and financial and reporting for Departments and Government as a whole; and integration with operating systems encompassing Executive Information Systems(Queensland Treasury-FISB QGFMS Strategic Plan, 1992).

QGFMS functionality offerings were divided into (compulsory) Core Modules:

- General Ledger, Budgeting, Commitment Management (a budgeted funds control facility designed to prevent transactions when funds are unavailable for that purpose), Financial Reporting, Fixed Assets, Accounts Payable and Purchasing, CFS integration;

and Optional Modules

- Accounts Receivable, Inventory, Order Processing, Common End-User

Interface (Brightview).

In the technology sphere at the time, several new phenomena were gaining momentum in the marketplace: local area networks, Microsoft windows, and Client-Server architecture. These technological developments would challenge the stranglehold that mainframe-based accounting packages had on large organisations. Dun & Bradstreet Software (DBS) bought the MSA software with plans to sell their next generation of client-server, windows based software to these customers. Furthermore, IT departments in agencies were adopting open systems platforms and PC based architectures for their operational and office systems.

It wasn't only Treasury policy and technical developments, however, that were shaping the future of QGFMS. The surrounding environment was also exerting pressures on the existing system.

4.7 1993: Department of Primary Industries' Public Accounts Committee Enquiry

Following a 1990-1991 Public Sector Management Commission Review, which recommended downsizing in the Department of Primary Industries' Corporate Services area, the ensuing redundancies depleted this agency's financial management expertise. The agency found combining the three MSA systems, integrating their receipting system, called PIAS, and the integration with the new centralised Human Resources Management System (under the DEVETIR Lead Agency) was problematic and exacerbated by the 'brain drain' resulting from the redundancies. There were considerable problems with bank reconciliations leading to a $7.3M error detected by the Auditor-General in the 1991-92 accounts. A Public Accounts Committee (Hansard, PAC 29, September 1993) investigated the matters surrounding these matters including the use of Arthur Andersen to rectify the situation. DPI had earlier recruited Craig Vayo from FISB to assist in cleaning up their financial systems. DPI used Vayo's recruitment to assure the Public Accounts Committee that they had the capability to recover their situation.

From DPI's viewpoint QGFMS had let them down. Pre-empting the Public Accounts Committee enquiry they went to the market to choose a new system in late 1992. By early 1993, DPI was considering several alternative financial software

suites and potential implementation partners including Prophecy (Helix), Oracle (Ernst & Young), Sun Systems (KPMG), Rainbow (Dialog) and Finance One (Technology One) (Personal diary note, 1993). DPI's plan was to start from scratch and implement the new financial systems in all their major divisions at the same time.

4.8 1993: Treasury's Reaction

The removal of the authoritarian 'Treasurer's Instructions' and the resultant individual financial accountability of agencies under the Public Finance Standards enabled departments to argue cogently for the decentralisation of the Queensland Government's financial systems. The new FISB adopted a management style to adapt to this new governance regime in Queensland. Its approach became one of broad consultation and information exchange with agency finance managers and technical operatives through the QGFMS Client User Group (QGFMS Strategic Plan, 1993a). The Marketing section of FISB coordinated these consultative activities.

Mason, FISB's Director, was facing increased pressure from agencies to leave the QGFMS 'family'. Losing agencies from the Lead Agency (QGFMS) now meant losing user-charges accruing to FISB for operations, and affected the operations of the CFS. It also weakened the Lead Agency's standing in the Queensland Government. The Department of Housing and Local Government (DHLG) was also tendering for new financial systems software, and finding the same market offerings as DPI.

Treasury's initial response in early 1993 was to commence preparation of a Request for Information for alternative software to Dun and Bradstreet (Timbrell Diary, 1993). A cross-agency management board for the RFI met only once. Following discussion at this meeting and after some internal consideration, FISB decided to do comprehensive User Requirements Analysis (URA) as a way to consult agencies and gain their commitment to any future alternative software strategy. Also, FISB decided that any further market testing would be an inefficient market process putting pressure on vendors who were already responding to DPI and DHLG. An RFI at this stage could draw anger from the vendor market. The RFI cross-agency management board reconstituted itself as the URA Steering Committee.

FISB launched the User Requirements Analysis (URA) on 17th March 1993 at the

monthly QGFMS Client User Group meeting and all agencies received the survey of needs at the end of May 1993 (Timbrell Diary, 1993).

4.9 1993 - Dun & Bradstreet fight back

Less than a week after the QGFMS Client Group announced the URA, sales (Mark Camillieri) and technical (Sally Munro) representatives from Dun & Bradstreet Software (DBS), the company that bought MSA, were demonstrating their new reporting tool 'SmartStream' (Timbrell Diary, 1993). This was a client-server based tool that enabled multi-dimensional reporting thereby providing functionality only found in contemporary proprietary Decision Support Software or Executive Information Systems software. It was the precursor to their suite of real-time client-server financial software built on database technology.

Dun & Bradstreet knew that reporting functionality was a weakness of the old MSA system and that MSA compared poorly to what users were experiencing in PC-based accounting systems that could export data to more user-friendly reporting environments such as Lotus 1-2-3 and Microsoft Excel. Even though DBS (MSA) users could and did export data into PC spreadsheets, reporting quality and form depended on an intimate knowledge of the DBS (MSA) internal file structures. DBS (MSA) was based on VSAM file structures, not database technology, and so data downloads could quickly become complex undertakings.

Over the next two months, Treasury negotiated with DPI to drop their tender and become the pilot for DBS 'SmartStream'. Treasury would pay the majority of the pilot costs. This was a win for Treasury and QGFMS, keeping DPI in the QGFMS fold.

DHLG, on the other hand, were committed to their market testing and finally selected Finance One from Technology One (Tech 1). Tech 1 did not use implementation partners, however DHLG contracted a project manager from Coopers and Lybrand to manage their interests in the implementation. They sought and received exemption not directly from the Lead Agency but via a cabinet submission through the IPB as per Information Standard No. 3. DHLG had specific needs related to the management (renting, maintenance) of their extensive real estate portfolio. This requirement by DHLG to integrate their central operational systems

with their finance systems put more pressure on QGFMS and FISB to respond to the changing needs of its customers. The defections from QGFMS were continuing, with Media and Information Services in the Administrative Services Department also requesting and receiving exemption, this time from Treasury directly because of their small size and specific needs.

4.10 1993: The User Requirements Analysis

On October 18, 1993 FISB reported the findings from the User Requirements Analysis to the cross-agency steering committee (Queensland Treasury-FISB URA Project Final Report, 1993b). The findings are summarised in Table 4.1.

The URA project recommended that no Request for Information for functionality currently being provided through QGFMS be issued at this stage.

It also recommended that:

1) FISB hold discussions with agencies where additional functionality is required to establish whether additional systems functionality or changes to business practices will achieve the required objectives.

2) A project be initiated towards migrating QGFMS to an Open Systems platform.

3) Where functionality is not provided by QGFMS and there is sufficient commonality of requirements, that a whole-of-government solution be sought either through QGFMS or through another (lead) agency.

4) Where other projects are addressing pertinent issues, such as the Inventory pilot project and procurement pilot project, an examination of the outcomes of those projects is undertaken before taking further action.

Table 4.1 – Results of the 1993 QGFMS User Requirements Analysis

Module	**Mean Functionality Fit (%) across QG**	**Clients using or planning to use this functionality (out of 24)**	**Comments from the report**
General Ledger	88%	24	Issues about poor enquiry and reporting will be addressed by the SmartStream project.
Inventory	86%	15	Still being piloted by the Corrective Services Commission

Accounts Payable	88%	23	Need more reporting capability.
Accounts Receivable	77%	18	Credit management ok at 79% fit Receipting poor at 55% fit
Purchasing and Procurement	78%	22	Financial aspects good at 88% fit Procurement mgt poor at 53% fit
Fixed Assets	60%	22	Poor management reporting
Order Entry	n/a	13	Apparent demand but no agency has requested implementation to date.
Electronic Trading	13%	19	Electronic Billing good fit 87% EFT excellent at 100% fit No fit for Corporate Credit Card, Point of Sale or EDI function.
Job/Project Costing	0%	9	Functionality not provided by Treasury within QGFMS
Fleet Management	0%	16	Functionality not provided by Treasury within QGFMS
Cash Receipting	0%	18	Functionality not provided by Treasury within QGFMS
Subscription Systems	0%	3	Functionality not provided by Treasury within QGFMS

The URA report demonstrated that DBS (MSA) functionality satisfied Queensland Government agencies' needs at the time. Dun and Bradstreet were developing a new database client-server version of their software and offered Treasury the opportunity to move to this product without a long and expensive tender process. Details of the functionality gaps in individual agencies figured in the appendices of the report. The recommendation about functionality and business practices reflected the early influence of the business process re-engineering (BPR) movement that was mentioned in the 1992 Strategic Plan. BPR also featured in the Financial Management Strategy (1994).

Several agencies had subsidiary systems 'integrated' with QGFMS. Because DBS (MSA) was an indexed file based system using VSAM, integration occurred at the batch level and did not have the complex issues of real-time database integration. As a result, the prospect of non-MSA modules or packages providing additional functionality was normal IT practice in pre-ERP (total integration, single database) times. Consequently, FISB believed that the best course of action was to identify common additional functionality eg. Costing, and then decide whether it was in Treasury and FISB's interests to take responsibility for it or not. For example, earlier in June at a Divisional meeting, FISB recommended that Treasury continue to develop electronic banking and electronic funds transfer but not extend this into

broader electronic data interchange (EDI) functionality because of the uncertainty surrounding other States' developments in this area (Timbrell Diary, 1993).

FISB management was pretty happy with this result. According to the URA, the functionality in QGFMS was suitable for the Queensland Government's purpose. The trial of 'SmartStream' was progressing well in DPI. The Inventory project in the Corrective Services Commission was also on track. FISB did not have to tender for new software and could continue supporting and training in Dun & Bradsteet software. FISB was able to continue operating within their existing capabilities and comfort zone. Then, on Wednesday 10 November, Dun and Bradstreet demonstrated their initial client-server financial systems module "Financial Stream" (Timbrell Diary, 1993).

4.11 April-May 1994 – The Turning Points

When DBS demonstrated "Financial Stream" at the Sheraton Hotel, Brisbane to Queensland Government senior accounting staff, it was immediately apparent that their offering did not have the functionality required for Queensland Government's needs. The core of government accounting activity was the management of the expenditure of their cash budget, but DBS had no Accounts Payable module at that time, as it was still under development.

Then DBS presented their consulting bill for the DPI 'SmartStream' pilot. The amount was above expectations, leading FISB to instigate a tender for commercial Decision Support Systems searching for competitive alternatives to SmartStream.

In early 1994, Queensland Transport told Treasury that they intended testing the market for alternative financial systems and would be applying for exemption from the QGFMS Lead Agency. Transport was a large department and their pulling out of the Lead Agency would have a negative effect on the increasingly tenuous status of QGFMS amongst agencies. Transport (which at the time included Main Roads) was partly corporatised, thereby needing both cash and accrual accounting systems. Initially, FISB tried to interest Transport in the SmartStream technology but this did not persuade them to change their mind. Transport's lobbying, and the development of transitional arrangements across all agencies for dual cash and accrual reporting, increased the pressure on FISB.

Furthermore, the introduction of DBS's "Financial Stream" System risked a market perception that Queensland Government was purchasing new software without reference to the equity principles and open-market policies embodied in the State Purchasing Policy.

Finally, while the DBS (MSA) software had its roots in the private sector and could adequately account using the accrual methods (corporatised entities in the Administrative Services Department were already using MSA in this way) FISB staff were becoming concerned about the dual cash/accrual reporting and management regime required for cash-to-accrual-accounting transition period. Significant modifications to the ageing system were becoming increasingly unpalatable. The strategy to adopt "Financial Stream" was losing support.

On the 28th and 29th April 1994 the FISB management team attended a strategic planning retreat at Clear Mountain near Brisbane. Following a discussion on Porter's competitive forces model, the management team decided to join with Transport and tender for a new generation QGFMS (Informant Mr M, 2003).

FISB wanted to maintain their central position and so accrue the knowledge re-use, financial and management benefits of a standard system eg. standard training offerings, easy movement of personnel across agencies, central licence and infrastructure management, central specialist support personnel. FISB at the time were unaware that a change of system would put immense pressure on them because, as the 'Lead Agency', they would be held accountable for this decision irrespective of the fact that it was made in broad consultation with its customer agencies.

Sensing a requirement for greater executive commitment across government for such a major initiative, Graham Carpenter formed the QGFMS Strategic Advisory Board in May 1994. This group consisted of influential senior executive managers from across Government. Carpenter included Gary Uhlmann, Executive Director Corporate Management and Development at the Transport Department in its founding membership.

4.12 June 1994 – The Financial Management Strategy

In June, just prior to the release of the RFI, Treasury published their medium to long term Financial Management Strategy (FMS) that outlined future developments such

as accrual accounting and budgeting, whole-of-government reporting and a strengthening of centralised cash management practice. The plan also endorsed the need for business process re-engineering and flexible systems to support these re-engineered processes.

This strategy document, usually hailed as the precursor to changes in QGFMS (Putra, 1998; Niehus et al., 1998; Chang, 2002) actually reflected the intended strategy prior to FISB's decision to tender with Transport. Its action plan aligned more with the recommendations of the User Requirements Analysis and other internal discussions (See Table 4.1). FISB made the decision to tender with Transport after the FMS book was at the printers. The strategies in the FMS, however, were sufficiently broad that readers of the FMS did not see them as contradictory.

Table 4.2 - Extracts from the Financial Management Strategy 1994

FMS Strategy	**Notes**
By 31st August 1994 decision support systems be available to QGFMS users	SmartStream pilot in DPI and DSS tender looking for alternatives to SmartStream
By 31st January 1995 review strategic financial management systems (especially QGFMS) …	Strategy was no longer to review but rather to replace QGFMS.
By July 1995 QGFMS will provide integrated, accrual-based information systems…	Strategy based on converting existing MSA configuration to an accrual accounting approach.

4.13 July 1994: The QGFMS Request for Information

By 1994 QGFMS had grown to service approximately 4000 users across 25 Queensland Government agencies. It connected to 2450 workstations and terminals and 450 remote printers. Concurrent users during prime time varied between 400 and 1000 with month-end daily averages of around 750 concurrent users. QGFMS posted a total of 15 million transactions per year to its general ledgers. Small departments posted between 30,000 and 40,000 transactions each with the largest department, Queensland Health, posting over 4 million. By 1994, the system required a daytime average of 70 MVS MIPS and a minimum of 100 GB of DASD drives on its Summit Class Hitachi Data Systems GX8312 mainframe (Queensland Treasury-FISB QGFMS Strategic Plan, 1994a). This was a very big system and FISB expected significant interest from the marketplace.

Under the management of a cross-agency steering committee and aided by a cross-agency working group, a project co-managed by John Mahoney from Transport and

Geoff Saxby from Treasury developed and released a request for information (RFI) for QGFMS in July 1994 (Queensland Treasury-FISB QGFMS Request for Offer, 1994b). The outcome sought was replacement software for QGFMS. The prize for the winning tender consortium was the definite software sale and associated consulting services sufficient to implement the system in a subset of Transport. This deal alone was worth several million dollars. The tender positioned the Transport implementation as the 'pilot' site which, if accepted, would pave the way for adopting the winning software across QG. This approach satisfied both Transport who would end up with a system in a suitable timeframe, and Treasury who did not have to commit to a whole-of-government software solution should the pilot fail.

The market response for the QGFMS RFI was buoyant. There were over 12 responses and the cross-agency working group evaluated these in great detail. The group recommended to the whole-of-government steering committee that three bids move to the second stage of the tender process, the Request for Offer.

4.14 1994 – SAP is selected

The three bids were from Technology One (Finance One), Oracle (Oracle Financials) and SAP (SAP R/3). The SAP bid was in conjunction with Coopers & Lybrand who would act as the implementation partner in the Transport project. The project team released a comprehensive Request for Offer to these final bidders on October 6th 1994 (Queensland Treasury-FISB QGFMS Request for Offer, 1994b). The offer closed on November 11, giving the bidders very little time to respond. During the bidding process Technology One withdrew from the tender leaving the contest between Oracle, firmly established in the market, SAP R/3 the newcomer, and a balancing evaluation of the Dun & Bradstreet software.

In December, the project team chose SAP R/3 as the New Generation QGFMS (NG QGFMS). SAP supported the push for business process re-engineering and automated workflow. The SAP offer promised improved financial reporting capability, greater integration, a client-server platform, functionality for electronic trading, treasury and cash management capability and the ability to integrate with operational systems. It satisfied the future needs identified in the 1992 QGFMS Strategic Plan.

The SAP system was intended as an alternative to the DBS offering rather than a replacement (Queensland Treasury-FISB QGFMS Strategic Plan, 1994a). Treasury's plan for the current generation (CG) QGFMS was that it be supported and upgraded for at least five years (QSAB minutes, 10 Oct 1994).

A new era in Queensland Government's financial management systems had arrived.

4.15 Discussion

The focusing question for this section of the historical recount of QGFMS is "What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?"

Briefly, this historical account describes several conditions that affected the decision to choose replacement software for QGFMS. These conditions can be split into four groups: Business Environment, Governance, Technical, and Political. Each will be discussed in turn.

4.15.1 Business Environment Conditions

The Business Environment comprises those conditions created by external business conditions. The conditions in this group include the change of government; the move to accrual accounting and reporting; commercialisation of certain government activities; downsizing in corporate services; and, changing business requirements. These are conditions that FISB had little or no control over.

As Chair of the Public Sector Accounting Standards Board, Graham Carpenter had considerable influence on the public sector move to accrual accounting. It is unlikely, however, that Carpenter and the Standards Board would have inhibited this policy development on the basis that financial systems would not be able to cope with the changes. Given that the financial systems in use by public sector agencies were also used to support accrual accounting in the private sector, it was expected that the move to accrual accounting was feasible from a system's perspective. Furthermore, the global and national trend towards the introduction of accrual accounting in government suggests that its introduction would be inevitable; resisting this trend might bring into question the government's commitment to public accountability.

Commercialisation was also a Treasury policy. Treasury, again, simply expected the financial systems to adapt to this policy and other changing business requirements. Traditionally, when systems are no longer considered able to cope with changing business conditions they are replaced. One effect of commercialisation is the principle of 'user pays' (see section 4.15.2 below). From an accounting point of view, if the user is going to pay then the agency must provide processes to facilitate payment e.g. cash and invoice processing, credit policy, and debt management. These processes are inextricably linked to accrual accounting concepts. They also increase the breadth and complexity of financial reporting.

The changing business environment, and financial policy developed to support this environment, therefore generates several conditions that put pressure on financial systems.

4.15.2 Governance Conditions

Governance describes the decision rights and accountability framework to encourage desirable behaviour (Weill & Woodham, 2002). This section describes those conditions created by internal policy development that affected the way that decisions about QGFMS were made. The conditions in this group include the decentralisation of financial operations policy; the centralisation of information policy through the introduction of the IPB's 'Lead Agency' concept; and, 'user pays'.

Treasury had considerable but not total influence on these policy changes. The government expected that the financial systems would simply have to cope with such changes in policy. Key decision makers viewed financial systems as a flexible tool that could be changed and moulded to any business requirement. The use of any particular system was secondary to the business requirement. When a system's flexibility comes into question, it is time to consider replacement options.

Davenport and Prusak (1997) and later Weill and Woodham (2002) described five archetypes for information technology governance. These were Business Monarchy (where IT decisions are driven by business needs and made by business managers usually in concert with the information technology executives); IT Monarchy (where IT executives make IT decisions); Feudal (where local autonomous business managers or IT managers make IT decisions); Federal (where governance rights are

shared by business and IT executives, and sometimes process owners and end users); and Anarchy (where decisions are made locally on an ad hoc basis).

The selection and management of QGFMS was driven within a predominantly Business Monarchy archetype with Treasury, and to a lesser extent Transport, exerting dominance in the decision making process. In contrast, the Information Policy Board was set up as an IT Monarchy, charged with setting IT policy and direction across the whole-of-government. Even though QGFMS was the major system in the Queensland Government, the IPB's role in its governance was a minor one. Illustrating this is the fact that under the original QGFMS Strategic Advisory Board (QSAB) Terms of Reference (May, 1994) the IPB was not represented. By October 1994, however, an IPB representative had joined the Board, although relatively junior in seniority compared with other QSAB members

The decentralisation of financial governance, introduced through the new financial management strategy, resulted in an increase in financial accountability for agency chief executive officers. This increased accountability provided Financial and Information Technology directors, who sought to run their own financial systems, an opportunity to bring them inside the agency. As a bonus, the increased responsibility of these systems meant increases in salaries for some finance and IT directors.

A close look at the governance policies of the IPB, however, demonstrates a more centralisation strategy e.g. the lead agency concept. The IPB's influence on Queensland Government's financial system landscape, however, was minimal suggesting their IT monarchy governance approach was quite powerless.

4.15.3 Technical Conditions

Technical conditions reflect general developments in computer infrastructure. The conditions in this group include client server technology; single database ERP systems availability; and, widespread use of PC Graphical User Interface (GUI).

Generally speaking, in a Business monarchy governance archetype, technical considerations are insufficient to bring about change in a major system unless there is a terminal issue. Later we will consider the Year 2000 issue that lead to Dun & Bradstreet no longer supporting the software. At this point in the history, however, the Year 2000 problem was not a mainstream issue until later in 1995.

The trend towards client-server architecture was fully in swing during the early 1990s and was creating a 'bandwagon effect'. The client-server architecture suited the developing trend towards decentralisation.

4.15.4 Political Conditions

The single political condition was FISB wanting to retain their central position in an increasingly decentralised environment. This cultural corporate self-protection mechanism drove internal FISB corporate strategy. As discussed previously, essentially this condition was not one that drove the change but it did affect the decision process and the shape of the implementation strategy.

FISB had five principal roles in the pre-SAP era that they were naturally inclined to replicate post-SAP:

1) Software licence management – buying licences for the software centrally and re-selling these to departments

2) Implementation support – limited to the occasional module in later years however many long-term staff had significant MSA implementation experience

3) Technical Management – oversight of the central infrastructure arrangements at CITEC and limited facilities management responsibilities

4) Software Support – provided by a group of senior system consultants with detailed knowledge of the old QGFMS software and

5) Training – development, management and delivery of training in the software. FISB earned revenue from this training activity.

The forthcoming SAP era brought about significant changes to these traditional activities unravelling the central nature of FISB's role. The slow and steady decentralisation of financial system management was not driven by FISB but rather developed around them. Centralisation of the management of financial systems had been successful for over ten years in Queensland Government. How did this central management dilute over time? More importantly, what conditions arose that created the re-centralisation of financial systems management in the Queensland

Government? These are the focusing questions of the next part of this historical recount.

Part 2: Rolling out SAP R/3

Focusing Questions: What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government? How did FISB's central management dilute over time?

4.16 First adopter: Queensland Transport -1995

Transport was a key player in the selection of the new generation QGFMS. Treasury and Transport jointly project managed the selection process. Transport was one of three agencies represented on the QGFMS Strategic Advisory Board. Transport planned to be the first department to implement the new system. Irrespective of the outcome of the selection process, Transport wanted to commence implementation and acceptance testing of the New Generation QGFMS in February 1995 (QSAB Minutes, Oct 1994, p. 2). The tender included the opportunity for an implementation partner to install a 'pilot' system in Transport. Coopers & Lybrand tendered with SAP and secured that consulting engagement.

The Transport implementation project was called the Financial Information Management System project or FiMS. Planning commenced immediately following selection with a Project Charter being drafted between January and May 1995 (Niehus et al., 1998). The project's goal was to "deliver productivity gains and enhance financial resource management through the redesign of business processes, increased efficiency in the processing of business transactions and the delivery of enhanced management information" (Queensland Transport Project Charter, 1995).

Management chose a phased implementation strategy (FiMS Implementation Strategy and Plan, 1996) with Phase 1 scheduled for July 1996, which included core modules such as Financials, Controlling and Materials Management, and Phase 2, which included Logistics and Project Costing, scheduled for July 1997. This plan, however, was upset by the machinations of the democratic processes.

A State election was held in November 1995 and the Labor party's majority in Parliament was reduced to just one seat. The subsequent overturning of the election result in the seat of Mundingburra created a 'hung parliament' forcing a by-election that was subsequently won by the conservative (National-Liberal) Coalition. With the support of the new conservative One Nation party and an independent,

the Coalition took government in early 1996, ousting the Labor party from power. Labor had been in power for six years and had set the financial policy and systems agenda.

The Coalition immediately restructured several government departments. Reversing the 1989 merger, Transport was split back into two departments: Transport and Main Roads. Main Roads' immediately outsourced its operational IT services to Transport's Information Resource Management Division. This 'Machinery of Government' change significantly affected the implementation of SAP R/3, causing extensive rework of the underlying business models. The Financial Management Reform Steering Committee, the project board overseeing the SAP R/3 implementation in the two departments, signed off the new configuration blueprints in August 1996 and the "go live" event slipped back three months to October 1996.

Abiding by the Public Finance Standards policy established in 1990, Transport and Main Roads implemented SAP to account using, and report on, both a cash and accrual basis in the 1996-7 financial year. Unfortunately, the first year of operation did not go smoothly and there were problems reconciling these two modes of accounting and reporting. The Auditor-General reported to Parliament that in 1996-7 there were system configuration problems in the Transport and Main Roads SAP implementation which resulted in imbalances between the Treasury Reporting Financial Module (TRFM) used for cash reporting and their General Ledgers which are used for accrual accounting. These imbalances amounted to overstatements of expenditure of $23.4M in Main Roads and $1.6M in Transport. Main Roads experienced a discrepancy in expenditure of $20.8M in the following year causing severe delays in the publication of its final accounts. During the 1997-8 financial year Transport also identified overstatements of revenue totalling $18.5M (Queensland Audit Office, 1999).

In responding to these issues the Director-General of Queensland Transport advised: "It is apparent that the current configuration of some accounts for cash reporting is inconsistent with the appropriate treatment for general reporting purposes". As a result, the two departments combined their financial management and SAP management even further to address the ongoing problems associated with the poor initial configuration of SAP. This change in the departmental structure was the first

since SAP was implemented in the Queensland Government. The complexities of changing the configuration of SAP became a consideration in the management of departmental finance operations. Shared service arrangements began to develop as a way of reducing the effects of machinery of government changes and to concentrate financial and systems expertise. While there may have been some savings through economies of scale, the shared services concept in this early case was driven by knowledge needs.

Questions arose in Parliament about the costs of the Transport/Main Roads SAP implementation. On 12 June 1997 in the Estimates Committee (an annual parliamentary financial review process) the General Manager responsible for the SAP project, Bill Turner, was asked to justify an estimate of $28M spent on the SAP project so far and the $1600 a day consultant costs. Turner responded that the amount expended to date was more like $15M but perhaps the figure of $28M took into account the planned Phase 2 and replacement HR systems. Turner further stated that the SAP project was not over budget. The Member of Parliament who was questioning Turner countered by asking whether the 'good basic business practice' of bank reconciliations had occurred over the last six months. Turner responded that there were problems in this area but they were not associated with SAP, per se, but rather problems where people had not followed 'laid down procedures' (Hansard, 1997). This could have been a veiled reference to weaknesses in the change management associated with business process re-engineering efforts that accompanied the SAP implementation.

The issues raised in these parliamentary sessions were indicative of the themes and myths arising around the SAP implementations across the Queensland Government. These included: Was SAP really worth it? Why is it so expensive? Was it able to do the job adequately? Why are consultants being paid so highly when the system configuration was failing? Weaknesses were appearing in the joint decision to select SAP. As the central agency responsible, FISB was continually associated with, and partially blamed for, any issues arising. SAP, QGFMS and FISB were inseparable in the perception of the client agencies.

4.17 FISB Support Centre – 1995

FISB had been the central player for QGFMS since 1983. They were still

supporting the Dun & Bradstreet system, which was taking on the appearance of a legacy system, and saw themselves as central to the SAP (also called New Generation QGFMS or NG QGFMS) rollout. Having settled the contract negotiations with SAP in early 1995 they formulated a plan to set up a SAP Support Centre.

The Support Centre would develop Government-wide system requirements, provide assistance with SAP business cases, develop a Standard Systems Model for use by departments as an advanced starting point for configuration, develop architecture models, and generally promote SAP as a viable alternative to Dun & Bradstreet (FISB Support Centre Project Proposal, 16 June 1995). Note that at this stage departments did not have to adopt SAP; it was still being positioned as an alternative system.

FISB contracted an experienced SAP project manager from BHP IT, Kaz Syziak, to lead the Support Centre project. The centrepiece of the Support Centre was to be the Standard Systems Model.

In the SAP marketplace, other industries (e.g. automotive) had developed similar configuration models. A Government template did not exist. The Queensland Government was the first major government customer for SAP R/3 and so an opportunity existed for the generation of revenues from such a model. FISB wanted this model development to be a whole-of-government effort so they recruited personnel from interested early adopter agencies to assist in its development. The early adopter agencies that participated in the Standard Systems Model project included Families, Treasury, Economic Development, and Transport. The project team completed the model in December 1995 (FISB Support Centre Project Report, 1995).

Clive Leckenby stated in his interview that the model was used by other departments implementing SAP although the extent of its use varied (ranging from 20% to 80%) from department to department (Leckenby transcript). Leckenby noted that Police was one department who used it extensively. Departments who employed the Standard Systems model appreciated that they didn't have to "re-invent the wheel". The Standard System Model provided a vehicle for FISB to maintain their central role in the SAP rollout.

4.18 1995 – 1996 Early Adopters

The three early adopters of SAP R/3 in the Queensland Government were the Departments of Transport and Main Roads; Department of Families, Youth and Community Care [Families]; and a partial implementation by the Corporate Services Agency of the Department of Primary Industries.

The international accounting and consulting firm, KPMG, assisted Families to implement SAP R/3. Families' staff worked with the FISB Support Centre to develop the Standard Systems Model. The Families SAP implementation was essentially an instantiation of this model. Families had a very socially focused culture and tended to spend every spare dollar on their social programs e.g. at-risk children. The staff in their administrative programs were used to working on tight budgets. One way they saved money was to run their entire technological environment on Unix. They were the only Queensland Government agency to do so. Being relatively small in size and simple in financial structure, with financial management staff who understood accrual accounting, Families successfully implemented SAP General Ledger running both cash and accrual ledgers. They went live in July 1996 (Estimates A – Legislative Assembly, 10 June 1997) and were the first department to do so.

The Corporate Services Agency piloted the fixed asset system in Forestry going live in July/August 1997. The Department of Mines and Energy also implemented fixed assets at the same time.

Over the course of the period 1995 and the first half of 1996, the early adopters were reliant on their implementation partners and FISB as their primary source of SAP knowledge. There was no existing pool of expertise within the Queensland Government, or the Australian marketplace in general, from which departments could draw trained personnel. The development of expertise in SAP during this period was facilitated predominantly via formalised training provided by FISB and supplemented by SAP trainers and implementation partner staff.

4.19 1995 – 1996 SAP Training begins

Training was a primary source of revenue for FISB under the 'user pays' regime. FISB immediately saw the requirement (and opportunity) to develop and provide

SAP training to an increasing stream of Queensland Government adopters. In mid 1995 they tendered for a company to develop training based on the Standard Model and selected a consortium comprising Coopers and Lybrand (configuration experience), Documentation Associates (manuals) and Donaldson Consulting (end-user training). Together, they developed an eight day implementation course delivered by FISB staff. These training courses began in 1995.

During the first half of 1996, numbers in the Dun & Bradstreet training courses started to drop off considerably. Take-up of the SAP training was vigorous with 1000 person days of training having been delivered by January 1996 (Support Centre Project Report to QSAB, 31 January 1996). Midway through 1996 FISB published their last training schedule of courses for the DBS systems.

4.20 1996 – 1997 A Flood of SAP Implementations

There was a big push to migrate over to SAP (Informant - Leckenby) in 1996. The Corporate Services Agency (CSA) was formed in 1996 to meet the combined administrative, financial and human resource needs of four government agencies: Department of Primary Industries, Department of Natural Resources, Forestry and State Water Projects (Accenture, 2004). Following a business case developed during 1997, CSA tendered for and subsequently selected an implementation partner to assist in the implementation of SAP within the five agencies (the four listed above and CSA itself). CSA selected Accenture as their implementation partner and, after some delays late in the project, went live in November 1998.

Public Works and Housing began implementing SAP also using Accenture as its implementation partner in late 1996. Some parts of this very large department went live on 1 July 1997, with the rest of the divisions transferring to SAP on 1 July 1998 (Queensland Treasury, Managing for Outcomes: Output Costing guidelines, September 1998, p. 94).

Education began implementing SAP with Price Waterhouse in 1997 and went live in May 1998 (Education Queensland Annual Report 1997 – 1998). Queensland Health began its implementation in 1997 with a plan to roll SAP out over two years. Several other smaller departments were also starting their SAP implementation processes at this time including the powerful Department of Premier and Cabinet

(with Price Waterhouse Coopers), the Department of State Development, the Queensland Treasury, the Queensland Audit Office and the Corporate Administration Agency. The Department of Employment, Training and Industrial Relations (DETIR) began work, but took a non-traditional path for such a large department. Here, rather than using an implementation partner, they hired individual expert contractors coordinated by an externally contracted project manager. This approach was not successful for DETIR. Ultimately, the whole SAP implementation was reviewed by PriceWaterhouseCoopers who then re-implemented the system in a more effective manner.

This spate of SAP implementations was a boom time for implementation partners. They did not, however, have sufficient expertise or sufficient numbers of personnel to staff these consulting engagements.

4.21 1997 The SAP expertise Boom

The world-wide market for SAP R/3 was booming in the mid to late 1990s and demand for staff was very high. Vayo (Interview Transcript, 2004) reported that once they went 'live', most Queensland Government departments immediately lost their skilled staff.

Skilled and experienced SAP staff working in the government could sometimes double their salaries by moving into implementation partners or just contracting to implementing organisations. The demand was world-wide so the combination of international travel, guaranteed employment and high wages attracted many people. Several FISB staff left to join the big accounting firms.

The public sector was forced to develop policy aimed at retaining SAP staff. In 1997 The Office of the Public Service, a central human resource policy body, created a SAP retention allowance. This allowed departments to pay up to 20% loading to all staff with SAP skills. The allowance was implemented for a three-year time period. The allowance stopped 'classification creep', the phenomenon of staff being promoted to more senior positions to match their salaries to temporary market conditions. CV noted that some departments did not employ the SAP loading and promoted their SAP experts. The SAP expertise marketplace collapsed in 2000 yet these staff are still being paid excessive rates four years later for performing similar

work and with similar responsibilities to other staff at lower rates.

In the Auditor-General's report (No 3, 1999b) he advised agencies to 'ensure that appropriate implementation methodologies, including strategies for dealing with the loss of key staff, were adopted to provide for the efficient operation … of these systems'. For many departments, however, there was little they could do to retain staff during this period.

4.22 1996 – 1997 Corporate Administration Agency Breakaway

Apart from the financial services outsourcing arrangement between Transport and Main Roads, the Corporate Services Agency and the Corporate Administration Agency were two other early movers to a shared services model in the Queensland Government. The Corporate Services Agency was set up to service the Department of Primary Industries, Forestry, State Water Projects, and the Department of Natural Resources. The Corporate Administration Agency began servicing the State Library of Queensland, Queensland Museum, Criminal Justice Commission, and the Queensland Board of Secondary School Studies. Compared to other State Government agencies, the customers of the Corporate Administration Agency were very small, with between 5 and 150 employees.

Initially, the Corporate Administration Agency implemented SAP. Faced with its first upgrade, and suffering from high salaries, consultant expenses and infrastructure costs associated with SAP, it conducted a cost-benefit analysis that concluded they would save $300,000 per year by converting to a local financial software product, Finance One from Technology One (Technology One Case Studies). CV reports that many government people were surprised to see that Corporate Administration Agency has succeeded in gaining an exemption from SAP from Treasury and the Information Policy Board. It was another sign that FISB was unable to sustain its centralist approach even after a whole-of-government process to choose a replacement to Dun & Bradstreet software.

The Corporate Administration Agency implemented Finance One during 1997 and 1998. It has been running successfully ever since. Like most departments, Corporate Administration Agency uses CITEC to host its infrastructure.

4.23 1996 - 1997 CITEC SAP hosting facility

CITEC had been hosting the QGFMS infrastructure since its inception and continued to host departments' hardware during the decentralisation to individual SAP instances. The introduction of SAP R/3 to the Queensland Government was a boon to CITEC who were well placed, through guaranteed business from Queensland Government agencies, to set up one of the world's first SAP bureaus (CITEC web site).

FISB set up a purchasing arrangement (code name PS71) with CITEC based on capacity units. A capacity unit is CITEC's proprietary measure of infrastructure usage. Since a driver for change to SAP was cost savings, when CSA found they weren't saving anything on CITEC charges following their conversion to SAP, they entered lengthy negotiations to reduce the cost of the capacity unit (Vayo Transcript). CSA entered these negotiations buoyed by the fact that similar deals had been struck between CITEC and other departments including Transport and Public Works (CITEC's parent department).

In effect, the poor negotiation of PS71 was a further undermining of FISB's effectiveness in its central role managing financial systems across the Queensland Government. Whereas previously FISB could better monitor usage and exert more influence in facility charges because of the central nature of the Dun & Bradstreet software, the decentralisation of the systems provided CITEC with the opportunity to negotiate individual contracts either privately or based on PS71. CITEC could effectively 'divide and conquer' in their negotiation strategy leaving FISB to shoulder the blame for increased costs to those departments who had less capacity or skill to negotiate directly in an effective manner.

4.24 1996 – 2000 Major Policy Changes

Australian Accounting Standard (AAS) 29, requiring government departments to report their financial statements on an accrual basis, came into effect in the 1996-7 financial year. The Queensland Government was also introducing accrual output budgeting in the 1998-9 financial year. The effect of these financial policy changes was fundamental with widespread consequences for financial systems processing.

The introduction of AAS29 meant that departments had to report both accrual and

cash-based financial statements. The accrual statements were to satisfy the reporting requirements of AAS29 and the cash-based statements used to support the existing cash centric budgeting process. One consequence of this dual based reporting was problems with reconciliation of the accounts.

Accrual output budgeting was the basis of Treasury's new policy universally called Managing for Outcomes. Now, not only would accrual output budgeting change the budget process from a cash-based system to an accrual based system but it also would underpin a change in the focus of performance from an input focus to an output focus.

Explaining the difference in simple terms, cash-based systems report the amount of cash expended (input) on government programs, whereas, an accrual-based system reports the change in the asset base (outcome) for which the government is responsible, making the appropriateness and effectiveness of spending more transparent. For example, if the government spends $200 million on road repairs in one year, under a cash system this can appear to be an impressive and appropriate amount for that purpose. If however, the road network's worth is $3 billion dollars at the start of the year and depreciates (through wear) to $2.8 billion dollars (the outcome) even after spending $200 million on repairs, the appropriateness and effectiveness of that expenditure is more transparent.

From a technical point of view, departments had to implement a separate costing module (SAP Controlling Module) because the General Ledger in the SAP Finance Module did not have the account/cost centre structure of the Dun & Bradstreet System. The 1998 Queensland Treasury Management for Outcomes: Output Costing Guidelines suggested to departments that if they sought to use SAP for costing that they seek expert advice from FISB in Queensland Treasury.

The aims of the Managing for Outcomes policy have a striking similarity to those in the 1994 Financial Management Standards developed by Graham Carpenter. They focused on promoting quality, client responsive services, maximising value for money in service delivery, and improving resource allocation in decision making (Carpenter, 2000).

The government was now focusing on Managing for Outcomes and a primary vehicle for reform of services. Not only did the financial systems have to

support this new focus but the management and effectiveness of these financial systems were also now coming under closer scrutiny.

4.25 1998 - 1999 A Key Player leaves and FISB is no more

Following a long and successful career in the public sector, Graham Carpenter, previously head of the Financial Management and Systems Division and driving force behind the Financial Management Standards, the introduction of SAP, the initial Managing for Outcomes development and guiding hand for the implementation of AAS29 into Queensland Government, left to become a partner with BDO Kendalls in 1998 (BDO Kendalls website - www.bdokendalls.com.au/00_pdf/CV_GrahamCarpenter.pdf). As a consultant to the Queensland Government, he was still influential in the development of financial policy and its implementation, however, his role as the sponsor (and possibly protector) of FISB ended.

In June of 1998, the minority Coalition Government lost their tenuous hold on power and a Labor Government was elected in Queensland, with the support of an independent MP. This event triggered a number of changes in organisational structure and senior personnel across the Queensland Government departments. With a Labor Ministry back at the helm, a new Under-Treasurer, Gerard Bradley, was appointed to lead Queensland Treasury. After an initial settling in period Bradley moved to restructure Queensland Treasury.

This restructure of Treasury saw the demise of FISB and the establishment of the Office of Financial Systems and Training (OFST) in 1999. Financial Management policy was moved to the Economics Division. John Mason, who had been director of FISB since 1992, was made Acting Executive Director of this Office and now reported directly to the Deputy Under-Treasurer. The focus of the OFST was to provide training services to support financial management improvements, lead agency services and to maximise the benefits of QGFMS (1999 Queensland Treasury Strategic Plan). Some technical SAP experts were transferred to CITEC in the restructure, depleting the group's capacity to provide support services and advice. The remaining consultants administered licences, developed broad guidelines such as security (Public Accounts Committee Report no 55 – Review of Auditor-General's

Reports, 1999-2000, p. 6) and some limited technical support. The implementations were in their final stages or completed, so demand for implementation support was dropping off. Agencies were now contacting SAP directly for ongoing support (Vayo Transcript, 2004) as the SAP knowledge base diminished in Treasury.

4.26 Year 2000

The OFST lasted for about 18 months before it was subsumed into a broader function called the Office of Financial Management (OFM) in 2000. This Office brought back together Financial Management policy and Financial Systems management. It had responsibility for the transition to Managing for Outcomes and an emerging project that extended this policy called Aligning Services and Priorities. Leckenby (Transcript) reports that when OFST closed down all SAP training stopped completely. OFM trained in financial management policy only, such as Managing for Outcomes and the Goods and Services Tax (GST). OFM still had responsibility for the administration of the SAP systems, licences, policy, some power over funding and to a slight extent, whole-of-government strategy for SAP, but compared to its responsibility for Managing for Outcomes and the emerging Aligning Priorities and Services Projects, financial systems were a minor concern.

Most departmental implementations had finished by 2000. Treasury had taken the decision not support the Dun & Bradstreet software beyond 2000 back in 1994. Dun & Bradstreet themselves were no longer supporting this legacy software leaving the only alternative as SAP or, in the case of customers of the Corporate Administration Agency, Finance One.

The end of the implementations led to a subsequent drop off in SAP demand. The 'bust' had come. Consulting companies could no longer sustain their large numbers of SAP specialist staff. Scores of consultants were made redundant and the salary levels collapsed. The SAP retention allowance lapsed in 2000. SAP support staff were now in plentiful supply reducing the overall cost of running the systems.

About this time, the first round of SAP upgrades were being implemented and while some departments hired implementation partners to assist them (e.g. Premiers), many did not. Instead they hired specific SAP expertise and managed their own upgrade processes. New upgrades of SAP were providing the required functionality to the

Queensland Government that had previously not been available in earlier versions. This was allowing agencies to 'back out' modifications simplifying the management of the software and lowering the total cost of ownership. OFM were encouraging agencies to review other previous modifications to see whether they were really necessary. Notwithstanding this better alignment to the standard SAP software, some major upgrades to Version 4.6c were more expensive than the original implementation (Chris Turnbull, Notes of Meeting, 11 Sept 2000). A couple of departments chose to change software rather than upgrade. Q-Build in the Department of Public Works changed to Mincom software (Auditor General of Queensland report no. 1, 2000-2001) and the Queensland Audit Office changed to Navision (Queensland Audit Office Annual Report, 2000/2001). The Audit Office estimated that cost savings accruing to this change would offset implementation costs over a period of 18 months.

SAP had been a part of the Queensland Government financial systems landscape for 7 years and while many agencies were happy with its operation, there were still questions over whether the benefits justified the costs. OFM had initiated a 'benefits realisation' program' and published a Guideline on how best to achieve this (Benefit Realisation Guidelines, 1999) but some within the Queensland Government were still concerned that such benefits could not be achieved by individual departments. The Aligning Services and Projects process initiated a whole-of-government review of all internal services, including QGFMS, to assess their contribution to Queensland Government agency outcomes (Queensland Government Budget Paper No. 2 for 2001/2002).

4.27 The Shared Services Initiative

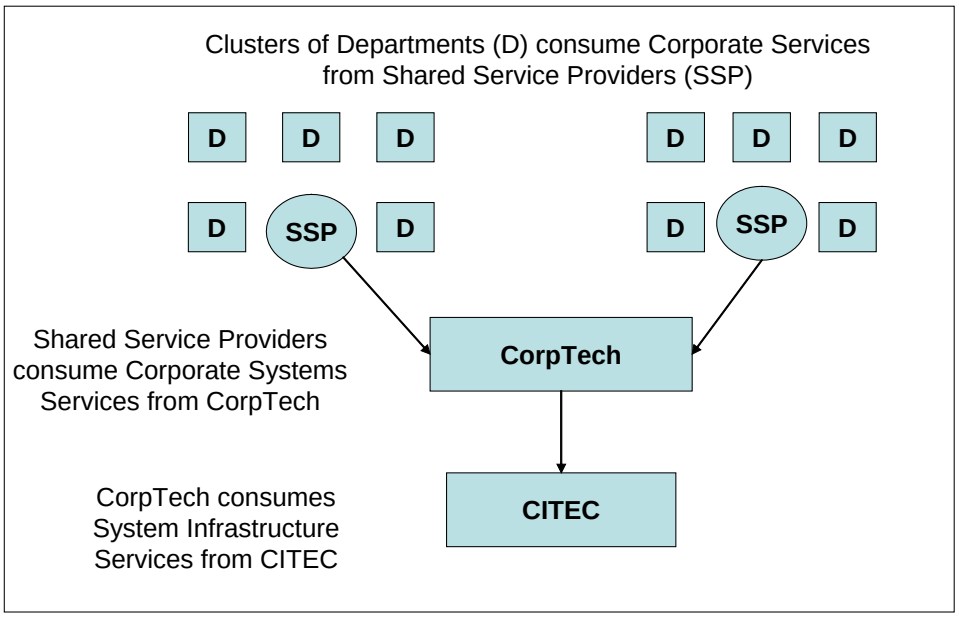
There were four major reviews arising from the Aligning Services and Projects project. One of those, the Corporate Services Review, directly affected the operations and management of QGFMS. One outcome of the Corporate Services Review was the decision to establish a Shared Services structure. A Shared Services approach standardises business processes, consolidates technology and pools resources and expertise to deliver a seamless, cost-effective and client-focused service (Shared Service Implementation Office, Fact Sheet 1, December 2002). The services include Finance; Procurement; Human Resources, including Payroll;

Document and Records Management; Property and Facilities Management; and the corporate systems (including QGFMS) that support these functions (Queensland Government Shared Service Initiative, 2004).

Essentially the Queensland Government was implementing Business Process Insourcing around clusters of agencies. Seven Shared Service providers would service the needs of the Queensland Government agencies. An eighth entity, Corptech would provide specialist shared services in corporate service applications (software used within corporate services) and systems infrastructure (computer networks) (Queensland Government Shared Service Initiative, 2004).

The new structure for providing financial services was tiered vertically. While the provision of the business processes was not fully centralised, the provision of the systems, including QGFMS, was moving towards a fully centralised model. The resulting structure is described in Figure 4.1.

Figure 4.1 - Shared Services Structure in Queensland Government



This new arrangement meant that all the SAP systems would be managed by CorpTech.

4.28 2003 CorpTech

CorpTech was officially established on 1 July 2003 as a Division of Queensland Treasury, initially employing over 250 staff. Departments officially

transferred SAP support staff to CorpTech on that day, although the physical relocation of staff took longer. Each departmental support team was still looking after their existing SAP instances but the initial consolidation effort allowed for better coordination and use of the capabilities within the new regime. At the time of establishment there were 27 different SAP systems. In an address to industry (CorpTech Address, 2003) the new Executive-Director of CorpTech, Geoff Waite, foreshadowed that this number of systems would be reduced to between six and eight common systems by the end of the transition period in June 2006.

Their transition strategy was to use business process engineering techniques to map and develop common processes across the shared service providers. Following the development of these common processes, they would then move the customers onto a smaller number of generic systems. The transition was initially expected to take three years and the Government accepted that such a transition would have a significant cost (Shared Service Initiative Business Plan, 2002). Two years into the transition period, CorpTech would move to the jurisdiction of the Department of Public Works.

As at the beginning of 2005, eighteen months into the transition period, the number of employees and contractors in CorpTech exceeded 400 and staff were concerned that they would not make the 2006 deadline. The support of the SAP systems had been effectively centralised seven years after the first implementation at Families. FISB was no more but a new central function was now established to meet the coordination, support, licensing and management of QGFMS.

4.29 Discussion

It is illustrative to discuss this second period using the four set of conditions outlined in the discussion of the first period. In this discussion the Political and Governance conditions have been combined.

4.29.1 Business environment conditions

Most of the major reform of financial management in Government had been formulated in the early 1990s and implemented during the middle to late 1990s. Such reform included changes to government financial reporting encompassing accrual accounting and budgeting and commercialisation of several government

activities.

Some reforms were developed further during the second period (1994 – 2004) such as downsizing in corporate services. The Queensland Government's policy of shared corporate services has had a major impact on the management of QGFMS, with outcomes yet to be realised. It is important to note that the shared corporate services initiative was not driven by cost savings arising from the merger of different SAP instances but rather from wider cost savings arising from the central management of common corporate service processes. The expectation of the architects of the Shared Service Initiative seemed to be that SAP would flexibly adapt to the new common processes designed for the shared service providers.

More recent government reforms such as Managing for Outcomes and Aligning Services and Priorities did not require changes to the financial systems but rather were concerned with how they were employed and subsequently managed. Their effect mostly impacted upon the Governance of QGFMS.

4.29.2 Governance and Political Conditions

During the late 1990s the central governance of QGFMS effectively dissipated. FISB and its descendants lost control of QGFMS as it decentralised into individual systems across the Queensland Government. Over time, they lost responsibility for a number of functions such as central purchasing of CITEC capacity; technical management; implementation support; and the development and delivery of central training.

Governance reverted to a Feudal system, where the local Finance Directors and IT managers made their own decisions about the management of the SAP systems. The Monarchy had weakened. Treasury had almost lost all of its leverage to influence the direction of these systems with the exception that they were still managing SAP licences centrally. Furthermore, from a knowledge perspective, the depletion of their SAP expertise gave them little credibility with the departments.

The creation of CorpTech was a reassertion of the Business Monarchy archetype that existed during the Dun & Bradstreet years. In fact, given the centralisation of departmental support staff into CorpTech (a situation that FISB never enjoyed) this created an even stronger centralist regime. During the same period, the centralist

Information Policy Board had also lost authority within the Queensland Government; hence CorpTech had no IT Monarch to whom it had to attend. CorpTech attained virtually total control on the QGFMS environment.

CorpTech's customers, the Shared Service Providers, dealt directly with their departmental customers, meaning that CorpTech was virtually removed from direct agency influence. It currently enjoys total authority but, of course, with this comes total accountability.

4.29.3 Technical Conditions

Technical conditions reflect general developments in computer infrastructure. The major technical innovation that developed during this 'second period' was the establishment of the world-wide-web. While the continuous upgrading of SAP does drive increases in computing infrastructure, the underlying infrastructure has changed little since SAP was first implemented in the mid 1990s.

One emerging infrastructure sourcing strategy is the internet based Application Service Provider. SAP provides this service under its mySAP banner. To date, the Queensland Government has not considered this option and continues to build and maintain its own systems.

Another emerging technical trend driven by the internet, which has also been affecting some operations in the Queensland Government, is electronic commerce. To date there are only pockets of electronic trading by Queensland Government agencies, and some division in strategies employed across policy makers in this area. For a full description of the state of electronic commerce in the Queensland Government see the appended case study "The Return of the JEBI" (Gable et al., 2004).

4.30 Summary

This historical narrative was developed using the historical methods outlined in Chapter 2. The purpose of this narrative is to provide a context within which the various studies, described in this thesis, can exist. It should be noted that many IS histories recorded, in particular those in the MIS Quarterly Special Issue (1997), do not provide any interpretation or discussion at all. They merely tell the story. While I have provided some discussion and attempted a very short analysis, this is

to satisfy the prevailing view of historiographers who insist history without any interpretation is not history at all as well as to provide an appropriate context (Stanford, 1994). The analysis is summarised below.

Overall, the plight of QGFMS is affected by four different groups of conditions:

1) Business Environment Conditions:

These conditions encompass the financial and commercial policy directions of the Queensland Government such as commercialisation. In the case of accrual accounting, for example, this policy was driven by global and national trends in government accountability. While technically the Queensland Government may have chosen not to adopt accrual accounting these global and national trends made it inevitable. Accrual accounting is inextricably linked with the drive for commercialisation.

Budget pressures on the Government pressed the need to downsize their corporate services. Their strategy was to set up Shared Service Providers who would service a number of agencies. This would have a dual effect. It effectively separates corporate services functions from agencies providing some flexibility during machinery of government changes. It also centralises the financial systems within these shared service providers thereby cutting down on the SAP instances required. In a major shift back to central systems, CorpTech became a central manager of these new SAP systems, thereby changing the governance model substantially.

2) Governance Conditions

The pendulum of governance of the QGFMS swung fully from centralisation to decentralisation and back to centralisation. This is a common tale. Pundits of both centralised and decentralised governance models extol their advantages (see Weill & Woodham, 2002). The main advantage of centralisation is control and cost saving, while the main advantage of decentralisation is flexibility and suitability of systems to the environment. Business needs and the development of decentralised financial policy drove the governance towards a decentralised model but cost savings drove it back again towards a centralised model.

3) Technical Conditions

Initially, the primary technical conditions affecting QGFMS was

client-server architecture, the development of graphical user interfaces and the integrated nature of ERP. The second technical condition affecting QGFMS was the widespread introduction of the world-wide-web, and the resulting increased communication facilities between organisations. This not only allowed this new client-server architecture to be effectively re-centralised but also drove new technical opportunities such as electronic commerce.

4) Political Conditions

The political conditions affecting QGFMS centred on the power play within the Queensland Government for control of QGFMS itself. FISB lost its central position of power during the decentralisation process. A new body, effectively recreating FISB, developed in the form of CorpTech. One could suggest that the roles that FISB had, and now CorpTech fill, were the basis of their political power in controlling the system. These include: 1) Software licence management; 2) Implementation support; 3) Technical infrastructure management; 4) Software support; and, 5) Training. Clearly, as each of these roles reduced so did the political power of FISB as the central controlling figure.

This concludes the overall analysis of this historical recount. Its purpose was to provide a rich context and, therefore, improved understanding of the research projects conducted in the QGFMS environment.

Chapter Five - Descriptive, Comparative and Reductive Statistics

5.0 Introduction

This chapter reports the descriptive statistics from the survey of 21 Queensland Government Agencies and their implementation partners who implemented SAP R/3 in their organisations in the second half of the 1990s. The study employed a three-round modified Delphi approach.

Round One of the modified Delphi method asked respondents "What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?" Responses were collated and synthesised by multiple coders into a master list of 41 major issues.

In Round Two each respondent was sent their submitted issues and the mapping of those issues into the synthesised master list of 41 issues. Respondents verified the mapping or alternately suggested mapping their issue to another issue in the master set. After this confirmation round and continued analysis of the master set a final master list of 37 major issues was derived. This final master set was used in Round Three.

Round Three of the modified Delphi method asked respondents to score the importance of the issues listed in the master set of issues synthesised from the earlier rounds.

Respondents scored the importance of these issues in each of six phases: Planning, Designing and Building, Testing, Implementing and Installing, Knowledge Management and Up-and-Running.

This chapter reports the descriptive and comparative statistics from three rounds of the modified Delphi process. Included in these statistics are: a profile of the survey population and counts of responses in each round. From the scores of the importance collected in Round Three, statistics reported include:

- Summarised scores of each issue

- Relative scores between strategic and operational organisational levels
- Relative scores between agency and implementation partner personnel and
- Selected relative scores of each reported agency.

Section 5.1 describes the study sample, which includes the Queensland Government Agencies, SAP (the vendor) and the major and minor consulting firms that acted as implementation partners. Section 5.2 describes and discusses the analysis and results of the first two modified Delphi survey rounds. Section 5.3 describes and discusses Round Three of the modified Delphi survey. In Section 5.4 the issues are ranked using the weight scores from Round Three. Section 5.5 derives major issue categories using reductive statistic. Finally section 5.6 summarises the chapter.

5.1 Study Sample

Following the selection of SAP R/3 in 1994 as the replacement for Dun & Bradstreet Software (previously MSA), Queensland State Government Agencies started implementing the SAP software, mostly with the assistance of implementation partners. Only one agency, Department of Training and Industrial Relations did not use an implementation partner. It chose to contract individual experts and project managers.

It was reported in Hansard (Estimates A 10 June 1997) that the early implementers (going partially or full "live" in 1996) of SAP were the Department of Main Roads and Transport, Department of Mines and Energy, the Department of Family Services and a group of agencies that implemented together under a shared services arrangement with the Corporate Services Agency: Department of Primary Industries, Department of Natural Resources, State Water Projects, Forestry and the Corporate Services Agency itself. This group of five agencies is not included in these comparative and descriptive statistics because they were the subject of a previous study (Chang, 2002). The results from Chang's (2002) study will be discussed further in Chapters 6 and 7.

In the next year, 1997, the following group implemented SAP:

- Department of Employment, Training and Industrial Relations

- Queensland Treasury
- Department of Premier and Cabinet
- Department of State Development
- Queensland Audit Office
- Department of Public Works and Housing
- Corporate Administration Agency and
- CITEC.

CITEC, the Queensland Government's facilities manager is a semi-corporatised entity that services not only Queensland Government agencies but also private sector customers. Administratively it is part of the Department of Public Works and Housing.

The Corporate Administration Agency is a shared service provider to a group of smaller government agencies. It initially implemented SAP but later changed to Finance One because the maintenance costs of SAP were too high. The data in this study collected from Corporate Administration Agency staff (for Round Three) pertains to the initial SAP implementation.

The rest of the major government agencies included in this study implemented SAP in 1998:

- Department of Corrective Services
- Queensland Police Service
- Department of Emergency Services
- Environmental Protection Agency
- Department of Justice and Attorney-General
- Department of Innovation and Information Economy, Sport & Recreation
- Department of Tourism, Racing and Fair Trading
- Department of Education and
- Queensland Health.

Implementation partners who assisted these agencies implement SAP R/3 included the 'Big 4' accounting/consulting firms: Accenture (previously Andersen Consulting), KPMG, PriceWaterhouseCoopers (an amalgamation of Price Waterhouse and Coopers & Lybrand) and Deloitte Consulting. Other implementation partners included BHP Information Technology and the smaller Sympatico and Purnell Webb consulting firms. The Office of Financial Systems and Training (formerly Financial Information Systems Branch – FISB) in Treasury also acted as an implementation partner. This group in Treasury provided advice, support and partially developed configuration models. A separate group in the Corporate Services Division implemented SAP for Queensland Treasury proper.

This study will treat the group (FISB) from the Office of Financial Systems and Training as an implementation partner. A representative from SAP is also included in the list of potential respondents. To avoid confusion this study will refer to the Office of Financial Systems and Training in Treasury and other implementation partners as IPs. The study will refer to Queensland Government agencies that use the services of these IPs as Clients.

In Rounds One and Three of the Delphi Survey, respondents from Implementation Partners (IP) were asked the same question as Agency respondents (*"What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?"*) and directed to answer with regards to the issues they experienced in the agencies in which they worked. IP respondents mostly completed a single survey response that reflected issues they encountered across their involvement in projects across the Queensland Government. One IP respondent provided two separate responses that reflected two different sets of issues encountered in two ERP projects. These two responses were treated separately.

To simplify future tables and provide meaningful names for the organisations represented in this study, Table 5.1 presents a three level listing of relevant organisations consisting of its full name, a short name (commonly used by employees of the Queensland Government) and an organisational code. The code will be used in tables and the short name used in discussion. Table 5.1 provides an indication of organisational size. Where number of staff in the government department is available publicly it is listed, otherwise the salary costs are reported

from the most recently published annual report. The numbers of staff in local implementation partners vary considerably and are not publicly available.

Table 5.1 – List of Organisations in this Study

Code	Short Name	Full Name	Notes
ACC	Accenture	Accenture	Implementation Partner
ATS	Families	Department of Family Services (includes responsibility for Aboriginal and Torres Strait Islanders)	1,490 staff
BHP*	BHP IT	BHP Information Technology*	Implementation Partner
CAA	CAA	Corporate Administration Agency	Approximately 30 staff
CIT	Citec	Citec	Approximately 500 staff
CJC	CJC	Criminal Justice Commission	Less than 50 staff
DCS	Corrective Services	Department of Corrective Services	Approximately 3300 staff
DEL*	Deloittes	Deloitte Consulting*	Implementation Partner
DET	DETIR	Departments of Employment and Training and Industrial Relations	Approximately 3900 staff
DII	Innovation	Department of Innovation and Information Economy, Sport & Recreation	Staff costs ~ $93m
DME	Mines	Department of Mines and Energy	564 staff
DPC	Premiers	Department of the Premier and Cabinet	491 staff
DPW	Public Works	Department of Public Works and Housing	5,607 staff
DSD	DSD	Department of State Development	Staff costs $50m
DTR	Tourism	Department of Tourism, Racing and Fair Trading	550 staff
EDU	Education	Department of Education	60,200 staff
ELC	Electoral Commission	Electoral Commission of Queensland	30 staff + approx 200 casual staff
EMS	Emergency Services	Department of Emergency Services	7,700 employees and 85,000 volunteers
EPA	EPA	Environmental Protection Agency	2,440 staff
HLT	Health	Department of Health	63,000 staff
JAG	Justice	Department of Justice and Attorney-General	2,285 staff
KPM*	KPMG	KPMG Consulting*	Implementation Partner

Code	Short Name	Full Name	Notes
MRT	Transport	Department of Main Roads and Transport	2,955 staff
PWB*	Purnell Webb	Purnell Webb*	Implementation Partner
PWC*	PWC	PricewaterhouseCoopers*	Implementation Partner
QAO	Audit	Queensland Audit Office	190 staff
QPS	Police	Queensland Police Service	11,928 staff
SAP	SAP AG	SAP AG	Vendor – local staff presence < 20
SYM*	Sympatico	Sympatico Consulting*	Implementation Partner
TRS	Treasury	Queensland Treasury	1,578 staff
TRS-P*	OFST	Queensland Treasury OFST*	Approximately 20 staff

Initially key informants in each Client and the IPs were identified. The key informant was sent a 'Survey Participants Selection Guidelines' (see Appendix A).

The key informant then identified staff in Clients and IPs that had direct involvement with SAP in an agency implementation and returned the list to the researcher. Staff could be in any role, at any level, involved with any phase and any module of SAP. Part of the Round One survey asked respondents to suggest additional staff who could appropriately inform this study. Several additional potential respondents were added as a result.

In total, 432 staff from Clients (355), IPs (76) and one local representative of SAP (1) were identified as prospective participants in Round One of the modified Delphi survey. Table 5.2 shows the numbers from each Client and IP in the study sample. While the sample approximates the 'population' of knowledgeable individuals in most of the targeted organisations, a number of both Clients and IPs did not provide a full list of staff involved in the implementations.

Table 5.2 – Profile of the Study Sample

Agency or Implementation Partner*	**Number Surveyed**	**% of Total**
Departments of Employment and Training and Industrial Relations	77	17.8
Accenture*	52	12.0
Department of Health	48	11.1
Department of Main Roads and Transport	46	10.6
Department of Education	33	7.6
Department of the Premier and Cabinet	28	6.5
Department of Public Works and Housing	28	6.5
Department of Corrective Services	27	6.3
Department of Tourism, Racing and Fair Trading	21	4.9
Queensland Treasury OFST*	16	3.7
Department of Family Services	8	1.9
Criminal Justice Commission	6	1.4
Department of Mines and Energy	4	0.9
Electoral Commission of Queensland	4	0.9
Department of Justice and Attorney-General	4	0.9
BHP Information Technology*	3	0.7
Deloitte Consulting*	3	0.7
Department of Innovation and Information Economy, Sport & Recreation	3	0.7
Department of Emergency Services	3	0.7
Environmental Protection Agency	3	0.7
Queensland Police Service	3	0.7
Queensland Treasury	3	0.7
Queensland Audit Office	2	0.5
Corporate Administration Agency	1	0.2
Department of State Development	1	0.2
KPMG Consulting*	1	0.2

Agency or Implementation Partner*	Number Surveyed	% of Total
Purnell Webb*	1	0.2
PricewaterhouseCoopers*	1	0.2
SAP AG	1	0.2
Sympatico Consulting*	1	0.2
Total	432	100

5.2 Analysis of the Modified Delphi Survey Rounds Results

The three modified Delphi survey rounds were conducted during the period April 2000 to October 2001. This section presents detailed results of the modified Delphi survey study. It provides resultant descriptive and comparative statistics from the three rounds of surveys. The section also presents detailed interpretations of the findings. A further analysis of this data by the author, based on the work of Gabriel Szulanski (1996), is presented in Timbrell et al. (2001).

5.2.1 Round One – The Inventory Round

Following the collation of a master list of staff from key informants in the responding organisations, 432 Round One surveys (see Appendix B) were mailed to the prospective respondents using email distribution software, WorldMerge.

Prior to general distribution of the survey instrument, a personalised email with a Microsoft Word document attachment, it was tested by several government personnel for comprehension, usability and clarity. Since the instrument had been previously used in the study by Chang (2002) it was quite robust and needed no changes.

Of the 432 surveys, 21 were unable to be sent due to problems with the supplied email address or contact details provided by the key informant. 130 surveys were returned yielding a 31.6% response rate [(432-21)/130]. 112 usable surveys from 15 Client organisations and 5 IP organisations were obtained from Round One. There were a variety of reasons that respondents gave for not returning surveys including: “Just joined the organisation”; “on maternity leave”; “long service leave”; “don’t

have time"; and, "left the organisation". Support for the return of the survey varied from agency to agency.

In some agencies, such as the Department of Employment, Training and Industrial Relations, a senior officer and key informant, John Moroney, urged staff to respond. In other cases, one might speculate that both Client and IP staff were reticent to record issues because they did not trust the anonymity of their comments to be preserved, regardless of any declaration made by the research team in the survey documentation. The publishing of any negative comment concerning the activities of government organisations is generally frowned upon. Implementation partners could also be wary of recording issues should they be used in any future legal dispute. Notwithstanding these barriers, 538 issues were harvested from Round One of the survey.

Table 5.3 shows the breakdown of usable responses and issues by organisation. Of these 538 issues, IP staff supplied 118 and Client staff provided 420.

The Round One survey instrument asked respondents to provide their job title and organisational role. Based on this information, staff were classified into two organisational levels: strategic – where the title or role specified or implied a management role; and, operational - where the title or role specified a functional level. Table 5.4 cross-tabulates the breakdown of usable survey respondents and recorded issues by organisational level (Strategic/Operational) and organisation type (Client/IP).

Table 5.3 – Round 1 Surveys Responses and Issues Count

Agency or Implementation Partner*	**Surveys Returned**	**Usable Surveys Returned**	**Number of Issues per Organisation**	**% of Total Issues**
DETIR	30	27	144	26.8
Accenture	13	12	53	9.9
Education	11	10	51	9.5
Transport	13	9	40	7.4
Tourism	8	7	37	6.9
OFST	13	10	36	6.7
Health	7	6	33	6.1
Public Works	7	6	29	5.4

Agency or Implementation Partner*	**Surveys Returned**	**Usable Surveys Returned**	**Number of Issues per Organisation**	**% of Total Issues**
Families	3	3	20	3.7
Premiers	6	6	17	3.2
BHP IT	3	3	13	2.4
Police	2	2	13	2.4
Deloittes	2	2	10	1.9
Innovation	2	2	10	1.9
Audit	2	2	10	1.9
Mines	1	1	6	1.1
KPMG	1	1	6	1.1
Corrective Services	3	1	4	0.7
Justice	1	1	4	0.7
DSD	1	1	2	0.4
Treasury	1	0	0	0.0
Total	**130**	**112**	**538**	**100.0**

Table 5.4 – Cross-tabulation of responses by role

	STRATEGIC		**OPERATIONAL**		TOTAL	
	Respondents	Issues	Respondents	Issues	Respondents	**Issues**
CLIENT	35	181	49	239	84	**420**
IP	10	44	18	74	28	**118**
Total	**45**	**225**	**67**	**313**	**112**	**538**

The 25% of responses that came from IP staff were predominantly operational. Maister (1993) states that there is a spectrum of three principal types of professional service practice that have three different staff leverage strategies:

- Expert – made up of mostly senior diagnosticians and strategists
- Experience – have more junior professional and para-professional staff to execute more predictable tasks and

- Efficiency – made up of mainly junior staff executing established systems and procedures.

Enterprise Systems (ES) related practices tend towards the experience – efficiency end of this spectrum (Timbrell & Gable, 2001).

The balance of strategic and operational staff represented in this survey sample is consistent with this assertion. The sample responses from the clients show that strategic level respondents had an average of 5.2 issues and operational level respondents had an average of 5.9 issues per response with an overall average of 5 issues per response. IP respondents at the strategic level returned 5.4 issues per response and 5.1 issues per response at the operational level giving an overall average of 5.2 issues per response. Consequently, the number of issues from Client respondents represented 78.1% of the total issues while the IPs provided 22% of the total number of raw issues. These results, summarised in Table 5.5, show consistency in the number of issues reported in each response across all groups.

Table 5.5 – Cross-tabulation of Respondents by Role

	STRATEGIC		OPERATIONAL		COMBINED	
	Issues		Issues		**Issues**	
	% of total issues	Average Issues per respondent	% of total issues	Average Issues per respondent	% of total issues	**Average Issues per respondent**
CLIENT	33.6	5.2	44.5	4.9	78.1	**5**
IP	8.2	4.4	13.7	4.2	21.9	**4.2**
COMBINED	**41.8**	**5**	**58.2**	**4.7**	**100**	**4.8**

The first round of this modified Delphi study was to create an inventory of issues raised by the stakeholder groups. These issues were collated in an Access database and then printed onto individual cards. Each card had an issue code, assigned by the researcher, and the issue title and description provided by the respondent. The issues were then synthesised by a group of three coders with three different perspectives.

These three coders were:

- the researcher, experienced in ERP and the Queensland Government

- Errol Smythe, a research assistant with no first hand experience in ERP or the Queensland Government but had assisted in the coding of a previous similar study (Chang, 2002) and
- Michael Schoch, a senior Queensland Government official with experience in ERP.

Working together the three coders created eleven preliminary major issue categories – Table 5.6. These issues are in no particular order.

Table 5.6 – Initial List of Major Issue Categories

Knowledge management and training
Impact on the organisation and/or whole-of-government business processes
Reporting
Implementation partner and implementation team
Change management
Financial Cost
Support
Systems and technical
Method and management of implementation
Requirements – 'closing the gap'
"Happy campers" – the reported issue was positive in nature.

In a second round of coding, the coding team broke the above major issues into groupings of greater refinement eventually ending up with 41 possible issue categories.

A fourth coder with experience in training and knowledge management worked with the researcher to classify those issues initially categorised to the Knowledge Management and Training issues group. The issues in the Knowledge Management and Training group were split into the following categories:

- Knowledge re-use
- Staff retention and knowledge
- Knowledge of the business

- Training method and management and
- Knowledge of the system.

After extensive grouping and re-grouping, the coders finalised the list of 41 major issue categories and assigned the respondents issues to these categories. Table 5.7 lists these 41 major issue categories. For cross-referencing purposes, the list includes the issues' reference number applied in the Round Three survey and employed throughout the thesis.

Table 5.7 – 41 preliminary Issue Categories from Round One

Description	**# of times reported**	**% of issues**
[21] The training method or management was inadequate.	55	7.77
[27] The reporting from the SAP system is inadequate.	42	5.93
[15] The project suffered from individual or team lack of knowledge of the organisational context.	31	4.38
[34] SAP functionality is inadequate.	30	4.24
[22] There was poor executive or project management of the SAP project.	29	4.1
[10] Insufficient resources were allocated to the project.	28	3.95
[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	28	3.95
[3] The project team did not consult or communicate sufficiently.	28	3.95
[24] Users do not have sufficient SAP knowledge.	24	3.39
[28] Staff/knowledge retention strategies were ineffective.	24	3.39
[17] The SAP system is too complex.	23	3.25
[33] The SAP system suffered non-acceptance, non-use or lack of ownership.	21	2.97
[37] Systems integration was problematic.	18	2.54
[19] The staffing of the project team was mismanaged.	17	2.4
[6] SAP reporting tools are difficult to use.	17	2.4
[23] The configuration of the SAP was inadequate	16	2.26
[32] Time management and planning was inadequate.	16	2.26
[2] There was lack of stakeholder/management support and ownership.	16	2.26
[26] The organisation has/is not taking advantage of available SAP functionality.	16	2.26
[1] Ongoing running costs are high.	15	2.12
[31] The SAP system does not work as it should.	15	2.12
[*] This issue was not classified. Suggestions welcome.	14	1.98

Description	# of times reported	% of issues
[25] Help desk SAP knowledge was inadequate.	13	1.84
[*] No major issue was reported.	13	1.84
[35] SAP is generally expensive to implement.	13	1.84
[18] Systems controls were inadequate.	13	1.84
[12] SAP related documentation is insufficient.	12	1.69
[4] SAP upgrade costs are high.	12	1.69
[13] The change management process has been mismanaged.	11	1.55
[14] The data conversion was inadequate.	10	1.41
[9] The organisation has experienced downtime, slow processing or unreliable hardware.	10	1.41
[20] SAP reporting is expensive.	10	1.41
[30] The Help Desk was under-resourced.	9	1.27
[8] SAP is not suitable for small agencies/organisations.	9	1.27
[5] The testing of SAP system was inadequate.	9	1.27
[7] SAP Knowledge not re-used efficiently by agencies.	8	1.13
[36] The SAP system was adversely affected by the machinery of government.	8	1.13
[*] SAP was not a suitable choice of software.	7	0.99
[29] The SAP system was customised too much.	7	0.99
[*] The central agency mismanaged their role.	6	0.85
[16] SAP is not value for money.	5	0.71
Total	**708**	**100**

[*] These issues were not part of the 37 final issues and therefore do not have a reference number.

While coding these issues, the coders realised that many of the issues were compound in nature. Individual issue titles or descriptions provided by the respondent alluded to more than one issue. For example:

Issue ID: *52*

Issue Title: *Implementation partner*

Issue Description: *Coopers and Lybrand was the implementation partner. I would have appreciated greater understanding of operator interface issues on their part, and also a greater emphasis on interpersonal skills and building relationships with EQ staff. They seemed to have a great propensity to saying "no you*

can't do that" or "that's a procedural issue that you will have to resolve". Also some of them just did not have adequate knowledge of SAP.

In subsequent coding these issues were assigned to more than one issue category. Continuing the above example:

Issue category 1: *The Project Team did not consult or communicate sufficiently.*

Issue category 2: *SAP knowledge was lacking in the project team, consultants or the vendor.*

The coding team found 170 issues of the initial 538 'raw' issues were compound in nature. These compound issues were assigned to a maximum of two sort categories. The final number of coded issues became 708. Table 5.6 lists the 41 issues categories and the number (#) of times the issues were assigned to that category.

One category, *No major issue reported*, was created to assign responses that did not express issue with SAP. There were 13 (1.8% of the total) instances of issues assigned to this category. Two examples of responses allocated to this issue category are:

Issue ID: *251*

Issue Title: *PPS TAX*

Issue Description: *PPS Tax reporting is now all produced by SAP whereas previously it was done manually. Reports to ATO & also the individuals.*

Issue ID: *121*

Issue Title: *Help Desk Support*

Issue Description: *Crucial to end-users, and Help Desk staff should be commended for their prompt assistance with queries.*

Another category, *this issue was not classified. Suggestions welcome* was created specifically to draw suggestions during the Round Two confirmation survey.

There were initially 14 (1.98% of the total) instances of issues assigned to this category. This reduced to 13 (1.84%) after the classification of one of these issues to

the category *SAP knowledge not re-use efficiently by agencies.* Two examples of issues that were allocated to this issue category are:

Issue ID: *307*

Issue Title: *Non English design*

Issue Description: *Some report names and screens don't make sense.*

Issue ID: *428*

Issue Title: *Consultants*

Issue Description: *Allowing them to forget that it is you who is employing them.*

If you exclude these two (non-issue) categories there are 39 categories remaining. Dividing these 39 categories into three equal sections, the first thirteen categories represents 55.9% of the total count of categorised issues; the second section of thirteen represents 28%; and, the third section of thirteen represents 16.1%.

While it might be interesting to consider the top ten or top twelve of these issues based on counts of category allocation, the Round Three survey that asks for measures of issues' importance will provide a better and more comprehensive analysis of their comparative rankings.

Having finalised the categorisation of the issues in the inventory round, the researcher was ready to verify the assignment of issues to categories in the confirmation round.

5.2.2 Round Two – The Confirmation Round

Round Two of the modified Delphi survey sought to:

1) Report a preliminary list of issue categories back to the respondents
2) Provide a mapping of their reported issues to the issues categories synthesised by the research team
3) Obtain confirmation of the mapping of their issues to the issues categories presented
4) Provide an opportunity for the respondents to reassign their issues to another category should they believe that the coders did not assign their issues to the right category

5) Provide an opportunity for the respondents to suggest a new issues category should they not find a suitable category to reassign their erroneously assigned issue and

6) Finalise the set of issue categories.

5.2.2.1 Confirmation Round Survey

In Round One the study used multiple coders to synthesise the respondents' issues into 41 issue categories and, depending on whether the issue was compound or not, assigned each respondent's individual issue to one or two of the issue categories. Using WorldMerge, each respondent from Round One was sent a Round Two survey by email (see Appendix C for a sample survey and sample reply) that showed the mapping of each of their issues to either one or two issue categories. The Round Two Survey also listed all 41 issue categories synthesised during Round One.

The Round Two Survey asked respondents to check the veracity of their categories' mapping and send a return email if they wished to suggest mapping their issues to an alternative category or suggest a brand new issue category to which their issue would be assigned. Respondents did not necessarily have to respond if they agreed in principle with the mapping of their issue to the preliminary issue category.

Those respondents in Round One who returned their surveys by fax or mail had supplied email addresses in their returns. Email addresses frequently change in the Queensland Government as agencies change their departmental or division name. For the purposes of consistency of the statistical analysis in this study, I will be retaining the names of the divisions as they were at the time of the Round One Survey. The name changes do not affect the survey sample or the results. Fourteen emails failed to reach the respondents in the Round Two survey. Eleven emails had fatal delivery failures because two departments (Department of Employment, Training and Industrial Relations; Department of Tourism, Racing and Fair Trading) and one Division (Office of Financial Systems and Training in Treasury) changed the extensions on their email address resulting from name changes. These were re-sent with the correct email extensions. The other three emails failed because the recipients no longer worked at the organisation.

112 emails were sent to the Round One respondents. There were a total of 36 email responses to the Round Two Confirmation Survey. 24 responses briefly confirmed the mapping of their issues to the issue categories. Five respondents suggested alternative mappings of 8 issues to other categories. Two respondents mapped two previously unallocated issues.

Two respondents added secondary categories to four of their issues (increasing total mappings by four). Four respondents declassified five issue category mappings (reducing total mappings by five). No respondent in Round Two suggested any further issue categories.

5.2.3 Queensland Government Executive Workshop

Following the Round Two survey, a group of Queensland Government senior managers participated in a workshop to group the 39 issues into major issue categories. The agencies represented were Department of Premier and Cabinet, Department of Education, Department of Main Roads and Transport, Department of Public Works and Housing and Queensland Treasury (not OFST).

A mixture of the Delphi method (Dalkey & Helmer, 1963) and Nominal Group Technique (Delbecq et al., 1986; Ruyter, 1996) was used within the workshop to determine whether consensus about a group of major issues could be reached. As discussed in Chapter 3, Linstone and Turoff (1975) described the Delphi procedure in four phases:

1) Exploring the subject under discussion
2) Reaching and understanding of how the group views the issues
3) Exploring and evaluating the disagreements and
4) Performing a final evaluation.

Similarly as seen in 3.13, Nominal Group Technique has five steps:

1) Presentation of the topic and initial recording of ideas
2) Individuals in random order are asked to provide a response and all responses are recorded for the group to review
3) The complete set of items is reviewed and redundancies are eliminated

4) The responses are accorded some weighting of importance and ranked, and

5) Finally, the results are compiled.

The method used within the workshop consisted of the following steps:

1) A presentation of the topic was provided

2) Participants working individually grouped the issue categories into major issue categories

3) The results of the individual groupings were recorded centrally and presented to the group

4) Discussion ensued on the merits of the groupings

5) Common groupings of issues were identified and initial sets of the issue categories were allocated major issue categories. This first round was called the Unanimous Round. The remaining unallocated issues were listed as 'orphans'

6) The group then discussed the orphans and allocated several of these on a consensus basis

7) The remaining orphans were discussed further and allocated to major issue categories where two or more of the executive group agreed on their allocation.

The group identified 6 Major Issue Categories:

1) Cost is too high

2) Inadequacy of Reporting

3) Choice/suitability of SAP

4) Project Management/Implementation

5) Knowledge Issues and

6) Ownership and Organisational Support.

Four issues remained as 'orphans'.

The allocation of issues to these 6 Major Issue Categories is presented in Table 5.8.

Table 5.8 - Allocation of Issues by Executives in the Round Two Workshop

Allocation of sub-issues to Major issues	Unanimous	Consensus	Two parties agreed
Cost is too high			
[1] Ongoing running costs are high.	X	X	X
[35] SAP is generally expensive to implement.	X	X	X
[16] SAP is not value for money.		X	X
[4] SAP upgrade costs are high.	X	X	X
Inadequacy of reporting			
[20] SAP reporting is expensive.	X	X	X
[6] SAP reporting tools are difficult to use.	X	X	X
[27] The reporting from the SAP system is inadequate.	X	X	X
Choice/suitability of SAP			
[8] SAP is not suitable for small agencies/organisations.	X	X	X
[*] SAP was not a suitable choice of software.	X	X	X
Project Mgt/Implementation			
[10] Insufficient resources were allocated to the project.	X	X	X
[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.		X	X
[12] SAP related documentation is insufficient.		X	X
[13] The change management process has been mismanaged.		X	X
[23] The configuration of the SAP was inadequate		X	X
[14] The data conversion was inadequate.	X	X	X
[15] The project suffered from individual or team lack of knowledge of the organisational context.		X	X
[3] The Project Team did not consult or communicate sufficiently.	X	X	X
[17] The SAP system is too complex.		X	X

Allocation of sub-issues to Major issues	**Unanimous**	**Consensus**	**Two parties agreed**
[29] The SAP system was customised too much.		X	X
[19] The staffing of the project team was mismanaged.	X	X	X
[5] The testing of SAP system was inadequate.		X	X
[21] The training method or management was inadequate.		X	X
[22] There was poor executive or project management of the SAP project.	X	X	X
[37] Systems integration was problematic.		X	X
[32] Time management and planning was inadequate.		X	X
Knowledge Issues			
[25] Help desk SAP knowledge was inadequate.	X	X	X
[26] The organisation has/is not taking advantage of available SAP functionality.			X
[7] SAP Knowledge not re-used efficiently by agencies.	X	X	X
[28] Staff/knowledge retention strategies were ineffective.		X	X
[18] Systems controls were inadequate.			X
[30] The Help Desk was under-resourced.		X	X
[31] The SAP system does not work as it should.			X
[24] Users do not have sufficient SAP knowledge.		X	X
Ownership and Organisational Support			
[33] The SAP system suffered non-acceptance, non-use or lack of ownership.		X	X
[2] There was lack of stakeholder/management support and ownership.	X	X	X
'Orphans'			

Allocation of sub-issues to Major issues	Unanimous	Consensus	Two parties agreed
[9] The organisation has experienced downtime, slow processing or unreliable hardware.			
[34] SAP functionality is inadequate.			
[*] The central agency mismanaged their role.			
[36] The SAP system was affected by the machinery of government.			

[*] These issues were not part of the 37 final issues and therefore do not have a reference number.

The executives attending this workshop were partially responsible for the successful implementation and ongoing management of SAP in their agencies.

Some of the comments recorded through this workshop were interesting and worthy of note. Some selected comments are presented:

On the issue of SAP functionality vs. the way it was implemented:

"The majority of issues are project management issues. I thought they were unfair on the system itself."

"It's not a SAP problem; it's how it's set up"

"So many of those issues are actually… right… nothing to do with SAP at all"

"All documentation issues come under implementation issues because that is where most documentation is generated"

"When SAP was first implemented there was a lot of blaming the tool for practice or whatever and I think that's more implementation failing to a large extent."

On the issue of ongoing costs to run SAP:

"Now we're successfully recruiting SAP support people . . . we're knocked over in the rush of people trying to get out of contract into a stable job. The market has changed significantly."

"Supply has dramatically increased and it's crossed over a boundary where the contractor demand is just not there. So staff turnover is stopped. We've stopped losing people."

"I can tell you now that my department alone exceeds operating cost on its SAP system of the whole of the old Dun and Bradstreet system. Easy."

On the issue of SAP's suitability for smaller agencies:

"We're driving an 18 wheeler and we need probably only a one tonne ute and we have associated costs with that . . . So Premiers actually went through an exercise six months ago where we looked at bailing out into an alternate system.

We decided against it at that point simply on the basis that on a cost/benefit it wouldn't save us any money in the immediate."

"I think part of the reason why even some of the smaller agencies feel ripped off is that they've got a huge investment and you'd want to realise some of the benefit for that investment. You walk away from that investment and it's a sunk cost"

On the issue of Queensland Government's SAP knowledge strategies:

"I think that's the same thing with a number of people who have been through awful lot of pain and an awful lot of cost to get to where we are, and because of the bigger area of knowledge that we've now got, the skills we've now got in our own organisations, we can now start to reap some of those benefits."

"The essential thing for our learning is that outsourcing the project management as a risk management strategy, instead of being that, actually increased the risk, or resulted in the risk being realised, rather than mitigating it."

"Unless you have some kind of skills transfer process in place to pull the skills and knowledge out of those consultants or contractors, and put it into your staff. It's always costly"

On the issue of change management:

> *"Our change management was so poor from our implementation that when we upgrade we decided that the majority of the people for the project would have to come in from business areas and they should go off line ... and they would learn the system ... and then come back to the business"*

The following comments relate to the clients' desire to control their own financial information systems:

> *"The Queensland State Government doesn't see itself as a single organisation. We all see ourselves as different organisations. We are all so different in terms of what we need and it's just crazy."*

> *"And there was also a perception thing about people didn't want to be on a central system. They wanted to be able to do their own thing."*

> *"People were pounding on the door asking for that. Certainly, Transport and Main Roads probably were the leaders of the break."*

Finally, the following comments are highlighted because they provide early instances of discussion about Shared Services Arrangements in the Queensland Government.

> *"Is there any going back? We see groups like CSA and CAA and other shared services…Shared services in some of the smaller agencies was definitely an option. A single system. An opportunity for a couple of the smaller agencies to get together and share a system."*

> *"We've actually gone backwards in functionality from a whole of Government perspective. We didn't realise with the old Dun & Bradstreet system, we have a world's first on a shared services system. That was actually the leading practice in the world and we gave it away…"*

5.2.4 Final list of issues

Following Round Two survey and the executives' workshop, the 39 issue categories (excluding the two non-issue categories) and the responses allocated to these categories were reviewed. After some discussion, two of the smaller categories *The central agency mismanaged their role* and *SAP was not a suitable choice of software* were discarded and the issues re-allocated across the other categories. The issues initially allocated to *The central agency mismanaged their role* were re-allocated to *SAP Knowledge not re-used efficiently by agencies*; *Insufficient resources were allocated to the project*; and, *SAP Knowledge not re-used efficiently by agencies*. The issues initially allocated to *SAP was not a suitable choice of software* were re-allocated to *SAP functionality is inadequate*; *The SAP system suffered non-acceptance, non-use or lack of ownership*; *SAP is generally expensive to implement*; and, *SAP is not value for money*.

The resultant list of issue categories and the number of issues allocated in each category are shown in Table 5.9.

Table 5.9 – Final List of Issue Categories from Round One and Two

Issue description	**# of times reported**	**% reported**
[21] The training method or management was inadequate.	55	8.08
[27] The reporting from the SAP system is inadequate.	43	6.31
[34] SAP functionality is inadequate.	34	4.99
[22] There was poor executive or project management of the SAP project.	32	4.70
[15] The project suffered from individual or team lack of knowledge of the organisational context.	31	4.55
[10] Insufficient resources were allocated to the project.	31	4.55
[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	29	4.26
[3] The project team did not consult or communicate sufficiently.	28	4.11
[28] Staff/knowledge retention strategies were ineffective.	24	3.52
[17] The SAP system is too complex.	24	3.52
[24] Users do not have sufficient SAP knowledge.	23	3.38
[33] The SAP system suffered non-acceptance, non-use or lack of ownership.	22	3.23

Issue description	# of times reported	% reported
[6] SAP reporting tools are difficult to use.	18	2.64
[37] Systems integration was problematic.	18	2.64
[19] The staffing of the project team was mismanaged.	17	2.50
[23] The configuration of the SAP was inadequate	17	2.50
[26] The organisation has/is not taking advantage of available SAP functionality.	17	2.50
[2] There was lack of stakeholder/management support and ownership.	16	2.35
[1] Ongoing running costs are high.	15	2.20
[31] The SAP system does not work as it should.	14	2.06
[32] Time management and planning was inadequate.	14	2.06
[35] SAP is generally expensive to implement.	14	2.06
[18] Systems controls were inadequate.	14	2.06
[25] Help desk SAP knowledge was inadequate.	13	1.91
[4] SAP upgrade costs are high.	12	1.76
[12] SAP related documentation is insufficient.	12	1.76
[13] The change management process has been mismanaged.	11	1.62
[14] The data conversion was inadequate.	10	1.47
[9] The organisation has experienced downtime, slow processing or unreliable hardware.	9	1.32
[20] SAP reporting is expensive.	9	1.32
[8] SAP is not suitable for small agencies/organisations.	9	1.32
[30] The Help Desk was under-resourced.	9	1.32
[7] SAP Knowledge not re-used efficiently by agencies.	9	1.32
[36] The SAP system was adversely affected by the machinery of government.	8	1.17
[16] SAP is not value for money.	7	1.03
[5] The testing of SAP system was inadequate.	7	1.03
[29] The SAP system was customised too much.	6	0.88
Total	**681**	

5.2.5 Summary of findings from first two rounds

The results from the Round One - Round Two survey are summarised in the following:

- Round One recorded 538 “raw issues” from 112 usable surveys. Some of these issues were compound.
- After de-aggregation of the compound issues, 708 issues were synthesised into 41 initial issue categories.
- Excluding the two categories *This issue was not classified. Suggestions welcome* (13 instances) and *No major issue reported* (13 instances) and, following re-allocations arising from the Round Two Confirmation survey, the 112 usable surveys produced 512 “raw issues” that de-aggregated into 681 separate issues.
- Excluding two further categories *The central agency mismanaged their role* and *SAP was not a suitable choice of software*, and re-allocating the responses from these issue categories resulted in a final list of 37 issue categories.

The executive workshop then derived six Major Issue Categories:

1) Cost is too high
2) Inadequacy of Reporting
3) Choice/suitability of SAP
4) Project Management/Implementation
5) Knowledge Issues and
6) Ownership and Organisational Support.

5.3 Round Three – Weights Round

5.3.1 Round Three Survey Instrument

Round Three of this modified Delphi Study asked respondents to weight the importance of the final list of 37 categorised issues across six ES lifecycle phases:

Plan, Design & Build, Testing, Implement/Install, Knowledge Management and Up & Running. The phases Plan and Knowledge Management extended across the whole lifecycle. These six phases were further explained in the Round Three Survey instrument (Appendix D) and in Table 5.10.

Table 5.10 – ES Lifecycle Phases

Phase	**Description**
Plan	Involved in the business process design period across the lifecycle
Design & Build	During the design, customisation, and modification of the software
Testing	Suring the system, integration and user testing phases
Implement/Install	System roll-out including security development
Knowledge Management	Includes the training, communication and change activity period across the lifecycle
Up & Running	General usage, data entry, operation, maintenance and upgrades

For each lifecycle phase that the respondents were involved in, they were asked to rate the importance of each of the 37 issues for that lifecycle phase on a seven-point Likert scale. The scale ranged from 1: 'Not Important' to 7: 'Very Important'. Respondents were also free to include comments should they wish. A sample Round Three completed questionnaire was included in the survey (see figure 5.1).

Figure 5.1 – Sample completed questionnaire included in survey

Key Issues and Their Rationale	Please score each issue in each phase in which you were involved (1-7) where 1=not important, 7=very important						Comments
	Plan	Build	Test	Install	Know	Run	
Sample Issue 1 description	1	7	5	2	1	2	In this example, the respondent felt that Issue 1 was very important during the 'build' phase, decreasingly important during subsequent phases, and not important in terms of 'knowledge management'
Sample Issue 2 description	4				4	4	In this example, the respondent feels that Issue 2 is 'moderately' important across all phases they were involved. The respondent was not involved in the Build, Test and Install phases.

Where respondents were not involved in a lifecycle phase they were instructed to leave this section blank. The 37 issue categories were further explained in the Round Three Survey instrument (Appendix D) and Table 5.11.

Table 5.11 – Explanations of Issues Provided in the Round 3 Survey

No.*	Issue	Further explanation
[1]	a) Ongoing running costs are high.	Ongoing bureau, staff, licence and maintenance costs are high.
[2]	b) There was lack of stakeholder/management support and ownership.	Executives and other key personnel did not support OR were not committed to the project OR were not sufficiently involved in the project.
[3]	c) The Project Team did not consult or communicate sufficiently.	The project did not consult widely enough OR with the right people. Users did not know what was going on. Problems were not communicated widely or quickly enough. Issues were recorded during consultation but not acted upon. The project team did not communicate amongst themselves.
[4]	d) SAP upgrade costs are high.	Moving to a new release is very expensive AND/OR creates greater ongoing costs.
[5]	e) The testing of SAP system was inadequate.	There was insufficient testing of the system before scheduled phased rollout/go-live. Production environments were released too soon.
[6]	f) SAP reporting tools are difficult to use.	It is difficult to extract the required information using the SAP reporting and inquiry tools.

No.*	Issue	Further explanation
[7]	g) SAP Knowledge not re-used efficiently by agencies.	Knowledge about SAP (lessons learnt, common configurations) was not shared amongst the government agencies in a planned and effective manner.
[8]	h) SAP is not suitable for small agencies/organisations.	The costs and other resources to implement and maintain SAP are greater than a small agency can bear. The system is more suitable for larger organisations.
[9]	i) Organisation has experienced downtime, slow processing or unreliable hardware.	This includes: slowness, systems crashes, down-times caused by service providers, slow running reports and network problems.
[10]	j) Insufficient resources were allocated to the project.	Insufficient money and staff were allocated to the SAP project. The staff resources were inexperienced OR there weren't enough people to implement in the time period OR staff was not released from their duties sufficiently to assist in the project. There was not enough technical infrastructure/capacity to run and/or maintain the SAP system.
[11]	k) SAP systems knowledge was lacking in the project team, consultants or the vendor.	There was a lack of AVAILABLE expertise about SAP in the project team OR in the consultants assisting the project OR from the SAP company personnel. At times, no-one implementing SAP could explain the impact of a configuration decision on the rest of the system.

No.*	Issue	Further explanation
[12]	l) SAP related documentation is insufficient.	Various types of documentation were cited as being substandard or non-existent. This includes online documentation such as help files, manuals, and help desk tools. Documentation is found to be out-of-date.
[13]	m) The change management process has been mismanaged.	The importance of change management was under-estimated OR the change management effort was under-resourced.
[14]	n) The data conversion was inadequate.	Lack of data preparation has led to inaccuracies, items in suspense accounts and errors in the SAP system. Data was not cleansed properly prior to uploading to the new system.
[15]	o) The project suffered from individual or team lack of knowledge of the organisational context.	The individuals in the project team AND/OR the team as a whole did not fully grasp/understand the business requirements of the organisation leading to poor configuration and design decisions. Project team members did not have sufficient expertise in certain areas to configure and implement the system properly.
[16]	p) SAP is not value for money.	The costs associated with SAP outweigh the benefits.
[17]	q) The SAP system is too complex.	Simple processes and procedure seem to be very difficult OR the system has been configured in a complex way OR it is very difficult to support (solve problems in) the system. Inter-relationships in the system are very complex.

No.*	Issue	Further explanation
[18]	r) Systems controls were inadequate.	There is a lack of audit trails OR the security system is inadequate OR the system does not pick up on errors OR there is a lack of validation processes.
[19]	s) The staffing of the project team was mismanaged.	Inappropriate people were selected for and allocated to the project team. The selection process was flawed. People were chosen because they were available and not on the basis of their skills.
[20]	t) SAP reporting is expensive.	It is expensive to produce the reports or hire people to produce the required reports.
[21]	u) The training method or management was inadequate.	The quality AND/OR quantity of training was unsatisfactory and did not prepare users AND/ OR help desk personnel adequately. Trainers did not have sufficient experience in the software. The training strategy was poorly executed. Training has not been ongoing.
[22]	v) There was poor executive or project management of the SAP project.	The overall departmental implementation process was unsatisfactory OR Implementation strategies were unclear OR The project is still experiencing problems as a result of initial poor project and executive management OR Senior consultants under-performed.
[23]	w) The configuration of SAP was inadequate	The configuration of SAP did not accurately reflect the business process OR need of the organisation and could have been improved.
[24]	x) Users do not have sufficient SAP knowledge.	For a variety of reasons users do not have sufficient knowledge about the SAP system to run, maintain or configure it properly.

No.*	Issue	Further explanation
[25]	y) Help desk SAP knowledge was inadequate.	Users AND/OR help desk personnel regard the SAP knowledge of the help desk personnel to be insufficient to meet the needs of help desk customers. This issue relates to the quality of the SAP knowledge of help desk personnel.
[26]	z) The organisation has/is not taking advantage of available SAP functionality.	The organisation did not apply available functionality to its processes OR did not re-engineer the organisations processes to better align them with SAP OR simply does not use parts of the system that would offer some benefit to the organisation.
[27]	aa) The reporting from the SAP system is inadequate.	The reporting does not meet the needs of the users. It is inaccurate OR not usable OR inflexible OR reports do not contain the proper or necessary information to conduct business.
[28]	bb) Staff/knowledge retention strategies were ineffective.	Staff (and their knowledge of SAP) was lost to other organisations. The incentives and strategies to retain them were inadequate.
[29]	cc) The SAP system was customised too much.	There were too many add-ons, customisations and non-standard SAP programs developed.
[30]	dd) The Help Desk was under-resourced.	This issue relates to the quantity of help desk resources: particularly understaffing, lack of responsiveness, lack of staff looking after systems or knowledgeable help desk staff assigned to other duties.
[31]	ee) The SAP system does not work as it should.	There are bugs and inconsistencies in the system. The system cannot do things that it should be able to do.

No.*	Issue	Further explanation
[32]	ff) Time management and planning was inadequate.	The project ran out of time OR missed deadlines OR did not plan sufficiently OR rushed the work OR underestimated the time it would take to complete the project work.
[33]	gg) The SAP system suffered non-acceptance, non-use or lack of ownership.	Users did not accept the system OR did not use the system OR were fearful of using it. Some staff tried to avoid it OR disown it.
[34]	hh) SAP functionality is inadequate.	The SAP functionality does not support day-to-day business needs of the organisation
[35]	ii) SAP is generally expensive to implement.	Overall SAP cost more than what was originally expected to implement.
[36]	jj) The SAP system was adversely affected by the machinery of government.	Changes to departments and internal departmental structures affected the SAP system configuration and implementation.
[37]	kk) Systems integration was problematic.	Integration is complex and mistakes were made. The interfaces with other systems do not work properly.

* The No. column in the table above is the issue reference basis within this thesis. In the survey, the issues were numbered alphabetically as shown in the Issue column. Both numbering systems are show here for completeness.

5.3.2 Round Three Survey Demographics

During August and September 2001, 559 Round Three surveys were emailed to potential respondents in 28 organisations. 96 surveys were sent to IP staff in six organisations, 461 were sent to Client staff and 2 surveys were sent to SAP.

The response to the survey was as follows:

- 77 emails bounced
- 83 respondents were contacted by telephone several of whom either completed the survey or forwarded it to another potential respondent
- There were 284 responses of which 76 declined to complete the survey or they forwarded it to a more appropriate respondent.
- Of the 208 completed surveys, 207 were usable.

The response rates are summarised in Table 5.12.

Table 5.12 – Response Rates by Organisation and IP/Client

Code	IP/[C]lient	Sent	Usable Responses	% Usable
Health	C	62	38	61.29
DETIR	C	79	30	37.97
Transport	C	76	29	38.16
Public Works	C	46	23	50.00
PWC	IP	26	12	46.15
Education	C	32	11	34.38
Corrective Services	C	32	10	31.25
Premiers	C	25	10	40.00
Accenture	IP	60	6	10.00
Tourism	C	13	6	46.15
Emergency	C	9	5	55.56

Code	IP/[C]lient	Sent	Usable Responses	% Usable
Services				
Police	C	8	5	62.50
Justice	C	7	4	57.14
CITEC	C	7	3	42.86
DSD	C	4	3	75.00
EPA	C	11	3	27.27
CAA	C	8	2	25.00
Audit	C	5	2	40.00
Families	C	10	1	10.00
Innovation	C	7	1	14.29
Mines	C	4	1	25.00
Treasury	C	10	1	10.00
OFST	IP	7	1	14.29
BHP IT	IP	1	0	0.00
CJC	C	6	0	0.00
Deloittes	IP	1	0	0.00
KPMG	IP	1	0	0.00
SAP AG	C	2	0	0.00
Total	C	463	188	40.60
Total	IP	96	19	19.79
Grand Total		559	207	37.03

The response rate from clients was 40.60% and from IPs was 19.79%. The overall response rate was 37.03%. The following table 5.13 provides a breakdown of the response by level and type.

Table 5.13 - Third Round Survey Response rate Cross-tabulation

Organisation/Clients	**Operational**	**Strategic**
Health	22	16
Transport	22	7
DETIR	17	13
Public Works	16	7
Education	8	3
Premiers	5	5
Corrective Services	5	5
Tourism	4	2
Emergency Services	3	2
DSD	3	0
Police	2	3
Justice	2	2
CITEC	2	1
EPA	1	2
Audit	1	1
CAA	1	1
Mines	1	0
Treasury	1	0
Innovation	0	1
Families	0	1
Total	116	72
Implementation Partners		
PricewaterhouseCoopers	11	1
Accenture	3	3
Queensland Treasury OFST	1	0
Total	15	4
Grand Total	131	76

The response rate for the Round Three survey was higher than for Round One. The higher response rate is attributable to a number of factors. Firstly, the Round One and Round Two survey processes generated several additional prospective respondents in both Client and IP organisations. Apart from leads generated by the survey instrument returns, longer relations and the identification of other key informants who could provide lists of contacts increased the sample size. Conversely, the Round One and Round Two processes also identified several staff who had left the organisation and some who had gone to other organisations. As a result, the possible lists of respondents for some organisations reduced slightly e.g. Department of Premier and Cabinet and Department of Tourism, Racing and Fair Trading. The employment of a research assistant to call prospective respondents also increased the response rate considerably. 83 respondents were successfully contacted by telephone, each of whom either provided a survey response, delegated to a third party to respond (often someone already identified as a potential respondent) or provided a reason why they would not be responding.

Table 5.14 shows the comparative response rates from Round One and Round Three surveys.

Table 5.14 Comparative Response Rates

	Strategic	%	Operational	%	Total
Round 1					
Client	35	41.67	49	58.33	84
IP	10	35.71	18	64.29	28
Total	45	40.18	67	59.82	112
Round 3					
Client	72	38.30	116	61.70	188
IP	4	21.05	15	78.95	19
Total	76	36.71	131	63.29	207

The Clients' Strategic:Operational percentage ratio is reasonably consistent from Round 1 (41.67:58.33) to Round 3 (38.3:61.7). The IPs' percentage ratio of Strategic:Operational dropped in Round Three with less Strategic staff from the IP responding to the Round Three survey.

Figure 5.2 shows the number of respondents by each lifecycle phase for all 37 issues. This figure shows that the 'Up and Running' phase received the majority of responses. The responses for each issue within each phase each fall within a distinct band. The minimum and maximum of the phase bands set out in Table 5.15:

Table 5.15 - Bands of Responses by Lifecycle Phase

Lifecycle Phase	**Min – Max counts of responses**	**Min – Max % of responses**
Plan	56 – 68	27.1% – 32.9%
Build	62 – 73	30.0% - 35.3%
Test	75 - 92	36.2% - 44.4%
Install	65 - 78	31.4% - 37.7%
Knowledge Management	85 - 103	41.1% - 49.8%
Up and Running	162 – 179	78.3% - 86.5%

All of the client organisations were in the up-and-running phase at the time of the survey thereby explaining the large percentage response for that phase. The planning, building and installing phases are typically the performed by the project team.

Figure 5.2 - Distribution of Importance rating responses by Lifecycle and Issue categories

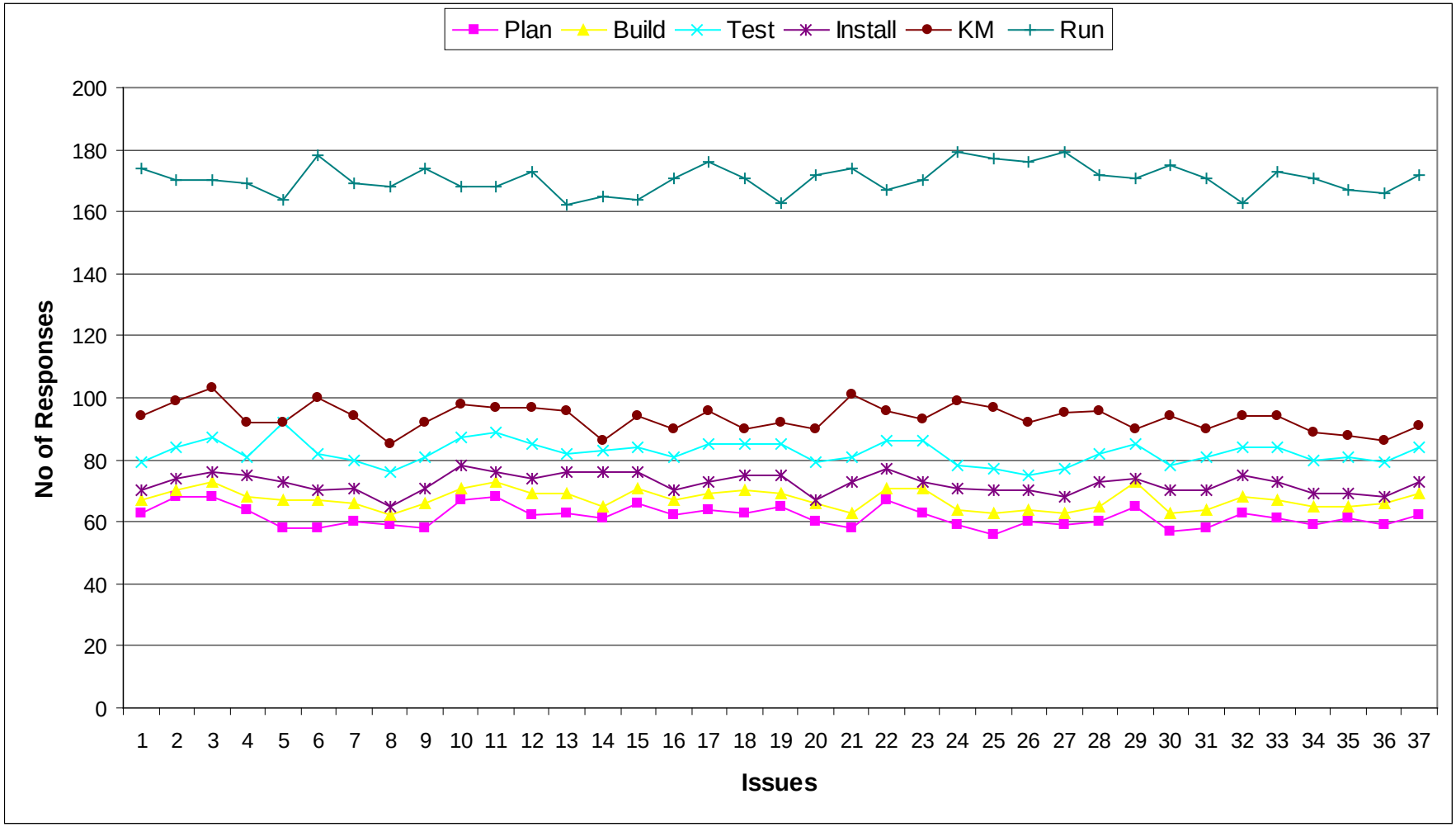


Table 5.16 sheds more light on the demographics of involvement in the lifecycle phases. It provides a cross-tabulation of counts of respondents and individual weights scores from each lifecycle phase shown by Client vs. IP and Operational vs. Strategic staff and as a total. It also shows the number of responses from respondents who declared they were involved in the project phase. Several respondents weighted issues in phases in which they were not involved.

Table 5.16 – Cross Tabulation of Counts of Respondents and Responses for each Phase

	Plan	**Build**	**Test**	**Install**	**Know**	**Run**	**Total**
Involved Respondents							
Total	51	59	73	63	83	147	207*
% Respondents	24.64	28.50	35.27	30.43	40.10	71.01	
Strategic	26	22	27	30	39	52	76*
Operational	25	37	46	33	44	95	131*
Client	45	45	63	56	77	140	188*
IP	6	14	10	7	6	7	19*
Strategic - Client	23	18	23	26	36	51	
Strategic - IP	3	4	4	4	3	1	
Operational - Client	22	27	40	30	41	89	
Operational - IP	3	10	6	3	3	6	
Weights scores							
Total	2284	2489	3045	2677	3462	6312	20269
% Total	11.27	12.28	15.02	13.21	17.08	31.14	100
Strategic	1146	899	1010	1129	1464	2315	7963
Operational	1138	1590	2035	1548	1998	3997	12306
Client	2026	1972	2677	2424	3259	6020	18378
IP	258	517	368	253	203	292	1891
Weights scores by involved respondents							
Total	1728	1959	2469	2101	2731	5174	
Strategic	889	682	834	931	1211	1840	
Operational	839	1277	1635	1170	1520	3334	
Client	1529	1478	2137	1884	2545	4915	
IP	199	481	332	217	186	259	

* Totals from Table 5.13

The majority of involvement of respondents was in the Up-and-Running phase. The involvement of the Clients' strategic management increased over the implementation phases while the IP's strategic management remained steady until the Up-and-Running phase, at which point the IP would begin withdrawing from the implementation project. Client operational staff increased their involvement as the lifecycle proceeded with the exception of the Install phase. IP Operational staff were mainly involved in the Build phase; designing, customising and modifying the software to meet the business requirements of the Clients prior to the systems' final rollout.

Similarly the number of weights scores in each phased increased over the lifecycle of the projects with the exception of the Install phase. This suggests the lesser involvement of staff during this phase. The number of people involved during each phase correlates highly with the numbers of responses attributed to each phase with $R = 0.9988$.

The following Table 5.17 lists the number of weights scores by agency comparing total weights scores with scores from respondents who indicated their involvement in the phase. While respondents may not have been directly involved in the phase, they would still have had knowledge of the issues of the phase through contact with other staff in the agency and publicly available information about progress during the phase.

The one respondent from the Office of Financial Systems and Training (OFST) in Treasury declared no direct involvement in any phase. The role of this person in Treasury was a Senior Business Analyst offering support to several agencies across a wide variety of issues. The survey asked for "all subsequent answers to relate to Queensland Treasury" and for the respondent to "indicate your involvement in the following phases". Literally her response to the survey was accurate. The fact that she had no involvement in the Treasury SAP lifecycle does not mean that her scores should be discounted. On the contrary, this respondent would be well placed to score and comment on the importance of these issues in this context.

Table 5.17 - Comparison of Total Counts of Scores by Phase with Counts of Scores by Involved Personnel

	Involved respondents counts of scores						**Total counts of scores**					
Agency Code	Plan	Build	Test	Imple-ment	Know	Run	Plan	Build	Test	Imple-ment	Know	Run
ACC	63	198	157	77	63	157	86	198	157	77	80	107
ATS	37	37	37	37	37	37	37	37	37	37	37	37
CAA	37	37	0	37	37	0	74	74	74	74	74	74
CIT	0	0	0	0	0	0	0	0	0	0	0	86
DCS	37	37	74	74	74	74	37	37	74	74	74	329
DET	213	74	210	199	356	210	320	178	262	291	430	913
DII	37	0	0	0	0	0	37	0	0	0	0	0
DME	36	36	35	0	0	35	36	36	35	32	31	32
DPC	0	37	74	0	72	74	37	74	111	74	146	338
DPW	111	296	362	185	222	362	198	386	450	274	311	699
DSD	0	0	37	0	37	37	37	37	74	0	74	111
DTR	0	0	37	19	59	37	0	0	37	19	59	190
EDU	31	48	87	74	117	87	46	48	115	108	147	383

	Involved respondents counts of scores						**Total counts of scores**					
EMS	74	74	107	108	109	107	111	111	144	145	146	183
EPA	37	37	37	37	37	37	37	37	37	37	37	111
HLT	361	318	470	618	712	470	369	343	499	644	896	1341
JAG	111	111	111	111	74	111	111	111	111	111	74	111
MRT	315	242	366	293	437	366	447	369	524	412	558	803
PWC	136	283	175	140	123	175	136	283	175	140	123	185
QAO	0	0	0	0	0	0	0	0	0	0	0	73
QPS	56	59	58	57	130	58	56	59	58	57	130	171
TRS	36	35	35	35	35	35	36	35	35	35	35	35
TRS-P	0	0	0	0	0	0	36	36	36	36	0	0
Total	**1728**	**1959**	**2469**	**2101**	**2731**	**2469**	**2284**	**2489**	**3045**	**2677**	**3462**	**6312**

5.4 Ranking of Issues using Weight Scores from the Round Three Survey

To better understand the 37 issues derived from Round One and Round Two, how they were derived, and what feedback from respondents was directed at the issues in the Round Three survey, individual issues will be examined in detail in Chapter 6.

In Section 5.4.1, the rankings of the issues will be presented. Issues will be compared by Partner vs. Agency, Strategic vs. Operational, Declared Involvement vs. Overall and by Phase. Differences arising will be discussed. Overall rankings will be calculated using a mean of the maximum scores from the phases of that issue. The maximum score of each phase indicates the highest ranking of importance of that issue for the respondent; since no overall importance ranking for the issue was collected in the survey the researchers thought this the most appropriate measure. Means will be calculated for only those respondents who scored the issue.

In the prior study of five Queensland Government agencies who implemented SAP together under the coordination of the Corporate Services Agency, the Round Three Survey Instrument was presented to respondents with the issues pre-sorted into 10 major issue categories (Chang et al., 2000a; 2000b). Such pre-sorting may have influenced the weights scored by respondents so in this study no pre-sorting was done. In the Round Three survey instrument the 37 issues were presented to respondents in random order. It was intended that major issue categories could be derived statistically using factor analysis. This factor analysis exercise will be fully described in Section 5.5. Comparative and descriptive analyses of the major issue categories will be described in Sections 5.4.1 and 5.4.2.

5.4.1 Comparisons of Issue Rankings

Three tables are presented as preamble giving the reader an overall context for the following discussions of the various rankings of these issues.

The first table in this section (Table 5.18) ranks the issues by the mean of the maximums of the reported rankings of importance by respondents. This is the primary ranking mechanism used in this study and future comparative statistics will use this ranking mechanism. The table also shows the mean of the means.

Table 5.18 – Ranking of Issues by Mean of Maximum and Mean of Mean Scores

Using Maximums			**Using Means**			
Rank	**Mean**	**StDev**	**Rank**	**Mean**	**StDev**	**Description**
1	5.11	1.81	1	4.78	1.80	[26] The organisation has/is not taking advantage of available SAP functionality.
2	4.90	1.92	4	4.46	1.85	[6] SAP reporting tools are difficult to use.
3	4.90	1.80	2	4.52	1.84	[24] Users do not have sufficient SAP knowledge.
4	4.81	2.12	12	4.19	1.96	[1] Ongoing running costs are high.
5	4.80	2.00	8	4.32	1.98	[4] SAP upgrade costs are high.
6	4.76	2.04	7	4.40	1.96	[2] There was lack of stakeholder/management support and ownership.
7	4.74	1.89	6	4.45	1.90	[27] The reporting from the SAP system is inadequate.
8	4.72	1.92	3	4.46	1.89	[7] SAP Knowledge not re-used efficiently by agencies.
9	4.70	2.00	5	4.45	1.94	[35] SAP is generally expensive to implement.
10	4.57	2.08	10	4.20	1.96	[3] The project team did not consult or communicate sufficiently.
11	4.56	2.00	9	4.28	1.91	[12] SAP related documentation is insufficient.
12	4.50	2.16	11	4.20	2.07	[10] Insufficient resources were allocated to the project.
13	4.46	2.18	14	4.05	2.02	[5] The testing of SAP system was inadequate.
14	4.43	1.91	13	4.18	1.86	[17] The SAP system is too complex.
15	4.33	1.93	16	3.94	1.81	[37] Systems integration was problematic.
16	4.33	1.99	15	4.02	1.91	[28] Staff/knowledge retention strategies were ineffective.
17	4.26	2.10	18	3.93	1.99	[13] The change management process has been mismanaged.
18	4.26	2.18	17	3.94	2.07	[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.
19	4.24	2.10	19	3.92	1.99	[21] The training method or management was inadequate.
20	4.18	2.01	20	3.86	1.90	[15] The project suffered from individual or team lack of knowledge of the organisational context.
21	4.16	2.01	22	3.79	1.89	[25] Help desk SAP knowledge was inadequate.
22	4.10	2.14	25	3.65	2.02	[9] The organisation has experienced downtime, slow processing or unreliable hardware.

23	4.08	2.01	23	3.75	1.88	[33] The SAP system suffered non-acceptance, non-use or lack of ownership.
24	4.04	2.11	21	3.80	1.99	[29] The SAP system was customised too much.
25	3.95	2.14	27	3.59	1.94	[14] The data conversion was inadequate.
26	3.91	2.10	28	3.58	1.95	[20] SAP reporting is expensive.
27	3.90	2.09	24	3.66	1.98	[23] The configuration of the SAP was inadequate
28	3.88	2.12	26	3.64	2.03	[16] SAP is not value for money.
29	3.83	2.06	31	3.49	1.92	[30] The Help Desk was under-resourced.
30	3.78	2.10	30	3.52	1.96	[22] There was poor executive or project management of the SAP project.
31	3.70	2.29	29	3.54	2.21	[8] SAP is not suitable for small agencies/organisations.
32	3.69	1.95	32	3.45	1.84	[34] SAP functionality is inadequate.
33	3.69	1.97	33	3.41	1.84	[32] Time management and planning was inadequate.
34	3.64	2.14	34	3.41	2.02	[31] The SAP system does not work as it should.
35	3.64	1.98	35	3.39	1.83	[18] Systems controls were inadequate.
36	3.57	2.14	36	3.34	1.97	[36] The SAP system was adversely affected by the machinery of government.
37	3.39	2.01	37	3.11	1.83	[19] The staffing of the project team was mismanaged.

There are several significant differences in perspective apparent arising from Table 5.19. Similarly there are examples of significant differences in perspective between the Strategic and Operational perspectives set out in Table 5.20. In Chapter 6, each issue will be discussed individually including the differing perspectives arising from Table 5.19 and Table 5.20.

Table 5.19 - Comparison of Client vs. IP Ranking of Issues in Clients with IP Involvement

Client Rank	**IP Rank**	**Issue Description**	**Client Mean**	**Client Std Dev**	**IP Mean**	**IP Std Dev**
1	4	[26] The organisation has/is not taking advantage of available SAP functionality.	5.19	1.81	4.53	1.94
2	19	[24] Users do not have sufficient SAP knowledge.	5.15	1.62	4.00	2.11

Client Rank	IP Rank	Issue Description	Client Mean	Client Std Dev	IP Mean	IP Std Dev
3	28	[6] SAP reporting tools are difficult to use.	5.06	1.84	3.67	2.00
4	12	[3] The project team did not consult or communicate sufficiently.	4.91	2.04	4.28	2.24
5	1	[2] There was lack of stakeholder/management support and ownership.	4.90	2.00	5.33	1.75
6	31	[27] The reporting from the SAP system is inadequate.	4.85	1.89	3.56	2.31
7	14	[5] The testing of SAP system was inadequate.	4.72	2.22	4.28	2.61
8	20	[12] SAP related documentation is insufficient.	4.70	2.07	4.00	2.30
9	23	[21] The training method or management was inadequate.	4.67	2.05	3.78	2.53
10	13	[29] The SAP system was customised too much.	4.65	2.19	4.28	2.16
11	3	[7] SAP Knowledge not re-used efficiently by agencies.	4.64	2.14	4.78	1.66
12	17	[28] Staff/knowledge retention strategies were ineffective.	4.63	2.02	4.17	2.18
13	33	[4] SAP upgrade costs are high.	4.55	2.20	3.39	2.00
14	10	[37] Systems integration was problematic.	4.50	2.04	4.33	2.28
15	7	[13] The change management process has been mismanaged.	4.49	2.20	4.50	2.38
16	15	[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	4.48	2.26	4.22	2.24
17	2	[10] Insufficient resources were allocated to the project.	4.44	2.30	4.89	2.35
18	21	[35] SAP is generally expensive to implement.	4.43	2.20	3.94	2.01
19	26	[1] Ongoing running costs are high.	4.41	2.30	3.67	2.22
20	18	[17] The SAP system is too complex.	4.28	2.05	4.11	2.17
21	11	[15] The project suffered from individual or team lack of knowledge of the organisational context.	4.25	2.06	4.28	2.02
22	29	[25] Help desk SAP knowledge was inadequate.	4.24	1.99	3.65	2.37
23	8	[22] There was poor executive or project management of the SAP project.	4.17	2.16	4.39	2.20
24	25	[23] The configuration of the SAP was inadequate	4.12	2.07	3.72	2.47
25	6	[33] The SAP system suffered non-acceptance, non-use or lack of ownership.	4.05	2.17	4.50	1.92

Client Rank	IP Rank	Issue Description	Client Mean	Client Std Dev	IP Mean	IP Std Dev
26	34	[30] The Help Desk was under-resourced.	3.89	2.06	3.29	2.49
27	27	[14] The data conversion was inadequate.	3.84	2.24	3.67	2.43
28	30	[9] The organisation has experienced downtime, slow processing or unreliable hardware.	3.82	2.20	3.65	2.29
29	9	[32] Time management and planning was inadequate.	3.74	2.05	4.33	2.06
30	32	[18] Systems controls were inadequate.	3.68	1.99	3.44	2.33
31	37	[20] SAP reporting is expensive.	3.67	2.19	3.00	2.00
32	35	[16] SAP is not value for money.	3.60	2.12	3.28	2.32
33	5	[36] The SAP system was adversely affected by the machinery of government.	3.55	2.27	4.53	2.10
34	16	[19] The staffing of the project team was mismanaged.	3.54	2.21	4.17	1.95
35	24	[34] SAP functionality is inadequate.	3.49	2.02	3.72	2.40
36	22	[31] The SAP system does not work as it should.	3.45	2.22	3.89	2.30
37	36	[8] SAP is not suitable for small agencies/organisations.	3.18	2.44	3.12	1.62

Table 5.20 - Comparison of Strategic vs. Operational Ranking of Issues

Rank Op	Rank Strat	Issue	Op Mean	Op Stdv	Strat Mean	Strat Stdv
1	5	[26] The organisation has/is not taking advantage of available SAP functionality.	5.08	1.87	5.18	1.70
2	7	[24] Users do not have sufficient SAP knowledge.	4.89	1.82	4.91	1.78
3	9	[2] There was lack of stakeholder/management support and ownership.	4.72	2.01	4.82	2.10
4	16	[12] SAP related documentation is insufficient.	4.70	2.05	4.31	1.90
5	14	[3] The project team did not consult or communicate sufficiently.	4.66	2.00	4.42	2.21
6	8	[7] SAP Knowledge not re-used efficiently by agencies.	4.64	1.97	4.85	1.82
7	1	[6] SAP reporting tools are difficult to use.	4.61	1.96	5.40	1.73

Rank Op	Rank Strat	Issue	Op Mean	Op Stdv	Strat Mean	Strat Stdv
8	17	[5] The testing of SAP system was inadequate.	4.60	2.08	4.23	2.34
9	6	[27] The reporting from the SAP system is inadequate.	4.58	1.94	5.01	1.77
10	3	[4] SAP upgrade costs are high.	4.52	2.12	5.30	1.69
11	2	[1] Ongoing running costs are high.	4.50	2.25	5.36	1.76
12	12	[10] Insufficient resources were allocated to the project.	4.50	2.12	4.50	2.23
13	19	[28] Staff/knowledge retention strategies were ineffective.	4.40	2.05	4.19	1.90
14	25	[21] The training method or management was inadequate.	4.40	2.13	3.97	2.03
15	4	[35] SAP is generally expensive to implement.	4.38	2.10	5.25	1.71
16	20	[13] The change management process has been mismanaged.	4.33	2.10	4.15	2.10
17	10	[17] The SAP system is too complex.	4.31	1.97	4.64	1.81
18	15	[37] Systems integration was problematic.	4.30	1.90	4.38	2.00
19	18	[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	4.29	2.13	4.21	2.26
20	28	[25] Help desk SAP knowledge was inadequate.	4.27	1.97	3.96	2.09
21	22	[15] The project suffered from individual or team lack of knowledge of the organisational context.	4.22	1.93	4.11	2.16
22	27	[33] The SAP system suffered non-acceptance, non-use or lack of ownership.	4.15	2.04	3.96	1.98
23	23	[9] The organisation has experienced downtime, slow processing or unreliable hardware.	4.12	2.15	4.07	2.13
24	26	[29] The SAP system was customised too much.	4.09	2.12	3.96	2.11
25	35	[30] The Help Desk was under-resourced.	4.02	2.04	3.46	2.06
26	29	[23] The configuration of the SAP was inadequate	3.94	2.09	3.85	2.09
27	24	[14] The data conversion was inadequate.	3.93	2.08	4.00	2.25

Rank Op	Rank Strat	Issue	Op Mean	Op Stdv	Strat Mean	Strat Stdv
28	33	[22] There was poor executive or project management of the SAP project.	3.93	2.07	3.52	2.14
29	32	[32] Time management and planning was inadequate.	3.76	1.95	3.57	2.00
30	34	[31] The SAP system does not work as it should.	3.74	2.11	3.47	2.21
31	30	[34] SAP functionality is inadequate.	3.71	1.96	3.66	1.96
32	31	[18] Systems controls were inadequate.	3.66	1.92	3.61	2.10
33	36	[36] The SAP system was adversely affected by the machinery of government.	3.65	2.08	3.44	2.23
34	13	[20] SAP reporting is expensive.	3.60	2.12	4.46	1.96
35	37	[19] The staffing of the project team was mismanaged.	3.59	2.06	3.04	1.87
36	11	[16] SAP is not value for money.	3.51	2.12	4.54	1.99
37	21	[8] SAP is not suitable for small agencies/organisations.	3.45	2.26	4.14	2.30

5.4.2 Summary of rankings

Tables 5.18, 5.19 and 5.20 provide the reader a summary of rankings of issues for reference when considering individual issues that will be discussed in detail in Chapter 6.

5.5 The Derivation of Major Issue Categories using Reductive Statistics[1]

5.5.1 Introduction

To date the analysis has employed a holistic, interpretive and inductive approach towards understanding the issues underlying the implementation of an enterprise

[1] Section 5 is derived from Timbrell, G., Chan, T. (2003) "Investigating Enterprise Systems Issues using a Modified Delphi Method and Exploratory Factor Analysis", Proceedings of the 14th

system such as the SAP R/3. Factor analysis of "weights" given by respondents in the final round of the survey on the relative importance of the implementation issues reveals the emergence of seven factors that could undermine the successful implementation of an enterprise system.

A pilot study of five QSG departments was initiated in 1999 (Chang, 2002) for the dual purposes of testing a variant of the Delphi Method (Dalkey & Helmer, 1963) as described in Chapter 3 used in the current study, and cataloguing an initial set of issues (Chang, 2002). This section extends the pilot study in terms of the approach used in analysing and identifying the major issues underlying the implementation of SAP R/3 within the QSG. The methods employed in this extension study, however, differed from the initial study. In example, instead of synthesising the major issues through experimenters' interpretation of the data collected from the respondents, this study allows the major issues to "emerge" through the factor analysis of "weights" assigned by the respondents from the final survey round.

The objective of this section is to report how the issues group together using factor analysis and provide some preliminary discussion of these groupings. To better illustrate the innovative nature of using factor analysis to determine emergent major issue categories in a study of enterprise system issues a short discussion of prior studies is presented in Section 5.5.2.

5.5.2 Other Studies of Enterprise System issues

While previously there has been little published in this area, a recent special issue of *Journal of Information Technology* reported several ES issues studies. Choosing companies that had reported problems, Markus et al. (2000a) used interviews, case study and literature reviews in their ES issues study. They grouped their issues by phase: 'project' (implementation), 'shakedown' (period after go-live) and 'onward and upward'. The research team grouped the issues into 'software modifications'; 'systems integration'; 'product and implementation consultants'; 'turnover of personnel'; 'an excessive functional view'; 'cutting scope'; 'cutting training'; 'inadequate testing'; 'not improving processes first'; 'underestimating data quality and reporting needs'; 'unknown/disappointing business results'; 'fragile human

Australasian Conference on Information Systems, November 2003, Perth WA. Note Chan is an

capital'; and 'migration problems'. Adam and O'Doherty (2000) used interviews to examine ES issues in Small-Medium-Enterprises (SMEs) using a single vendor product in Ireland and concluded that SMEs would have an easier time of ES implementation due to their lesser complexity. Here the research team analysed the data in conjunction with the vendor's senior project manager. Lee and Lee (2000) used interviews, process analysis and document analysis to look at knowledge transfer issues in a single ES implementation.

No indication is given in the article whether the research team analysed the data with the target organisation's staff. Based on traditional risk models (e.g. Keil et al., 1998), Sumner (2000) used interviews and case study to identify risks unique to ES projects. Sumner structured her interviews around pre-chosen major issue categories. Kumar et al. (2001) used interviews and a questionnaire to identify ES management issues. Their questioning methods were structured around specific a priori issues. The majority of ES issues studies found in this literature used interviews and case studies. The methods either employed a priori major issue categories or the major issue categories were determined without reference to the interview or case study pool.

The contribution made by this current study is its use of the variant Delphi approach to uncover issues (rather than to confirm or validate pre-existing set of issues). The researchers did not use a priori major issue groupings in Round One, preferring an open question. In Round Two the survey participants confirm the categorisation of the 'raw' issues gathered through an open question in Round One. Finally, major issue groupings were determined using factor analysis of the weights gathered in Round Three. The factor analysis performed on the data confirms other previous qualitative studies but also uncovers the importance of some knowledge related matters.

5.5.3 The model building methods applied

Similar to other studies of contemporary information systems, the issues we investigated relate to emerging phenomena.

Associate Supervisor on this doctoral thesis.

Some of the previously mentioned ERP issues studies have used existing frameworks to analyse their results.

In this research we have employed inductive methods; i.e. building models from data and identifying patterns in that data, in the hope those patterns in the evidence will surface compelling theory and explanation (Martin and Turner, 1986).

In summary our method follows this path:

1) Delphi Round One - inventory issues

2) Synthesise a master set of issues

3) Delphi Round Two - confirm issues

4) Delphi Round Three - collect weights of importance for each issue across lifecycle phases and

5) Use exploratory factor analysis to discover latent constructs.

Pattern analysis and inductive approaches were applied during synthesis of the Delphi study issues from Round One. This process resulted in a final list of 37 issue groupings. Following a verification of the issue categories in Round Two, the 'weights round' (Round Three) was conducted in which respondents scored the importance of each issue across six lifecycle phases: plan, build, test, install, run, and know. Preliminary, exploratory principal components factor analysis using weights reported in Round Three was then performed.

The research team specifically did not use existing frameworks or theories to group the issues to avoid tainting the data driven approach.

The methods applied in this work are consistently inductive, data driven and holistic/interpretive approaches and are appropriate for any future derivation of a predictive model of ES Lifecycle Issues. This differs from the pilot study approach.

During the extension study Round One issue categorisation, coders did not refer to, nor were they familiar with, issue groupings from the pilot study. In the pilot study Round Two and Round Three instruments, the issues were grouped into ten major issue categories. The extension study instruments randomly listed the issues and did not present them in any grouping. Some issues listed in the pilot study were of a

compound nature. This was avoided in the extension study so that respondents could apply weights to clear simple issues.

5.5.4 Factor analysis

5.5.4.1 Using Factor Analysis

Factor Analysis is a statistical technique that aims to simplify and reduce complex sets of data. Royce (1963) described a factor as a construct operationally defined by its factor loadings or correlations of a variable with a factor. Factor analysis was originally developed by Spearman (1904) for the purpose of exploration. In exploratory factor analysis, the aim is to discover the main constructs or dimensions. In this study, the aim was to explore whether there were underlying groupings of the 37 major issues derived from the Delphi study. The specific factor analysis method used is the principal components analysis. This method (calculated using SPSS V9) calculates the sum of squares of the factor loadings of each factor, which reflect the proportion of variance explained by each factor. This total amount of variance is the eigenvalue for the factor. The larger the eigenvalue, the more variance is explained by the factor. Rotating the correlation matrix simplifies the structure allowing better interpretation of results. The Varimax rotation aims at simple structure and keeps the factor axes orthogonal (i.e. the factors are uncorrelated) (Kline, 1994).

5.5.4.2 Factor Analysis Results

This Exploratory factor analysis employed principal components with Varimax rotation (using SPSS software package). The issues loaded naturally (without forcing the number of factors) in order onto the 7 factors set out in Table 5.21. The factor descriptions were conceived by the research team after the factor analysis had been performed.

Table 5.21 - Factor Analysis of ES Issues

Component	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Factor 1: Poor management of the implementation project and processes.							
[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	0.814	0.174			0.22		
[19] The staffing of the project team was mismanaged.	0.811		0.149	0.153	-0.124		0.137
[10] Insufficient resources were allocated to the project.	0.773	0.236		0.131	0.194		
[32] Time management and planning was inadequate.	0.702	0.337				0.183	0.247
[22] There was poor executive or project management of the SAP project.	0.7			0.282		0.217	0.169
[13] The change management process has been mismanaged.	0.697		0.126	0.293	0.114		0.219
[3] The Project Team did not consult or communicate sufficiently.	0.691	0.117		0.187	0.275	0.431	-0.102
[15] The project suffered from individual or team lack of knowledge of the organisational context.	0.69	0.279		0.25	0.14		0.107
[5] The testing of the SAP system was inadequate.	0.674	0.14	0.131	0.34		0.355	-0.114
[14] The data conversion was inadequate.	0.608	0.357		0.193		0.109	
[2] There was lack of stakeholder/management support and ownership.	0.566		0.113		0.397	0.365	
[12] SAP related documentation is insufficient.	0.55	0.196		0.321	0.165	-0.136	
[33] The SAP system suffered non-acceptance, non-use or lack of ownership.	0.531	0.254	0.156	0.287			0.433
[23] The configuration of SAP was inadequate.	0.516	0.479		0.2		0.295	
Factor 2: The SAP system is inadequate or difficult to use.							
[34] SAP functionality is inadequate.	0.275	0.7		0.231	0.138	0.214	0.247

Component	**1**	**2**	**3**	**4**	**5**	**6**	**7**
[27] The reporting from the SAP system is inadequate.		0.693	0.205	0.21	0.389		
[18] Systems controls were inadequate.	0.328	0.646	0.156	0.164		0.207	0.243
[31] The SAP system does not work as it should.	0.284	0.631		0.407		0.269	
[17] The SAP system is too complex.	0.193	0.626	0.385			-0.111	-0.134
[9] The organisation has experienced downtime, slow processing or unreliable hardware.	0.25	0.601		0.208	0.19	-0.133	
[6] SAP reporting tools difficult to use.	0.205	0.533	0.23	0.32	0.295		-0.351
Factor 3: Costs are too high or benefits relative to costs are too low							
[4] SAP upgrade costs are high.			0.841	0.119	0.217	0.109	
[1] Ongoing running costs are high.			0.81		0.141	0.141	
[35] SAP is generally expensive to implement.			0.807			0.11	0.14
[16] SAP not value for money.	0.151	0.27	0.77				
[20] SAP reporting is expensive.		0.415	0.671			-0.111	
[8] SAP not suitable for small agencies/organisations.		0.167	0.592			-0.435	
Factor 4: Knowledge required to support and run SAP was not managed effectively							
[24] Users do not have sufficient SAP knowledge.	0.212	0.275	0.15	0.715		0.132	
[25] Help desk SAP knowledge was inadequate.	0.336	0.234		0.69	0.223		0.189
[21] The training method or management was inadequate.	0.504	0.222		0.658			
[30] The help desk was under-resourced.	0.421	0.246		0.606	0.142		0.129
[28] Staff/knowledge retention strategies were ineffective.	0.366	0.191	0.135	0.462	0.396	0.143	0.28
Factor 5: Lack of organisation-wide knowledge strategy reduces benefits							

Component	**1**	**2**	**3**	**4**	**5**	**6**	**7**
[26] The organisation has/is not taking advantage of available SAP functionality.		0.183		0.275	0.714		0.241
[7] SAP knowledge was not re-used efficiently by agencies.	0.443	0.111	0.202		0.654		
Factor 6: Customisation and systems integration							
[29] The SAP system was customised too much.	0.42	0.193			0.129	0.538	0.175
[37] Systems integration was problematic.	0.372	0.4		0.269		0.452	0.161
Factor 7: Organisational restructuring affected implementation effort							
[36] The SAP system was adversely affected by the machinery of government.	0.321	0.132	0.172		0.204		0.718

Table 5.22 Rotation Sums of Squared Loadings

Factor	Eigenvalues (Total)	% of Variance
Factor 1: Poor management of the implementation project and processes	8.128	21.967%
Factor 2: The SAP system is inadequate or difficult to use	4.451	12.030%
Factor 3: Costs are too high or benefits relative to costs are too low	3.947	10.666%
Factor 4: Knowledge required to support and run SAP was not managed effectively	3.322	8.978%
Factor 5: Lack of organisation-wide knowledge strategy reduces benefits	2.034	5.497%
Factor 6: Customisation and systems integration	1.670	4.513%
Factor 7: Organisational restructuring affected implementation effort	1.477	3.993%

The total cumulative variance explained by these factor loadings is 67.645%. This result is not strong but it is a satisfactory outcome. Eigenvalues for the last and possibly the second last factor being weak as they approach 1. Furthermore, as can be seen in Table 5.21, there are components that load across the factors. It should be noted that this factor analysis is not the central theme or chief analytical technique of

the thesis. I will use, however, these groupings as the basis of my choice of issues for further in-depth discussion of individual issues in Chapter 6 of the thesis.

5.5.5 Discussion

During the pilot study, the issues were pre-grouped into ten groups in the round-three instrument. These major issue groups were Cost/Benefit; Data Conversion, Knowledge Management, Lack of Consultation, Operational Deficiencies, Organisational Context, Reluctance to Accept a Dissenting View, Support, System Development and System Performance (Chang, 2002). In the current study, however, to avoid the round-three scoring to be affected by any suggested grouping, and to enable the major issues to emerge from the data directly, the 37 issues were randomly listed in the round-three instrument.

Factor analysis of the weights assigned to the issues suggests that the issues related to the implementation of the SAP R/3 within the QSG can be divided into seven separate factors.[2]

The issues that load onto "Factor 1 - Poor management of the implementation project and processes" describe issues related to poor project and executive management of activities during the implementation period. The issues that load onto this are commonly cited (Esteves et al., 2002; Markus et al., 2000a) and expected. An issue specifically relevant to ES projects appears to be effective application of the ES software capability within the organisational context. Knowledge of the organisational context by the project team is also paramount to a successful outcome. When the project team does not elicit business needs through poor consultation or methods employed, and/or the project team have insufficient knowledge of the software capability and therefore cannot apply it, the business outcomes can suffer from poor configuration. This was also found in Sumner (2000). This is a strong factor, and has been commonly reported in past literature (eg. Esteves et al., 2002; Markus et al., 2000a). Further discussion of the issues in this factor can be found in Appendix E.

[2] It may be argued that perhaps these factors emerge due to the similarity of the words used in issues that load together and hence do not represent any real, deep, conceptual constructs. Examination of the potential influence of similar wording, however, revealed that there is as much commonality of critical words within factors as across factors.

The issues that load onto "Factor 2 - The SAP system is inadequate or difficult to use", describe users' experiences with the system itself. Possibly as a result of poor implementation practices, the functionality of the system does not satisfy user business requirements, e.g. inadequate SAP functionality, reporting, and systems controls; has perceived bugs, e.g. does not work as it should; or, has hardware issues or is difficult to use, e.g. reporting tools are hard to use. Difficulty in use may result from poor knowledge transfer practices. Absorptive capacity by users is a knowledge transfer issue identified within an ES study (Timbrell et al., 2001). This is also a strong factor but has been discussed in past literature (Markus, 2000, Sumner 2000). Individual issues will be discussed in Appendix E.

"Factor 3 - Costs are too high or benefits relative to costs are too low" is a relative issue according to the resources available to the organisation and how staff saw the application of financial resources to this project. There are two possible explanations why this factor emerges. One possible explanation is that respondents may have seen these costs relative to the previous software (non integrated/non ES) or relative to other applications of the funds. Another, and more likely explanation here, is that the benefits relative to the cost of the SAP implementation were not visible or have not been realised. The cost issue has been previously identified. While interesting, the cost issue is not a central theme of the research program and the individual issues in this grouping will be discussed in Appendix E.

"Factor 4 - Knowledge required to support and run SAP was not managed effectively" is a focus point of this research. The research team argues those ES knowledge management decisions/strategies taken early during the systems lifecycle affect knowledge related decisions required at later points in the lifecycle e.g. if you outsource implementation management to consultants without properly constructed knowledge transfer mechanisms in place, problems can occur in support and upgrade phases (Timbrell et al., 2003). Poorly targeted or inadequate training will lead to a lesser staff knowledge base putting further pressure on help desk and support staff. The help desk is an integral feature of the knowledge self-sufficiency of an organisation. Because it is often the last internal knowledge resource before seeking (often expensive) outside assistance, insufficient help desk knowledge can result in diminished ES and possibly organisational effectiveness.

Further, careful management of help desk, support staff and divisional ES knowledge leaders can again influence system and organisational effectiveness and flexibility. While others have identified training as a key issue, no studies have been identified that focus on the importance of the help desk role and its impact on ES outcomes. This group of issues will be further discussed in Chapter 6.

"Factor 5 - Lack of organisation-wide knowledge strategy reduces benefits" reflects the perception that SAP expertise was not shared throughout the government, amongst the QSG agencies, to affect better implementation outcomes. While respondents believed that SAP was inadequate in some quarters, they perceived SAP functionality that was not being used but could be applied in their business context. This inter-organisational knowledge issue is worthy of further discussion. The individual issues will be further explored in Chapter 6.

"Factor 6 - Customisation increased the complexity of systems integration" might reflect the common tension between the "technology swap" implementation strategy and the "vanilla" strategy. The technology swap (change the system to the organisation) approach is where the functionality of the previous system is configured into the new system and little or no process re-engineering takes place. The vanilla (change the organisation to the system) approach is where the organisation changes to the system's standard processes that purport to be best practice. Many QSG agencies took the customisation approach, recognising it is easier and less risky (but perhaps more expensive) to manage technological change than organisational behavioural change. Choosing this approach increases the knowledge stress on the technological project team (having to solve the customisation issues in a new environment) rather than the organisation's user base who would then have to learn new and unfamiliar systems and processes. Additionally, due to the complex nature of the system the technology swap option can make it more difficult to integrate both between customised SAP modules and other organisational systems. This was a weak factor and discussion of the individual issues in this grouping can be found in Appendix E.

"Factor 7 – Organisational restructuring affected implementation effort" reflects the regular change in ministerial portfolio makeup and the consequences on government agencies. Agency functions can be split or combined in various ways following a

change in government to reflect the different political management approaches. A weak factor. Discussion of the single issue can be found in Appendix E.

5.5.6 Conclusion

The statistical analysis of the 'weights' round suggest 7 groups (factors) of issues arising from the implementation of SAP R/3 in the Queensland Government. In order these are Project Practices, Usage Difficulty, Cost vs. Benefits, Knowledge Required to Run the System, Lack of Inter-Organisational Knowledge Strategy, Customisation, and Organisational Restructuring. The factors present familiar issues grouped for example in the project management, cost and functionality areas. At a macro level several of these factors (cost is an exception) fall into broad lifecycle stages i.e. implementation and post implementation. The results corroborate reported findings in other studies but do so empirically.

Furthermore, the importance of knowledge related issues arise from this statistical exercise as initially suspected in the broader research program.

5.6 Chapter Summary

This chapter presented descriptive, comparative and reductive statistics for the three-round Delphi study of major issues in SAP conducted in Queensland Government agencies. The chapter provides detailed descriptive statistics on the study sample demographics and responses. Reporting these descriptive statistics gives an insight into the validity and comprehensiveness of the methods employed in conducting this three-round modified Delphi study. The chapter also reports comparative statistics by listing summary ranks of issues. Issues are ranked and compared between Client vs. IP staff and Strategic vs. Operational staff. Finally, the chapter presents reductive statistics, using factor analysis to reduce the issues to a set of major issue categories. Additionally, the chapter provides some comment on a number of issues arising from the executive workshop scheduled just after the confirmatory (second) round.

These descriptive, comparative and reductive statistics provide guidance in the further analysis of these major issues. In Chapter 6, each issue from the two knowledge-related factors will be discussed individually. Initial comparative

rankings show some disagreement between the studied interest groups (Client vs. IP, Strategic vs. Operational) and these will be considered in that analysis. The individual issues and major issue categories will be compared with results from the pilot study (Chang, 2002).

Chapter Six - Interpretation of the Major Issues Extension Study

6.1 Introduction

This chapter presents a detailed interpretation of the findings from the Major Issues Study. The seven issues that group together in *Factor 4: Knowledge required to support and run SAP was not managed effectively* and *Factor 5: Lack of organisation-wide knowledge strategy reduced benefits* are reported in this Chapter. Comparisons are made with reported SAP issues from previous studies conducted in the Queensland Government and elsewhere. These two groups warrant further discussion because the research program, Cooperative ERP Lifecycle Knowledge Management, focuses on the knowledge management issues in the ERP context. The remaining five groups of issues are contained in Appendix E using the same conventions and format as found in this chapter.

The issues in this chapter are grouped into the two major issue categories. The Round Three weighting of the major issue categories determines the order in which these major issue categories are presented. In Table 6.1 the major issues are ranked according to the following algorithm. All maximum weightings for all issues for each respondent within each category are combined and the mean and standard deviation calculated. This is consistent with other ranking methods used within this study. For the purpose of comparison with the preliminary study (see Chang, 2002) the means of each response are calculated and a grand mean (of the means) presented for each major issue category.

Table 6.1 - Ranking of the Major Issues

		Maximums			Means		
Major Issue Factor No.	**Major issue Category**	**Rank**	**Mean**	**Std Dev**	**Rank Mean**	**Mean**	**Std Dev**
5	Lack of organisation-wide knowledge strategy reduces benefits	1	4.92	1.87	1	4.62	1.85
4	Knowledge required to support and run SAP was not managed effectively	2	4.30	2.02	2	3.95	1.94
3	Costs are too high or benefits relative to costs are too low	2	4.30	2.16	2	3.95	2.04

6	Customisation and systems integration	4	4.18	2.03	4	3.87	1.90
2	The SAP system is inadequate or difficult to use	5	4.17	2.05	5	3.86	1.95
1	Poor management of the implementation project and processes	6	4.17	2.11	6	3.85	1.98
7	Organisational restructuring affected implementation effort	7	3.57	2.14	7	3.34	1.97

Each issue is presented using a standard format – see Figure 6.1 and associated notes.

Figure 6.1 – Issues Example Table

Issue No:	**26**	**Overall rankings using mean of**		**Perspectives[3]**			
		Maximums[1]	**Means[2]**	**Client**	**IP**	**Operational**	**Strategic**
Rank		1	1	1	4	1	5
Mean		5.11	4.78	5.19	4.53	5.08	5.18
Std Dev		1.81	1.80	1.81	1.94	1.87	1.70
Major Issue Category:			(Factor 5) Lack of organisation-wide knowledge strategy reduces benefits				

[1]This figure is based on the maximums of the Round Three phase data. A full explanation is given below.

[2] This figure is based on the means of the Round Three phase data. This figure is used when comparing with Chang's (2002) study in which he based his ranking of issues on the mean of the means.

[3] These figures are based on the maximums of the Round Three phase data.

The principal figures in the table are based on the maximums of the phase data. For example, a respondent may have filled out the survey as follows for the first listed issue:

Figure 6.2 - Example survey line

Issue	**Plan**	**Build**	**Test**	**Install**	**Know**	**Run**
a) Ongoing running costs are high.			1		4	6

This response shows that respondent was not involved in the Plan, Build or Install phases. They regarded the issue as Unimportant for the *Test* phase, moderately Important for the *Know* phase and Very Important for the *Run* phase. The maximum of this data for all phases is 6 (Very Important) and that would be the datum recorded for this issue in the study. By recording the maximum score of the phases, the research is capturing the incidence of greatest import to the respondent for that issue

across all phases. This method is a better measure than using the mean of the phase scores because the Issue may not be as pertinent to some phases as to others.

The Mean of these individual phase scores is 3.67. The Mean of the phase data is calculated should the reader wish to compare this data with a similar study conducted by Alex Chang (2002) in five Queensland Government agencies.

For each issue, the Rank, Mean and Standard Deviation of the IP vs. Client and Strategic vs. Operational comparative scores are also presented. These measures are calculated using the maximum score from the phases for each response. The issues are divided into four quadrants: the first quadrant comprises issues ranked one to nine; the second quadrant comprises issues ranked ten to eighteen; the third quadrant comprises issues ranked nineteen to twenty-eight; and, the fourth quadrant comprises issues ranked twenty-nine to thirty-seven.

Each issue is presented within its Major Issue category. The two major issue categories in this chapter and the remaining five in Appendix E were determined using factor analysis as reported in Chapter 5. Where relevant, a secondary table records the mean and standard deviation of the maximum scores for agencies that reported five or more responses in Round Three. This information includes scores from agencies and the implementation partners (IPs). The number of issues reported in the Round One survey and their split between *IP/Client* and *Strategic/Operational* is presented as well as some examples of responses from which the issue category is derived. It is important to note that not all respondents thought of, or recorded, all possible issues in Round One and so the incidence of reporting from Round One of the original issues is for illustrative purposes only. It could illustrate, for example, 'top of mind' issues in certain departments. The 'confirmation' brought all issues to all respondents' attention and their consideration of all issues was not really obligatory until Round Three.

The Round Three 'weights' survey provided an opportunity for respondents not only to indicate the importance of the issues but also comment on these issues. Selected illustrative comments from the Round Three survey instrument are presented for each issue. In some cases they confirm or attempt to explain the issue and in others they deny that the issue was important. Again, these comments are for illustrative

purposes and it should be remembered that they are individual comments alluding to their experiences with their own departments' ERP lifecycles.

Following the presentation of this data, each issue is discussed and compared with issues presented in other studies of SAP in the Queensland Government or other relevant studies. Comparisons between the Strategic and Operational respondents and the Client and IP respondents are included in the discussion of each issue. Agreement and dissent between these respondent groups is delineated using the following heuristic: agreement is defined when the ranks vary between the two respondent groups by five or less; dissent is defined where the ranks vary by seven or more; where the ranks vary by six, the result is considered inconclusive.

The issues will be presented, therefore, in the order set out in Table 6.2

Table 6.2 - Order of Issues presented in this Chapter

Rank of Major Issue Category	Issues by Major Issue Category (Factor)	Overall Rank of issues
Reported in Chapter 6		
1	Factor 5: Lack of organisation-wide knowledge strategy reduces benefits	
	[26] The organisation has/is not taking advantage of available SAP functionality	1
	[7] SAP knowledge was not re-used efficiently by agencies	8
2	Factor 4: Knowledge required to support and run SAP was not managed effectively	
	[24] Users do not have sufficient SAP knowledge	3
	[28] Staff/knowledge retention strategies were ineffective	16
	[21] The training method or management was inadequate	19
	[25] Help desk SAP knowledge was inadequate	21
	[30] The help desk was under-resourced	29
Reported in Appendix E		
3	Factor 3: Costs are too high or benefits relative to costs are too low	
	[1] Ongoing running costs are high	4
	[4] SAP upgrade costs are high	5
	[35] SAP is generally expensive to implement	9
	[20] SAP reporting is expensive	26
	[16] SAP not value for money	28
	[8] SAP not suitable for small agencies/organisations	31
4	Factor 6: Customisation and systems integration	
	[37] Systems integration was problematic	15
	[29] The SAP system was customised too much	24

5	Factor 2: The SAP system is inadequate or difficult to use	
	[6] SAP reporting tools difficult to use	2
	[27] The reporting from the SAP system is inadequate	7
	[17] The SAP system is too complex	14
	[9] The organisation has experienced downtime, slow processing or unreliable hardware	22
	[34] SAP functionality is inadequate	32
	[31] The SAP system does not work as it should	34
	[18] Systems controls were inadequate	35
6	Factor 1: Poor management of the implementation project and processes	
	[2] There was lack of stakeholder/management support and ownership	6
	[3] The Project Team did not consult or communicate sufficiently	10
	[12] SAP related documentation is insufficient	11
	[10] Insufficient resources were allocated to the project	12
	[5] The testing of the SAP system was inadequate	13
	[13] The change management process has been mismanaged	17
	[11] SAP systems knowledge was lacking in the project team, consultants or the vendor	18
	15] The project suffered from individual or team lack of knowledge of the organisational context	20
	[33] The SAP system suffered non-acceptance, non-use or lack of ownership	23
	[14] The data conversion was inadequate	25
	[12] The configuration of SAP was inadequate	27
	[22] There was poor executive or project management of the SAP project	30
	[32] Time management and planning was inadequate	33
	[19] The staffing of the project team was mismanaged	37
7	Factor 7: Organisational restructuring affected implementation effort	
	[36] The SAP system was adversely affected by the machinery of government	36

The following section presents the issues as set out above beginning with the first-listed major issue category "*Lack of Organisational-wide knowledge strategy reduces benefits*".

6.2 Issue Descriptions

6.2.1 Major Issue Category 5: Lack of organisation-wide knowledge strategy reduces benefits

This Major Issue Category includes two issues:

- ✓ **Issue 1: The organisation has/is not taking advantage of available SAP functionality.**
- ✓ **Issue 8: SAP knowledge was not re-used efficiently by agencies.**

This is the first of two knowledge-management-oriented major issue categories derived through the factor analysis process described in Chapter 5. These two knowledge related issues reflect the perception that SAP expertise was not shared throughout the government, amongst the Queensland Government agencies, to affect better implementation outcomes. While respondents believed that SAP was inadequate in some quarters, they perceived that some SAP functionality was not being used but could potentially be applied in their business context. This inter-organisational knowledge issue is worthy of further research.

6.2.1.1 Issue 26: The organisation has/is not taking advantage of available SAP functionality

Table 6.3 – Issue 26: Summary descriptive statistics

Issue No:	**26**	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		1	1	1	4	1	5
Mean		5.11	4.78	5.19	4.53	5.08	5.18
Std Dev		1.81	1.80	1.81	1.94	1.87	1.70
Major Issue Category:			(Factor 5) Lack of organisation-wide knowledge strategy reduces benefits				

Table 6.4 – Issue 26: Respondent organisations' statistics with count >4 plus OFST[1]

Agency	Count	Mean	Std Dev	Minimum	Maximum
OFST	1	7		7	7
Corrective Services	9	5.78	1.72	2	7
DETIR	29	5.69	1.56	2	7
Public Works	22	5.55	1.44	2	7

[1] Agencies with a respondent count less than five that are mentioned in the discussion will be included in the list of selected agencies.

Transport	29	5.21	1.82	1	7
Health	37	5.16	1.69	1	7
Emergency Services	5	5	1	4	6
Police	5	4.8	2.28	2	7
Education	11	4.73	1.74	1	7
PWC	12	4.67	1.92	1	7
Premiers	10	4.4	2.01	2	7
Tourism	5	4.4	2.07	2	7
Accenture	5	4.2	2.17	1	7

The overall top ranked issue is "The organisation has/is not taking advantage of available SAP functionality". This issue was further explained in the Round Three Survey Instrument as "The organisation did not apply available functionality to its processes **OR** did not re-engineer the organisations processes to better align them with SAP **OR** simply does not use parts of the system that would offer some benefit to the organisation".

This issue was synthesised from 17 issues identified by 16 respondents (8 IP and 8 Client respondents; 9 Strategic and 7 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to the same category.

Some examples of these reported issues follow.

In relation to "The organisation did not apply available functionality to its processes":

Issue: *Reliance on 3rd party products.*

Description: *Preference to use 3rd party products instead of functionality/tool within SAP R/3.*

[Reported by: IP/Operational - OFST]

Issue: *Under-utilisation of SAP Financial Reporting.*

Description: *There is an under-utilisation of the financial reporting options, with still a preference to download data and manipulate in spreadsheets. This time lag of information can mean outdated information, and can cause misunderstanding and confusion.* **[Reported by: IP/Operational - Accenture]**

In relation to: "The organisation did not re-engineer the organisations processes to better align them with SAP":

Issue: *Rationalising business processes.*

Description: *Matching business processes to SAP functionality to incorporate authorisation and approval processes.* **[Reported by: IP/Operational - OFST]**

Issue: *Business Process Identification.*

Description: *Ability to identify business processes and having the knowledge and empowerment to change the processes to take advantage of SAP R/3's functionality.*

[Reported by: Client/Strategic - Tourism]

In relation to: "The organisation simply does not use parts of the system that would offer some benefit to the organisation"

Issue: *Ability to achieve organisational benefits and take advantage of system features not implemented in the initial phases.*

Description: *The initial scope of the implementation did not allow additional features of SAP that would provide significant process improvements and organisational benefits to be achieved.* **[Reported by: IP/Operational - Deloittes]**

Issue: *On-line processing.*

Description: *Ensure that managers fully understand that benefits SAP R/3 can bring to business processes through its on-line processing functionality. Some managers ignore these processes, such as the ability to approve purchase orders through the release mechanism.*

[Reported by: Client/Operational - Tourism]

In the Round Three survey, respondents could comment on their weightings of importance of the issues. Some Round Three comments on this issue included:

Due to high level of customisation through unwillingness of the business to review its processes, the upgrade project currently underway is now a major undertaking.

[Reported by: Client/Strategic – Public Works]

Priority seems to be more "What does the Business want from the system" rather than "What can the system do for the Business"?

[Reported by: Client/Operational - Transport]

Very important point. Too many times we have tried to change SAP to do what the process owner wants rather than change our processes to what SAP can do.

[Reported by: Client/Operational - Transport]

Discussion

This issue is one of two knowledge related issues belonging to the highest ranking major issue category *Lack of organisation-wide knowledge strategy reduces benefits*. It ranks highly from all perspectives. Respondents perceived that there were benefits still to be realised by extending the use of available functionality within the SAP system.

This issue raises the question of whether to change the system to suit the current business processes or change the processes to suit the system. Conventional wisdom suggests that implementing an ERP involves reengineering existing business practices (Davenport, 2000b; Prasad et al., 1999). Faced with pressure to implement and upgrade these large systems quickly, Queensland Government implementation strategists conceivably saw less risk in spending additional funds to modify the standard SAP system to current practices, rather than facing the prospect of widespread change management issues resulting from changing current processes and practices. Users already faced the knowledge challenges of learning new software and slightly modified processes. They were also facing the concurrent challenges associated with changes in financial policy; specifically, the introduction of accrual accounting and managing for outcomes. Departments also faced the spectre of the Year 2000 problem and knew they had to not only bed down SAP but review and replace all at-risk systems.

In an interview with Craig Vayo in CSA (Vayo, 2004) he pointed out that during the first upgrade they adopted a 'like for like' strategy, introducing new functionality only when it enabled CSA to back out modifications added during the implementation. Given the pressure to upgrade (really a re-implementation) on time and on budget, Vayo was reticent to introduce additional risk to this process. He felt more

comfortable with an initial 'replacement strategy' after which he could introduce new functionality over time and in conjunction with future upgrades.

There is evidence from the Round Three comment above that management was reticent to approve process change. Perhaps they saw such change as reducing both the 'knowledge' and 'change' stress on the user population or as a possible cause of time or budget overruns. This strategy, however, transfers the workload and the risk to the project team who have to modify the software to suit current processes. Note that customisation of ERP in the public sector to support existing business practices is not driven by the need to sustain competitive advantage but rather to sustain public service quality and efficiency.

SAP put forward the value proposition that their software brought with it embedded 'best practice' processes and workflow automation, which would streamline current practices and provide savings and other benefits. Conscious decisions by SAP implementation strategists to modify the software rather than the processes would be contrary to this benefit strategy. Such a decision could be considered politically risky because the public could perceive it as a higher cost strategy that put unnecessary pressure on the public purse.

SAP also boasted superior reporting capabilities but the Round One comment above noted the use of third party tools to write reports. The use of more familiar tools to manipulate downloaded data (e.g. Excel, Lotus 123) may have been seen as an easier or cheaper alternative to writing SAP reports using ABAP. This would be consistent with Issue 2: *SAP reporting tools are difficult to use* and Issue 26: *SAP reporting is expensive*.

Strategic vs. Operational

Both Strategic and Operational staff ranked this issue highly agreeing that greater benefits could be derived from the SAP system.

Client vs. IP

While both sectors ranked the issue highly, IPs scored this issue lower at 4.53, ranking it the fourth most important issue. Clients who scored this at 5.19, ranked it as the top issue. All the major agencies (DETIR, Health, Public Works, Transport) reported this issue at means higher than the IPs.

This issue was synthesised from respondents in Round One who were predominantly IP or Strategic level staff. One can speculate that the IP staff were more likely to be aware of the available functionality and the Strategic level staff had greater expectations of the SAP functionality.

Alex Chang (2002) reported a similar issue in his pilot study: *Issue 8 – Too little effort was put into redesigning the underlying business processes, resulting in a system that represented a "technology swap" thereby constraining benefits realisable*. In workshops held with agency representatives, participants indicated difficulties in gaining agreement to the new process from all who were affected.

Overall the decision to change business practices to suit the software is an important and ongoing debate in ERP circles. The issue impacts directly on the pursuit of ERP benefits realisation and the relation between the knowledge required to realise benefits and the execution of that realisation. Arising from this program, further research is ongoing in this issue (see Sedera et al., 2003).

6.2.1.2 Issue 7: SAP knowledge was not re-used efficiently by agencies.

Table 6.5 – Issue 7: Summary descriptive statistics

Issue No:	7	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		8	3	11	3	6	8
Mean		4.72	4.46	4.64	4.78	4.64	4.85
Std Dev		1.92	1.89	2.14	1.66	1.97	1.82
Major Issue Category:			(Factor 5) Lack of organisation-wide knowledge strategy reduces benefits				

Table 6.6 – Issue 7: Respondent organisations' statistics with count >4 plus OFST

Agency	Count	Mean	Std Dev	Minimum	Maximum
OFST	1	7.00		7	7
Audit	2	6.00	1.41	5	7
Education	10	5.70	1.16	3	7
Accenture	6	5.50	1.05	4	7
Premiers	9	5.44	1.88	1	7
Corrective Services	9	5.33	1.94	1	7
Public Works	23	5.04	1.61	2	7
Emergency Services	5	5.00	2.35	2	7
DETIR	27	4.96	1.65	2	7
Police	5	4.80	1.48	3	7
Transport	27	4.67	2.13	1	7

PWC	12	4.42	1.83	1	6
Tourism	6	4.33	1.63	2	7
Health	37	4.11	2.07	1	7

The respondents who rated this issue perceived that "Knowledge about SAP (lessons learnt, common configurations) was not shared amongst the government agencies in a planned and effective manner" (Round Three Survey Instrument).

This issue was synthesised from 9 issues identified by 8 respondents (5 IP and 3 Client respondents; 6 Strategic and 2 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Comparisons with other Departments.*

Description: *I believe that much expense and time could have been saved by recognising and adopting strategies and procedures put in place by other Government Departments who had already implemented SAP or were at a similar stage. I could be wrong, but once again it seemed the consultants were running the show in this regard and reinventing the wheel in many instances – tried and true practices employed by other Departments are still being ignored.*

[Reported by: Client/Strategic - DETIR]

Issue: *Whole of Government Functionality.*

Description: *The functionality that could be used across all of government, and as such should have been built by Support Centre was not clearly defined up front, so was an overhead to the project, but was subsequently incorporated into the Whole of Government model after the Department built and implemented that functionality. Effect – cost overrun in project.*

[Reported by: IP/Strategic - KPMG]

Issue: *Re use/Leverage of knowledge across agencies.*

Description: *I think that there was not enough leverage/re-use of knowledge/lessons learnt across agencies during initial SAP*

implementations over the past couple of years. This was probably due to the fact that several different Implementation Partners were involved. I think this has contributed to the cost of SAP implementations to the Qld Government. It should have been possible to use SAP for cross-government reporting instead of having to build a reporting tool using Lotus Notes (sorry – I've forgotten the name of this tool). Additionally, having a core SAP support team in each agency adds to the cost of the implementation.

[Reported by: IP/Operational - Accenture]

Issue: *Contacts.*

Description: *A document was created that gave the profile of use of SAP within the department. This idea was provided to FISB (now Financial Systems & Training), but I don't know if it was followed up. The intention was that a manger in one department could easily determine if another department had skills in an area in which they were interested. They could then contact the department directly (without FISB) and discuss issues or problems. Some managers may have seen this as a 'staff poaching' threat.*

[Reported by: IP/Strategic – BHP IT]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Most of Project Team wasn't staffed internally resulting in skill transfer issues.

[Reported by: Client/Strategic – Emergency Services]

Consultants relied on, and put in senior positions, and took the knowledge with them.

[Reported by: Client/Operational - Transport]

This is an important issue – Treasury do have an ongoing involvement here.
[Reported by: Client/Operational – Public Works]

Qhealth have considerable skills in SAP. Very rarely been utilised by other Government agencies.

[Reported by: Client/Operational - Health]

Discussion[2]

This study forms part of a research program entitled "Enterprise Resource Planning (ERP) Lifecycle Knowledge Management" (Gable et al., 1998). A central premise of this work is that an organisation's ERP knowledge management/sourcing strategy affects knowledge requirements in later lifecycle phases. Effective ERP knowledge management is considered to offer significant commercial and practical benefits throughout the ERP lifecycle (Gable et al., 1998).

Davenport (2000b) posits that organisations regard an ERP project as a one-time exercise and so fail to attend to ERP knowledge management issues, such as requesting (contracting for) knowledge transfers from consultants, or adequately maintaining the transferred knowledge. His expectation is that knowledge transfer from the IP leave the client organisation better positioned to maintain and evolve their system and to generate returns from the ERP investment.

According to Chan (1999; 2003), ERP implementations require a wide range of knowledge including project knowledge, technical knowledge, product knowledge, business knowledge and company-specific knowledge. Where an organisation does not have the requisite expertise, it will seek knowledge-based resources from third-party providers such as consulting firms (knowledge vendors), which act in the capacity of implementation partner (Timbrell and Gable, 2001; Timbrell et al., 2001).

Following completion of an ERP implementation, the implementation partner usually withdraws from the organisation and responsibility for managing the ERP falls back to the client. Continuing success of the ERP becomes reliant on the client's skill and knowledge in running, supporting, maintaining and upgrading the ERP. In order to keep the ERP 'live' and relevant, the client must draw from their ERP capabilities transferred-in during the implementation period, develop them internally or seek

[2] Some of this discussion is drawn from Timbrell, G., Gable, G. (2002) "The SAP Ecosystem: A Knowledge Perspective" in "Enterprise Resource Planning Solutions and Management", IDEA Publishing, Hershey PA and Timbrell, G., Nelson, K., Jewels, T. (2003) "Knowledge Re-use in an Application Service Provider" in "Knowledge Management: Current Issues and Challenges", IDEA Publishing, Hershey PA

expert support (knowledge) externally. Such external support is usually available from the vendor, the implementation partner and other third parties, and is often expensive (Timbrell and Gable, 2001).

Self-sufficiency is the knowledge objective of an internal ERP and indeed most support functions. Where the client plans to outsource its ERP to an Application Service Provider (ASP), the need for post-implementation, ERP knowledge self-sufficiency reduces for that organisation. ASP vendors cite this alleviation of 'future skills risk' as one of their competitive advantages (Bennett and Timbrell, 2000). Responsibility for most of the project, technical and product knowledge management transfers to the ASP. To achieve operative, internal, ERP knowledge self-sufficiency, the ERP team must, inter alia, systemically identify, qualify, and record ERP knowledge for later reuse by themselves, their successors and relevant others in their organisation.

The core of the Queensland Public Service is one legal entity. This allows the Government to re-arrange the core departments/agencies according to the needs of the State at any time. It also facilitates the smooth movement of public servants between different jobs in different agencies. Each Government agency has an "Accountable Officer" that serves as its CEO. The core major agencies are run by a Director-General while smaller agencies may be run by Executive Directors or Chief Executive Officers of various titles. Each agency reports to a Minister. In some cases, a Minister may be responsible for multiple portfolios (areas of responsibility managed by agencies) and therefore have more than one agency CEO reporting to them. Ministers are individually responsible for their portfolios and each agency is separately managed and separately accountable to Parliament. It is this separation of accountability and management practice that reduces the flow of knowledge between agencies.

Because they are separately accountable and responsible for their own financial practices, Queensland Government agencies implemented separate instances of SAP to suit their own purposes and business requirements. Each agency was also responsible for all resources applied to the implementation of SAP and could be required to justify the use of these resources during the parliamentary Budget Review and Estimates Committee processes. It is accepted behaviour for agencies to share

knowledge and expertise between themselves so long as it does not impact on their own business needs (eg. loss of critical staff for extended periods of time).

The only agency with whole-of-government responsibilities for the management of SAP was Treasury, specifically the Office of Financial Systems and Training (OFST). Any cross-agency knowledge sharing strategy fell within the ambit of OFST's responsibilities. While they took some measures towards this, for example the Standard Model and User Group meetings, overall the perception of agencies was that they could have done more. The OFST respondent considered this issue as very important.

Strategic vs. Operational

Strategic and Operational staff ranked this issue similarly indicating general agreement on its importance. Both groups considered that improved cross-agency knowledge re-use strategy would have improved implementation outcomes. One agency, Health, noted above that, although it had considerable skills in SAP, few other agencies took advantage of these skills.

Client vs. IP

IP staff ranked this issue as their 3rd highest issue while Client staff ranked it 11th. PWC rated it lower than Accenture. Note the spread of responses from Accenture ranged from 4 to 7 while PWC's response range was 1 to 6 indicating slightly differing views by staff of the two firms. The initial responses from IP staff suggested that cross-agency knowledge sharing was a positive strategy and one that should be managed and encouraged by OFST. One IP staff member mentioned a central repository of knowledgeable staff managed by OFST but seemingly not used to effect. Another IP respondent even suggested that the problem was exacerbated by the presence of several implementation partner firms who would be reticent to initiate such exchanges. Even though IP staff might believe that efficient cross-agency knowledge re-use could effectively improve SAP implementation and management outcomes they perhaps felt it was an issue for the Queensland Government to address rather than them.

The comments from the Round Three survey produced an alternate view from Client staff who believed that the roles that IP staff played were the cause of

the lack of knowledge transfer. IP staff were appointed to senior positions during the implementation project but left at the end of the project taking their knowledge with them.

It is proposed in the parent study that the need for post-implementation external support will to a great extent depend on the ERP knowledge transferred and developed during the implementation period. Other factors impacting post-implementation external support requirements might include key staff losses, major upgrades, major configuration changes, and changes to the business process models. The client, therefore, needs to carefully consider from where, to what extent, and how they are going to source the knowledge required to ensure the ongoing vitality of their ERP from the very outset. In other words they need to develop an ERP lifecycle-wide 'knowledge sourcing strategy'.

The three key players in the SAP ecosystem, the client, the vendor and the implementation partner stand to benefit from effective ERP knowledge management. The vendor, SAP, seeks to redress negative perceptions that SAP implementation duration and cost is difficult to manage and to improve client support and satisfaction. The consulting firms seek to streamline implementation and share in the savings with clients. Both SAP and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. The client will benefit through better-planned lifecycle management and more effective implementation outcomes. Also, to the extent that SAP and its partners can capture key knowledge during implementation, they will be well placed to further support clients throughout the ERP life cycle.

These differing but aligned objectives will drive the separate knowledge strategies of each of the three key players. Zack (1999) defines knowledge strategy as balancing knowledge-based resources and capabilities with the knowledge required for providing products or services in ways superior to those of competitors. Zack further defines a firm as having an aggressive knowledge strategy when it closely integrates knowledge exploitation and exploration (innovation) using knowledge sources both internal and external to its organisational boundaries. In the SAP services ecosystem, when the business objectives of the three players either compete or overlap there is potential for the players' knowledge strategies to conflict. We call this 'knowledge strategy friction'.

This example of Client perceptions that the IPs left the organisation with critical knowledge at the project's end is an example of 'knowledge strategy friction'. Furthermore, if IPs were reticent to organise cross-project knowledge transfer, this would be another example of 'knowledge strategy friction'.

Note the Audit Office saw this issue as very important and responded to it by publishing a guide to implementing SAP.

Chang (2002) reported a similar issue: *Poor communication between agencies*. Chang noted that a lack of communication among the agencies about common problems and their solutions. A sample statement from his data was: "*Most agencies did not share their resources and knowledge base which led to the implementation of the project over time and over budget."* Chang's finding is consistent with this issue.

6.2.1.3 Conclusion

This major issue category suggests that more attention to organisational and inter-organisational knowledge strategies will provide greater benefits to ERP outcomes. The Client, Vendor and IPs are not only isolated stakeholders, but important actors, and ostensibly partners, in a relationship that may span the life of the software. Across the ERP life-cycle, clients, consultants, and vendors work together to realise ERP benefits in a way suggestive of an extended virtual organisation (Sieber and Griese 1999). Strategic conflict between 'members' may arise, threatening ERP benefits (Timbrell and Gable 2001). This can result in 'finger pointing' by the parties assigning blame to the other actors for the issues arising. An examination of the barriers to ERP benefits-realisation, and identification of relevant theoretical foundations for their explanation, has the potential to provide a unique, innovative perspective on strategic management of large-scale packaged software, and the extended virtual enterprise explicitly or implicitly deployed across the ERP life-cycle. This is being pursued by the research team in an Australian Research Council Grant entitled "Unlocking Benefits from Enterprise Systems in the Australian Public Sector: Benefits Realisation in the Context of the Virtual Organisation". More information on this research program will be outlined in the "Future Research" section in Chapter 8.

6.2.2 Major Issue Category 4: Knowledge required to support and run SAP was not managed effectively

This Major Issue Category comprises five knowledge-related issues:

- ✓ **Issue 24: Users do not have sufficient SAP knowledge;**
- ✓ **Issue 28: Staff/knowledge retention strategies were ineffective;**
- ✓ **Issue 21: The training method or management was inadequate;**
- ✓ **Issue 25: Help desk SAP knowledge was inadequate;**
- ✓ **Issue 30: The help desk was under-resourced.**

Each issue is discussed in turn and a summary of the major issue category is presented at the end of the section.

This major issue category predominantly concerns knowledge management issues that are focused internally to the organisation. This thesis argues that ERP knowledge management decisions/strategies taken early during the systems lifecycle affect knowledge related decisions required at later points in the lifecycle e.g. if you outsource implementation management to consultants without properly constructed knowledge transfer mechanisms in place, problems can occur in support and upgrade phases (Timbrell et al., 2003).

Poorly targeted or inadequate training will lead to a diminished staff knowledge base putting further pressure on help desk and support staff. The help desk is a central source of ERP knowledge in an organisation. Because it is often the last internal knowledge resource before seeking (often expensive) outside assistance, insufficient help desk knowledge can result in diminished ERP and possibly reduced organisational effectiveness. Further, careful management of help desk, support staff and divisional ERP knowledge leaders can influence system and organisational effectiveness and flexibility. The need for continuing support is an important consideration in the initial planning of an enterprise system (Markus et al., 2000b).

While other studies have identified training as a key issue, few studies have been identified that focus on the importance of the help desk role and its impact on ERP outcomes. Even if an organisation has developed sufficient ERP expertise within its staff and help desk during an implementation, part of an enterprise knowledge strategy must address retaining that expertise. Market forces apply equally to knowledge as they do to other resources. Under certain market conditions specific

knowledge can become scarce, thereby forcing up its price. The second major issue category includes issues that result from a paucity of knowledge resources.

6.2.2.1 Issue 24: Users do not have sufficient SAP knowledge

Table 6.7 – Issue 24: Summary descriptive statistics

Issue No:	24	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		3	2	2	19	2	7
Mean		4.90	4.52	5.15	4.00	4.89	4.91
Std Dev		1.80	1.84	1.62	2.11	1.82	1.78
Major Issue Category:			(Factor 4) Knowledge required to support and run SAP was not managed effectively				

Table 6.8 – Issue 24: Respondent organisations' statistics with count >4 plus OFST, Audit and CAA

Agency	Count	Mean	Std Dev	Minimum	Maximum
OFST	1	7.00		7	7
Corrective Services	10	6.10	0.88	5	7
DETIR	30	5.93	1.01	4	7
Education	11	5.45	1.13	3	7
Police	5	5.20	1.79	3	7
Premiers	10	5.10	0.99	4	7
Transport	28	5.00	1.72	1	7
Audit	2	5.00	0.00	5	5
Tourism	6	4.83	2.32	1	7
Public Works	23	4.61	1.78	1	7
Emergency Services	5	4.60	2.30	2	7
CAA	2	4.50	2.12	3	6
Health	38	4.47	2.02	1	7
PWC	12	4.00	1.86	1	6
Accenture	6	4.00	2.76	1	7

The respondents who rated this issue perceived that "For a variety of reasons users do not have sufficient knowledge about the SAP system to run, maintain or configure it properly" (Round Three Survey Instrument).

This issue was synthesised from 23 issues identified by 22 respondents (2 IP and 20 Client respondents; 7 Strategic and 15 Operational respondents) in the Round One survey. 1 IP respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *System Usage.*

Description: *Frequency of system users and their familiarity of the system are not developed due to infrequent use. Remembering passwords, how to run reports etc.*

[Reported by: Client/Operational - Tourism]

Issue: *System Knowledge.*

Description: *Not full knowledge of system and its requirements and some were critical for usage e.g. GR/IR account in Financials that we weren't informed of that needed to be monitored and reconciled, huge problem due to method of implementation of new system.*

[Reported by: Client/Strategic - Health]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

A constant challenge particularly with infrequent users.

[Reported by: Client/Strategic - Premiers]

User knowledge is steadily increasing over time.

[Reported by: IP/Operational - PWC]

System development & support staff – initial implementation was the most difficult. Rely entirely on external consultants regarding functionality, etc. Ongoing reliance to externals has diminished significantly & limited to specific projects such as the 4.6B upgrade. General users – as with any system, some users excel & some have ongoing difficulties, while the majority learn enough to perform their duties. User knowledge limited by the amount of initiative or desire to understand the system.

[Reported by: Client/Operational - Health]

Many users limit their SAP activities to those explicitly trained – not a good deal of adventure in exploring available menu options. I think this is similar to most other system applications.

[Reported by: Client/Operational - Health]

Discussion

This issue focuses on the users and their lack of knowledge of the SAP system. In listing the issues, the identification by respondents of a lack of knowledge about the SAP applications within the user community implies that greater knowledge would enable the system to function better and, subsequently, there would be greater resultant benefits to the organisation. A Round One respondent from Health noted that users were unaware of some necessary critical functions in SAP that required ongoing oversight. This is an example of 'unconscious incompetence' where a novice does not realise they are making errors through lack of knowledge. Making users aware of this requirement for greater knowledge moves them to a second stage of learning (conscious incompetence) where they realise the need for action but do not know what action to take to reconcile the situation. Learning the required action gives them 'conscious competence' to act on the situation and eventually the competence may become so ingrained it becomes unconscious competence (Howell, 1982).

This issue is the third highest ranked issue in the study. Comments from Round Three vary in suggesting different reasons for the lack of SAP user knowledge. One respondent blames the users themselves for not exploring the software of their own accord. Another suggests that the training was inadequate and yet another blames this outcome on the reliance and role of the IPs. This is an example of 'finger pointing': one group blaming another for weaknesses, issues or the non-realisation of benefits.

Operational vs. Strategic

Operational staff ranked this issue as the second most important issue overall with Strategic staff ranking it seventh. The two cohorts generally agree on the importance of this issue.

Client vs. IP

While Client staff ranked this issue second, IP staff ranked it nineteenth. The mean of Accenture's and PWC's rating was the same at 4.0, below that of all the major agencies. The difference in perception of this issue's importance between Client and IP could be illustrated by the IP's comment in the Round Three survey (above) where they note that the users' knowledge is increasing over time. In other words they could be suggesting that this lack of knowledge will correct itself and therefore is not an ongoing concern.

Other comments point to the reliance on third parties (IPs) for SAP knowledge. During implementation, IP staff are often responsible for directing Client staff to appropriate sources of knowledge e.g. specific manuals, courses, relevant organisational data required to configure the system. After 'go-live', IP staff will continue their support role for a short time giving some Client staff continued opportunities to rely on their expertise. A Client staff comment above notes that this situation will vary according to the initiative of individual Client staff to experiment and learn the system for themselves. This suggests that personal measures of self-efficacy could predict individuals' motivation to self-educate themselves on the system. Further research is needed to consider to what extent users have the personal characteristics for self-improvement in the system and whether this delivers increased benefits and ultimately greater ERP Success.

A Round Three comment above suggests that the lack of training led to this perceived lack of SAP knowledge in the user base. Certainly, lack of training is another issue cited in both this study and Chang's (2002) study, and raises the question whether more or better training lead to the reduction of this perceived issue? Markus et al. (2000a) cite the lack of improvement in users' skill levels as a common problem of an ERP project in the 'Onward and Upward' phase (the equivalent of this study's 'Run' phase). Perhaps, then, the absorptive capacity of the user is the issue? Cohen and Levinthal (1990) found that a recipient's stock of prior related knowledge determines their absorptive capacity for new knowledge, and deficiencies can render the recipient unable to successfully exploit new knowledge. Aside from basic skills, important prior knowledge may include a shared language, previous relevant experience and knowing where to find complementary expertise. This will be discussed further in the training related issues in Section 6.2.2.3. Apart from inadequate user knowledge, knowledge within the help desk was also perceived inadequate: this is discussed in section 6.2.2.5.

6.2.2.2 Issue 28: Staff/knowledge retention strategies were ineffective

Table 6.9 – Issue 28: Summary descriptive statistics

Issue No:	28	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		16	15	12	17	13	19
Mean		4.33	4.02	4.63	4.17	4.40	4.19
Std Dev		1.99	1.91	2.02	2.18	2.05	1.90
Major Issue Category:			(Factor 4) Knowledge required to support and run SAP was not managed effectively				

Table 6.10 – Issue 28: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
DETIR	29	5.28	1.71	1	7
Transport	27	5.07	2.06	1	7
Public Works	23	4.52	1.78	1	7
Accenture	6	4.50	2.26	1	7
Premiers	9	4.44	1.59	2	7
Corrective Services	9	4.44	2.70	1	7
Education	11	4.27	1.42	2	6
PWC	12	4.00	2.22	1	7
Health	36	3.78	1.97	1	7
Tourism	6	3.50	1.38	1	5

The respondents who rated this issue perceived that "Staff (and their knowledge of SAP) were lost to other organisations. The incentives and strategies to retain them were inadequate" (Round Three Survey Instrument).

This issue was synthesised from 24 issues identified by 21 respondents (9 IP and 12 Client respondents; 9 Strategic and 12 Operational respondents) in the Round One survey. 3 respondents reported 6 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to: "Staff (and their knowledge of SAP) were lost to other organisations"

Issue: *Knowledge drain.*

Description: *Implementation partners overly responsible for configuration. Departure of implementation partner meant departure of specialist knowledge insufficient skill sharing.*

[Reported by: Client/Operational - Education]

In relation to: "The incentives and strategies to retain them were inadequate."

Issue: *Retaining skilled staff.*

Description: *As an adjunct to the above, whenever in house staff are trained to a high level of proficiency, the market place beckons as the salaries paid in the commercial are higher than those on offer in the public sector.*

[Reported by: Client/Strategic - DETIR]

Issue: *Staffing.*

Description: *The Department did not show enough flexibility and foresight to retain critical staff who had participated on the project. This had the effect of lowering morale and reducing the options available to line staff to use the system to create further new functionality. What was implemented worked correctly, but the opportunity to build on this base was not immediately followed up.*

[Reported by: IP/Strategic – BHP IT]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Qhealth have a bonus scheme and a skills transfer programme.

[Reported by: Client/Operational - Health]

Knowledge retention difficult in small QH districts.

[Reported by: Client/Strategic - Health]

A challenge in the early days as staff were poached.

[Reported by: Client/Strategic - Premiers]

Discussion[3]

The world-wide market for SAP R/3 was booming in the mid to late 1990s and demand for staff was very high. Vayo (Vayo Interview Transcript 2004) reported that once they went 'live', most Queensland Government departments immediately lost their skilled staff.

Skilled and experienced SAP staff working in the government could sometimes double their salaries by moving into implementation partners or just contracting to implementing organisations. The demand was world-wide so the combination of international travel, guaranteed employment and high wages attracted many people. Several FISB staff left to join the big accounting firms.

The public sector was forced to develop policy aimed at retaining SAP staff. In 1997 The Office of the Public Service, a central human resource policy body, created a SAP retention allowance. This allowed departments to pay up to 20% loading to all staff with SAP skills. The allowance was implemented for a three-year time period. The allowance stopped 'classification creep', the phenomenon of staff being promoted to more senior positions to match their salaries to temporary market conditions. Vayo (2004) noted that some departments did not employ the SAP loading and promoted their SAP experts. The SAP expertise marketplace collapsed in 2000 yet these staff were still being paid excessive rates four years later for performing similar work and with similar responsibilities to other staff at lower rates.

In the Auditor-General's report (Queensland Audit Office, No 3, 1999) he advised agencies to 'ensure that appropriate implementation methodologies, including strategies for dealing with the loss of key staff, were adopted to provide for the efficient operation … of these systems'. For many departments, however, there was little they could do to retain staff during this period.

By 2000, most departmental implementations had finished. The end of the implementations led to a subsequent drop off in demand for SAP expertise. The 'bust' had come. Consulting companies could no longer sustain their large numbers of SAP specialist staff. Scores of consultants were made redundant and the salary levels

[3] Some of the discussion about the staff and knowledge retention strategies has been previously recorded in the history of QGFMS – please see Chapter 4. It is re-presented here because it is directly pertinent to the issue under discussion.

collapsed. The SAP retention allowance lapsed in 2000. SAP support staff were now in plentiful supply reducing the overall cost of running the systems. The availability of staff with SAP expertise, however, did not necessarily solve the knowledge retention issue.

Following the Year 2000 'event', agencies began implementing the first round of SAP upgrades. While some departments hired implementation partners to assist them (e.g. Premiers), many did not. Instead they hired specific SAP expertise and managed their own upgrade processes.

In come cases (e.g. Premiers), the extent and cost of these major upgrades matched or exceeded the initial implementation and management began to appreciate the need to recall their lessons and practices from these initial projects. In effect, they were acknowledging the potential value of reusing the procedural, declarative and rationale knowledge (Zack, 1999) from these earlier implementations, as a means to reducing the financial risk to the enterprise (Marshall et al., 1996). Such re-use requires the knowledge to be retained in some way, either in the knowledge and experience of human resources or in some documentation or other re-usable repository.

A full discussion of issues of knowledge re-use in an enterprise systems context is contained in the study by Timbrell et al. (2003).

6.2.2.3 Issue 21: The training method or management was inadequate

Table 6.11 – Issue 21: Summary descriptive statistics

Issue No:	21	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		19	19	9	23	14	25
Mean		4.24	3.92	4.67	3.78	4.40	3.97
Std Dev		2.10	1.99	2.05	2.53	2.13	2.03
Major Issue Category:			(Factor 4) Knowledge required to support and run SAP was not managed effectively				

Table 6.12 – Issue 21: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
DETIR	30	6.10	1.24	2	7
Corrective Services	9	4.89	1.96	1	7
Accenture	6	4.83	2.99	1	7
Transport	27	4.78	1.95	1	7
Education	11	4.73	1.49	2	7

Tourism	6	4.17	1.17	2	5
Public Works	23	3.87	1.84	1	7
Premiers	9	3.56	1.88	1	6
Health	38	3.45	2.01	1	7
PWC	12	3.25	2.22	1	7

The respondents who rated this issue perceived that "The quality AND/OR quantity of training was unsatisfactory and did not prepare users AND/OR help desk personnel adequately. Trainers did not have sufficient experience in the software. The training strategy was poorly executed. Training has not been ongoing" (Round Three Survey Instrument).

This issue was synthesised from 55 issues identified by 42 respondents (4 IP and 38 Client respondents; 17 Strategic and 25 Operational respondents) in the Round One survey. 11 respondents reported 24 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to "The quality AND/OR quantity of training was unsatisfactory and did not prepare users AND/OR help desk personnel adequately":

Issue: *Training.*

Description: *Lack of specialised training has been a problem. Errors have been identified in the training material and have yet to be corrected. Lack of appropriate staff to deliver training has also been an issue. Trainers were training consultants who had a quick one day run down of how the system worked. Training was a waste of our time and I have taught myself the ways of the system.*

[Reported by: Client/Strategic - DETIR]

Issue: *User Training.*

Description: *User training was generally a complete failure. They tended to be taught to press that button, or series of buttons to get a particular output. What has never been clearly explained to users and business management staff is the use of and what affects and outcomes SAP can/could provide. This added to the*

confusion, to the poor acceptance by users and the poor performance of the system

[Reported by: Client/Strategic - DETIR]

In relation to "Trainers did not have sufficient experience in the software":

Issue: *Support.*

Description: *There was no support from the SAP 'experts' (these were staff employed to help the SAP consultants). We were told that each person would know the module we would be using and then they would learn the job we did and transfer the knowledge and therefore be able to show us how to do the same job in SAP. This did not happen.*

[Reported by: Client/Operational - DETIR]

In relation to "The training strategy was poorly executed":

Issue: *Inadequate training of Implementation Team.*

Description: *Agency resources should be given adequate pre-implementation training and background knowledge in the capability of SAP.*

[Reported by: Client/Strategic – Public Works]

In relation to "Training has not been ongoing":

Issue: *Training/Change Management.*

Description: *Before, during and after implementation, training is essential for all users. System staff need to be continually educated/trained in new SAP initiative.*

[Reported by: Client/Operational - Police]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

The training method in most cases is non-existent or comes second-hand from colleagues.

[Reported by: Client/Operational – Corrective Services]

Trainers were not skilled enough to provide what was required.

[Reported by: Client/Operational - DETIR]

Too many trainers with inadequate knowledge of the modules and also no help desk experience. Therefore they know what is in the manual but not what end users are having problems with on a day to day basis. Also Training clients are only available in training classes. They should be available to all staff to use at any time on their desktop as per Qld Health.

[Reported by: Client/Operational - Transport]

Often to cut costs, training is provided on a train the trainer basis. The newly trained trainer may not follow through properly.

[Reported by: IP/Operational - PWC]

Discussion

Training and updating employees in ERP knowledge is a major challenge. ERP are complex and employees not only have to absorb the technical knowledge but also their new process responsibilities (Bingi et al., 1999). Sumner (2000) identified 'insufficient training and re-skilling of the IT workforce in new technology' as a risk factor in the systems implementation and maintenance phases of an ERP system project. Markus et al. (2000a) noted common ERP training related problems such as poor quality of training materials and cutting training when the schedule gets tight. A 'broad-based holistic education in the company's ERP-mediated business processes' is needed to address the 'what and why' in order to enrich training that focuses on the 'how' (Wheatley, 2000; Murray and Coffin, 2001). Bancroft (1996) suggested training users and the project team were critical success factors for ERP success.

Esteves and Pastor (2001) also cite an adequate training program as a relevant critical success factor for ERP implementations. Organisations can facilitate the knowledge acquisition process by budgeting for vendors to spend time educating key users about the system, by shifting the ERP focus training earlier in the implementation process, by planning for detailed data, functionality and output walk-throughs, and by selecting vendors with significant industry knowledge (Soh et al., 2000).

The training strategy for ERP implementations commonly used in the Queensland Government is 'train the trainer'. Outside experts and IPs provide Client staff, many of whom have worked on the implementation project, with training materials and

guidance on the training process. The client staff would then be 'seeded' back into the user environment to run training courses and provide support. Ideally these would be personnel who were familiar with the business environment, had a sound grasp of the system's technical aspects and an appreciation of the issues faced by the users. Unfortunately, market forces attracted such people away to join consulting firms, diluting the expertise in the training pool.

Under the old QGFMS regime (Dun & Bradstreet) training was run centrally by FISB senior consultants who had a strong grasp of the software and practical experience in its application. FISB, recognising the need to provide SAP training in Queensland Government, tendered for end-user training development. FISB selected a consortium comprising Documentation Associates, Donaldson Consulting, for their training and documentation expertise, and Coopers & Lybrand, for their configuration experience (Informant – Leckenby). They developed an instructor-driven training course and supporting materials e.g. PowerPoint slides and training manuals. Having developed these materials, they handed them over without much direction to the FISB staff. Consequently, it took a while for the FISB training staff to refine the training delivery. When QGFMS was the MSA/Dun & Bradstreet software, FISB training staff had many years of practical implementation and operating experience in the systems. In the new SAP environ, FISB training staff were relatively inexperienced in all aspects of the application: support, implementation and operation.

Because of their size, Health developed their own training function - survey responses from their staff, and others familiar with the Health training strategy, indicate their success. DETIR, however, who initially implemented without an IP, drew a lot criticism from respondents about their training approach.

Training was a source of revenue for FISB and became its primary business focus when FISB became the Office of Financial Systems and Training in 1998. By 2000, following the establishment of the Office of Financial Management that took over the functions of the Office of Financial Systems and Training, all centralised SAP training had stopped. Health, however, continued to run central SAP training courses.

Overall the ranking of this issue was in the middle, 19th of 37 issues.

Client vs. IP

Client staff ranked this issue at 9th position in the top quartile while IP staff ranked this issue at 23rd in the 3rd quartile. The difference in rankings could be explained by the fact that IP staff were responsible for the development of training strategy, training materials and in some cases delivery of training. Client staff, for the most part, were the recipients of the training. They were affected by the consequences of the training methods and management and therefore more sensitive to this issue.

Operational vs. Strategic

Operational staff ranked this issue at 14th in the second quartile while Strategic staff ranked this issue at 25th in the 3rd quartile. Operational staff were more affected by the consequences of the training, they being the personnel who had to operate the system. Strategic staff were more likely to be 'information clients' of the operational staff ie. the recipients of reports generated by operational staff. Strategic staff, therefore would be affected more indirectly by the consequences of poor training, where operational staff had to bear the frustration of operating a system without the benefit of satisfactory training.

Chang (2002) reported similar outcomes in his study. His issue *"Support personnel are inadequately trained"* was ranked 15th. Strategic staff ranked this issue 25th while operational staff ranked the issue 12th (note these ranks are based on the means of means in Chang's study). Dhaheri (2002) also cited this issue in his study of Oracle Financials in the Abu Dhabi government. He notes that *"Training provided was not organised properly and did not cover all of Oracle Financial functions needed for daily work"*. This issue was included in his Knowledge Management major issue category and was ranked the highest in his study. He concluded that the complexity of the system, poor choice of trainer and late timing of training all contributed to this issue in the Oracle environment.

6.2.2.4 Issue 25: Help desk SAP knowledge was inadequate

Table 6.13 – Issue 25: Summary descriptive statistics

Issue No:	25	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		21	22	22	29	20	28
Mean		4.16	3.79	4.24	3.65	4.27	3.96
Std Dev		2.01	1.89	1.99	2.37	1.97	2.09
Major Issue Category:			(Factor 4) Knowledge required to support and run SAP was not managed effectively				

Table 6.14 – Issue 25: Respondent organisations' statistics with count >4 plus OFST

Agency	Count	Mean	Std Dev	Minimum	Maximum
OFST	1	7.00		7	7
DETIR	28	5.21	1.52	2	7
Tourism	6	4.50	2.35	1	7
Health	38	4.42	1.98	1	7
Transport	28	4.32	1.87	1	7
Premiers	9	4.22	2.11	1	7
Corrective Services	9	4.11	2.15	1	7
Public Works	23	4.09	1.86	1	7
Accenture	5	4.00	3.00	1	7
Education	11	3.64	1.75	1	6
Police	5	3.60	1.95	1	6
PWC	12	3.50	2.20	1	7
Emergency Services	5	2.20	1.30	1	4

The respondents who rated this issue perceived that "Users AND/OR help desk personnel regard the SAP knowledge of the help desk personnel to be insufficient to meet the needs of help desk customers. This issue relates to the quality of the SAP knowledge of help desk personnel" (Round Three Survey Instrument).

This issue was synthesised from 13 issues identified by 13 respondents (2 IP and 11 Client respondents; 5 Strategic and 8 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

Issue: *Help Desk.*

Description: *At times it appears that the people who are there to answer the questions are not able to as they do not have a practical application of the system and processing documents. They*

have the knowledge for system maintenance but general working knowledge is not there.

[Reported by: Client/Operational - DETIR]

Issue: *Help Desk Support Staff.*

Description: *The support staff were not sufficiently trained and in the main, were contractors. Within a year, the key support personnel had left for consulting firms.*

[Reported by: IP/Operational - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

This was due to the knowledge transfer from the subject matter experts (SME) and the consultants to the helpdesk staff being very inadequate.

[Reported by: Client/Operational - DETIR]

It was adequate, but we have lost staff recently, and with that, we have lost their knowledge.

[Reported by: Client/Strategic - Premiers]

Help desk is probably the most important area of SAP support, however is regarded as the lowest in importance. At some stages there has been a major lack of knowledge and users stopped calling and contacted one another. As the skills improve users will start calling again. However the skills required to do Help Desk are way beyond that of most other staff in terms of needing knowledge across several or all modules, excellent communication skills, etc. Business analysts are traditionally paid at 1 to 2 levels above a Help Desk consultant, however they have the time to sit down and work out a solution, without an end user on the other end of the phone and also they generally only have knowledge in 1 or 2 modules.

[Reported by: Client/Operational - Transport]

Discussion

Help desks play a critical role in the support and maintenance of ERP. The breaking up of ERP support in the Queensland Government from a largely centralised model to

a predominantly decentralised model had a large effect on the structure and management of help desks. Under the centralised model, the help desk in FISB (Treasury) provided second level support for the Dun & Bradstreet software. Local individuals were responsible for primary support and, if the request needed research or greater expertise, the support query was promoted to the FISB experts. A small group of senior personnel in FISB worked through the requests and provided advice back to the departmental support officers. These FISB personnel had direct contacts with Dun & Bradstreet expert personnel (third level support) if required. The senior FISB personnel were involved in early implementations of QGFMS (Dun & Bradstreet) and so had practical experience in its implementation in the agencies.

In the new de-centralised environment individual departments were responsible for their own support mechanisms including help-desk. Survey respondents believed that the help desk staff were under-trained or that continuous turnover of contracted help desk staff diminished their capability to support SAP. Some blamed the consultants for not transferring sufficient knowledge to the help desk while other respondents believed that the staff were too low level and therefore insufficiently expert to provide adequate support.

By 2000, the inability of Office of Financial Systems and Training to provide satisfactory second level support in SAP led to the diminution of that that role in Treasury (see Chapter 4). With the formation of the Office of Financial Management, this centralised role virtually disappeared until the Shared Services program brought all the decentralised help desk support for SAP into one organisation, CorpTech, in 2003.

This was the 21st ranked issue overall putting it in the 3rd quartile of the issues rankings.

Client vs. IP

Clients ranked this 22nd overall while the IPs ranked it much lower at 29th. Both groups saw this as important but ranked it moderately in the 3rd quartile. IP staff often take on an initial support role after go-live and given their better knowledge of the system may not have ‘marked themselves down’ when responding to this issue.

Strategic vs. Operational

Strategic staff ranked this issue 28th in the 4th quartile of the rankings. Operational staff ranked it higher at 20th place probably because they were more affected by the lack of knowledge in help desk staff. Unresolved help desk queries usually result in ERP tasks not being fulfilled often creating frustration amongst operational staff.

Chang (2002) also found similar rankings for his issue "*Ongoing support for SAP system is inadequate*". Strategic staff ranked this issue 32nd and Operational staff ranked it 17th (based on means of means). Survey respondents in his study stated that "several staff members who had gained knowledge of SAP on the development team has since departed the agency's employ and were not replaced by equally knowledgeable staff".

The normal support strategy is for implementation project team members to man the support desk post go-live and use the knowledge they have gained from being involved in the configuration phase. In the case of ERP in the Queensland Government, a severe lack of experienced SAP staff in the mid to late 1990s meant that staff with SAP implementation experience were immediately marketable at higher salaries and so many left for other roles. When most of the implementations were completed after 2000, this SAP knowledge market collapsed. IPs laid off staff creating a glut of SAP experience and salary levels in the market fell subsequently. SAP allowances were scrapped in the Queensland Government. The SAP knowledge market had settled considerably and expertise was easier to recruit.

6.2.2.5 Issue 30: The Help Desk was under-resourced

Table 6.15 – Issue 30: Summary descriptive statistics

Issue No:	30	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		29	31	26	34	25	35
Mean		3.83	3.49	3.89	3.29	4.02	3.46
Std Dev		2.06	1.92	2.06	2.49	2.04	2.06
Major Issue Category:			(Factor 4) Knowledge required to support and run SAP was not managed effectively				

Table 6.16 – Issue 30: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
DETIR	28	4.86	1.80	1	7
Transport	28	4.50	2.10	1	7
Corrective Services	9	4.22	2.17	1	7
Education	11	4.09	1.76	1	6
Health	37	3.73	2.12	1	7
PWC	11	3.18	2.18	1	6
Public Works	23	3.09	1.53	1	6
Premiers	9	2.78	1.64	1	6

The respondents who rated this issue perceived that "This issue relates to the quantity of help desk resources: particularly understaffing, lack of responsiveness, lack of staff looking after systems or knowledgeable help desk staff assigned to other duties" (Round Three Survey Instrument).

This issue was synthesised from 9 issues identified by 9 respondents (2 IP and 7 Client respondents; 4 Strategic and 5 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

Issue: *Resource allocation.*

Description: *Support unit under-resourced – staffing insufficient to both maintain and enhance.*

[Reported by: Client/Operational - Education]

Issue: *Keeping the system up-to-date.*

Description: *There are many system fixes coming and these take a lot of time to review and implement. This takes the time of the System Administrator, leaving him/her with little time to support the users, as small agencies cannot afford large System Administration sections.*

[Reported by: Client/Operational - Audit]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

The amount of customisation and poor implementation has led to many bugs having to be fixed.

[Reported by: Client/Operational – Emergency Services]

It is improving.

[Reported by: Client/Operational - DETIR]

Discussion

It is difficult to predict the workload of help-desk particularly with a new application. If the service from help-desk personnel is slow, a user may perceive the help-desk knowledge to be inadequate, whereas the real problem is that there isn't enough staff to process help-desk inquiries. This issue reflects a quantitative lack of resources rather than a qualitative lack of knowledge resources.

Respondents ranked this issue quite low: 29th, and so in the bottom quartile.

Client vs. IP

Client staff ranked this issue at 26th, slightly higher than IP staff who ranked it at 34th. Client staff would have been more affected by the lack of resources in the help-desk explaining their slightly higher ranking.

Strategic vs. Operational

Operational staff ranked this issue at 25th, higher than Strategic staff who ranked it at 35th.

The difference in both Client vs. IP rankings and Strategic vs. Operational rankings is consistent with the differences in the issue *"Help Desk SAP knowledge was inadequate"*.

6.2.2.6 Conclusion

Like the previous major issue category, this category illustrates the importance of knowledge management to enterprise systems in organisations. Here, had sufficient attention been paid by organisations to the better management of knowledge, particularly in the training and help desk functions, the above issues may not have attracted the level of importance recorded by respondents during Round Three of the modified Delphi study.

There are several knowledge sources addressed in this major issue category. These knowledge sources include: IP staff, training materials and trainers, and other users and the help desk staff (both internal and external). Knowledge flows from these

sources to the system users so they can effectively operate the ERP for the benefit of the organisation. When barriers arise between the sources and recipients of ERP knowledge, issues such as those described in this section arise.

The issues in this category also make a distinction between the insufficient knowledge and insufficient resources to distribute this knowledge. Even when, for example, there is sufficient knowledge in the help desk function to address ongoing problems, there must also be sufficient numbers of staff to handle the support load. This distinction has not been made in prior studies.

Knowledge related issues account for the top categories in this major issues study.

6.3 Chapter Conclusion

This concludes the discussion of the individual issues in the two knowledge-related major issue categories. For an in-depth discussion of the remaining issues please see Appendix E. In Chapter 7 there will be a discussion that integrates all issues with the historical recount in Chapter 4 and the other studies in this research program; that discussion will analyse, and draw out observations and themes from this research.

Chapter Seven – Findings from the Major Issues Study and the Meta-Study

There are three studies described in this thesis: the Historical Study, the Major Issues Study and the Meta-study. The Historical Study was presented in Chapter 4. Chapter 5 described descriptive, comparative and reductive statistics from the Major Issues Study while Chapter 6 discussed the knowledge-related issues from that study (see also Appendix E for a discussion of the rest of the issues). This chapter addresses the study's principal research questions and presents summary findings from the Major Issues Study.

This Chapter also reports on the Meta-study, drawing out themes from across studies conducted within the ERP Lifecycle Knowledge Management research program. These studies include the Major Issues Study reported in this thesis; Chang, 2002; Putra, 1998; Niehus, 1998; Chan, 2003; Timbrell et al., 2001; Timbrell et al., 2003; Ng, 2003; and, Vayo et al., 2002.

7.1 The Major Issues Study

This thesis reports on a study of major issues that arise in an ERP lifecycle. The study was conducted in Queensland Government SAP R/3 implementation projects. The Major Issues Study set out to achieve the following: (1) Identify/explicate major issues in relation to the ES life-cycle in the public sector; (2) Rank the importance of these issues; (3) Highlight areas of consensus and difference among the three stakeholder groups: the user organisation and the implementation partners (consultants); and (4) Inform academic research directions in ES.

The research team used a modified three-round Delphi Method to conduct this study. In Round One, potential respondents were asked "*What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?"* These responses were aggregated into a master list of issues and respondents were asked to confirm the mapping of their responses to the master set of issues in Round Two. Finally, respondents were asked to weight the importance of the issues across the phases of the ERP lifecycle.

For this study, the following research questions were asked:

1) What are the major public sector ES implementation, management, and support issues faced by the stakeholder groups?

2) How do stakeholders rate the relative importance of these issues?

3) What are the points of consensus and dissent between the stakeholder groups?

7.2 Major Issues Study Findings

This section summarises the main findings from the ERP Major Issues Study conducted across the Queensland Government. Each of the research questions are considered in turn:

7.2.1 Research Question: What are the major public sector ES implementation, management, and support issues faced by the stakeholder groups?

This study found thirty seven major issues from the study of ERP issues within the Queensland Government. The issues were distilled from the first two rounds of a modified Delphi method described in detail in Chapter 3.

The first round, the inventory round, identified 538 issues from 112 usable surveys giving an average of 4.8 issues per respondent. These were distilled into 41 issues including two non-issue categories: *Issue not classified* and *No issue reported*. Following the second round of the Delphi study, the confirmation round, and an executive workshop, 37 issues were included in the final list. These thirty seven issues and an explanation of each issue and the number/percentage of times they were reported are set out in Table 7.1.

Many of these 538 issues were compound in nature and were de-aggregated. Following Round Two the final number of separate usable issues number 681. Using the incidence of overall citation as an early crude indicator of severity, these issues can be grouped into the major issue categories developed after Round Three. The highest incidence of issues cited in Round One belongs to the major issue category *Factor 1: Poor Management of the implementation project and processes* with count of 277 de-aggregated issues (40.68%). The counts in the other major issue categories

from highest to lowest were: 156 for *Factor 2: The SAP system is inadequate or difficult to use* (22.91%); 124 issues for *Factor 4: Knowledge required to support or run SAP was not managed effectively* (18.21%); 66 issues for *Factor 3: Costs are too high or benefits relative to costs are too low* (9.69%); 26 issues for *Factor 1: Lack of organisation-wide knowledge strategy reduced benefits* (3.82%); 24 issues for *Factor 6: Customisation and Systems Integration (3.52%)*; and, 8 issues for *Factor 7: Organisational restructuring affected the implementation* (1.17%).

Using the raw counts as an indication, therefore, shows that respondents were mostly concerned with the quality of the project management and the resulting functionality of the system (63.59%). This was followed by frustration around the knowledge required to support the system (18.21%). The broader issues of costs and government wide knowledge strategy were cited less by respondents (13.51%) and finally the technical issues of customisation and integration and inevitable organisational restructuring accounted for the least number of cited issues (4.69%).

While the number of citations does give some indication of those frustrations held uppermost in the mind by individual respondents across the Queensland Government public sector, once they were confronted with all the refined issues from the study, each respondent was able to make a more informed response. This is the objective and the power of the Delphi Method in operation. Round Three provided the opportunity for respondents to consider the relative importance of the whole range of issues identified across the sector.

Table 7.1 - Final list of 37 issues with explanation and counts of reporting

MI Cat*	**No.**	**Issue**	**Times /% reported**		**Further explanation**
2	21	The training method or management was inadequate.	55	8.08	The quality AND/OR quantity of training was unsatisfactory and did not prepare users AND/ OR help desk personnel adequately. Trainers did not have sufficient experience in the software. The training strategy was poorly executed. Training has not been ongoing.
5	27	The reporting from the SAP system is inadequate.	43	6.31	The reporting does not meet the needs of the users. It is inaccurate OR not usable OR inflexible OR reports do not contain the proper or necessary information to conduct business.
5	34	SAP functionality is inadequate.	34	4.99	The SAP functionality does not support day-to-day business needs of the organisation

MI Cat*	No.	Issue	Times /% reported		Further explanation
6	22	There was poor executive or project management of the SAP project.	32	4.70	The overall departmental implementation process was unsatisfactory OR Implementation strategies were unclear OR The project is still experiencing problems as a result of initial poor project and executive management OR Senior consultants under-performed.
6	10	Insufficient resources were allocated to the project.	31	4.55	Insufficient money and staff were allocated to the SAP project. The staff resources were inexperienced OR there weren't enough people to implement in the time period OR staff was not released from their duties sufficiently to assist in the project. There was not enough technical infrastructure/capacity to run and/or maintain the SAP system.
6	15	The project suffered from individual or team lack of knowledge of the organisational context.	31	4.55	The individuals in the project team AND/OR the team as a whole did not fully grasp/understand the business requirements of the organisation leading to poor configuration and design decisions. Project team members did not have sufficient expertise in certain areas to configure and implement the system properly.
6	11	SAP systems knowledge was lacking in the project team, consultants or the vendor.	29	4.26	There was a lack of available expertise about SAP in the project team OR in the consultants assisting the project OR from the SAP company personnel. At times, no-one implementing SAP could explain the impact of a configuration decision on the rest of the system.
6	3	The Project Team did not consult or communicate sufficiently.	28	4.11	The project did not consult widely enough OR with the right people. Users did not know what was going on. Problems were not communicated widely or quickly enough. Issues were recorded during consultation but not acted upon. The project team did not communicate amongst themselves.
5	17	The SAP system is too complex.	24	3.52	Simple processes and procedure seem to be very difficult OR the system has been configured in a complex way OR it is very difficult to support (solve problems in) the system. Inter-relationships in the system are very complex.
2	28	Staff/knowledge retention strategies were ineffective.	24	3.52	Staff (and their knowledge of SAP) was lost to other organisations. The incentives and strategies to retain them were inadequate.
2	24	Users do not have sufficient SAP knowledge.	23	3.38	For a variety of reasons users do not have sufficient knowledge about the SAP system to run, maintain or configure it properly.

MI Cat*	No.	Issue	Times /% reported		Further explanation
6	33	The SAP system suffered non-acceptance, non-use or lack of ownership.	22	3.23	Users did not accept the system OR did not use the system OR were fearful of using it. Some staff tried to avoid it OR disown it.
5	6	SAP reporting tools are difficult to use.	18	2.64	It is difficult to extract the required information using the SAP reporting and inquiry tools.
4	37	Systems integration was problematic.	18	2.64	Integration is complex and mistakes were made. The interfaces with other systems do not work properly.
6	19	The staffing of the project team was mis-managed.	17	2.50	Inappropriate people were selected for and allocated to the project team. The selection process was flawed. People were chosen because they were available and not on the basis of their skills.
6	23	The configuration of SAP was inadequate	17	2.50	The configuration of SAP did not accurately reflect the business process OR need of the organisation and could have been improved.
1	26	The organisation has/is not taking advantage of available SAP functionality.	17	2.50	The organisation did not apply available functionality to its processes OR did not re-engineer the organisations processes to better align them with SAP OR simply does not use parts of the system that would offer some benefit to the organisation.
6	2	There was lack of stakeholder/management support and ownership.	16	2.35	Executives and other key personnel did not support OR were not committed to the project OR were not sufficiently involved in the project.
3	1	Ongoing running costs are high.	15	2.20	Ongoing bureau, staff, licence and maintenance costs are high.
5	18	Systems controls were inadequate.	14	2.06	There is a lack of audit trails OR the security system is inadequate OR the system does not pick up on errors OR there is a lack of validation processes.
5	31	The SAP system does not work as it should.	14	2.06	There are bugs and inconsistencies in the system. The system cannot do things that it should be able to do.
6	32	Time management and planning was inadequate.	14	2.06	The project ran out of time OR missed deadlines OR did not plan sufficiently OR rushed the work OR underestimated the time it would take to complete the project work.
3	35	SAP is generally expensive to implement.	14	2.06	Overall SAP cost more than what was originally expected to implement.
2	25	Help desk SAP knowledge was inadequate.	13	1.91	Users AND/OR help desk personnel regard the SAP knowledge of the help desk personnel to be insufficient to meet the needs of help desk customers. This issues relates to the quality of the SAP knowledge of help desk personnel.
3	4	SAP upgrade costs are high.	12	1.76	Moving to a new release is very expensive AND/OR creates greater ongoing costs.

MI Cat*	No.	Issue	Times /% reported		Further explanation
6	12	SAP related documentation is insufficient.	12	1.76	Various types of documentation were cited as being substandard or non-existent. This includes online documentation such as help files, manuals, and help desk tools. Documentation is found to be out-of-date.
6	13	The change management process has been mis-managed.	11	1.62	The importance of change management was under-estimated OR the change management effort was under-resourced.
6	14	The data conversion was inadequate.	10	1.47	Lack of data preparation has led to inaccuracies, items in suspense accounts and errors in the SAP system. Data was not cleansed properly prior to uploading to the new system.
1	7	SAP Knowledge not re-used efficiently by agencies.	9	1.32	Knowledge about SAP (lessons learnt, common configurations) was not shared amongst the government agencies in a planned and effective manner.
3	8	SAP is not suitable for small agencies/organisations.	9	1.32	The costs and other resources to implement and maintain SAP are greater than a small agency can bear. The system is more suitable for larger organisations.
5	9	Organisation has experienced downtime, slow processing or unreliable hardware.	9	1.32	This includes: slowness, systems crashes, down-times caused by service providers, slow running reports and network problems.
3	20	SAP reporting is expensive.	9	1.32	It is expensive to produce the reports or hire people to produce the required reports.
2	30	The Help Desk was under-resourced.	9	1.32	This issue relates to the quantity of help desk resources: particularly understaffing, lack of responsiveness, lack of staff looking after systems or knowledgeable help desk staff assigned to other duties.
7	36	The SAP system was adversely affected by the machinery of government.	8	1.17	Changes to departments and internal departmental structures affected the SAP system configuration and implementation.
6	5	The testing of SAP system was inadequate.	7	1.03	There was insufficient testing of the system before scheduled phased rollout/go-live. Production environments were released too soon.
3	16	SAP is not value for money.	7	1.03	The costs associated with SAP outweigh the benefits.
4	29	The SAP system was customised too much.	6	0.88	There were too many add-ons, customizations and non-standard SAP programs developed.

***** Major Issue Category

7.2.2 Research Question: How do stakeholders rate the relative importance of these issues?

During Round Three, 559 surveys were distributed, 284 responses were received of which 207 were usable. The ranking of these issues (based on the maximum scores across the lifecycle phases attributed to them by respondents) is set out in Table 7.2.

Table 7.2 - Final 37 issues listed in order of importance

Rank	Mean	Std	Description
1	5.11	1.81	The organisation has/is not taking advantage of available SAP functionality.
2	4.90	1.92	SAP reporting tools are difficult to use.
3	4.90	1.80	Users do not have sufficient SAP knowledge.
4	4.81	2.12	Ongoing running costs are high.
5	4.80	2.00	SAP upgrade costs are high.
6	4.76	2.04	There was lack of stakeholder/management support and ownership.
7	4.74	1.89	The reporting from the SAP system is inadequate.
8	4.72	1.92	SAP Knowledge was not re-used efficiently by agencies.
9	4.70	2.00	SAP is generally expensive to implement.
10	4.57	2.08	The Project Team did not consult or communicate sufficiently.
11	4.56	2.00	SAP related documentation is insufficient.
12	4.50	2.16	Insufficient resources were allocated to the project.
13	4.46	2.18	The testing of the SAP system was inadequate.
14	4.43	1.91	The SAP system is too complex.
15	4.33	1.93	Systems integration was problematic.
16	4.33	1.99	Staff/knowledge retention strategies were ineffective.
17	4.26	2.10	The change management process has been mismanaged.
18	4.26	2.18	SAP systems knowledge was lacking in the project team, consultants or the vendor.
19	4.24	2.10	The training method or management was inadequate.
20	4.18	2.01	The project suffered from individual or team lack of knowledge of the organisational context.
21	4.16	2.01	Help desk SAP knowledge was inadequate.
22	4.10	2.14	The organisation has experienced downtime, slow processing or unreliable hardware.
23	4.08	2.01	The SAP system suffered non-acceptance, non-use or lack of ownership.
24	4.04	2.11	The SAP system was customised too much.
25	3.95	2.14	The data conversion was inadequate
26	3.91	2.10	SAP reporting is expensive.
27	3.90	2.09	The configuration of SAP was inadequate.
28	3.88	2.12	SAP is not value for money.
29	3.83	2.06	The Help Desk was under-resourced.
30	3.78	2.10	There was poor executive or project management of the

Rank	Mean	Std	Description
			SAP project.
31	3.70	2.29	SAP is not suitable for small agencies/organisations.
32	3.69	1.95	SAP functionality is inadequate.
33	3.69	1.97	Time management and planning was inadequate.
34	3.64	2.14	The SAP system does not work as it should.
35	3.64	1.98	Systems controls were inadequate.
36	3.57	2.14	The SAP system was adversely affected by the machinery of government.
37	3.39	2.01	The staffing of the project team was mismanaged.

The relative rankings of importance from the perspectives of Client vs. Implementation Partner staff are reported in Table 5.19. The relative rankings of importance from the perspectives of Strategic vs. Operational staff are reported in Table 5.20.

These measures of importance were analysed using Factor Analysis to derive the major issue categories. This approach is a departure from Chang's (2002) preliminary study where he pre-allocated the issues into major issue categories prior to the Round Three (weights) survey.

Perhaps more informative is the ranking of the major issue categories set out in Table 7.3:

Table 7.3 - Ranking of the Major Issues

		Maximums			Means		
Major Issue Factor No.	Major issue Category	Rank	Mean	Std Dev	Rank Mean	Mean	Std Dev
5	Lack of organisation-wide knowledge strategy reduces benefits	1	4.92	1.87	1	4.62	1.85
4	Knowledge required to support and run SAP was not managed effectively	2	4.30	2.02	2	3.95	1.94
3	Costs are too high or benefits relative to costs are too low	2	4.30	2.16	2	3.95	2.04
6	Customisation and systems integration	4	4.18	2.03	4	3.87	1.90
2	The SAP system is inadequate or difficult to use	5	4.17	2.05	5	3.86	1.95
1	Poor management of the implementation project and processes	6	4.17	2.11	6	3.85	1.98

7	Organisational restructuring affected implementation effort	7	3.57	2.14	7	3.34	1.97

This ranking of major issue categories places the Knowledge Management related categories at the top. The difference in ranking between the second knowledge category and the cost category is very marginal. The categories that describe issues with the use of SAP come next followed by the project management category. Finally the single issue category concerned with organisational restructuring comes last.

The knowledge management theme is strong throughout this research program. The initial idea behind the *ERP Lifecycle Knowledge Management* research program was that coordinated knowledge management between the key players in the ERP lifecycle (the vendor, the client and the implementation partner) could offer better ERP lifecycle support (Gable et al., 1998).

These first two major issue categories demonstrate that respondents understood the relative importance of knowledge-based issues in the ERP context and ranked them highly as a result. The first major issue category included issues such as *The organisation has/is not taking advantage of available SAP functionality* and *SAP knowledge was not re-used efficiently by agencies*. These two issues that make up this category can only be realised after the implementation projects have been substantially completed across a range of agencies. The realisation of the importance of these issues comes from reflection on what has happened in ERP projects across the Queensland Government public sector. The first issue, *The organisation has/is not taking advantage of available SAP functionality*, is a key knowledge management issue that relates to the approach to process engineering and organisational structure decisions taken during the design phase. Had there been sufficient knowledge of SAP in the project team, consultants and vendor (Issue 11) this issue may not have gained as much prominence. The second issue in this first major issue category, *SAP Knowledge was not re-used efficiently by agencies*, is a broader inter-agency knowledge management issue. The expectation from agencies is that the coordination of this expertise across the sector is a responsibility of the central agency i.e. FISB and its later variations. While FISB did try and do this during the early years of SAP, the dilution of FISB's power and role over time meant this central coordination of SAP capability also suffered.

The second major issue category *Factor 4: Knowledge required to support and run SAP was not managed effectively* reflected intra-agency knowledge management issues. It included the following issues: *Issue 24: Users do not have sufficient SAP knowledge; Issue 28: Staff/knowledge retention strategies were ineffective; Issue 21: The training method or management was inadequate; Issue 25: Help desk SAP knowledge was inadequate*; and *Issue 30*: *The help desk was under-resourced*. These agency based issues were common across the Queensland Government. It would be simplistic to attribute the lack of knowledge to lack of training (Issue 21). This assumes that because training is provided to personnel they fully understand it; it is sufficient to meet their longer term needs; that they can apply it in their context; and they can retain it. The analysis of knowledge transfer across the sector by Timbrell et al. (2001) demonstrates issues with knowledge absorption and retention. In fact, there was plenty of training provided to users but training is not enough. Organisations must build a knowledge base from a combination of learning (formal training) and experience. Help desks must solve problems (and have methods to solve problems) and record these solution paths for others to reuse. No Queensland Government agencies had a knowledge strategy for their ERP areas. It wasn't until early studies in CSA (see Timbrell et al., 2003) provided some guidance towards the development of strategy and activities to record specific ERP knowledge for longer term use (see Vayo et al., 2002)

Considering both the inter-agency (Issue 7) and intra-agency knowledge issues (Issues 11, 15, 24, 28, 21, 25 and 30) it is apparent that this study reveals a need to formulate knowledge strategies for both levels. Furthermore, one outcome from this study is an appreciation of the need for the earlier formulation of knowledge strategy to contain these ERP issues in future similar contexts. These knowledge issues became apparent to respondents after the implementation projects were complete. Earlier intervention is suggested. A major knowledge-related finding from this study is therefore:

Knowledge-management-oriented decisions taken early in the ERP lifecycle impact on the ERP capabilities later in the lifecycle.

A second major finding from this study is that:

In a multi-agency (firm/organisation) context, knowledge strategy is needed at the inter-agency and intra-agency levels.

The major issue category ranked third in importance *Factor 3: Costs are too high or benefits relative to costs are too low* reflected the perception that SAP as an ERP was relatively expensive and did not deliver the benefits expected by the respondents. It included the following issues: *Issue 4: SAP upgrade costs are high; Issue 1: Ongoing running costs are high; Issue 35: SAP is generally expensive to implement; Issue 16: SAP not value for money; Issue 20: SAP reporting is expensive;* and, *Issue 8: SAP not suitable for small agencies/organisations.*

These costs issues were of great concern mostly for the strategic respondents who are generally responsible for budget expenditure. This issue demonstrates that the costs of the systems exceeded the expectations of Queensland Government personnel. In order to manage expectations and temper costs, ERP lifecycle managers need to balance these cost expectations with attainment of benefits, both real and perceived. Management must be proactive in channelling the restructuring of processes and reporting from ERP projects towards the attainment of organisational goals and benefits. Furthermore, these benefits must be targeted, measured and managed until they are realised. Two conclusions from this study, therefore, are:

Management must be clear about the benefits they want to achieve from ERP systems and manage towards the achievement of these benefits.

ERP managers should employ a systematic measurement model of ERP benefits.

With regards the first conclusion, the Queensland Government organised a group to look at benefits realisation from the ERP projects in 2001-2002 but this activity dissipated. The second conclusion has been the subject of a related study in the research group led by Guy Gable (see Sedera et al., 2003). Any early hypothesis put forward at the beginning of this research program was that *The benefits from an ERP project are more likely to be achieved through the cooperation of the actors in the project: client, vendor and implementation partner.* The findings from this thesis are insufficient to either support or dispute this hypothesis.

The fourth major issue category *Factor 6: Customisation and systems integration* contains two issues: *Issue 37: The SAP system was customised too much* and *Issue 29: Systems integration was problematic.* The first issue is a generic information systems issue that affects most systems that require multiple interfaces. The central nature of an ERP dictates the extent of this problem. The second issue about

customisation is a core debate in the ERP world centred on changing the software to suit the organisation vs. changing the organisation to suit the software. This issue supports the argument that the system was changed too much to suit the organisation. This issue could be related to *Issue 26: The organisation has/is not taking advantage of available SAP functionality* in that if the organisation did take advantage of this (existing) functionality, some of the customisation may not have been needed. In the Vayo et al. (2002) study they note the effect of customisation on the upgrade process. Also, OFM reported in the historical study that customisation tended to be backed out during the upgrade process as agencies assumed the standard functionality and processes. The issue also relates to the discussion of costs and benefits and the wisdom or otherwise of the 'technology swap' implementation strategy. The knowledge perspective of these arguments considers the knowledge absorption and retentive capacities of the personnel vs. the confinement of knowledge stress on the project team and associated cost implications of customisation. Full discussion of this argument can be found in E.2.2 and E.1.5 This discussion provides another major conclusion of this study:

The 'technology swap' strategy (changing the system to suit the organisation) may be a viable option if the ERP project team does not think the organisation has the absorptive and retentive capacities to cope with the effect of broad scale process and other re-engineering efforts (changing the organisation to suit the system).

The fifth ranked major issue category *Factor 2: The SAP system is inadequate or difficult to use* reflects frustrations within the ERP community with its operation and functionality. The issues included in this issue include: *Issue 34: SAP functionality is inadequate; Issue 27: The reporting from the SAP system is inadequate; Issue 18: Systems controls were inadequate; Issue 31: The SAP system does not work as it should; Issue 17: The SAP system is too complex; Issue 9: The organisation has experienced downtime, slow processing or unreliable hardware;* and, *Issue 6: SAP reporting tools difficult to use.*

This issue reflects physical limitations of the software and knowledge limitations of the user community. All software systems take time to bed down. The more complex the system, the longer it takes for the user community to become familiar with its structure, processes and workings. The major issue category is related to other

knowledge-based issues such as *Issue 24: Users do not have sufficient SAP knowledge; Issue 21: The training method or management was inadequate;* and, *Issue 25: Help desk SAP knowledge was inadequate*. The last mentioned issue relates because if the help desk cannot address the issues in this category (e.g. reporting inadequacies, functionality problems) then the issue remains with the user. This issue supports the need for a targeted intra- and inter-agency knowledge strategy supporting the finding mentioned above:

In a multi-agency (firm/organisation) context, knowledge strategy is needed at the inter-agency and intra-agency levels.

The sixth ranked major issue category was *Factor 1: Poor management of the implementation project and processes.* This major issue category contained the most issues (over one third). Several of the issues in this category are cited in the general information systems and project management literature. They are commonly found in projects, both ERP and other types, and include: *Issue 19: The staffing of the project team was mismanaged; Issue 10: Insufficient resources were allocated to the project; Issue 32: Time management and planning was inadequate; Issue 22: There was poor executive or project management of the SAP project; Issue 13: The change management process has been mismanaged; Issue 3: The Project Team did not consult or communicate sufficiently; Issue 5: The testing of the SAP system was inadequate; Issue 14: The data conversion was inadequate; Issue 2: There was lack of stakeholder/management support and ownership; Issue 12: SAP related documentation is insufficient; Issue 33: The SAP system suffered non-acceptance, non-use or lack of ownership.* A simple conclusion from this finding is that:

ERP Project Managers must attend to and manage common information systems project issues as well as ERP specific issues.

Other issues in this major issue category include two knowledge management issues: *Issue 11: SAP systems knowledge was lacking in the project team, consultants or the vendor* and *Issue 15: The project suffered from individual or team lack of knowledge of the organisational context;* and, one specific to packaged software: *Issue 23: The configuration of SAP was inadequate.*

The three issues are strongly related because they describe two types of knowledge that are required for a successful SAP project and one important output of the project

i.e. configuration. It is the combination of SAP systems knowledge (see Issues 11, 24 and 25) and the knowledge of the organisational context (see Issue 15) that contributes to the correct design and ultimate configuration of the system. In Chan's (2003) study he classified different types of knowledge within an ERP context: business, technical, product, company-specific, project and communication/coordination/cooperation knowledge. This study goes one step further by concluding that:

There are two essential types of knowledge that require integration within an ERP project: knowledge of the system and knowledge of the organisational context.

The final major issue category *Factor 7: Organisational restructuring affected the implementation* included only one issue: *Issue 36: The SAP system was adversely affected by the machinery of government.* This issue is probably context specific to Queensland Government, or perhaps Australian governments generally, because of their habit of restructuring departments following a change of government, regardless of its effect on current operations. Perhaps this issue is a cautionary tale to future ERP projects to consider carefully any mid-project restructures. There is no major finding or conclusion from this major issue category.

The next section will consider differences in the perspectives of the stakeholder cohorts studied in this Delphi study.

7.2.3 Research Question: What are the points of consensus and dissent between the stakeholder groups?

There were two sets of stakeholder group perspectives considered in this study. These were the Strategic vs. Operational perspective and the Client vs. Implementation Partner perspectives. The ranking of each issue was measured and compared for these two pairs of stakeholder groups. The data for this comparison is drawn from Round Three, the weights round, where respondents were asked to weight the importance of the individual issues across the phases.

This demographic analysis of the stakeholder cohorts resulted in three outcomes. The groups were either; 1) in consensus on the issue; 2) in dissent about the issue; or 3) there was no strong indication of consensus or dissent. When discussing the issues in Chapter 6 and Appendix E, the following analytic rules were attended: if the ranking

varied by 7 ranks or more this indicated dissent; if the rankings varied by 5 ranks or less, this indicated consensus; other results (a difference of 6 ranks) were considered inconclusive.

The Strategic and Operational stakeholders found general consensus in the following 21 issues: *Issue 10: Insufficient resources were allocated to the project; Issue 9: The organisation has experienced downtime, slow processing or unreliable hardware; Issue 11: SAP systems knowledge was lacking in the project team, consultants or the vendor; Issue 15: The project suffered from individual or team lack of knowledge of the organisational context; Issue 34: SAP functionality is inadequate; Issue 18: Systems controls were inadequate; Issue 7: SAP Knowledge was not re-used efficiently by agencies; Issue 29: The SAP system was customised too much; Issue 19: The staffing of the project team was mismanaged; Issue 27: The reporting from the SAP system is inadequate; Issue 37: Systems integration was problematic; Issue 23: The configuration of SAP was inadequate; Issue 14: The data conversion was inadequate; Issue 32: Time management and planning was inadequate; Issue 36: The SAP system was adversely affected by the machinery of government; Issue 26: The organisation has/is not taking advantage of available SAP functionality; Issue 13: The change management process has been mismanaged; Issue 31: The SAP system does not work as it should; Issue 24: Users do not have sufficient SAP knowledge; Issue 33: The SAP system suffered non-acceptance, non-use or lack of ownership;* and, *Issue 22: There was poor executive or project management of the SAP project.*

The Strategic and Operational stakeholders held general dissent about the following 13 issues: *Issue 17: The SAP system is too complex; Issue 4: SAP upgrade costs are high; Issue 25: Help desk SAP knowledge was inadequate; Issue 3: The Project Team did not consult or communicate sufficiently; Issue 5: The testing of the SAP system was inadequate; Issue 1: Ongoing running costs are high; Issue 30: The Help Desk was under-resourced; Issue 35: SAP is generally expensive to implement; Issue 21: The training method or management was inadequate; Issue 12: SAP related documentation is insufficient; Issue 8: SAP is not suitable for small agencies/organisations; Issue 20: SAP reporting is expensive;* and, *Issue 16: SAP is not value for money.*

When one groups these issues into major issue categories the consensus and dissent between the Strategic and Operational respondents becomes clearer. Strategic and Operational respondents agreed on all issues in the following major issue categories: *Factor 5: Lack of organisation-wide knowledge strategy reduces benefits; Factor 6: Customisation and systems integration*; and, *Factor 7: Organisational restructuring affected implementation effort*. They agreed on a majority of issues from *Factor 1: Poor management of the implementation project and processes* (10 from 14, 1 inconclusive); *Factor 2: The SAP system is inadequate or difficult to use* (5 from 7, 1 inconclusive). They disagreed completely on all the issues in *Factor 3: Costs are too high or benefits relative to costs are too low*. They disagreed on the majority of issues from *Factor 4: Knowledge required to support and run SAP was not managed effectively* (3 from 5, 1 inconclusive).

Strategic and Operational respondents notably disagreed on costs and benefits of SAP. In every case, the Strategic respondents ranked this issue higher than the Operational respondents reflecting their sensitivity to issues of expenditure and benefits realisation. They mostly disagreed on the issue of internal knowledge management issues with operational staff ranking it higher in every case. These knowledge issues with the help desk, retention strategies and training would affect operational staff more directly. The key findings from this comparative analysis therefore are:

Strategic and Operational respondents had different perspectives on the costs and relative benefits of SAP

Strategic and Operational respondents tended to agree on the importance of: project management; the lack of an organisational-wide knowledge strategy; customisation and integration; the effect of organisational restructuring; and, the inadequacy of and difficulty using SAP.

The Client and Implementation Partner respondents found general consensus in the following 14 issues: *Issue 14: The data conversion was inadequate; Issue 11: SAP systems knowledge was lacking in the project team, consultants or the vendor; Issue 23: The configuration of SAP was inadequate; Issue 8: SAP is not suitable for small agencies/organisations; Issue 9: The organisation has experienced downtime, slow processing or unreliable hardware; Issue 18: Systems controls were inadequate; Issue 17: The SAP system is too complex; Issue 35: SAP is generally expensive to*

implement; Issue 16: SAP is not value for money; Issue 26: The organisation has/is not taking advantage of available SAP functionality; Issue 29: The SAP system was customised too much; Issue 2: There was lack of stakeholder/management support and ownership; Issue 37: Systems integration was problematic; and, *Issue 28: Staff/knowledge retention strategies were ineffective.*

The Client and IP respondents held general dissent over the following 22 issues: *Issue 5: The testing of the SAP system was inadequate; Issue 1: Ongoing running costs are high; Issue 25: Help desk SAP knowledge was inadequate; Issue 13: The change management process has been mismanaged; Issue 3: The Project Team did not consult or communicate sufficiently; Issue 30: The Help Desk was under-resourced; Issue 7: SAP Knowledge was not re-used efficiently by agencies; Issue 15: The project suffered from individual or team lack of knowledge of the organisational context; Issue 34: SAP functionality is inadequate; Issue 12: SAP related documentation is insufficient; Issue 31: The SAP system does not work as it should; Issue 21: The training method or management was inadequate; Issue 10: Insufficient resources were allocated to the project; Issue 22: There was poor executive or project management of the SAP project; Issue 24: Users do not have sufficient SAP knowledge; Issue 19: The staffing of the project team was mismanaged; Issue 33: The SAP system suffered non-acceptance, non-use or lack of ownership; Issue 32: Time management and planning was inadequate; Issue 4: SAP upgrade costs are high; Issue 27: The reporting from the SAP system is inadequate; Issue 6: SAP reporting tools are difficult to use;* and, *Issue 36: The SAP system was adversely affected by the machinery of government.*

The Client and IP cohorts exhibited a lesser amount of consensus on the issues than the Strategic and Operational cohorts. Analysing these issues within the major issue categories provides show few conclusive patterns.

Client and IP respondents agreed on all issues in the major issue category *Factor 6: Customisation and systems integration***.** They disagreed on the single-issue category *Factor 7: Organisational restructuring affected implementation effort.* For *Factor 1: Poor management of the implementation project and processes* the two groups disagreed on the majority of issues (10 from 14). The IP respondents tended to rank these project management issues more highly than the Client respondents (7 from the 10 issues in dissent). The two groups also disagreed over the majority of issues (4

from 5) in *Factor 4: Knowledge required to support and run SAP was not managed effectively*. Clients ranked these issues as more important in the all issues in this major issue category. For the remaining major issue categories, the issues were evenly split into groups exhibiting consensus and dissent: *Factor 5: Lack of organisation-wide knowledge strategy reduces benefits* (1 consensus, 1 dissent); *Factor 2: The SAP system is inadequate or difficult to use* (3 consensus, 4 dissent); and, *Factor 3: Costs are too high or benefits relative to costs are too low* (3 consensus, 2 dissent, 1 inconclusive).

The findings from this analysis, therefore, are that the Client and IP groups agreed on the importance of issues surrounding integration and customisation and disagreed on issues pertaining to the effect of organisational restructuring and project management. The only strong finding from this analysis is that:

Client and Implementation Partner respondents had different perspectives on the importance of issues connected with internal knowledge management efforts.

There were no other strong conclusions from this analysis.

7.3 Meta-study

The Meta-study discusses key themes from across all of these studies in the ERP Lifecycle Knowledge Management research program. In creating this program Gable et al. (1998) suggested that coordinated knowledge management between the key players in the ERP lifecycle (the vendor, the client and the implementation partner) could offer better ERP lifecycle support. Important steps to better understand the ERP lifecycle are: a determination of what issues are faced by participants in the ERP lifecycle; a deeper look at individual lifecycle activities such as maintenance; what happens over time in a complex ERP environment; and examinations into the knowledge dynamics of the ERP context. The Meta-study combines the results from studies conducted with the Lifecycle Knowledge Management research program into a set of related and overarching themes. The Meta-study examines the major issues study described in Chapters 5 and 6, Appendix E, earlier ERP issue studies by Chang (2002); Putra (1998) and Niehus (1998); knowledge management studies conducted by Chan (2003); Timbrell et al. (2001); Timbrell et al. (2003) and ERP maintenance studies by Ng (2003) and Vayo et al. (2002).

The objective of this meta-study is to draw out similarities across the studies and identify the main themes arising from the research program. To focus the research, a number of research questions were developed. These are:

1) How do issues from this ERP major issues study compare with ERP issues found by other researchers within the Queensland Government and in other contexts?

2) What are the common themes and findings from this research program?

Each research question will be dealt with in turn.

7.3.1 Research Question: How do issues from this major issues study compare with other issues studies conducted within the Queensland Government and in other contexts?

The following Table 7.4 compares the issues across other issues studies conducted in the Queensland Government. It also includes a comparative study by Dhaheri (2002) who used the same methodology (modified Delphi) to examine issues in the Oracle implementation at the United Arab Emirates Finance Department. To provide a fuller picture, similar issues identified by studies outside of this research program are also provided in Table 7.4.

Table 7.4 - Comparison of Issues across studies in the ERP Lifecycle Knowledge Management Research Program

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
Factor 5: Lack of organisation-wide knowledge strategy reduces benefits					
[26] The organization has/is not taking advantage of available SAP functionality.	[8] Too little effort was put into redesigning the underlying business processes, resulting in a system that represented a "technology swap" thereby constraining benefits realisable.				
[7] SAP knowledge was not re-used efficiently by agencies	[26] Poor communication between agencies.				
Factor 4: Knowledge required to support and run SAP was not managed effectively					
[24] Users do not have sufficient SAP knowledge.					A lack of improvement in users' skill levels is a common problem in the 'onward and upward' phase of an ES Project (Markus et al., 2000).
[28] Staff/knowledge retention strategies were ineffective.	[9] Difficulty to retain people with SAP skills due to market pressure to leave				

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[21] The training method or management was inadequate.	[4] Training provided was inadequate and did not cover the diversity in circumstances encountered in normal daily operations [15] Support personnel are inadequately trained	[3.e] Training provided was not organised properly and did not cover all of Oracle Financial functions needed for daily work.			Insufficient training and re-skilling of the IT workforce in new technology is a risk factor in the systems implementation and maintenance phases (Sumner, 2000) An adequate training program is a critical success factor for ES implementations (Esteves and Pastor, 2001). Training users and the project team are critical success factors for ES success (Bancroft, 1998).
[25] Help desk SAP knowledge was inadequate.	[17] Ongoing support for the SAP system is inadequate.				
[30] The help desk was under-resourced.					
Factor 3: Costs are too high or benefits relative to costs are too low					
[1] Ongoing running costs are high.	*Costs and Benefits* was a Major Issue Category in Chang's (2002) study – SAP-related costs can be excessive if not managed well.		[28] Cost of Licensing and registering all users		Installation and ongoing costs of ERP packages can reach 7 to 10 times initial software cost. They derive from the service and support required by end-user organisations (Hecht, 1997).

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[4] SAP upgrade costs are high.					Hawat and Chookhiatti (2005) ranked the issue of 'Upgrade Costs' 5th in their study on upgrades. Ng (2003) states that ERP upgrades account for 25-33 percent of initial investment costs, on average.
[35] SAP is generally expensive to implement.	[29] SAP implementation benefits do not justify costs.		[14] Cost includes establishment, infrastructure, consultants, training, and establishing the support centre.		
[20] SAP reporting is expensive.					
[16] SAP not value for money.	[8] Too little effort was put into redesigning the underlying business processes, resulting in a system that represented a "technology swap" thereby constraining benefits realisable. [31] Costs of SAP exceed those of QGFMS without commensurate benefit				

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[8] SAP not suitable for small agencies/organisations.	[19] Complexity (and therefore cost) of SAP far exceeds the requirements of some agencies				It is critical for organisations to select ERP software that best suits the organization's information and processing needs (Janson and Subramanian, 1996). Selection of software that does not fit the environment can result in extreme modifications, and commitment to applications that do not fit the organization's strategic goals or business processes (Robinson and Dilts, 1999).
Factor 6: Customisation and systems integration					
[37] Systems integration was problematic.	[34] SAP is not sufficiently integrated with other systems.	[1.a] In-house software had to be re-configured to interface with the Oracle system [9.a] Some errors were found while integrating Oracle Financial with in-house software.	[32] Integration with Existing System.		A study by Markus et al. (2000a) into ERP adoption found that integration was one of the most challenging project phase problems.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[29] The SAP system was customised too much.	[5] Implementation across multiple agencies led to sub-optimization of the system configuration.				Nah and Lau (2001) listed 'Business process reengineering and minimum customization' as a factor critical to ERP implementation success.
Factor 2: The SAP system is inadequate or difficult to use.					
[6] SAP reporting tools difficult to use.	[2] Developing reports is difficult in SAP				
[27] The reporting from the SAP system is inadequate.	[3] Not all required reports were available at implementation time	[2.b] Even though a lot of time was spent on data gathering, testing and customising, there were still some forms and reports that needed to be redesigned.		Issue 2.1 - Reporting was complicated by need to report both cash and accrual accounting positions.	O'Leary (2003) found with Microsoft that the SAP inquiry tools was cumbersome and did not meet the company's objectives for reporting.
[17] The SAP system is too complex.	[1] Complexity of SAP means few, if any, people understand SAP beyond a single module, making overall decisions very difficult.				Avital and Vandenbosch (2000) allude to the complexity of the SAP system and its impact on organisations.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[9] The organisation has experienced downtime, slow processing or unreliable hardware.	[36] System performance is inadequate to meet operational requirements.	[5.b] Whey they are maintaining the system for some time, work would stop for a full day; [8.a] Printers were slow and some stopped working; [8.b]System freezes were common, happening suddenly and PC's were unresponsive; [8.c] System performance was inadequate to meet operational requirements, and was worse after the upgrade.	[7] Infrastructure Establishment – there is a need to establish an appropriate infrastructure to support the new system and to ensure continuous maintenance of the system.		
[34] SAP functionality is inadequate.	[17] SAP lacks some functionality of QGFMS	[7.c] FMS is not covering all ADFD financial responsibilities.			
[31] The SAP system does not work as it should.					

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[18] Systems controls were inadequate.	[10] Security is difficult to maintain in SAP, resulting in some users being granted too much access and others not having access to data. [20] System documentation is inadequate, particularly with respect to system design and controls.				Alles et al. (2005) state that with highly integrated enterprise information systems in large-scale enterprises, the hierarchy of IT controls should reflect the structure of the system. Daigle et al. (2005) found that strong system controls results in audit savings and well-documented system controls that are placed appropriately and operate effectively, contribute to more reliable information.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
Factor 1: Poor management of the implementation project and processes.					
[2] There was lack of stakeholder/management support and ownership.	[22] Lack of ownership/responsibility by agency personnel at the project level.			Issue 1.1: Project Championship - A need for management support and 'ownership' of the project at all levels was identified as being central to successful implementation.	Project objectives are more attainable with top management support and the alignment of those objectives with strategic business goals (Sumner, 2000). ERP projects need a 'champion' to market the project across the organization (Sumner, 2000). KPMG (2005) found that top management support and involvement was a major factor that contributed to project success. Nah and Lau (2001) ranked having a project champion the 6th most important critical success factor for ERP implementations. Bancroft (1996) lists superior executive championship for ERP projects as one of nine critical success factors.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[3] The Project Team did not consult or communicate sufficiently.	[21] Lack of consultation with operational level users meant that operation requirements were not met.	[3.d] There was no project knowledge sharing between the implementation team and the users, which led to users being unaware of the whole project and resistant to change.	[8] Consultant Engagement - Good user/consultant relationship is a necessity.		Nah and Lau (2001) listed communication as a factor critical to ERP success Slevin and Pinto (1987) identify communication as a key component across all ten factors of their Project Implementation Profile. Lack of communication within and between teams is considered an indicator of troubled IS projects by Havelka et al. (2004). Chornoboy and Gardner (1990) state that the relationship between client and consultant is a crucial component of project success.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[12] SAP related documentation is insufficient.	[20] System documentation is inadequate, particularly with respect to system design and controls.	[3.a] At the time of implementation, there was no online help or user manual for functional or technical issues.	[19] Sharing of Experience - Sharing successful implementation experiences from other agencies should be collected and documented.		Huber (2005) listed "no or insufficient documentation of installed software and systems" as one of the ten worst computer validation mistakes committed. Havelka et al. (2004) cite limited or lack of documentation on tasks completed or technical specific as an indicator of troubled IS projects.
[10] Insufficient resources were allocated to the project.		[3.c] There was a shortage of staff experience with Oracle Financial.	[33] Estimating Resources - This involves the allocation of enough resources for the implementation of the ERP system.		Van Slooten and Yap (1999) name two factors of insufficient resources in ERP projects: a shortage of human resources and a shortage of means. Shipps and Zahedi (1999) state that inadequate staffing is a stumbling block for IT-related projects.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[5] The testing of the SAP system was inadequate.	[13] Inadequate system testing left many errors in the implemented system.	[2.b] Even though a lot of time was spent on data gathering, testing and customising, there were still some forms and reports that needed to be redesigned; [3.b] Some of the important comments sent on data gathering and at the testing stage was not considered.	[25] Testing - This refers to the need to test the new system so that it meets the users and business requirements		Nah and Lau (2001) rank 'Software development, testing and troubleshooting' 10th in their eleven factors critical to ERP implementation success. Huber (2005) calls "no or insufficient testing and documentation" as one of the ten worst computer validation mistakes committed. Coincidentally, he also places the issue of "too much testing" in this category.
[13] The change management process has been mismanaged.	[38] Timing of implementation was inappropriate because of change underway in the public sector.		[1] Change Management - Balancing forces in favour of a change over forces of resistance		Bancroft (1996) suggests that to be successful in an ERP project, one must ensure the project manager is capable of negotiating equally between the technical, business, and change management requirements.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[11] SAP systems knowledge was lacking in the project team, consultants or the vendor.	[6] Shared knowledge among project team members was a problem – agency staff did not understand SAP and implementation personnel did not understand agency requirements.	[4.a] Consultants were not capable of handling FMS problems, and it seemed as if they were working with Oracle Financial for the first time.	[8] Consultant Engagement - Little relevant experience demonstrated		Van Slooten and Yap (1999) reported lack of knowledge, experience and skills of the R/3 reference model as an impediment for project teams.
[15] The project suffered from individual or team lack of knowledge of the organisational context.	[6] Shared knowledge among project team members was a problem – agency staff did not understand SAP and implementation personnel did not understand agency requirements.	Lack of sufficient knowledge of the organisational environment – Consultant had no government ERP implementation experience.	[16] Gap analysis issues and business requirements identification and resolution.		Chornoboy and Gardner (1990) refer to lack of knowledge of the organisational context as a major problem area, and, coupled with the inability to admit this knowledge inadequacy, causes more issues than any other factor. Murray and Coffin (2001) identified a commonly cited critical success for ERP implementations: 'Business Processes/Rules Are Well Understood and Functional Requirements Built from These Processes Are Clearly Defined'.

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[33] The SAP system suffered non-acceptance, non-use or lack of ownership.			[9] Users' Involvement - Having users involved in the implementation process is that it promotes the new system and increases the systems acceptance.		Tetlock (1999) gives six types of user resistances: (a) voiced objection; (b) decision avoidance including buck passing, procrastination and obfuscation; (c) corner cutting such as workarounds; (d) sabotage i.e. active efforts to subvert the intent of the implemented program (e) exit from the organization and (f) grudging compliance.
[14] The data conversion was inadequate.	[18] Errors were found in data converted from former QGFMS.	[9.a] Some errors were found while integrating Oracle Financial with in-house software.	[5] Data Transfer/Data Conversion		Wright and Wright (2002) - poor data conversion was a problem in the aftermath of implementation.
[23] The configuration of SAP was inadequate.					

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[22] There was poor executive or project management of the SAP project.	[27] Lack of leadership at senior levels.		[15] Team Structure - the importance of executive steering committee and team leaders as crucial components of team structure in ERP implementation projects.		KPMG (2005) found that poor project management processes and lack of executive sponsorship and management buy-in were two significant factors which contributed to IT project failure. Taylor (2002) states that the "number one reason" for many project failures is a lack of leadership. Nah and Lau (2001) ranked project management as the 5th most critical factor to ERP implementation success.
[32] Time management and planning was inadequate.	[11] Requested system functionality was sacrificed in order to meet implementation deadlines.				Jurison (1998) notes time management is central to project management.
[19] The staffing of the project team was mismanaged.			[15] Team Structure - The need to structure team members to carry out the implementation is important.		Feldman (2002) states that "poor staffing structure and practices contribute to the 'suck factor' of many IT departments"
Factor 7: Organisational restructuring affected implementation effort					

Issues by Major Issue Category (Factor)	Alex Chang (2002)	Dhaheri (2002)	Putra (1998)	Niehus (1998)	Other Studies
[36] The SAP system was adversely affected by the machinery of government.					

Table 7.4 shows that some issues are commonly found in similar studies while other issues were unique to the Queensland Government context.

The implementations of SAP in the Queensland Government were independent in some ways and coordinated in other ways. Ministers in Parliament are responsible for the outcomes and outputs of their portfolios and operate independently of one another. They may agree on policy in Cabinet to coordinate activities such as the common use of SAP as the ERP for Queensland Government. The Queensland Government is a single entity but ruled by 'feudal barons'. This complex governance structure, discussed in the historical recount, provides two layers of coordination: inter-agency and intra-agency.

This study and Chang's (2002) were cross-agency studies and therefore able to pick up the inter-agency issue e.g. that a *lack of an organisation-wide knowledge sharing of experiences reduced the potential benefits of knowledge re-use*. The other studies in the research program were of individual agencies and tended to focus on intra-agency issues, thereby missing the unnecessary re-inventing and redevelopment of processes and organisational ERP knowledge. Similarly, the external studies cited tended to be of individual ERP implementations and therefore did not detect these inter-organisational issues. The intra-agency knowledge management issues arose in several studies. Other studies, (Dhaheri, 2002; Sumner, 2000; Esteves & Pastor, 2001) for example, noted the importance of training and its management.

Later studies, like Chang (2002) and this study, picked up issues arising later in the lifecycle i.e. the operations and maintenance phases. This and Chang's study pointed out the issues arising from the users' lack of SAP knowledge and issues with the Help Desk knowledge. Timbrell et al. (2003) discuss the re-use of knowledge within a Queensland Government agency that supported several ERP systems (help desk and maintenance) in detail. The next section on meta-study themes further discusses knowledge and maintenance.

The studies commonly addressed cost issues. It depends on when the study was conducted whether the research identified upgrade costs as an issue. Studies of implementations (Dhaheri, 2002; Niehus, 1998) tended not to address upgrade costs. This study and Chang's (2002) study tended to find the same issues regarding cost except this study included the cost of reporting as a separate concern.

The next major issue category of integration and customisation was cited in this and Chang's study and in the literature more generally. Customisation is a common issue discussed in ERP literature and has been fully discussed in this thesis.

The inadequacy of SAP's functionality and the difficulties that users have with it are commonly found across the studies in Table 7.4. Only this and Chang's study reported the difficulty of using the SAP reporting tool.

Concerning the poor project management issues, all the studies including the external studies reported these. The only issue specific to this study was the identification of the poor configuration of SAP. The configuration issue can manifest itself in other ways including perceived lack of functionality.

Finally, only this study reported the organisational restructuring issue. To uncover this issue, the study had to consider a very large organisation such as Queensland Government. I would suggest that this restructuring issue is more likely to affect public sector ERP systems because of the practice of shuffling ministerial portfolios during change of government. The development of shared services organisations within government will reduce the incidence of this issue.

There are no strong findings or conclusions from the comparison of these issues. The existence of previously unidentified issues is more likely attributable to the context of a multi-organisational ERP project in a public sector environment.

7.3.2 Research Question: What are the common themes and findings from this research program?

This research program includes a number of studies carried out at different times in the history of SAP in the Queensland Government. Across these studies are a number of important themes that are common and worthy of further discussion at a broader level. These themes include knowledge management; support, maintenance and upgrades; influences on the systems context; and the relationship between the parties who are involved in the ERP lifecycle. Each of these will be discussed in turn.

7.3.2.1 Knowledge Management

There were three studies directly targeting knowledge-related matters in the Queensland Government context. These were studies by Chan (2003), Timbrell et al. (2002) and Timbrell et al. (2003). Issue studies conducted by Chang (2002) and the

major issues study described in this thesis found that knowledge management issues were very important factors in the ERP lifecycle. Other studies noted poor training practices or the lack of sharing experiences across agencies but did not describe these issues as knowledge issues.

The historical narrative in Chapter Three described the activities that FISB took in the mid 1990s to try and coordinate agencies to develop a common configuration as a basis for agency implementations. This was only partially successful. As the decentralisation pressures on QGFMS played out, FISB's influence and power decreased. Its efforts to maintain a central role providing training and expert support dissipated and so did its knowledge-sharing role. Respondents to the major issues study also cited problems with training management, help desk support, knowledge-based implementation support and the effectiveness of sharing knowledge across agencies. Timbrell et al. (2001) looked at the first round of the major issues study described herein from a knowledge transfer perspective. Using Szulanski's model (1996) this study suggested that the players in the project teams did not exhibit barriers to share knowledge. However, the same study concluded that respondents had problems both absorbing and retaining (its institution in agencies) knowledge during the ERP lifecycle; so while the intention to share was there, its execution was flawed. This finding is supported to an extent by the Timbrell et al. (2003) study of knowledge re-use in a support organisation (CSA). This study found that personnel new to an organisation needed some time to establish who held expertise in the organisations. One may conclude then, that despite all good intentions, the execution of knowledge sharing was flawed due to the limitations of the personnel to identify the source, absorb or retain/institute the knowledge. The communication of this knowledge and the organisational culture (e.g. executive support) may have also inhibited the free flow of knowledge within and between agencies.

Chan (2003) looked at the types of knowledge needed to support the ERP context. He separated these into business, technical, product, company–specific, project and communication/coordination/cooperation knowledge. The issues studies supported the need for these knowledge types. Many of the issues noted a shortage of one or other of these types of knowledge within the ERP projects. The issue studies brought out the importance of integrating these knowledge types effectively. In example, to configure SAP to meet the needs of an organisation's processing and reporting

functions, the implementation project leaders must integrate the knowledge of the organisational context with the knowledge of the SAP system. When there is a lack of knowledge in either of these areas (system, context) or there is a poor communication channel between these two sources of knowledge, or the organisational culture inhibits this communication, the configuration will suffer accordingly. This finding accords with Szulanski's (1996) framework.

Agencies that implemented 'like for like', adopting a 'technology swap' strategy that changed the software to suit the organisation may have unwittingly adopted a knowledge strategy that reduced the requirement by users to absorb and retain new ERP knowledge. While this may have consequences for upgrades, costs and perceptions of reduced benefits realisation, it should be considered as a viable implementation strategy for configurable mega-packages such as ERP systems.

There is another knowledge management matter that arises from the studies in this research program. This thesis considers contemporaneous knowledge issues (transfer/re-use) i.e. the period of the study. Some knowledge issues arise because of the passing of time. The study of CSA by Timbrell et al. (2003) and the study by Vayo et al. (2002) demonstrated that the knowledge gained during the implementation process was not necessarily available during the upgrade process. In fact, the motivation behind the Vayo et al. (2002) study was to record the upgrade process decisions; their rationale; the success of these decisions; and to provide advice to future upgrade projects. Since major upgrade projects can be so large they are really re-implementations, agencies rely once more on the knowledge of consultants and other temporary staff. A finding from the knowledge re-use study in CSA showed that these consultants and contractors draw their knowledge from personal networks hence these knowledge sources are no longer available once the contractor or consultant has left the project. Furthermore, there are few resources or processes to capture the knowledge of these short-term project contributors; in fact, they can be excluded from recording their experiences because of security restrictions to agency knowledge systems.

Finally what is the knowledge role of consultants in the ERP context? Are they systems integrators or really knowledge integrators? Is the expertise of the system their greatest contribution to an ERP project or is it their skills in drawing out and mapping the organisational processes and reporting requirements to these

configurable software packages, then guiding the acquisition and application of that systems knowledge to the user community? The client's perception of the implementation partner's role affects the expectations of their performance. Perhaps a redefinition of their role as a knowledge integrator is appropriate.

The conclusions from the meta-study relating to knowledge management therefore are the following:

1) Organisations should plan a knowledge strategy, in conjunction with their project plans, which spans the complete ERP lifecycle.

a. This knowledge strategy should consider the knowledge readiness of the organisation i.e. the amount of knowledge that users will need to absorb and retain to accomplish a successful ERP project.

b. This knowledge strategy should consider the dissipation of knowledge about ERP activities that have a long cycle time.

2) Organisations should attend more closely to both intra-agency needs of users and help desk personnel.

3) Organisations should contribute to and draw upon the knowledge base of other ERP-using organisations.

4) Implementation partners could benefit from a redefinition of their role from systems integrator to systems/organisational context knowledge integrator.

7.3.2.2 Support Maintenance and Upgrades

This is a second major theme from this research program. During the 1990s the high incidence of ERP implementations focused the research effort in this phase of the lifecycle. In comparison, however, the implementation project may only comprise a small proportion of the ERP lifecycle. Consequently, much benefit can be gained from a closer examination of the support, maintenance and upgrade efforts.

One theme that is common across these studies is the need to identify better maintenance and upgrade processes in the ERP context. Ng (2003) successfully developed appropriate mechanisms and methodology for effective and efficient ERP maintenance management. Unlike bespoke software, the drivers for ERP maintenance activities can be driven by external parties, predominantly the vendor.

At the same time users often request the internal ERP maintenance team to provide additional (custom) functionality, the vendor is sending through a constant stream of fixes. Invariably, driven by market forces and the need to minimise their own support, the vendor will demand that ERP systems are upgraded on a regular basis. The maintenance team must balance their efforts to maintain stability, meet user expectations, satisfy vendor requirements, and provide benefits over costs.

Three studies were conducted in CSA: Timbrell et al. (2003), Ng (2003) and Vayo et al. (2002). The Timbrell et al. (2003) study examined the knowledge re-use within the help desk/maintenance personnel and discovered, inter alia, that longer cycle knowledge was not maintained well diminishing the opportunities for re-use over time. Ng (2003) and Vayo et al. (2002) attempted to address this. Ng created a comprehensive understanding and framework for managing ERP maintenance. Vayo et al. (2002) recorded the activities of a full upgrade project providing practical advice and recording the lesson learnt and rationale for decisions taken during this project. Timbrell extended this work on help desk knowledge management and software support call centres (see Timbrell (2003), Timbrell et al. (2005)).

The conclusions from this meta-study on support, maintenance and upgrades therefore are:

1) **Maintenance of ERP is different and requires a different management approach. Ng (2003) developed a comprehensive maintenance management framework.**

2) **Upgrade activities have a long cycle time in the ERP lifecycle and knowledge dissipates over this time. The Vayo et al. (2002) recording of their upgrade experiences addresses this concern.**

7.3.2.3 Influences on the ERP systems context

The historical recount in Chapter Three of this thesis provides a comprehensive view of the influences of the external context on ERP implementations. The narrative identified the influences of the changing business environment, the technical conditions, the governance arrangements and the political situation. For example, the latest major change in the Queensland Government ERP context is the move to shared service providers and the recentralisation of system infrastructure. The studies on

maintenance and upgrade identify the important ongoing influence of the vendor, SAP, as a major driver of change.

As the functionality of ERP systems expand, so do their proliferation across organisational processes. As their functionality grow, it will become harder and harder to replace these mega-packages and their lifecycle span will increase. It becomes harder to justify the costs of replacing these systems. For systems managers, therefore, if the ERP software becomes a constant, the drivers of change to that software will become increasingly external i.e. the strategic and operational activities of the vendor; changes in technical conditions; changes in the business environment; changes to the governance models; and changes driven by political conditions.

The conclusion from this meta-study is therefore:

ERP systems managers must find new ways to manage changes in the external environment because organisations can no longer easily replace these entrenched systems.

7.3.2.4 Relationship between the parties involved in the ERP lifecycle

One of the initial hypotheses of the research program, Cooperative ERP Lifecycle Knowledge Management, funded by the Australian Research Council, was that benefit would arise from knowledge-based cooperation between the participants in the ERP lifecycle: client, vendor and implementation partner. These participants come together to form a 'virtual organisation' in an ERP project; each playing their part to create a working system that supports the business processes of the client organisation. It is proposed in the parent study that the need for post-implementation external support will to a great extent depend on the ERP knowledge transferred and developed during the implementation period. Other factors impacting post-implementation external support requirements might include key staff losses, major upgrades, major configuration changes, and changes to the business process models. The client, therefore, from the very outset needs to carefully consider from where, to what extent, and how they are going to source the knowledge required to ensure the ongoing vitality of their ERP: in other words, they need to develop an ERP lifecycle-wide 'knowledge sourcing strategy'.

The three key players in the SAP ecosystem, the client, the vendor and the implementation partner stand to benefit from effective ERP knowledge management. The vendor, SAP, seeks to redress negative perceptions that SAP implementation duration and cost is difficult to manage and to improve client support and satisfaction. The consulting firms seek to streamline implementation and share in the savings with clients. Both SAP and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. The client will benefit through better-planned lifecycle management and more effective implementation outcomes. Also, to the extent that SAP and its partners can capture key knowledge during implementation, they will be well placed to further support clients throughout the ERP life cycle.

These differing but aligned objectives will drive the separate knowledge strategies of each of the three key players. Zack (1999) defines knowledge strategy, as balancing knowledge-based resources and capabilities with the knowledge required for providing products or services in ways superior to those of competitors. Zack further defines a firm as having an aggressive knowledge strategy when it closely integrates knowledge exploitation and exploration (innovation) using knowledge sources both internal and external to its organisational boundaries. In the SAP services ecosystem, when the business objectives of the three players either compete or overlap there is potential for the players' knowledge strategies to conflict.

The issues studies in this research program surface problems in this relationship such as the perception that the consultant or vendor has insufficient knowledge to implement the system properly or has insufficient knowledge of the context. These problems pertain to those knowledge types that Chan (2003) lists in his study: business, technical, product, company–specific, project and communication/coordination/cooperation knowledge. The importance of the interplay and integration of these knowledge types has already been noted. But this interplay raises questions about the optimum relationship between these three parties that will benefit each accordingly. The issues study described in this thesis also demonstrate the different perspectives held by implementation partners and clients on a range of ERP issues. Chang (2002) also noted the differing perspectives between these two stakeholder groups.

While the relationship between the vendor and the client is ongoing through maintenance and upgrade processes, the relationship between the client and the implementation partner is more fragile. Unless the client changes this relationship commercially, in example into an outsourcing relationship, the client may pursue alternative knowledge sources for expert advice on major lifecycle events such as key upgrades. Since an implementation partner has already invested significant time to get to know a client's processes during the implementation process, one would imagine it worthwhile for both parties to continue their ERP knowledge relationship. On the surface, this would benefit both parties. Certainly, consulting firms would benefit from an ongoing relationship because it reduces their costs in engaging new clients to provide sufficient ongoing fees to support their workforce. The question is what ongoing role is there for these implementation partners?

A common objective of an implementation project is to ensure that the client can operate and support the system as soon as possible after 'go-live'. In this thesis we refer to this as ERP knowledge 'self-sufficiency'. In effect, the client and implementation partner work together to allow the implementation partner to eventually withdraw. Any knowledge 'self-sufficiency' problems post-implementation, therefore, can be seen as not achieving this project objective and blame/finger-pointing is more easily attributed to the implementation partner after they have left. The incidence of finger-pointing and differing perspectives between the client and implementation partner were reported in both Chang (2002) and the major issues study in this thesis. In the government sector, such ongoing relationships are difficult to maintain because the State Purchasing Policy dictates that all major projects (value > $10,000) go to public tender. This means that agencies may be forced to accept consulting firms to assist in later ERP lifecycle events who were not involved in earlier lifecycle activities.

Perhaps organisations in the private sector might be in a better position to reap benefits from the knowledge built in these early ERP lifecycle activities.

The conclusions from this meta-study about the relationships amongst the three key players in the ERP lifecycle (client, vendor, implementation partner) are:

1) While logically benefits could accrue from an ongoing relationship between the client and the implementation partner, there are

administrative barriers to such a relationship in the Queensland Government.

2) **There is a strong ongoing relationship between the vendor and the client driven by the maintenance and upgrade process.**

3) **The objective of knowledge 'self-sufficiency' in ERP projects means that there is an expectation that the implementation partner effectively makes their role redundant at the completion of an implementation project.**

This concludes the discussion of the Queensland Government ERP Lifecycle Meta-Study. In summary, there are three themes that run across the studies embraced by the Cooperative ERP Lifecycle Knowledge Management research programme. These are Knowledge Management; Support, Maintenance and Upgrade; and the Relationship between the Parties involved in the ERP Lifecycle.

7.4 Chapter Summary

This chapter presented summary findings from the Major Issues Study. It addresses the principal research questions of that study. This chapter also reports on the Meta-study, drawing out themes from across studies conducted within the ERP Lifecycle Knowledge Management research program. These studies include the Major Issues Study reported in this thesis; Chang, 2002; Putra, 1998; Niehus, 1998; Chan, 2003; Timbrell et al., 2001; Timbrell et al., 2003; Ng, 2003; and, Vayo et al., 2002.

The next chapter will conclude the thesis.

Chapter Eight – Summary and Conclusion

This chapter summarises and concludes the thesis. It is structured as follows: Section 8.1 briefly summarises the studies undertaken; section 8.2 re-iterates the research motivations and objectives; section 8.3 re-states the research questions for the three studies and the unit of analysis; section 8.4 summarises the research methods employed in this thesis; section 8.5 presents a brief summary of the main findings from the three studies in this thesis; section 8.6 outlines some limitations of the studies; section 8.7 discusses implications of the studies to practice and research; section 8.8 lists follow-on research completed and future research suggested; section 8.9 summarises the chapter; and section 8.10 briefly summarises and concludes the thesis.

8.1 Summary of the Research

This research provides a comprehensive view of the issues encountered during the ERP lifecycle of a group of related SAP R/3 implementations across the Queensland Government. This study follows a preliminary issues study (Chang, 2002) conducted in five Queensland Government agencies who implemented SAP under the coordination of a shared services provider, the Corporate Services Agency. To provide a rich context for these two studies and the anthology of related studies by researchers in this research centre (Chan, 2003; Vayo et al., 2002; Ng, 2003; Timbrell et al., 2001; Timbrell et al., 2003; Putra, 1998; Niehus et al., 1998), which were carried out within the context of the Queensland Government SAP environs, this research project also included an historical recount of the Queensland Government Financial Management System (QGFMS) from its inception as a centralised and standardised system, through the selection of SAP and subsequent decentralisation, to its eventual recentralisation under the Shared Services Initiative and CorpTech. Finally, these studies come together in an overarching Meta-study.

The resulting Meta-study discusses key themes across all of these studies, creating an holistic report for the overarching research program, ERP Lifecycle Knowledge Management. This research program suggested that coordinated knowledge management between the key players in the ERP lifecycle (the vendor, the client and

the implementation partner) could offer better ERP lifecycle support (Gable et al., 1998). Important steps to better understand the ERP lifecycle include a determination of what issues are faced by participants in the ERP lifecycle; a deeper look at individual lifecycle activities such as maintenance; what happens over time in a complex ERP environment; and, examinations into the knowledge dynamics of the ERP context. The meta-study combines the results from these individual studies into a set of related and overarching themes.

8.2 Research Motivations and Objectives

Implementing ERP is for many organisations the largest information systems project they have ever undertaken. Global ERP revenues are significant. Revenues for SAP in 2000 were 6.2 billion euro growing to 7.5 million euro in 2004 (SAP AG, 2005).

For the Queensland Government, the implementation of SAP was amongst their largest systems expenditures. The total cost of the SAP implementations is difficult to ascertain from government reports (mainly due to commercial-in-confidence arrangements with the vendor and implementation partners), but estimates range between $100M and $200M. These ERP implementation projects involved hundreds of staff across the Queensland Government sector. All the major consulting firms in Brisbane and several smaller firms were involved in these implementations. This series of projects significantly affected the SAP staff marketplace causing massive shortages of SAP expertise, and driving up salaries.

Many organisations underestimate the effort, cost and strain on the organisation, which an ERP implementation brings. The complexity this exercise is easily misjudged and the consequences are potentially grave. Organisations, therefore, rarely set out on this journey alone.

Where an organisation does not have the requisite knowledge or internal capacity to manage through the ‘resource spike’ caused by initial ERP implementation, it must obtain this knowledge and capacity from external sources. Implementation resources are predominantly knowledge based. This knowledge may be sourced from a consulting firm (knowledge vendor) which acts in the capacity of implementation partner. Among other things, the role of the implementation partner can include project manager, decision-maker, arbitrator and knowledge facilitator. In this way, a triumvirate is formed involving the client, vendor and implementation partner.

These three parties, the client, vendor and implementation partner, form a 'virtual organisation' to bring about the ERP project. These three parties are not isolated stakeholders, but important actors, and ostensibly partners, in a relationship that may span the life of the software. They work together across the ERP life-cycle to reify a design into a configured, working system supporting the business's processes and information needs. Occasionally, strategic conflict between and within 'members' of this virtual organisation may arise, threatening ERP benefits.

In the case of the Queensland Government, the interplay between the SAP implementations created another layer of complexity. The SAP projects were not separate and independent of each other. A number of other actors in this stage play also influenced the progress of these projects including FISB; Parliament; Accounting Standards Bodies; Financial Policy makers; IT Policy makers; and the technical marketplace. Understanding the interplay between these factors requires a deep look into their development and effects. This study achieves this by employing the historical method to track the development of ERP in the Queensland Government.

This need for an improved understanding of the issues that arise during the ERP lifecycle motivated the second study in this thesis. This is an exploratory, descriptive and comparative study of major issues from the perspective of the individual staff members in Queensland Government agencies and their implementation partners. This examination of ERP lifecycle issues includes an analysis of the differing perspectives of groups involved in the ERP project, specifically comparisons between Client and Implementation Partner, and Strategic and Operational staff. To achieve consensus on what these issues are, the Delphi Method was employed. In a modification to this method, respondents were asked to weight the importance of these issues in Round Three of the Delphi survey. This weighting provided statistical data allowing the issues to be ranked within respondent groups and, using factor analysis, group these issues into major issue categories.

The major issues study aims to achieve the following: (1) Identify/explicate major issues in relation to the ES life-cycle in the public sector; (2) Rank the importance of these issues; (3) Highlight areas of consensus and difference among the three stakeholder groups: the user organisation and the implementation partners (consultants); and, (4) Inform academic research directions in ES.

Finally, against the background of a comprehensive historical study of the ERP context and events, this thesis presents a Meta-Study of ERP in the Queensland Government. This meta-study examines the major issues study described in Chapters 5 and 6 and Appendix E, earlier ERP issue studies by Chang (2002), Putra (1998) and Niehus (1998), knowledge management studies conducted by Chan (2003), Timbrell et al. (2001), Timbrell et al. (2003) and ERP maintenance studies by Ng (2003) and Vayo et al. (2002).

The objective of this meta-study is to draw out similarities across the studies and identify the main themes arising from the research program. To focus the research, a number of research questions were developed. These are set out in the next section.

8.3 Research Questions

This thesis describes and integrates a set of related studies conducted within an Australian Research Council Linkage Grant under the research program entitled ERP Lifecycle Knowledge Management. The main sections of the thesis comprises: an ERP issues study across Queensland Government agencies; an historical recount of SAP in the Queensland Government; and integrating themes from these and other sources a meta-study report that integrates themes from related studies across this research program.

8.3.1 Historical Recount Study

The first study sets the context for the other two studies. In accordance with the historical method, the research question is really a focusing question that gives the historian guidance in what to emphasise in the construction of the narrative and the balance between narrative and context. These questions develop as the historical problems evolve from the sources.

There were two parts to the historical recount. The first part described events from 1983 to 1994 and focused on the following question:

> *What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?*

The second part described events from 1994 to 2003 focusing on the following question:

What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?

And a sub-question:

How did FISB's (Queensland Treasury's Financial Information Systems Branch) central management dilute over time?

Finally, the third objective of this study was to enhance the historical method for information systems developed by Mason et al. (1997b).

8.3.2 Major Issues Study

The second research project in this thesis is a study of major issues in the ERP lifecycle set within the context of the Queensland Government. A modified three-round Delphi Method was employed to conduct this study. In Round One, potential respondents were asked *"What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?"* These responses were aggregated into a master list of issues and respondents were asked to confirm the mapping of their responses to the master set of issues in Round Two. Finally, respondents were asked to weight the importance of the issues across the phases of the ERP lifecycle.

Working with data collected from the stakeholder groups, the following research questions guided the analysis:

1) What are the major public sector ES implementation, management, and support issues faced by the stakeholder groups?

2) How do stakeholders rate the relative importance of these issues?

3) What are the points of consensus and dissent between the stakeholder groups?

8.3.3 Meta-Study

The third overarching research project in this thesis looks broadly across the issues and other research conduced within the Australian Research Council funded research program *ERP Lifecycle Knowledge Management.*

1) How do issues from this ERP major issues study compare with ERP issues found by other researchers within the Queensland Government and in other contexts?

2) What are the common themes and findings from this research program?

8.3.4 Unit of Analysis

The unit of analysis is the set of SAP R/3 systems implemented by Queensland Government agencies.

8.4 Research method and design

8.4.1 Historical Method

The three major steps in the historical method developed for this study are: (1) Specification of the subject; (2) Discovery and Critique of the Sources of Evidence; and (3) Construction of the Narrative.

The specification of the subject includes the development of focusing questions, the determination of the historical period, deciding the balance between narrative and description and the focus of the study. The discovery and critique of the evidence includes the identification and gathering of the sources of evidence, identification of informants, the critiquing of the evidence for relevance, authenticity and provenance, and the arrangement of that evidence in preparation for the narrative construction. The third part of the method is the construction of the narrative. This entails the synthesis of the material into an historical whole, the structuring of that evidence into a readable form, a formulation and explanation of possible causation and finally some explanation of the historical narrative.

This historical narrative creates a rich background for other studies in this program including the major issues study described in this thesis.

8.4.2 Delphi Method

This section summarises the modified Delphi Method employed in the ERP major issues study described in this thesis.

Firstly, the starting Delphi study sample is defined. We seek to contact only individuals who have substantive experience of ES. We thus first interview our high-level contact in the agency to establish a starting list of ‘knowledgeable’ individuals

from all levels of the agency. The round one survey instrument requires that respondents nominate further, and target 'knowledgeable' prospect respondents from their agency or from the vendor or consulting organisations. In addition to 'issues' we also capture salient demographics thereby allowing us to segment responses for comparison purposes (eg. strategic versus operational staff).

The Delphi-study involves three rounds. Round One seeks to inventory issues. The central question posed to the target respondents is "What do you consider have been the major issues in implementing, managing and/or supporting the Enterprise System in [agency name]?" This process seeks to identify specific activities by which the key players can capitalise on their advantages and seek to eliminate or overcome obstacles to better manage and support the installed ES. Having gathered a large number of issues, we next synthesised a manageable, summary set of issues (approximately 40). A bottom-up (data-driven) approach is employed.

In Round Two of the survey, our mapping of original issues from each respondent to the summary set is returned to each respondent for confirmation, thereby further co-opting respondents to the study, while further validating the summary issues. In the final Round Three of the survey, respondents are asked to score or weight the relative importance of the summary issues. A further consensus round is conducted with a select group of senior experts.

Weights returned can now be analysed to first identify clusters of respondents with differing priorities, and then to compare relative ranks and weights from respondent clusters and across various sample segments based on demographics. A factor analysis was conducted to identify the major issue categories.

This study follows on from the preliminary study conducted by Chang (2002) in a group of five Queensland Government agencies who implemented SAP with the same implementation partner. Methodologically, it differs from Chang's study. No top-down analysis was conducted using any pre-determined framework (e.g. MITS90). Also, major issues were constructed statistically using factor analysis rather than determined after Round Two.

8.4.3 Meta-study

The meta-study looks across all studies in the research program using simple content analysis and pattern matching techniques. The objective of the meta-study is to report common themes found across all of these related ERP studies.

8.5 Summary of the main findings

8.5.1 Summary of findings from the historical recount

The historical recount was presented in Chapter 4. This section brings together the findings and conclusions from the analysis of that historical narrative.

The focusing question for the first section of the historical recount of QGFMS was

> *What conditions led the Queensland Government to change their common financial system (QGFMS) from Dun & Bradstreet Software?*

These conditions can be split into four groups: Business Environment, Governance, Technical, and Political.

The changing Business Environment, and financial policy developed to support this environment, generated several conditions that put pressure on Queensland Government's financial systems. The Business Environment conditions include the change of government; the move to accrual accounting and reporting; commercialisation of certain government activities; downsizing in corporate services; and, changing business requirements. FISB had little or no control over these conditions.

The Governance conditions comprised of policy edicts that affected the way Queensland Government executives made decisions about QGFMS. These Governance conditions include the decentralisation of financial operations policy; the centralisation of information policy through the introduction of the IPB's 'Lead Agency' concept; and, 'user pays'. Treasury had considerable but not total influence on these policy changes.

Technical conditions reflect general developments in computer infrastructure. The conditions in this group include client server technology; single database ERP systems availability; and, widespread use of PC Graphical User Interface (GUI).

The single political condition was FISB wanting to retain their central position in an increasingly decentralised environment. This cultural corporate self-protection mechanism drove internal FISB corporate strategy.

The forthcoming SAP era brought about significant changes to these traditional activities unravelling the nature of FISB's central role. FISB did not drive the slow and steady decentralisation of financial systems management; it developed around them. Centralisation of the management of financial systems had been successful for over ten years in Queensland Government.

The focusing question for the second section of the historical recount of QGFMS was:

> *What conditions drove the decentralisation and subsequent recentralisation of financial systems management within the Queensland Government?*

With the associated sub-question:

> *How did FISB's central management dilute over time?*

The findings from this second period are summarised using the set of conditions used to discuss the first period.

Government reforms (e.g. financial reporting, accrual accounting, and commercialisation) developed in the early 1990s and implemented during the late 1990s dominated the business environment conditions. One reform, the downsizing of corporate services, was further developed through the Shared Services Initiative, resulting in a re-centralisation of the SAP systems. More recent government reforms such as Managing for Outcomes and Aligning Services and Priorities did not require changes to the financial systems but rather concerned how they were employed and subsequently managed. Their effect mostly affected the Governance of QGFMS.

During the late 1990s the central governance of QGFMS effectively dissipated. From a political perspective, FISB and its descendants lost control of QGFMS as it decentralised into individual systems across the Queensland Government. Governance reverted to a feudal system, where the local Finance Directors and IT managers made their own decisions about the management of the SAP systems.

The Shared Services Initiative created CorpTech, reasserting a Business Monarchy archetype. The centralist Information Policy Board had also lost authority within the Queensland Government and so CorpTech had no IT Monarch to whom it had to

attend. CorpTech's customers, the Shared Service Providers, dealt directly with their departmental customers, meaning that CorpTech was virtually removed from direct agency influence. Consequently, CorpTech attained virtually total control on the QGFMS environment.

The major technical innovation that developed during this 'second period' was the establishment of the world-wide-web. An emerging infrastructure sourcing strategy is the internet based Application Service Provider but to date, the Queensland Government continues to build and maintain its own systems. Similarly, electronic commerce, enabled by web-based infrastructure, only exists in pockets of the Queensland Government.

In summary, the conditions that drove ERP systems decisions and development fell into four categories: Business environment, Governance, Political and Technical. These conditions are not mutually exclusive, each condition influencing the others.

8.5.2 Major Issues Study Findings

The Major Issues Study findings were reported in Chapter 7. This section summarises those findings. Thirty-seven issues were derived from the Delphi study and categorised into five major issue categories. Table 8.1 lists the five major issue categories and associated conclusions arising from the analysis of these issues

Table 8.1 – Conclusions from the Major Issues Study

	Major issue Category	**Conclusion**
1	Lack of organisation-wide knowledge strategy reduces benefits	Knowledge-management-oriented decisions taken early in the ERP lifecycle impact on the ERP capabilities later in the lifecycle.
2	Knowledge required to support and run SAP was not managed effectively	In a multi-agency (firm/organisation) context, knowledge strategy is needed at the inter-agency and intra-agency levels.
3	Costs are too high or benefits relative to costs are too low	The benefits from an ERP project are more likely to be achieved through the cooperation of the actors in the project: client, vendor and implementation partner. Management must be clear about the benefits they want to achieve from ERP systems and manage towards the achievement of these benefits. ERP managers should employ a systematic measurement model of ERP benefits.

4	Customisation and systems integration	The 'technology swap' strategy (changing the system to suit the organisation) may be a viable option if the ERP project team does not think the organisation has the absorptive and retentive capacities to cope with the effect of broad scale process and other re-engineering efforts (changing the organisation to suit the system).
5	The SAP system is inadequate or difficult to use	In a multi-agency (firm/organisation) context, knowledge strategy is needed at the inter-agency and intra-agency levels.
6	Poor management of the implementation project and processes	ERP Project Managers must attend to and manage common information systems project issues as well as ERP specific issues. There are two essential types of knowledge that require integration within an ERP project: knowledge of the system and knowledge of the organisational context.
7	Organisational restructuring affected implementation effort	No conclusion.

This ranking of major issue categories places the Knowledge Management related categories at the top. The difference in ranking between the second knowledge category and the cost category is very marginal. The categories that describe issues with the use of SAP come next followed by the project management category. Finally the single issue category concerned with organisational restructuring was ranked last.

There were three conclusions arising from the differing perspectives of the stakeholder cohorts (Client vs. Implementation Partner and Strategic vs. Operational staff) studied in this Delphi study. These conclusions were:

1) Strategic and Operational respondents had different perspectives on the costs and relative benefits of SAP

2) Strategic and Operational respondents tended to agree on the importance of: project management; the lack of an organisational-wide knowledge strategy; customisation and integration; the effect of organisational restructuring; and, the inadequacy of and difficulty using SAP.

3) Client and Implementation Partner respondents had different perspectives on the importance of issues connected with internal knowledge management efforts.

8.5.3 Meta-Study

The Meta-Study integrated the findings from the historical recount, the major issues study, studies conducted within the Queensland Government ERP context and other relevant studies from the literature.

The first research question looked at commonality across the ERP issue studies conducted in the Queensland Government. In summary, the commonality was as follows:

1) The breadth (multi vs. single organisation) of the individual studies determined whether they reported inter-agency knowledge management issues such as re-work and knowledge sharing and knowledge re-use opportunities.

2) Single agency studies tended to address intra-agency knowledge management issues, commonly training deficiencies.

3) Studies that studied the post-implementation phase found common issues concerning deficient user and help desk SAP knowledge.

4) Cost was a common issue with upgrade costs a concern in studies that included the post-implementation phase.

5) Customisation and integration are common issues in these studies and the ERP literature in general.

6) Inadequacy of functionality is commonly found in ERP issue studies.

7) Project management issues are commonly found in ERP issue studies.

Overall the study concluded no strong findings or conclusions from the comparison of these issues. The existence of previously unidentified issues is more likely attributable to the context of a multi-organisational ERP project in a public sector environment.

The Meta-study also considered the common themes and finding from the ERP Lifecycle Knowledge Management research program. The conclusions from this research are summarised under four headings: Knowledge Management; Support, Maintenance and Upgrades; Influences on the ERP Context; and, the Relationship between the parties involved in the ERP lifecycle.

These conclusions are set out below:

8.5.3.1 Knowledge Management

1) Organisations should plan a knowledge strategy, in conjunction with their project plans, which spans the complete ERP lifecycle.

a. This knowledge strategy should consider the knowledge readiness of the organisation i.e. the amount of knowledge that users will need to absorb and retain to accomplish a successful ERP project.

b. This knowledge strategy should consider the dissipation of knowledge about ERP activities that have a long cycle time.

2) Organisations should attend more closely to both intra-agency needs of users and help desk personnel.

3) Organisations should contribute to and draw upon the knowledge base of other ERP-using organisations.

4) Implementation partners could benefit from a redefinition of their role from systems integrator to systems/organisational context knowledge integrator.

8.5.3.2 Support Maintenance and Upgrades

1) Maintenance of ERP is different and requires a different management approach. Ng (2003) developed a comprehensive maintenance management framework.

2) Upgrade activities have a long cycle time in the ERP lifecycle and knowledge dissipates over this time. The recording of their upgrade experiences in Vayo et al. (2002) addresses this concern.

8.5.3.3 Influences on the ERP systems context

1) ERP systems managers must find new ways to manage changes in the external environment because organisations can no longer easily replace these entrenched systems.

8.5.3.4 Relationship between the parties involved in the ERP lifecycle

1) While logically benefits could accrue from an ongoing relationship between the client and the implementation partner, there are administrative barriers to such a relationship in the Queensland Government.

2) There is a strong ongoing relationship between the vendor and the client driven by the maintenance and upgrade process.

3) The objective of knowledge 'self-sufficiency' in ERP projects means that there is an expectation that the implementation partner effectively makes their role redundant at the completion of an implementation project.

This concludes the discussion of the Queensland Government ERP Lifecycle Meta-Study.

8.6 Limitations of the Study

Like all research these studies have their limitations. This section examines the theoretical and methodological limitations of the study and discusses their impact on the conclusions from this research. Each major study in this thesis will be dealt with individually.

8.6.1 Historical narrative

All historical narratives are subject to bias by the writer. Even though the historical method was studied in great detail, best practices in historical research harvested from leading historiographers and applied rigorously, and sources critiqued carefully, the construction of any historical narrative will still be influenced by the personal perceptions of the writer.

The limitations to the first half of the historical narrative mainly apply to the very early years. There were few source documents and the principal chronology was based on a secondary source written by the head of FISB. The events immediately preceding the selection of SAP were well documented and triangulated but the period of implementations was based on sparse primary sources. The period through which FISB and its successor groups lost it power was based mainly on participant interviews and the writer believes these coincide sufficiently to represent a true account of events. Finally, the creation of the Shared Services Initiative and CorpTech are well documented and supported by participant interviews to give the reader confidence.

8.6.2 Major Issues Study

Many measures were adopted by the research team (consisting of myself and my supervisors) to ensure a rigorous approach to the major issues study described in this thesis. Steps taken include: 1) the survey instrument was pre-tested; 2) coding was done by multiple coders; 3) the final set of issues was confirmed by participants; 4) a domain expert workshop was conducted to increase understanding and validity of the issues; 5) data collected was broken into differing respondent groups to measure the consensus and dissent by those groups; and, 6) major issue categories were determined statistically using factor analysis.

Steps were also taken in this survey to reduce non-respondent bias and sampling errors. All efforts were made to ensure data validity and reliability of the survey instrument. This study bases much of its discussion on the relative rankings of importance of the issues and the major issue categories. The reader must be cautious when comparing these results with results from similar studies. This study would be much enhanced with further statistical analysis. The researcher will pursue this task in future.

8.6.3 Meta-study

The meta-study looks across a variety of studies conducted under the umbrella of this research program. These studies were conducted by researchers with varying research skills and the validity and rigor of the studies varies accordingly. The study by Putra (1998) was very comprehensive but lacked a strong and rigorous methodology. All other studies were carried out under the supervision of experienced academic supervisors and independently reviewed.

Overall, the major issues study, historical narrative and the meta-study were exploratory, descriptive, empirical studies of predominantly contemporary phenomena. The methodologies were rigorously studied and applied.

8.7 Implications of the Study

8.7.1 Implications for Practice

The comprehensive historical narrative in Chapter 4 provides a broad view of how broader market and organisational factors can impact on the selection, operation and support of an ERP. Readers of this historical narrative will gain an understanding of

how such conditions can combine to cause a variety of outcomes both good (benefits) and bad (issues and problems).

Another implication of this study for ERP using organisations is a better understanding of the issues that can occur across the ERP lifecycle. Knowledge of these issues, and the major issue categories in which they fall, provides staff with operational responsibilities and executive staff with management oversight specific areas to which they must attend to avoid the concerns of the respondents in this study.

An understanding of the different perspectives held by stakeholder groups (Client vs. IP and Strategic vs. Operational) gives each stakeholder group a better appreciation of the other group that can aid discussion and decision making about the mitigation of these issues should they arise. Where the stakeholder groups in consensus, such as the Strategic and Operational groups' consensus on the relative importance of project management issues during implementation, they can cooperatively take steps to mitigate these issues. Where the stakeholder groups are in dissent such as Client and IP groups' on the same issue (project management), the groups can better negotiate these values through increased understanding of the different perspectives.

ERP using organisations would benefit from a thorough examination of the themes running through this research program. Issues arising from this study can be included in any risk analysis for planned ERP implementations and upgrades. Managers responsible for the operation of ERP systems can also gain deeper insights into ongoing operational matters.

Finally, the meta-study provides the reader with a view of the ERP lifecycle and a better understanding of the longer term role of the players in that lifecycle. The meta-study emphasises the importance of the knowledge relationships between the player in the lifecycle and their respective roles over time. This broader view gives the ERP executive managers greater insights that will contribute to their long-term (lifecycle) planning.

8.7.2 Implications for Research

An important research implication arises from this study. The historical method in information systems studies was considered at length and following on from the work of Mason et al. (1997b) simplified in accordance with more general historiographical practice. Historical studies are important for all disciplines and there is a need to

extend the number of historical studies in the IS discipline. The discipline needs to consider the use (and epistemology) of analysis within the historical studies. There is little historiographical guidance or emphasis within the discipline; addressing this would be of lasting benefit especially while we have immediate access to our pioneers. There is a myriad of opportunity to inform future generations of the deep rationale of how the information systems world developed. It is also an opportunity to inform users of other methods such as case study and ethnography to improve our perspective on the information systems context.

8.8 Associated Research

This study has already spawned a number of other studies and papers. These include

8.8.1 Australian Research Council Linkage-Project Grants

Title: Unlocking Benefits From Enterprise Systems In The Australian Public Sector: Benefits Realisation in the Context of the Virtual Organisation

Chief Investigators: Guy Gable (QUT), Chris Sauer (Oxford), Tom Davenport (Babson), Greg Timbrell (QUT), Taizan Chan (QUT)

8.8.2 Masters Theses

The Systematic Improvement of Advice given by Public Sector Call-centres, Nev Schefe, 2006.

Supervisors: **Principal** Greg Timbrell, **Associate**: Alan Underwood

8.8.3 Book Chapters

In the following citations I estimate my percentage of contribution to the publication in brackets.

Gable, G., Farhoomand, A., Timbrell, G. (2004) Return of the JEBI in *e-Business Transformation: text and cases*, Centre for Asian Business Cases, Hong Kong. [95%]

Timbrell, G., Nelson, K., Jewels, T. (2003) “Knowledge Re-use in an Application Service Provider" in *Knowledge Management: Current Issues and Challenges*, Hershey PA, IDEA Publishing. [90%]

Timbrell, G., Gable, G. (2002) "The SAP Ecosystem: A Knowledge Perspective" in *Enterprise Resource Planning Solutions and Management*, Hershey PA, IDEA Publishing. [50%]

8.8.4 Journal Articles

Timbrell, G., Koller, S., Schefe, N., Lindstaedt, S. (2005) “A Knowledge Process Infrastructure Hierarchy Model for Call Centre Processes”, *Journal of Universal Computer Science*, Vol 11, No 4. [50%]

Timbrell, G., Andrews, N., Gable, G. (2001) "Impediments to Inter-firm transfer of best practice: in an Enterprise Systems Context", *Australian Journal of Information Systems*, Special Edition, pp116-125, NSW Australia [60%]

8.8.5 Conference Papers

Chan, T., Gable, G., Timbrell G. (2005) “Drivers of Software and Maintenance Sourcing Strategies: Economic, Psychological, and Social Factors”, *Proceedings of the 9th Pacific-Asia Conference on Information Systems*, July 7-10, Bangkok, Thailand. [20%]

Schefe, N., Timbrell, G. (2004) “A Tale of Two City Call Centres”, *Proceedings of the 15th Australasian Conference on Information Systems*, November 2004, Hobart TAS. [40%]

Timbrell, G. (2004) “An Historical Recount of the Queensland Government Financial Management System (QGFMS) – 1983-1994”, *Proceedings of the 1st International Conference on Enterprise Systems and Accounting*, Sep 3-4, Thessaloniki, Greece. [100%]

Gable, G., Davenport, T., Broadbent, M., Timbrell, G. (2004) “The IT Consulting Process through a Knowledge Management Lens”, *Proceedings of the 8th Pacific-Asia Conference on Information Systems*, July 8-11, Shanghai, China. [10%]

Timbrell, G., Koller, S., Lindstaedt, S.N. (2004) “A Knowledge Infrastructure Hierarchy Model for Call Centre Processes”, *I-KNOW ‘04: Proceedings of the 4th International Conference on Knowledge Management*, June 30 – July 2, 2004, Graz, Austria. [70%]

Timbrell, G., Chan, T. (2003) “Investigating Enterprise Systems Issues using a Modified Delphi Method and Exploratory Factor Analysis”, *Proceedings of the 14th Australasian Conference on Information Systems*, November 2003, Perth WA. [70%]

Gable, G., Timbrell, G., Sauer, C., Chan, T. (2002) "An Examination of Barriers to Benefits-realisation From Enterprise Systems in the Public Service", *Proceedings of the European Conference of Information Systems*, June 2002, Gdansk, Poland. [20%]

Timbrell G., Jewels T. (2002) "Knowledge Re-use Situations in an Enterprise Systems Context" in *Proceedings of the Information Resources Management Association International Conference*, May 19-22, Seattle WA USA. [95%]

Timbrell G., Andrews, N., Gable, G. (2001) "Impediments to Inter-firm Transfer of Best Practice: in an enterprise systems context", in *Proceedings of the Americas Conference of Information Systems*, 3-5 August 2001, Boston, MA, USA. [60%]

Timbrell G., Gable G. (2001) "The SAP Ecosystem: A Knowledge Perspective", *Proceedings of the Information Resources Management Association International Conference*, 20-23 May 2001, Toronto, Canada. [50%]

Chang S., Gable G., Smythe E., Timbrell, G. (2000). "Methods for distilling key issues using a Delphi approach", *Proceedings of the 11th Australasian Conference on Information Systems*, 6-8 December 2000, Brisbane, Australia. [15%]

Chang, S., Gable, G, Smythe, E., Timbrell, G. (2000). "A Delphi examination of public sector ERP implementation issues" *Proceedings of the International Conference of Information Systems*, 10-13 December 2000, Brisbane, Australia. [15%]

8.8.6 Seminars and Presentations

Timbrell, G. (2003) “Call Centre Knowledge Management”, *Institut for Samfundsvidenskab & Erhvervsokonomi Seminar*, Roskilde Universitetscenter, July 2, Denmark. [100%]

Timbrell, G. (2004). "Managing Knowledge in Call Centres and Service Desks". *Invited Seminar: Information and Knowledge Management Society*, Civil Service College, Singapore. 7th September 2004. [100%]

Timbrell, G. (2003) "Innovation in Knowledge-Intensive Service Firms", *Proceedings of the 4th actkm Conference*, 28 October 2003, Canberra. [100%]

Schefe, N., Timbrell, G. (2003) "The Systematic Improvement of Advice given by Public Sector Call Centres", *Proceedings of "KM Challenge 2003 Conference*, 3-4 April, Melbourne. [50%]

Gable, G., Sedera, D., Timbrell, G. (2002), "Cooperative ERP Lifecycle Knowledge Management, 20-22 November 2002, *Proceedings of the IAG Conference*, Gold Coast. [33%]

Timbrell, G., Shepperd, B. (2002) "Improving Advice and Support Services using Applied Knowledge Management Strategies", *Proceedings of the Enabling the Information Future Conference*, 16-17 October, 2002, Brisbane. [70%]

Timbrell, G., Andrews, N. (2002) "Workshop on Advanced Knowledge Transfer Strategies", *Proceedings of the Enabling the Information Future Conference*, 16-17 October, 2002, Brisbane. [80%]

Research has already begun on combining the issues in this study with the results of the ERP success factor studies conducted by Sedera et al. (2003). Other future research arising from this study would include:

1) Analysing the data by phase. While this was collected during the study, little statistical analysis was conducted at this data level.

2) Using structural equation modelling to look at relationships between the issues.

3) Extending the modified Delphi method to create a more rigorous and repeatable process of coding the issues from studies such as this one.

4) Examining the results of the survey through a comparison of small vs. large agencies.

5) Developing a more comprehensive risk analysis framework based on the issues found.

8.9 Chapter Summary

This chapter summarises and concludes the thesis. It provided summaries of the studies undertaken and the findings and conclusions from the studies; the research methods employed; research motivations and objectives; some limitations of the studies; implications of the studies to practice and research; follow-on research completed; and, suggested future research.

8.10 Thesis Summary

This thesis consisted of eight chapters. Chapter 1 provided an overview of the Research; Chapter 2 discusses pertinent background literature; Chapter 3 explained the research methods used in the studies described in this thesis; Chapter 4 narrated an historical recount of the Queensland Government Financial Management System; Chapter 5 set out the descriptive, comparative and reductive statistics pertaining to the Major Issues Study; Chapter 6 (and Appendix E) discussed the individual issues in the Major Issues Study; Chapter 7 presented findings from the Major Issues Study and from the overarching Meta-Study; and Chapter 8 summarised and concluded the thesis. Attached are a set of appendices that contain example survey instruments.

This concludes this thesis.

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Appendices

Appendix A

Survey Participants Selection Guidelines

Survey of Major Issues with SAP Financials in Queensland Government

Guidelines for Re-building the "Survey Contact List" for PricewaterhouseCoopers

Introduction - The survey of "*Major Issues with SAP Financials in Queensland Government*" commenced in each government agency with the development of a starting contact list of agency staff. The original contact list was developed using the guidelines set out below.

Over time the contact details (email, phone, department, position) of agency staff change. Prior to releasing the very important third round of this survey, where people rank the importance of the derived list of major issues, we are looking to re-build our contact list.

This document offers guidelines for choosing staff to include in the survey contact list.

Who to Include in the Contact List ? – For the purposes of the survey, we require representation in the sample from all levels in PricewaterhouseCoopers. We seek responses from individuals who have had substantive involvement with SAP Financials in PricewaterhouseCoopers. Following are listed several alternative characteristics of appropriate respondents to include in your starting contact list:

- Have had substantive involvement with SAP Financials at any level (e.g., Strategic, Technical and Operational users)
- Have had involvement in any phase of the SAP Financials lifecycle (e.g., Plan, Design & Build, Testing, Implement, Knowledge Management and Up-and-Running)
- Have had involvement with any of the modules implemented (e.g., General Ledger, Accounts receivable, Accounts Payable, Fixed Assets, Controlling, etc.)
- Have been involved in any of various roles (e.g., Project Management, Change Management, Development, Configuration, Internal Audit, etc.)

We are also seeking survey responses from representatives of SAP and your implementation partner(s). Thus, a further guideline is …

- Have been involved with SAP Financials in the PricewaterhouseCoopers as a representative of either:
  - The PricewaterhouseCoopers
  - An Implementation Partner, or
  - The Vendor (SAP)

How Many to Include in the Contact List? - The larger the respondent group the better for statistical analysis purposes. It is suggested that given the variability in roles and responsibilities across your agency, a broad range and significant number of

participants is appropriate. Thus, there can be too few, but not too many respondents. In order to further broaden the survey sample, participants are encouraged in the survey instrument to nominate other knowledgeable individuals who might respond to the survey.

IF YOU ARE UNCERTAIN ABOUT WHETHER TO INCLUDE SOMEONE, INCLUDE THEM

Following is a table you may choose to use in building your contact list Please fax to 3864 1214. Alternatively (and preferably), you may choose to develop the list in the attached spreadsheet that can be sent via email to k.stark@qut.edu.au

Agency:_____ **Agency Contact (nominee):**_____ **Email:**_____

No	Surname	Given Name	Title	Position	Current Organisation	Phone	Fax	Email
1								
2								
3								
4								
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No	Surname	Given Name	Title	Position	Current Organisation	Phone	Fax	Email
21								
22								
23								

Agency:_____ **Agency Contact (nominee):**_____ **Email:**_____

No	Surname	Given Name	Title	Position	Current Organisation	Phone	Fax	Email
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No	Surname	Given Name	Title	Position	Current Organisation	Phone	Fax	Email
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43								
44								

Appendix B

Round One Survey Instrument and accompanying communiqués

Dear Peter,

I am writing in the capacity of Chair - QGFMS Strategic Advisory Board, to request your involvement in a survey being conducted by the Information Systems Management Research Centre (ISMRC), Queensland University of Technology, in cooperation with Queensland Government and SAP.

*** MAJOR ISSUES WITH SAP FINANCIALS in Queensland Government

The purpose of the survey is to identify and quantify major issues in relation to implementing, managing and supporting the SAP Financials throughout their lifecycle in Queensland
Government. Your insights will be valuable in highlighting where Queensland Government, SAP, Implementation partners, the ISMRC and others should be focusing their attention, today and in
future.

All key players (i.e. Queensland Government, SAP, and the Implementation Partners) continually face difficult judgments on these major issues. By inventorying then weighting and analysing
the issues, management educational and research resources can be allocated more effectively. In addition, much can be learned 'for next time'.

Following are your details in the ISMRC survey database. Please report missing or incorrect details when you complete the attached survey instrument that is to be returned directly to ISMRC.

NAME: Peter Laing
EMAIL: peter_laing@health.qld.com.au
PHONE: 3406 6753
FAX:
AGENCY: Health

Please find attached the 1st round questionnaire. Please complete the attached questionnaire and return it as per instructions therein. It will require 15-20 minutes to complete the survey instrument. Detailed results of the survey will be confidential to ISMRC. No names are entered into the ISMRC responses database. Respondents are assigned a sequential number. Only aggregated results are reported. Findings are never attributed to any individual. Neither Queensland Government nor SAP will receive a copy of the study database.

Thank you for your time and involvement in this important study.

Yours sincerely,

Rob Freeman,

Chair, QGFMS Strategic Advisory Board

Guy G Gable,
Director, Information Systems Management Research Centre, QUT

Marianne Starkey,
Director, Sapient College, SAP Australia

A survey of

Major Issues with SAP Financials

in Queensland Government

(1st Round)

Introduction and Background – Over the past 3 years, Queensland Government has been implementing SAP financials across all state government agencies. Many issues have been addressed and others remain. Now that the financials are in place in most agencies, new issues associated with ongoing support and the continuing evolution of the SAP Financials are arising.

Purpose of the Survey – The purpose of this survey is to identify and quantify major issues in relation to implementing, managing and supporting the SAP Financials throughout their lifecycle in Queensland Government. The survey is being conducted by the *InformationSystemsManagement* Research Centre (ISMRC), Queensland University of Technology, with support from SAP and Queensland Government.

We seek to learn from your experiences to date with SAP Financials in Queensland Government. Your insights will be valuable in highlighting where Queensland Government, SAP, the implementation partner, the ISMRC and others should be focusing their attention, today and in future. All key players continually face difficult judgments on these major issues. By inventorying, then weighting and analysing the issues, management, educational and research resources can be allocated more effectively. In addition, much can be learned 'for next time'.

Conduct of the Survey – The survey will involve 2 rounds. In this the 1st round, we are seeking to 'inventory' all major issues experienced to date. After having summarised this list of issues, in the 2nd round we will seek your scores on the relative importance of the issues. Representatives from Queensland Government, SAP and the Implementation Partner are being surveyed.

Who Should Complete the Questionnaire – You have been identified as having had direct involvement with the SAP Financial system in Queensland Government.

Confidentiality - Detailed results of the survey will be confidential to ISMRC. No names will be entered into the ISMRC database. Respondents are assigned a sequential number and findings are never attributed to any individual. Only aggregated results are reported. Neither Queensland Government nor SAP will receive a copy of the study database.

General Instructions for Completing and Returning the Questionnaire – It will take you approximately 15-20 minutes to complete this questionnaire. Please answer all questions and return the completed questionnaire by **18 February 2000.** Please return your completed survey as an email attachment to my research assistant, Greg Timbrell at g.timbrell@qut.edu.au If you have any questions concerning the questionnaire, please do not hesitate to contact me (voicemail) at:

Professor Guy Gable, Director ISMRC

Faculty of Information Technology,

Queensland University of Technology

GPO Box 2434, Brisbane 4001

QUT Number (voicemail): 3864 1125 Fax Number: 3864 1214

E-mail: g.gable@qut.edu.au

Section 1: Your Involvement

Confidentiality – This is not an anonymous survey. For data analysis, we must be able to associate your demographic data (e.g. phases of involvement, organisation) with your responses in all 'rounds' of the survey. Nonetheless, your confidentiality will be secure. No names are entered into our database. Respon-dents are assigned a sequential number. Only aggregated results are reported. Findings are never attributed to any individual. Neither Queensland Government nor SAP will receive a copy of the study database.

Name and Organisation - Please enter your name following, or return the personalised covering email along with your completed survey instrument.

Name: _____

This survey is being conducted across each Agency of Queensland Government. Please enter the Agency in which you are/were involved with SAP Financials. If you have been involved with SAP Financials in more than one Agency, please complete a separate copy of this survey instrument for each Agency.

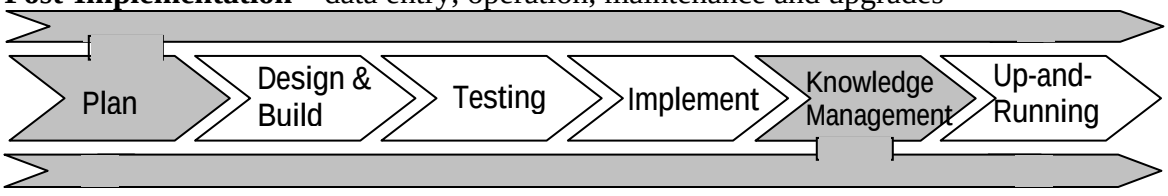
Agency:
Health_____
___

All subsequent answers in this survey instrument should relate to the afore-listed Agency.

Phases and Modules you have been involved with - The columns of the table below represent the six broad phases of the SAP Financials lifecycle in Queensland Government (we realise the phases in practice are not as distinct nor linear as the diagram suggests). The rows represent the main SAP Financials modules implemented in Queensland Government. For each module, please simply tick the phases of the lifecycle in which you have been involved WITH THE ABOVE AGENCY.

Please tick all relevant cells in the table.

Plan - business process design, select and acquire software and hardware
Design & Build – design, customise and modify the software
Testing – system, integration & user testing
Implement – system roll-out including security development
Knowledge Management – training, communication and change management (spans all phases)
Post-Implementation – data entry, operation, maintenance and upgrades



Modules

General Ledger	☐	☐	☐	☐	☐	☐
Accounts Receivable	☐	☐	☐	☐	☐	☐
Accounts Payable	☐	☐	☐	☐	☐	☐

Fixed Assets	☐	☐	☐	☐	☐	☐
Controlling	☐	☐	☐	☐	☐	✔ ☐
TR/FM	☐	☐	☐	☐	☐	☐
Materials Management	☐	☐	☐	☐	☐	☐
Projects	☐	☐	☐	☐	☐	☐
Other …	☐	☐	☐	☐	☐	✔ ☐

Nature of Your Involvement - In 2 or 3 sentences, please briefly describe your involvement with SAP Financials in the above-listed Agency (main role(s) and responsibilities).

As Director of Finance @ xxx I used SAP as my day to day reporting and monitoring tool with regard to both cash and accrual

Financial management.

Duration of Your Involvement – Please indicate the period during which you have been involved with the above modules, in the above-listed Agency. **Start** (mm/yy) _03_/_98_ **End** (mm/yy) _08_/_00_

Section 2: Major SAP Implementation, Management and Support Issues

Please use the table below to identify and briefly describe five to ten answers to:

"*What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above-listed Agency?*"

Please feel free to include all important issues that occur to you (add rows to the table or annotate the hard copy if faxing or posting).

	MAJOR ISSUE	DESCRIPTION
1	Implementation Support	Not enough skilled staff to support implementation in Districts due to the tight and optomistic roll-out timeframes. Districts had to wait sometimes weeks to get responses to post-implementation issues.
2	On-going Training	Very limited on-going training once initial implementation phase completed thereby making it difficult for new staff or those who wanted to progress beyond basics.
3	HR/Payroll Module	Health chose not to purchase and implement SAP HR/Payroll module, which would have provided an integrated solution but had to marry current systems with interfaces.
4	System Knowledge	Not full knowledge of system and its requirements and some were critical for usage e.g. GR/IR account in Financials that we weren't informed of that needed to be monitored and reconciled, huge problem due to method of implementation of new system.
5	Technology	Significant new technology purchases occurred but will not be sustainable when replacement required thereby another one-off hump funding without resources to sustain.
6		
7		
8		

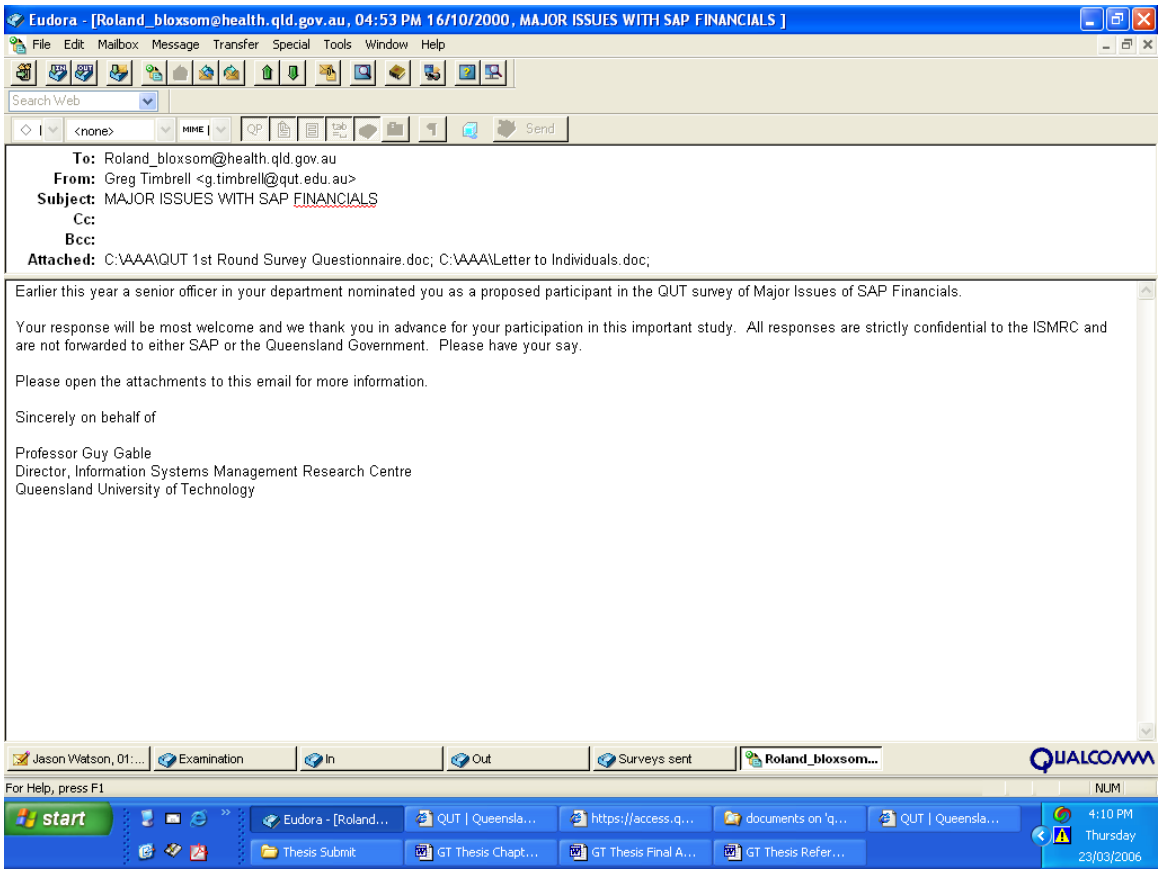
9		
10		

Section 3: Other Possible Respondents

We hope with this survey to contact ALL individuals who have been closely involved with the SAP Financials in Queensland Government. We will seek to contact all involved, even if they have left the project or organisation. For this purpose, we would appreciate if you would use the space below to identify others in the above-listed Agency and within SAP and the Implementation Partner, who you feel might usefully respond to the survey. Please list whatever details you have. If you only have a name, this will be useful. If you are uncertain about someone, please include them.

Name	Email Address	Other Contact Details
Chris xxx	xxx@health.qld.gov.au	PAH 3240 xxxx
Daniel xxx		PAH 3240 xxxx

THE END - THANK YOU FOR YOUR COOPERATION


Eudora - [Roland_bloxsom@health.qld.gov.au, 04:53 PM 16/10/2000, MAJOR ISSUES WITH SAP FINANCIALS]
File Edit Mailbox Message Transfer Special Tools Window Help
Search Web
<none>
Send
To: Roland_bloxsom@health.qld.gov.au
From: Greg Timbrell <g.timbrell@qut.edu.au>
Subject: MAJOR ISSUES WITH SAP FINANCIALS
Cc:
Bcc:
Attached: C:\AAA\QUT 1st Round Survey Questionnaire.doc; C:\AAA\Letter to Individuals.doc;
Earlier this year a senior officer in your department nominated you as a proposed participant in the QUT survey of Major Issues of SAP Financials.
Your response will be most welcome and we thank you in advance for your participation in this important study. All responses are strictly confidential to the ISMRC and are not forwarded to either SAP or the Queensland Government. Please have your say.
Please open the attachments to this email for more information.
Sincerely on behalf of
Professor Guy Gable
Director, Information Systems Management Research Centre
Queensland University of Technology
Jason Watson, 01:...
Examination
In
Out
Surveys sent
Roland_bloxsom...
QUALCOMM
For Help, press F1
NUM
start
Eudora - [Roland...
QUT | Queensla...
https://access.q...
documents on 'q...
QUT | Queensla...
Thesis Submit
GT Thesis Chapt...
GT Thesis Final A...
GT Thesis Refer...
4:10 PM
Thursday
23/03/2006

Appendix C

Round Two Survey Instrument

-----Original Message-----
From: Information Systems Management Research Centre
[mailto:g.timbrell@qut.edu.au]
Sent: Saturday, 17 February 2001 3:00
To: michael.XXX@XXX.qld.gov.au
Subject: MAJOR ISSUES WITH SAP FINANCIALS IN QUEENSLAND GOVERNMENT

Confidential email to Michael XXX

Dear Michael,

MAJOR ISSUES WITH SAP FINANCIALS IN QUEENSLAND GOVERNMENT

You have been contacted previously regarding a study being conducted by the Information Systems Management Research Centre (ISMRC), Queensland University of Technology (QUT) in cooperation with SAP Australia and with the full support of the Queensland Government. Thank you once again for your involvement and support.

The previous survey-round sought to inventory your issues. 538 issues were supplied by respondents from 25 Departments within the Queensland Government. Subsequently, we have used several different approaches, including a workshop with Queensland Government staff, to categorise and summarise the issues identified.

The classification we arrived at is listed at the end of this email.
Following, for each issue you supplied, we have listed:

ISSUE: the issue you provided in your survey response;
DESCRIPTION : the further description you provided in your survey response;
CATEGORY: the category in our classification to which we have mapped your issue;
2ND CATEGORY: a further category in our classification to which we have mapped your issue.

We are writing now to confirm our understanding of the issues you supplied and our mapping.

Your issues are:

Issue 1 - IMPLEMENTATION: Lack of suitable SAP Skilled staff available from within the Department.

Description 1 - There was very little (if any) general SAP training provided to project team staff prior to the implementation project commencing. The view was that staff would gain SAP skills on the job via knowledge transfer from the implementation partners. The prob
Category - SAP knowledge was lacking in the project team, consultants or the vendor.
2nd Category - The staffing of the project team was mis-managed.

Issue 2 - IMPLEMENTATION: The high cost of implementing SAP or additional SAP modules (IS Real Estate foe example) is prohibitive.
Description 2 - The cost of implementing SAP or of implementing additional SAP func-tionality is was and seems to remain extremely high. The large accounting firms still appear to be charging an average of $1200 a day for consultancy fees, and SAP Australia charge $1800
Category - SAP is generally expensive to implement.
2nd Category - SAP is not value for money.

Issue 3 - IMPLEMENTATION: License costs remain high.
Description 3 - The extension of the user base for SAP R/3 is a costly. License costs of $1100 per users (licenses are purchased on a concurrent basis at $4400 per concurrent user which allows for 4 named users) plus an annual license maintenance fee of 15% of the licens
Category - SAP is generally expensive to implement.
2nd Category - Running costs are high.

Issue 4 - ON-GOING SUPPORT: The reporting capability of SAP is a constant source of complain from users.
Description 4 - Whilst it is acknowledged that there a thousands of reports available within SAP, it is impossible to find a report to meet specific user require-ments. The modification of existing reports or the development of new reports using the ABAP/4 language is co
Category - SAP reporting is expensive.
2nd Category -

Issue 5 - ON-GOING SUPPORT: Whilst archiving of old data does not present particular problems, retrieval of archived data does.
Description 5 - The effective retrieval of archived data required the use of a third party tool. Table reorganisations after archiving has been undertaken also presents problems due to the amount of time required for the system to effects a reorganisation all tables with
Category - The SAP system does not work as it should.
2nd Category -

Issue 6 - ONGOING SUPPORT: System upgrades are proving to be expensive and time consuming.
Description 6 - SAP are forcing users into an upgrade cycle of once every

three or so years. We are currently upgrading our SAP system from 3.0f to 4.5b, and costs are in the vicinity of $1m. This covers additional hardware require-ments, contractors to assists, ABAP/4 r
Category - SAP upgrade costs are high.
2nd Category - Time management and planning was inadequate.

Issue 7 - ON-GOING SUPPORT: The general complexity of an SAP R/3 systems makes the provision of help desk facilities and functional support a complex issue.
Description 7 - Help desk support for users is a must, and that help desk support needs to be provided from within the organisation, because users dont just require assistance in the use of SAP, they require assistance in how use SAP in the organisations environment.
Category - The Help Desk was under-resourced.
2nd Category - The training method or management was inadequate.

Issue 8 - ON-GOING SUPPORT: The general complexity of an SAP R/3 systems makes undertaking even minor changes a time consuming and costly exercise.
Description 8 - The amount of work required to undertake and test even minor changes can be prohibitive.
Category - The SAP system has been made too complex by the organisation.
2nd Category - SAP is generally expensive to implement.

Issue 9 -
Description 9 -
Category -
2nd Category -

Issue 10 -
Description 10 -
Category -
2nd Category -

I would be grateful if you could email any comments you have to my research assistant g.timbrell@qut.edu.au by 1 March 2001. Details of the survey are confidential to the ISMRC.

Once we have confirmed the categories listed below, a final survey-round seeking your scores on the relative importance of the major issues will be distributed. A summary report of study findings will be made available to all respondents. If you have questions on any aspect of this study please do not hesitate to contact either g.timbrell@qut.edu.au or g.gable@qut.edu.au

Thank you once again for your time and assistance with this important and interesting study.

Yours sincerely,

Professor Guy G Gable, Director
Information Systems Management Research Centre

APPENDIX

Preliminary Major Issue Categories
---

1. Help desk SAP knowledge was inadequate.
2. Insufficient resources were allocated to the project.
3. No major issue was reported.
4. Organisation has experienced downtime, slow processing or unreliable hardware.
5. Organisation not taking advantage of available SAP functionality.
6. Running costs are high.
7. SAP functionality is inadequate.
8. SAP is generally expensive to implement.
9. SAP is not suitable for small agencies/organisations.
10. SAP is not value for money.
11. SAP Knowledge not re-used efficiently by agencies.
12. SAP knowledge was lacking in the project team, consultants or the vendor.
13. SAP related documentation is insufficient.
14. SAP reporting is expensive.
15. SAP reporting tools are difficult to use.
16. SAP upgrade costs are high.
17. SAP was not a suitable choice of software.
18. Staff/knowledge retention strategies were ineffective.
19. Systems controls were inadequate.
20. The central agency mis-managed their role.
21. The change management process has been mis-managed.
22. The configuration of the SAP was inadequate
23. The data conversion was inadequate.
24. The Help Desk was under-resourced.
25. The project suffered from individual or team lack of knowledge of the organisational context.
26. The Project Team did not consult or communicate sufficiently.
27. The reporting from the SAP system is inadequate.
28. The SAP system does not work as it should.
29. The SAP system has been made too complex by the organisation.
30. The SAP system suffered non-acceptance, non-use or lack of ownership.
31. The SAP system was affected by the machinery of government.

32. The SAP system was customised too much.
33. The staffing of the project team was mis-managed.
34. The testing of SAP system was inadequate.
35. The training method or management was inadequate.
36. There was lack of stakeholder/management support and ownership.
37. There was poor executive or project management of the SAP project.
38. There were systems integration issues.
39. This issue was not classified. Suggestions welcome.
40. Time management and planning was inadequate.
41. Users do not have sufficient SAP knowledge.

Date: Thu, 01 Mar 2001 09:12:28 +1000
From: "XXX, Michael" <Michael.XXX@XXX.qld.gov.au>
Subject: RE: MAJOR ISSUES WITH SAP FINANCIALS IN QUEENSLAND GOVERNMENT
To: "'Information Systems Management Research Centre'" <g.timbrell@qut.edu.au>
Message-id:
MIME-version: 1.0
X-MIME-Autoconverted: from 8bit to quoted-printable by inet02.citec.qld.gov.au
X-Mailer: Internet Mail Service
Content-type: text/plain; charset="windows-1252"
Content-Transfer-Encoding: 8bit
X-MIME-Autoconverted: from quoted-printable to 8bit by pigeon.qut.edu.au id JAA28103

Sorry about the late reply.

I wish to clarify or recategorise some of the issues.

ISSUE 1
I would not categorise this as "The staffing of the project team was mis-managed." The staffing of the project team was managed according to the information and advice available at the time. It was this advice and information that was flawed. I could not find a category in your list to match my answer.

ISSUE 2
The category 2 statement that SAP is not value for money is I think a little too general. The accounting modules (FI, Controlling etc) are reasonable, but it is difficult to justify and determine the cost benefit of an implementation of some modules of SAP, for example the IS Real Estate module. It is the licensing structure of modules like Real Estate when you are not using MySAP that cause the very high costs, and the cost of implementing MySAP could not be justified at this time.

ISSUE 3
I am OK with this.

ISSUE 4
I am OK with this.

ISSUE 5
I don't entirely agree with the statement that "The SAP system does not work as it should". the philosophy of SAP in terms of the retrieval of archived data differs from ours, and I guess ours will differ from many others. The use of a third party tool to effective retrieve archived data simply adds

complexity to an already complex system. Archiving and table reorganisations just need to be managed much more carefully to keep table sizes in check. It is the sheer size of the main tables in the database that result the large amount of time required for the system to effect table reorganisations.

ISSUE 6
I disagree with your Category 2 response of "Time management and planning was inadequate". My main point was that the cycle of upgrades is generally out of our control given that at the moment SAP seems only to be supporting a version for 3 or 4 years after its release, and that the cost of upgrading to later versions is a very costly exercise (even if spread out over a couple of years), as is any major exercise involving SAP.

ISSUE 7
Again I disagree with your Category 2 response. it is not a matter of the training method or management of the training or help desk being inadequate, it is a matter of the amount of training required to be undertaken/provided each time help desk staff are replaced. Training of users had not been maintained (now rectified) at an adequate level, and this is exacerbated by the number of users who are infrequent to very infrequent users who seem to require held desk assistance almost every time they use the system. The implementation of the on-line training tool On-Demand will we hope reduce the dependence of these users on the help desk. The help desk has been adequately resourced.

ISSUE 8
I am OK with this.

If you require further clarification of any of these points, and feel that face to face contact may be useful, please do not hesitate to contact me.

Michael L. XXX
Manager
SAP Support
Corporate Financial Reporting Unit
Finance Branch
Office of XXX

Appendix D

Round Three Survey Instrument

A survey of

Major Issues with SAP Financials

in Queensland Government

3rd (final) Round: Importance of the Issues

Dear Gregory,

Re: your involvement with SAP Financials in …
Queensland Department of Human Administration and General Corporate Resources

This survey instrument represents the last in a series of 3 related surveys conducted within the Queensland Government

All subsequent answers in this survey instrument should relate to the Queensland Department of Human Administration and General Corporate Resources**.**

If you have been involved with SAP Financials in more than one Agency, we would very much appreciate if you would complete a separate copy of this survey instrument for each Agency.

Background – Over the past several years, Queensland Government has implemented SAP financials across the state government agencies. Many issues have been addressed and others remain. Now that the financials are in place, new issues associated with ongoing support and the continuing evolution of the SAP Financials are arising.

Purpose of the Survey – The purpose of this survey is to identify and quantify major issues in relation to implementing, managing and supporting the SAP Financials throughout their lifecycle in Queensland Government. The survey is being conducted by the *Information Systems Management Research Centre* (ISMRC), Queensland University of Technology. We seek to learn from your experiences to date with SAP Financials in Queensland Government. Your insights will be valuable in highlighting where Queensland Government, SAP, the implementation partners, and the ISMRC should be focusing their attention, today and in future. All key players continually face difficult judgments on these major issues. By inventorying, then weighting and analysing the issues, management, educational and research resources can be allocated more effectively.

The Three Survey Rounds – In the first round "inventory" survey, we requested the major issues from the perspectives of the agency and implementation partner staff who have been involved with the SAP systems in Queensland Government. Five hundred and thirty-eight issues were identified from the first round survey responses. Through data analysis and further feedback from respondents in the 2nd round "confirmatory" survey, a *master set* of thirty-seven issues has been synthesised and is attached. **The purpose of**

this final survey is to seek your views on the importance of the issues in the *master set*.

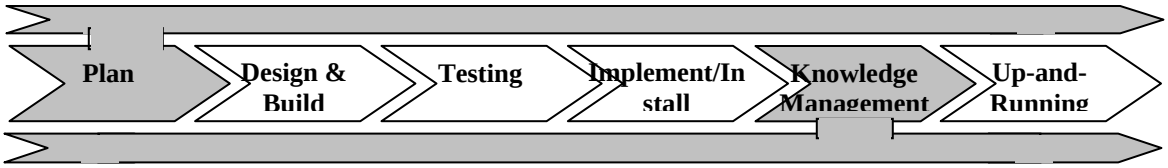
Confidentiality – This is not an anonymous survey. For data analysis, we must be able to associate your demographic data (e.g. phases of involvement, organisation) with your responses to the survey. Nonetheless, your confidentiality will be secure. Respondents are assigned a code that is used in all data analysis. Only aggregated results are reported. Findings are never attributed to any individual. Neither Queensland Government nor SAP will receive a copy of the detailed data.

General Instructions for Completing and Returning the Questionnaire – It should take no longer than 15 minutes to complete this questionnaire. Please return the completed questionnaire as an email attachment to **Karen Stark** (k.stark@qut.edu.au 3864-4296) by **14 August 2001.** Do not hesitate to contact Greg Timbrell (3864-4086 g.timbrell@qut.edu.au) or me (3864-1125 g.gable@qut.edu.au) with any queries you might have.

Yours sincerely, Professor Guy G Gable, Director ISMRC

Instructions for Responding to the 3rd Round Questionnaire –

FIRSTLY **Please indicate** your involvement **in the following phases of the SAP Financials life-cycle by placing an "X" in the appropriate boxes below.**



Phases: **Plan -** involved in the business process redesign period across the lifecycle
Design and build – during the design, customisation and modification of the software
Testing – during the system, integration and user testing phases
Implement/Install – system roll-out including security development
Knowledge Management - includes the training, communication and change activity period across the lifecycle
Up-and-running – general usage, data entry, operation, maintenance and upgrades

In the first round of the survey we asked:

> *What do you consider have been the major issues in implementing, managing and/or supporting the SAP Financials in the above listed Agency?*

In this round of the survey we ask you to SCORE THE IMPORTANCE OF THE ISSUES IN THE SYNTHESISED MASTER SET.

In the following 2 pages are listed the 37 issues synthesised from the 538 issues supplied and confirmed by respondents in Rounds 1 and 2. For EACH AND EVERY ONE of the issues please enter a score between 1 and 7 where **1 indicates** that you think the issue is **Not Important** and **7 indicates** that you think an issue is **Very Important** for EACH PHASE OF LIFECYCLE YOU WERE INVOLVED IN.

Not Important					**Very Important**	
1	**2**	**3**	**4**	**5**	**6**	**7**

- The issues are listed in random order. The sequence has no relevance.
- Please enter scores for EACH AND EVERY ISSUE, and for EACH AND EVERY PHASE YOU WERE INVOLVED IN realising the importance of an issue may vary across the phases.
- Please feel free to include comments in the right-hand column (or wherever there is space).

Sample Completed 3rd Round Questionnaire

Key Issues and Their Rationale	**Please score each issue in each phase in which you were involved (1-7) where 1=not important, 7=very important**						**Comments**
	Plan	**Build**	**Test**	**Install**	**Know**	**Run**	

Sample Issue 1 description	1	7	5	2	1	2	In this example, the respondent felt that Issue 1 was very important during the 'build' phase, decreasingly important during subsequent phases, and not important in terms of 'knowledge management'
Sample Issue 2 description	4				4	4	In this example, the respondent feels that Issue 2 is 'moderately' important across all phases they were involved. The respondent was not involved in the Build, Test and Install phases.

NOTE: Issues are described more fully in the APPENDIX at the back of this document.

Major Issues with SAP Financials in Queensland Government

(*See the APPENDIX for further explanation of the issues*)

Key Issues	Please score each issue in each phase in which you were involved (1-7) where 1=not important, 7=very important						Comments
	Plan	Build	Test	Install	Know	Run	
a) Ongoing running costs are high.							
b) There was lack of stakeholder/management support and							
c) The Project Team did not consult or communicate sufficiently.							
d) SAP upgrade costs are high.							
e) The testing of the SAP system was inadequate.							
f) SAP reporting tools are difficult to use.							
g) SAP Knowledge was not re-used efficiently by agencies.							
h) SAP is not suitable for small agencies/organisations.							
i) The organisation has experienced downtime, slow processing or unreliable							
j) Insufficient resources were allocated to the project.							
k) SAP systems knowledge was lacking in the project team, consultants or the							
l) SAP related documentation is insufficient.							
m) The change management process has been mis-managed.							
n) The data conversion was inadequate.							
o) The project suffered from individual or team lack of knowledge of the							
p) SAP is not value for money.							
q) The SAP system is too complex.							
r) Systems controls were inadequate.							
s) The staffing of the project team was mis-managed.							
t) SAP reporting is expensive.							
u) The training method or management was inadequate.							
v) There was poor executive or project management of the SAP project.							
w) The configuration of SAP was inadequate.							

Key Issues	Please score each issue in each phase in which you were involved (1-7) where 1=not important, 7=very important						Comments
	Plan	Build	Test	Install	Know	Run	
x) Users do not have sufficient SAP knowledge.							
y) Help desk SAP knowledge was inadequate.							
z) The organisation has/is not taking advantage of available SAP							
aa) The reporting from the SAP system is inadequate.							
bb) Staff/knowledge retention strategies were ineffective.							
cc) The SAP system was customised too much.							
dd) The Help Desk was under-resourced.							
ee) The SAP system does not work as it should.							
ff) Time management and planning was inadequate.							
gg) The SAP system suffered non-acceptance, non-use or lack of							
hh) SAP functionality is inadequate.							
ii) SAP is generally expensive to implement.							
jj) The SAP system was adversely affected by the machinery of							
kk) Systems integration was problematic.							

THE END – THANK YOU FOR YOUR COOPERATION Gregory Timbrell

A P P E N D I X Further explanation about the Issues

Issue	Further explanation
a) Ongoing running costs are high.	Ongoing bureau, staff, licence and maintenance costs are high.
b) There was lack of stakeholder/management support and ownership.	Executives and other key personnel did not support OR were not committed to the project OR were not sufficiently involved in the project.
c) The Project Team did not consult or communicate sufficiently.	The project did not consult widely enough OR with the right people. Users did not know what was going on. Problems were not communicated widely or quickly enough. Issues were recorded during consultation but not acted upon. The project team did not communicate amongst themselves.
d) SAP upgrade costs are high.	Moving to a new release is very expensive AND/OR creates greater ongoing costs.
e) The testing of SAP system was inadequate.	There was insufficient testing of the system before scheduled phased rollout/go-live. Production environments were released too soon.
f) SAP reporting tools are difficult to use.	It is difficult to extract the required information using the SAP reporting and inquiry tools.
g) SAP Knowledge not re-used efficiently by agencies.	Knowledge about SAP (lessons learnt, common configurations) was not shared amongst the government agencies in a planned and effective manner.
h) SAP is not suitable for small agencies/organisations.	The costs and other resources to implement and maintain SAP are greater than a small agency can bear. The system is more suitable for larger organisations.
i) Organisation has experienced downtime, slow processing or unreliable hardware.	This includes: slowness, systems crashes, down-times caused by service providers, slow running reports and network problems.
j) Insufficient resources were allocated to the project.	Insufficient money and staff were allocated to the SAP project. The staff resources were inexperienced OR there weren't enough people to implement in the time period OR staff were not released from their duties sufficiently to assist in the project. There was not enough technical infrastructure/capacity to run and/or maintain the SAP system.
k) SAP systems knowledge was lacking in the project team, consultants or the vendor.	There was a lack of AVAILABLE expertise about SAP in the project team OR in the consultants assisting the project OR from the SAP company personnel. At times, no-one implementing SAP could explain the impact of a configuration decision on the rest of the system.
l) SAP related documentation is insufficient.	Various types of documentation were cited as being substandard or non-existant. This includes online documentation such as help files, manuals, and help desk tools. Documentation is found to be out-of-date.

Issue	Further explanation
m) The change management process has been mis-managed.	The importance of change management was under-estimated OR the change management effort was under-resourced.
n) The data conversion was inadequate.	Lack of data preparation has led to inaccuracies, items in suspense accounts and errors in the SAP system. Data was not cleansed properly prior to uploading to the new system.
o) The project suffered from individual or team lack of knowledge of the organisational context.	The individuals in the project team AND/OR the team as a whole did not fully grasp/understand the business requirements of the organisation leading to poor configuration and design decisions. Project team members did not have sufficient expertise in certain areas to configure and implement the system properly.
p) SAP is not value for money.	The costs associated with SAP outweigh the benefits.
q) The SAP system is too complex.	Simple processes and procedure seem to be very difficult OR the system has been configured in a complex way OR it is very difficult to support (solve problems in) the system. Inter-relationships in the system are very complex.
r) Systems controls were inadequate.	There is a lack of audit trails OR the security system is inadequate OR the system does not pick up on errors OR there is a lack of validation processes.
s) The staffing of the project team was mis-managed.	Inappropriate people were selected for and allocated to the project team. The selection process was flawed. People were chosen because they were available and not on the basis of their skills.
t) SAP reporting is expensive.	It is expensive to produce the reports or hire people to produce the required reports.
u) The training method or management was inadequate.	The quality AND/OR quantity of training was unsatisfactory and did not prepare users AND/ OR help desk personnel adequately. Trainers did not have sufficient experience in the software. The training strategy was poorly executed. Training has not been ongoing.
v) There was poor executive or project management of the SAP project.	The overall departmental implementation process was unsatisfactory OR Implementation strategies were unclear OR The project is still experiencing problems as a result of initial poor project and executive management OR Senior consultants under-performed.
w) The configuration of SAP was inadequate	The configuration of SAP did not accurately reflect the business process OR need of the organisation and could have been improved.
x) Users do not have sufficient SAP knowledge.	For a variety of reasons users do not have sufficient knowledge about the SAP system to run, maintain or configure it properly.

Issue	Further explanation
y) Help desk SAP knowledge was inadequate.	Users AND/OR help desk personnel regard the SAP knowledge of the help desk personnel to be insufficient to meet the needs of help desk customers. This issues relates to the quality of the SAP knowledge of help desk personnel.
z) The organisation has/is not taking advantage of available SAP functionality.	The organisation did not apply available functionality to its processes OR did not re-engineer the organisations processes to better align them with SAP OR simply does not use parts of the system that would offer some benefit to the organisation.
aa) The reporting from the SAP system is inadequate.	The reporting does not meet the needs of the users. It is inaccurate OR not usable OR inflexible OR reports do not contain the proper or necessary information to conduct business.
bb) Staff/knowledge retention strategies were ineffective.	Staff (and their knowledge of SAP) were lost to other organisations. The incentives and strategies to retain them were inadequate.
cc) The SAP system was customised too much.	There were too many add-ons, customisations and non-standard SAP programs developed.
dd) The Help Desk was under-resourced.	This issue relates to the quantity of help desk resources: particularly understaffing, lack of responsiveness, lack of staff looking after systems or knowledgeable help desk staff assigned to other duties.
ee) The SAP system does not work as it should.	There are bugs and inconsistencies in the system. The system cannot do things that it should be able to do.
ff) Time management and planning was inadequate.	The project ran out of time OR missed deadlines OR did not plan sufficiently OR rushed the work OR underestimated the time it would take to complete the project work.
gg) The SAP system suffered non-acceptance, non-use or lack of ownership.	Users did not accept the system OR did not use the system OR were fearful of using it. Some staff tried to avoid it OR disown it.
hh) SAP functionality is inadequate.	The SAP functionality does not support day-to-day business needs of the organisation
ii) SAP is generally expensive to implement.	Overall SAP cost more than what was originally expected to implement.
jj) The SAP system was adversely affected by the machinery of government.	Changes to departments and internal departmental structures affected the SAP system configuration and implementation.
kk) Systems integration was problematic.	Integration is complex and mistakes were made. The interfaces with other systems do not work properly.

Appendix E

Individual Issue Descriptions from Factors 3,6,2,1and 7

E.1 Major Issue Category 3: Costs are too high or benefits relative to costs are too low

This Major Issue Category comprises six cost-related issues:

- ✓ **Issue 1: Ongoing running costs are high;**
- ✓ **Issue 4: SAP upgrade costs are high;**
- ✓ **Issue 35: SAP is generally expensive to implement;**
- ✓ **Issue 20: SAP reporting is expensive;**
- ✓ **Issue 16: SAP not value for money;**
- ✓ **Issue 8: SAP not suitable for small agencies/organisations.**

This major issue category describes the perspectives of respondents which suggests that the cost of implementing, upgrading, running and reporting from SAP is high or excessive. The major issue category also expresses the allied perspective that the benefits from SAP are not commensurable with the costs. Many respondents present their attitudes by making a comparison to the legacy Dun & Bradstreet software systems. A related issue in this category is the notion that SAP is not suitable for small agencies. This issue is also cost related but extends to the expertise needed to maintain the system and its overall complexity.

Each of the issues in this major issue category is discussed in turn. A summary and conclusion section is presented at the end of this section (E.1.7).

E.1.1 Issue 1: Ongoing running costs are high.

Table E.1 – Issue 1: Summary descriptive statistics

Issue No:	1	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		4	12	19	26	11	2
Mean		4.81	4.19	4.41	3.67	4.50	5.36
Std Dev		2.12	1.96	2.30	2.22	2.25	1.76
Major Issue Category:			(Factor 3) Costs are too high or benefits relative to costs are too low.				

Table E.2 – Issue 1: All respondent organisations' statistics

Agency	Count	Mean	Std Dev	Minimum	Maximum
Treasury	1	7.00		7	7
Innovation	1	7.00		7	7
Police	5	6.80	0.45	6	7
Emergency Services	5	6.60	0.89	5	7
Audit	2	6.50	0.71	6	7
DSD	3	6.33	1.15	5	7
Justice	4	6.25	1.50	4	7
CAA	2	6.00	1.41	5	7
CITEC	3	6.00	1.00	5	7
Education	11	5.27	2.05	1	7
OFST	1	5.00		5	5
Families	1	5.00		5	5
Health	37	4.92	2.03	1	7
DETIR	30	4.80	2.17	1	7
Transport	25	4.80	2.16	1	7
Tourism	5	4.80	2.68	1	7
Premiers	9	4.44	2.74	1	7
Corrective Services	10	4.40	2.27	1	7
Public Works	23	4.00	1.83	1	6
PWC	12	3.75	2.14	1	7
EPA	3	3.67	2.89	2	7
Accenture	6	3.50	2.59	1	7
Mines	1	3.00		3	3

The respondents who rated this issue perceived that *"Ongoing bureau, staff, licence and maintenance costs are high"* (Round Three Survey Instrument).

This issue was synthesised from 15 issues identified by 12 respondents (1 IP and 11 Client respondents; 1 Strategic and 11 Operational respondents) in the Round One survey. 3 respondents reported 6 separate issues assigned to this category.

Some examples of these reported issues follow:

Issue: *Running costs.*

Description: *Significant and increasing bureau running costs for our services provider (CAA) will impact on us in the form of increased CAA bureau processing costs.*

[Reported by: Client/Strategic - Innovation]

Issue: *Cost – outrageous for a multi national, and multi site accounting package etc.*

Description: *Far too expensive to implement and maintain.*

[Reported by: Client/Strategic - Families]

Issue: *Cost.*

Description: *SAP has been more expensive to implement and maintain than first thought.*

[Reported by: Client/Operational - Police]

In the Round Three survey, respondents commented on their weightings of the importance of the issues. Some Round Three comments on this issue included:

This is why we are now on Finance One.

[Reported by: Client/Operational - CAA]

Lead agency fees, bureau fees, license costs, SAP services are all VERY expensive.

[Reported by: Client/Strategic – Emergency Services]

I do not believe that projected costs were fully understood.

[Reported by: Client/Strategic - DETIR]

Discussion

Running costs are the fourth highest ranked issue overall. This issue was considered most important during the Run Phase.

Table E.3 – Phase data for Issue 1

	Plan	Build	Test	Implement	Know	Run
Mean	3.8	3.6	2.9	3.5	3.8	4.8
Std Dev	2.1	2.1	1.8	2.2	2.1	2.1
Count	63	67	79	70	94	174

Ongoing running costs include bureau, staff, licence and maintenance costs. Maintenance in this instance refers to the cost of implementing patches and not to the costs of version upgrade projects. The Queensland Government introduced strategies to reduce bureau and licensing costs through central management by Treasury. OFST in Treasury went through market testing and compiled a panel of SAP bureau providers for use by agencies. This panel, known as PS71, was dominated by CITEC. While the panel was open to several bureau providers, most agencies were 'encouraged' to use CITEC as their bureau provider.

Similarly, SAP licences were managed centrally by OFST in Treasury. SAP wanted a single point for licence sales to the Queensland Government so Treasury took on this role. They bought the SAP licences and on-sold these licences to agencies as they required them.

To give an indication of costs during the peak implementation period between 1995 and 1999, it was reported in parliament (Hansard, Questions on Notice 12 May 1998) that FISB, the forerunner of OFST, spent the following on QGFMS during the 1997-1998 financial year:

QGFMS Strategic Management - $653,550

QGFMS Operational Management - $3,010,000

QGFMS Human Resource and Payroll support - $2,137,000

Considering this represented the central government activities and did not represent any specific implementation project costs, the perception of high costs is justified.

Zrimsek and Prior (2003) speak of ongoing costs of ERP in terms of whether the software is centralised or decentralised. Decentralised ERP packages have the consequence of higher initial implementation expenditures and greater ongoing ownership costs. Having multiple configurations of an ERP application across the organisation results in unique technical environments. Ongoing costs increase as a result of these differing configurations.

Such was the situation in Queensland Government with agencies implementing individual SAP configurations. As described in the historical narrative in Chapter 4,

these costs were a driver for creating a centralised body in Queensland Government (CorpTech) to manage SAP.

Installation and ongoing costs of ERP packages can reach seven to ten times the initial software cost (Hecht, 1997). These costs derive from the service and support required by end-user organisations. Ng (2003) found that annual maintenance costs for ERP systems are approximately 25 percent of initial implementation costs.

Maintenance costs can be composed of factors such as enhancement, bug fixes, ongoing system support, and helpdesk activities (Ng, 2003). Ng also states that there are two major maintenance types provided by vendors: changes to the version installed; and new versions of the ERP (upgrades). Each of these types are provided by the vendor and implemented by the client, sometimes with the assistance of external consultants. Using external assistance increases upgrade costs. Putra (1998) also found that additional costs can derive from areas such as education and training.

Chang's (2002) study listed *Costs and Benefits* as a major issue category. While no specific sub-issue from his study tackled ongoing running costs, there were several references to these types of costs in responses associated with this major issue category. For example, one respondent from Chang's (2002) study noted that "*even immediately after the 'go-live' date, there was still a reliance on external resources to maintain the software, which inevitably led to ongoing costs surrounding the operations of the system"*. Chang concluded that SAP-related costs can be excessive if not managed well. His study participants suggested that the simplest method to control expenditure was '*to minimise dependence on external contractors and consultants and concentrate on building in-house expertise'*.

Putra (1998) had a similar finding, noting that licensing and registration fees were a significant cost incursion suffered by his case organisation over time. The need to license and register every user using the software package was expensive and could escalate costs significantly.

Strategic vs. Operational

For strategic staff this was the 2nd highest ranked issue. Operational staff ranked this issue 11th. Strategic respondents are more likely to be

responsible for the management of these costs than operational staff and therefore would be more sensitive to this cost issue. Higher ongoing costs for this necessary service mean less discretionary funds for other developmental activities.

Client vs. IP

Client staff ranked this 19th and IP staff 26th. This result indicates some agreement in the middle to lower ranking of this issue compared to others included in the survey. Overall clients are more sensitive to ongoing costs than IP staff.

Finally, one can see from the table of individual agency responses that generally the smaller agencies ranked the issue of running costs more important than the larger agencies.

E.1.2 Issue 4: SAP upgrade costs are high

Table E.4 – Issue 4: Summary descriptive statistics

Issue No:	4	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		5	8	13	33	10	3
Mean		4.80	4.32	4.55	3.39	4.52	5.30
Std Dev		2.00	1.98	2.20	2.00	2.12	1.69
Major Issue Category:		(Factor 3) Costs are too high or benefits relative to costs are too low.					

The respondents who rated this issue perceived that *"Moving to a new release is very expensive AND/OR creates greater ongoing costs"* (Round Three Survey Instrument).

This issue was synthesised from 12 issues identified by 12 respondents (1 IP and 11 Client respondents; 8 Strategic and 4 Operational respondents) in the Round One survey.

Some examples of these reported issues follow:

Issue: *Non-standard PM SAP*.

Description: *Given the magnitude of non-standard SAP within PM (Project Management Module), the possibility of significant*

expenditure to upgrade this module to the latest version is a concern. **[Reported by: Client/Operational - Education].**

Issue: *Very high upgrade costs*

Description: *Moving from current release to a new release is a major cost item for not a great deal of benefit.*

[Reported by: IP/Strategic - OFST].

Issue: *Ongoing Support: System upgrades are proving to be expensive and time consuming.*

Description: *SAP is forcing users into an upgrade cycle of once every three or so years. We are currently upgrading our SAP system from 3.0f to 4.5b, and costs are in the vicinity of $1m. This covers additional hardware requirements, contractors to assists, ABAP/4 resources, and additional charges form our facilities managers CITEC.*

[Reported by: Agency/Strategic - Education].

In the Round Three survey, respondents commented on their weightings of the importance of the issues. Some Round Three comments on this issue included:

Sticking to vanilla SAP will minimise costs.

[Reported by: IP/Strategic - Accenture]

High upgrade costs may indicate that package is not suitable and consideration should be made as to whether they are necessary in each instance. High upgrade costs may also effect departmental budgets and adversely impact other service areas.

[Reported by: Client/Strategic – Corrective Services]

*This has caused a trend towards running other systems rather than expanding SAP***.**

[Reported by: Client/Operational - DETIR]

Discussion

One of the major problems cited by respondents in a study of SAP by Hawat and Chookhiatti (2005) was high upgrade costs. In this study the issue of upgrade costs was ranked 5th overall, signifying its relative importance to the survey's respondents. The issue of upgrades and maintenance was looked at in detail by Ng (2003) in this research program.

In her thesis on ERP maintenance, Ng (2003) discusses upgrade costs extensively. She states that ERP upgrades account for 25-33 percent of initial investment costs, on average. In conjunction with maintenance costs, ERP upgrades therefore present ERP-using organisations with significant expenditure decisions. She describes an ERP upgrade as a complex project that requires knowledge across a diverse spectrum of expertise, such as project management, change management, business processes, system integration and system configuration, among other areas. To supplement their knowledge deficiencies organisations will engage external consultants. This engagement of consultants is a significant cost driver in upgrade projects (Ng, 2003).

Other drivers of expenditure in upgrade projects include: data conversion, system analysis, integration and testing (Jakovljevic, 2000a; Slater, 1998). Another issue Ng (2003) observes is possible downtime resulting from implementation of an upgrade, or the installation of a new system.

Strategic vs. Operational

Both strategic and operational respondents rate this issue quite highly at 3rd and 10th respectively but the difference in ranking suggests dissent regarding its importance. Upgrade costs are costs that go on forever in an ERP system and would be of concern to strategic staff who have responsibility for managing expenditure.

Client vs. IP

There is significant dissent on the importance of this issue between the clients who ranked this issue 13th and IP staff who ranked it 33rd. For IP

staff, the costs of upgrades represent potential future revenue for them and so it is in their interest to play down this issue. One reason consultants preach the wisdom of implementing the software with minimal modification is because it lowers the costs of upgrades. They may, therefore, judge those clients who choose not to change the organisation but rather modify the software, as bringing high upgrade costs on themselves unnecessarily.

ERP users are at the mercy of vendors who must continually move their system forward to maintain a competitive position in the marketplace. While from the perspective of a current customer the continual development of the system represents an upgrade, from the vendor's point of view it is their latest offering to new customers as well. With a vast range of clients with differing needs, vendors must also continually expand the functionality and flexibility of their product to maintain or even expand market share. In some cases, this allows a customer to reduce the customisation and modification to their configuration as that functionality is incorporated to the package. At the same time it also increases the complexity of the package. High upgrade costs represent revenues to the vendor and IP firms. It is not surprising, therefore, to see differing perspectives from clients and the vendor/IP community.

E.1.3 Issue 35: SAP is generally expensive to implement.

Table E.5 – Issue 35: Summary descriptive statistics

Issue No:	35	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		9	5	18	21	15	4
Mean		4.70	4.45	4.43	3.94	4.38	5.25
Std Dev		2.00	1.94	2.20	2.01	2.10	1.71
Major Issue Category:			(Factor 3) Costs are too high or benefits relative to costs are too low.				

Table E.6 – Issue 35: All respondent organisations' statistics

Agency	Count	Mean	Std Dev	Minimum	Maximum
Emergency Services	4	7.00	0.00	7	7
OFST	1	7.00		7	7
Innovation	1	7.00		7	7
Mines	1	7.00		7	7
Police	5	6.60	0.55	6	7
Audit	2	6.50	0.71	6	7
CAA	2	6.50	0.71	6	7
DSD	3	6.00	1.73	4	7
CITEC	3	5.67	1.53	4	7
Justice	4	5.50	0.58	5	6
Families	1	5.00		5	5
Transport	25	4.88	1.99	1	7
Corrective Services	9	4.78	2.33	1	7
Premiers	10	4.70	2.21	1	7
Education	10	4.70	2.41	1	7
Accenture	6	4.67	1.86	3	7
DETIR	30	4.57	2.10	1	7
Public Works	22	4.45	1.84	1	7
Tourism	5	4.40	2.41	1	7
Health	37	4.32	1.80	1	7
PWC	12	3.58	2.07	1	6
EPA	3	2.67	2.08	1	5
Treasury	1	1.00		1	1

The respondents who rated this issue perceived that "Overall SAP cost more than what was originally expected to implement" (Round Three Survey Instrument).

This issue was synthesised from 14 issues identified by 12 respondents (2 IP and 10 Client respondents; 10 Strategic and 2 Operational respondents) in the Round One survey. 1 respondent reported 3 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Cost of the application.*

Description: *SAP works well as an OLTP system if processes are automated and/or centralised and on-line reporting is restricted. We currently have much of the source processing done manually around the State as it was too expensive to roll-out SAP to any lower than the highest regional level.*

[Reported by: Client/Strategic - Police]

Issue: *Implementation: The high cost of implementing SAP or additional SAP modules (IS Real Estate for example) is prohibitive.*

Description: *The cost of implementing SAP or of implementing additional SAP functionality is, was and seems to remain extremely high. The large accounting firms still appear to be charging an average of $1200 a day for consultancy fees, and SAP Australia charge $1800 a day. This makes the cost of implementing additional SAP modules or functionality prohibitive, and often hard to justify in terms of the cost benefit* **[Reported by: Client/Strategic - Education]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

The benefits now and in the future far outweigh the costs.

[Reported by: IP/Operational - PriceWaterhouseCoopers]

Agree SAP is expensive to implement – BUT this project did not go over budget and was on time.

[Reported by: Client/Operational - Health]

We are not manufacturing and functionality is limited to basic financials – it shouldn't cost so much for that.

[Reported by: Client/Strategic - Police]

Discussion

This is a difficult concern to analyse because there are so many relative perspectives one can take when considering the notion of "expensiveness". The expenditure might be of concern because the respondents cannot see the longer term benefits or such benefits do not seem possible. It might be a concern because the expected or budgeted expenditure was lower than the real expenditure. The SAP related expense could be drawing funds away from other activities that respondents think will return

greater benefits. Respondents might also be reacting to the high fees being paid to IP staff. Nevertheless it is an issue that ranked 9th overall and therefore these perspectives need to be managed in any future similar ERP venture.

Chang (2002) reported a similar issue in his study of ERP in CSA: *Issue 29 – SAP implementation benefits do not justify costs.* In his study, one respondent commented that *"The initial implementation plan indicated improved functionality. However, due to license and development costs, much of the proposed improvements – (for example, on-line requisitioning and approvals) – were dropped, leaving the agency with a simple (if costly) technology swap in many areas".*

The cost of implementing SAP can be very high. Survey respondents in Chang's study claimed that the benefits obtained from any SAP implementation must be carefully evaluated with hindsight. One interesting point raised by Chang's respondents was that implementation costs increase in tandem with the degree of customisation. This was due to the costs of hiring consultants.

Davenport (1996) refers to SAP as a "mega-package"; one that requires a much greater level of organisational change than other types of systems. For maximum benefits to be obtained from the implementation of SAP, firms must adapt to the technology, altering their business processes to those supported by the software. Organisations can eventually recoup initial costs of SAP, but as noted by Chang's (2002) and this study, many benefits will not be realised for some time.

Strategic vs. Operational

The strategic cohort ranked this their 4th most important issue. Strategic staff are responsible for budgeting and expenditure control in government organisations. Exceeding budgets can result in political and senior management scrutiny, possibly even bad press. Such scrutiny can hinder their career progress and so this is a sensitive issue for them. Operational staff ranked this issue 15th demonstrating dissent with the strategic respondents.

Client vs. IP

There was general consensus between the client and IP respondents who ranked this issue at 18th and 21st respectively.

A pattern of reporting is appearing in this major issue category. The smaller agencies, again, are reporting that this cost issue is more important than the larger agencies (i.e. DETIR, Public Works, Transport, and Education).

E.1.4 Issue 20: SAP reporting is expensive

Table E.7 – Issue 20: Summary descriptive statistics

Issue No:	20	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		26	28	31	37	34	13
Mean		3.91	3.58	3.67	3.00	3.60	4.46
Std Dev		2.10	1.95	2.19	2.00	2.12	1.96
Major Issue Category:			(Factor 3) Costs are too high or benefits relative to costs are too low.				

Table E.8 – Issue 20: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
Education	10	5.00	1.94	1	7
Corrective Services	9	4.56	2.70	1	7
Public Works	22	4.14	1.81	1	6
DETIR	30	3.93	2.15	1	7
Premiers	8	3.63	2.45	1	7
Transport	26	3.42	1.96	1	7
Health	38	3.13	2.06	1	7
PWC	11	2.55	1.75	1	6

The respondents who rated this issue perceived that "It is expensive to produce the reports or hire people to produce the required reports" (Round Three Survey Instrument).

This issue was synthesised from 9 issues identified by 9 respondents (0 IP and 9 Client respondents; 2 Strategic and 7 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

Issue: *High cost of maintenance.*

Description: *In-built security features based on a transaction basis requires a continuous support area to modify security profiles. Changing and making minor modifications to report layouts, screens, and programs is a very expensive and time consuming process.*

[Reported by: Client/Operational - Education]

Issue: *Reporting.*

Description: *Limited to what's in system as cost is too great.*

[Reported by: Client/Operational – Public Works]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Reporting does not meet the needs of organisations therefore need to invest in another tool.

[Reported by: Client/Strategic - Police].

Far less expensive than its predecessor.

[Reported by: Client/Strategic - Health].

ABAP resources are expensive (supply and demand?) and need hardware with grunt. Expensive is a relative term – depends on the costs of alternatives and what you do with the reported info or the opportunity costs of not having the info.

[Reported by: Client/Operational - Health].

Discussion

This issue was 26th overall by respondents, placing it at the bottom of the third quadrant of issues. Managers need access to adequate reporting from ERP systems so they can monitor business performance (Ross, 1999). If reporting is perceived as expensive, managers may be reticent to develop the reports that they need. Interestingly, no other issue study mentions this issue specifically.

This issue, like other costs issues, is one of perspective and comparison. Since the old QGFMS system had been in place for several years, agency personnel probably had already invested the time and effort to develop the reports that they needed to

monitor business processes. Faced with a new system, and more significantly, new accrual accounting policy, personnel had to both recreate the reports that the old QGFMS supported and create new reports to manage within an accrual accounting context.

Another issue (6) reported in this study suggests the *SAP reporting tool (ABAP) is difficult to use.* From a management perspective, combining the difficulty of using the tool and the demand for new financial reports, the result is an increased expenditure for reporting.

Strategic vs. Operational

Strategic respondents ranked the importance of this issue 13th while operational staff ranked it much lower at 34th. This is not surprising since budgetary and expenditure responsibility sits with the strategic staff members. The expense of SAP reporting would be frustrating to strategic respondents; they require the reports to run the business but by developing these reports they risk censure for overspending.

Client vs. IP

IP ranked this as their least important issue of at 37th. Client staff ranked this issue 31st. While there is a difference, both rank the issue in the fourth quadrant and comparatively quite low. The question of consensus or dissent between the two respondent groups is inconclusive.

E.1.5 Issue 16: SAP is not value for money.

Table E.9 – Issue 16: Summary descriptive statistics

Issue No:	16	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		28	26	32	35	36	11
Mean		3.88	3.64	3.60	3.28	3.51	4.54
Std Dev		2.12	2.03	2.12	2.32	2.12	1.99
Major Issue Category:			(Factor 3) Costs are too high or benefits relative to costs are too low.				

Table E.10 – Issue 16: All respondent organisations' statistics

Agency	Count	Mean	Std Dev	Minimum	Maximum
CAA	2	6.50	0.71	6	7
Audit	2	6.00	1.41	5	7
Innovation	1	6.00		6	6
Justice	4	5.75	1.50	4	7
Premiers	10	5.30	2.06	1	7
Emergency Services	5	5.20	2.49	2	7
Families	1	5.00		5	5
Police	5	5.00	1.22	4	7
Tourism	5	4.40	2.61	1	7
CITEC	3	4.33	2.31	3	7
Corrective Services	10	4.30	2.41	1	7
Mine	1	4.00		4	4
Accenture	6	4.00	2.53	1	7
Education	9	4.00	1.41	1	6
Health	37	3.70	2.16	1	7
DETIR	29	3.66	2.04	1	7
Public Works	22	3.59	1.92	1	7
Transport	27	3.41	2.08	1	7
DSD	3	3.33	2.08	1	5
PWC	12	2.92	2.23	1	7
EPA	3	2.33	2.31	1	5
OFST	1	1.00		1	1
Treasury	1	1.00		1	1

The respondents who rated this issue perceived that "The costs associated with SAP outweigh the benefits" (Round Three Survey Instrument).

This issue was synthesised from 7 issues identified by 6 respondents (0 IP and 6 Client respondents; 4 Strategic and 2 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Implementation: The high cost of implementing SAP or additional SAP modules (IS Real Estate for example) is prohibitive.*

Description: *The cost of implementing SAP or of implementing additional SAP functionality is, was, and seems to remain, extremely high. The large accounting firms still appear to be charging*

an average of $1200 a day for consultancy fees, and SAP Australia charge $1800 a day. This makes the cost of implementing additional SAP modules or functionality prohibitive, and often hard to justify in terms of the cost benefit **[Reported by: Client/Strategic - Education].**

Issue: *Value for money.*

Description: *The SAP processes used in the dept. value for money could be completed at a far lower cost than being incurred by the department to run and maintain SAP.*

[Reported by: Client/Strategic - Premiers].

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

The issue of SAP value for money is an important one when it is understood this department has spent a considerable sum of money on a Pivot Table package, which will be used to manipulate reports derived from the SAP database.

[Reported by: Client/Operational – Corrective Services]

SAP will be the backbone of any future e-business initiatives. The cost is for a high quality product.

[Reported by: IP/Operational - PriceWaterhouseCoopers]

If more parts of the system are implemented then it would be more value for money.

[Reported by: Client/Operational – Transport]

Discussion

This issue ranks 28th in overall importance to respondents. The general feeling of those who reported this issue is that SAP will not return benefits commensurate with the costs incurred in implementing it. Some respondents also factor in the costs of maintenance and upgrades to the system. It is difficult to judge whether the system will return sufficient benefits to justify its purchase and application. Whereas

traditionally financial (only) systems tended to have a lifecycle of about seven years, an ERP system probably has a projected life of 15 to 20 years. This extended life stems from its integrated nature, widespread use across an organisation and the difficulty of replacing such a large system. One could speculate that because the organisation has invested such a large amount of money implementing an ERP package such as SAP R/3, its executive would be reticent to replace it knowing it would cost a similar amount for an alternative ERP system.

Respondents in this study comment on the expensive nature of SAP in a number of issues including Issue: 1 Ongoing running costs are high; Issue 4: SAP upgrade costs are high; Issue 20: SAP reporting is expensive; and, Issue 35: SAP is generally expensive to implement. While these issues express similar sentiments on the perceived high cost of SAP, this issue is slightly more complex in that it makes a judgment about the overall value and benefits received from the investment in SAP.

There were two issues stemming from Chang's (2002) study that have a similarity with this issue of SAP not being value for money. The first of these was *Issue 31 - Costs of SAP exceed those of QGFMS without commensurate benefit*. Respondents to Chang's survey stated that the cost of management and ongoing support of SAP was much higher when compared with the previous system. One comment reflecting this suggested that: *"…with development and implementation, the ongoing support and control of the R/3 system is considerable higher than previous systems"*. In Chang's issue, the respondents make a comparison to the former system, which was much smaller in scope, centrally managed and more familiar to the end-user community. Essentially, this is a flawed argument because the former QGFMS system was not Year 2000 compliant and needed replacing. Comparing costs to the former system is, therefore, irrelevant because its benefit would have reduced to zero when it stopped operating post 2000.

One respondent from Chang's study mentioned that, *"one has to question the value for money obtained. SAP appears to work best for stable organisations. The cost and effort of reflecting these changes in SAP far exceeds QGFMS"*. Additionally, upgrades contributed to the cost of ongoing support and, for some agencies, the

implementation was more costly than predicted, which resulted in intended benefits not being realised.

Wilcocks and Sykes (2000) and Bingi et al. (1999) note that an ERP system does not improve organisational performance alone; it is only in conjunction with the organisation restructuring its business processes that benefits can be realised. However, with the redesign of business processes comes added complexity, which in turn leads to risk and cost implications.

From their global IT project management survey, KPMG (2005) discovered that most organisations lacked the ability to accurately measure benefits from ERP projects. From their survey, KPMG found a significant proportion of organisations did not have a benefits realisation process.

The second issue from Chang's (2002) study was *Issue 8: Too little effort put into redesigning the underlying business processes, resulting in a system that represented a "technology swap" thereby constraining benefits realisable*. It supports the ideas put forward by Willcocks and Sykes (2000) mentioned above. The argument between the 'technology swap' strategy, that is changing the software to suit the organisation, and the 'vanilla' implementation, where an organisation changes their processes and minimises the modifications to the ERP, has been covered elsewhere in this thesis. Commentators tend to advise that modifications be minimised (see Sumner 2000).

An alternative view applies a knowledge management perspective to this issue. The 'technology swap' approach minimises the 'knowledge stress' on the organisation; end users are not forced into major change and need not unlearn old processes and learn new ones, and, rather than inflict 'knowledge stress' on the personnel, the software is changed to match current processes and routines. The stress, and associated cost, is absorbed by the implementation project team. Process change is then gradually introduced into the organisation over time, reducing 'knowledge stress' and spreading knowledge absorption rate over time. One might regard the 'technology swap' strategy, therefore, as effective ERP lifecycle knowledge management.

Strategic vs. Operational

There is definite dissent between the strategic and operational cohorts. The strategic respondents ranked this issue 11th while the operational respondents ranked it 36th, second last. Strategic respondents are responsible for the management of their resources and the ERP system is no exception. The perception that SAP is not value for money reflects on their ability to manage the resources and implement the system effectively and at a reasonable cost. It could also reflect the paucity of benefits realisation strategy in the Queensland Government.

Client vs. IP

The client and IP respondents agree on the ranking of this issue's importance. They ranked the issue towards the bottom of the list at 32nd and 35th respectively.

Smaller agencies ranked this issue as more important than larger agencies. Note that CAA (Corporate Administration Agency) and the Audit (Queensland Audit Office) both replaced SAP with other software.

E.1.6 Issue 8: SAP is not suitable for small agencies / organisations.

Table E.11 – Issue 8: Summary descriptive statistics

Issue No:	8	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		9	5	18	21	15	4
Mean		4.70	4.45	4.43	3.94	4.38	5.25
Std Dev		2.00	1.94	2.20	2.01	2.10	1.71
Major Issue Category:			(Factor 3) Costs are too high or benefits relative to costs are too low.				

Table E.12 – Issue 8: All Respondent organisations' statistics

Agency	Count	Mean	Std Dev	Minimum	Maximum
Treasury	1	7.00		7	7
CAA	2	7.00	0.00	7	7
OFST	1	7.00		7	7
Audit	2	6.50	0.71	6	7
Innovation	1	6.00		6	6
Police	5	5.60	1.67	3	7
Emergency Services	5	5.20	2.68	1	7
CITEC	3	5.00	1.73	4	7
Premiers	10	5.00	2.16	1	7
Corrective Services	9	4.78	1.92	1	7
Tourism	6	4.67	1.75	2	7
Accenture	5	4.40	1.14	3	6
Public Works	22	3.86	2.51	1	7
EPA	3	3.67	2.52	1	6
Justice	4	3.50	2.08	1	6
Education	10	3.30	2.63	1	7
Health	36	3.28	2.28	1	7
DETIR	28	3.21	2.25	1	7
Transport	25	2.76	2.13	1	7
DSD	3	2.67	2.08	1	5
PWC	12	2.58	1.51	1	4
Mines	1	2.00		2	2
Families	1	1.00		1	1

The respondents who rated this issue perceived that "The costs and other resources to implement and maintain SAP are greater than a small agency can bear. The system is more suitable for larger organisations" (Round Three Survey Instrument).

This issue was synthesised from 9 issues identified by 6 respondents (0 IP and 6 Client respondents; 3 Strategic and 6 Operational respondents) in the Round One survey. 3 respondents reported 6 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Systems complexity.*

Description: *SAP more complex and a much bigger system than the functionality required by small agencies.*

[Reported by: Client/Strategic – Innovation and Information Economy]

Issue: *Functionality/Maintenance of SAP*

Description: *As the functionality of the SAP environment is significantly greater than that of the previous QGFMS product, it has been necessary for DME to allocate substantially more resources to support the new system. For a small agency this has been difficult and expensive.*

[Reported by: Client/Strategic – Mines and Energy]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

*Consideration needs to be given to whether the cost of operating this package on a small scale is a viable use of resources as opposed to benefits gained from the use of a Standard across departments***.**

[Reported by: Client/Operational – Corrective Services]

Very costly for small organisations for full implementation.

[Reported by: Client/Strategic – Emergency Services]

Cost of running/maintaining alternate systems need to be considered.

[Reported by: IP/Operational - PriceWaterhouseCoopers]

Discussion

This issue ranks quite highly at 9th overall. It was mainly staff from small agencies that reported this matter in the first Delphi round. In the Round Three survey, the agency personnel who rated this issue as important or very important were mostly from the smaller agencies.

The SAP R/3 system is a full function ERP. All organisations have a minimum number of financial processes that need systems support e.g. creditors, general ledger, reporting. The SAP configuration effort, even for a small organisation, is quite substantial.

Initially, SAP was an alternative to the Dun & Bradstreet software. This policy later changed, forcing Queensland Government agencies to adopt SAP as their financial

system (see Chapter 4 for a full account of this). This change of policy to the compulsory adoption of SAP was always contemplated by Treasury, who wanted to continue their strategy of standard software across government. When Treasury prepared the cost-benefit analysis for the whole-of-government, the projected benefit over cost was less than one million dollars. The thinking in Treasury was that the savings from adopting SAP would be distributed over all of the Queensland Government, with the larger savings accruing to the larger departments compensating for the losses made by the small departments. Ultimately, though, even if this was the case from a budgetary perspective, small agencies with limited resources such as the Corporate Administration Agency (CAA) found it difficult to maintain the levels of expertise required to operate and maintain the complex SAP system.

Queensland Government created the Corporate Administration Agency (CAA) as a shared service provider to create efficiencies across a group of small agencies that comprised the Arts portfolio e.g. Queensland Museum, Performing Arts Centre, Queensland Theatre Company. Initially CAA adopted SAP but found it too expensive to run and maintain. They eventually replaced the system with Finance One, a system developed by a local Brisbane firm, Technology One.

A comparative issue from Chang's (2002) study was *Issue 19 - that Complexity and therefore cost of SAP far exceeds the requirements of some agencies*. One respondent commented, *"SAP was extremely costly to implement, and it was difficult to interpret at the time what the overall costs would be across the government. It would be difficult to justify implementing SAP in some of the smaller agencies"*.

Janson and Subramanian (1996) state that it is critical for organisations to select ERP software that best suits the organisation's information and processing needs. Selection of software that does not fit the environment can result in extreme modifications, and commitment to applications that do not fit the organisation's strategic goals or business processes (Robinson and Dilts, 1999, cited by Chang, 2002).

Strategic vs. Operational

There was dissent between strategic and operational staff on the importance of this issue. Strategic staff are responsible for budgets and ensuring the systems are running. The strategic respondents ranked this issue 4th highest. Operational staff ranked it 15th. Operational staff across all agencies stood to benefit from standardised SAP software. SAP expertise paid well and enabled increased mobility across Queensland Government agencies. It is difficult to speculate on the reasons undpinning this dissent.

Client vs. IP

The client and IP cohorts agreed on the importance of this issue ranking it at 18th and 21st respectively.

The table of individual agencies clearly shows that the small agencies ranked this issue as important or very important. The cost issue impacted small agencies much more that larger ones.

E.1.7 Conclusion

The cost factor, Major Issue Category 3, is a logical collection of the cost and benefits issues from this study. The issues demonstrate the widespread feeling amongst respondents that SAP was too expensive and would not necessarily return the benefits promised by the vendor. All parts of the lifecycle are seen to be expensive: implementation, ongoing running costs and upgrades. The cost issue is much more sensitive in small agencies with smaller budgets and less people/expertise at their disposal. Small agencies suffered because of the excessive expenditure they had to outlay on a complex system that had functionality way beyond their needs.

Another interesting point arising from the discussion on costs and benefits is the attitudes arising from the technology swap strategy. Some respondents felt that it was not worth merely swapping the technology (at great cost) because this provided minimal benefit to the agency. While there may have been good reason to employ this strategy, the study shows that it generates negative perceptions of the worth of

the project. In future, managers implementing ERP systems should take note of this negative attitude.

Finally, strategic staff tended to emphasise the cost issues, probably because they are mostly responsible for the management of budgets and expenditures.

The three key players in the SAP ecosystem, the client, the vendor and the implementation partner stand to benefit from effective ERP knowledge management. The vendor, SAP, seeks to redress negative perceptions that SAP implementation duration and cost is difficult to manage and to improve client support and satisfaction. The consulting firms seek to streamline implementation and share in the savings with clients. Both SAP and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. The client will benefit through better-planned lifecycle management and more effective implementation outcomes. In addition, to the extent that SAP and its partners can capture key knowledge during implementation, they will be well placed to further support clients throughout the ERP life cycle (Timbrell and Gable, 2001)

Recently, Sedera et al. (2003) have developed an ERP benefits measurement model. In forthcoming research, the results from this issues study will be combined with the results from a benefits study conducted in the Queensland Government to establish whether there is a relationship between the two data sets.

E.2 Major Issue Category 6: Customisation and systems integration

This Major Issue Category includes two issues:

- ✓ **Issue 37: Systems integration was problematic**
- ✓ **Issue 29: The SAP system was customised too much.**

The major issue category looks at two issues that are important to the implementation and maintenance efforts.

The first issue concerns systems integration with other organisational software. ERP and financial systems often integrate with many other corporate systems and the replacement effort means creating new interfaces for each and every system. Sometimes the flow of data is one-way, sometimes two-way. Replacing these interfaces poses many technical problems.

The second issue is one that is unique to ERP systems (Sumner, 2000). The debate in ERP circles continues to be "Do you change the system to suit the organisation, or change the organisation to suit the system". This issue would suggest the former but this thesis introduces counter arguments to the debate over this evergreen ERP problem.

Each issue is discussed in turn following by a concluding section.

E.2.1 Issue 37: Systems integration was problematic

Table E.13 – Issue 37: Summary descriptive statistics

Issue No:	37	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		15	16	14	10	18	15
Mean		4.33	3.94	4.50	4.33	4.30	4.38
Std Dev		1.93	1.81	2.04	2.28	1.90	2.00
Major Issue Category:			(Factor 6) Customisation and systems integration.				

The respondents who rated this issue perceived that "Integration is complex and mistakes were made. The interfaces with other systems do not work properly" (Round Three Survey Instrument).

This issue was synthesised from 18 issues identified by 18 respondents (1 IP and 17 Client respondents; 7 Strategic and 11 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

In relation to the issue of "Integration is complex and mistakes were made":

Issue: *Interfaces.*

Description: *Problems arose with interfaces to DSS and other third parties. For example, rent for a period was deducted from a persons account twice.*

[Reported by: IP/Operational - Accenture].

In relation to the issue of "The interfaces with other systems do not work properly":

Issue: *Integrated System?*

Description: *Although SAP is an integrated system there are differences between the Materials Management module and the Financial module. An example is material document numbers are in a calendar year and financial document numbers are in fiscal years. Why is there a difference between material groups and account groups? This has proven to be very difficult for the users in particular those that do not use the system consistently* **[Reported by: Client/Strategic - Health].**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

We have a major non-SAP sub-system in operation. The problems stemmed from the difficulties inherent in the non-SAP system rather than SAP.

[Reported by: Client/Operational]

We didn't try – too expensive.

[Reported by: Client/Strategic]

Discussion

Effective integration remains extremely problematic for ERP systems (Kumar et al., 2003). A study by Markus et al. (2000a) into ERP adoption found that integration was one of the most challenging project phase problems. Problems with system integration arise because companies assume ERP contain everything needed, and that software configuration is the main focus of the project phase. Markus et al. (2000a) give two reasons why this is not the case:

(1) Companies experience trouble with integrating the enterprise software with hardware, operating systems, database management and telecommunications suited to their particular organisation size, structure and dispersion. Respondents to the Markus et al. (2000a) study additionally stated that it is difficult to locate experts that could advise on exact operating requirements.

(2) It was reported that companies needed to retain legacy systems that performed specialised functions. The activity of interfacing the ERP system with these legacy systems proved to be expensive and difficult.

Markus et al. (2000a) also note that during sales cycles in some of the organisations investigated, there was a considerable absence of product-specific knowledge of ERP products, such as integration, tools and interfaces with 'partner products'.

Chang (2002) reported a similar issue: *Issue 34 - SAP is not sufficiently integrated with other systems.* A comment that illustrates this was: *"It appears that the SAP system does not 'talk' with other systems in this Dept. It is not only existing systems, but also new ones now being developed e.g. SAP does not recognize products"*. The respondents to Chang's (2002) study stated that the SAP system had difficulty in interfacing with other systems. SAP's integration with existing systems was not as effective as anticipated.

In his study, Putra (1998) discusses the importance of integration between ERP software packages and existing systems. He suggests that "IT organisations must knit together a variety of approaches to integrate applications, while users themselves should choose infrastructure components that allow for optimal integration". The issue of integration arose in Dhaheri's (2002) study of Oracle

financials. In-house software had to be re-configured to interface with the Oracle system.

This issue is interesting because the major advantage of an ERP system is its internal integration. Yet it is the complexity of this internal integration that makes it more difficult to interface the ERP with other existing systems. Ideally, the ERP would be able to functionally support all of an organisation's business processes and information needs. This is not the case, however, and so to extend the enterprise wide approach to integrated information processing sought in ERP implementations, ERP systems must 'talk' to other systems. The complexity of this interfacing or integration will vary from system to system.

Strategic vs. Operational

Strategic respondents ranked this issue 15th while Operational respondents ranked it 18th. This suggests consensus between the two groups.

Client vs. IP

Client respondents ranked this issue 14th most important while IP staff ranked it 10th. While this also shows consensus between the two groups, one might suggest that the IP staff ranked it higher because they were generally responsible for solving these complex technical integration problems.

E.2.2 Issue 29: The SAP system was customised too much.

Table E.14 – Issue 29: Summary descriptive statistics

Issue No:	29	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		24	21	10	13	24	26
Mean		4.04	3.80	4.65	4.28	4.09	3.96
Std Dev		2.11	1.99	2.19	2.16	2.12	2.11
Major Issue Category:			(Factor 6) Customisation and systems integration.				

Table E.15 – Issue 29: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
Transport	28	5.89	1.73	1	7
Accenture	6	5.50	1.76	3	7
DETIR	30	4.80	2.16	1	7
Public Works	23	4.35	2.10	1	7
Corrective Services	9	4.33	2.06	1	7
Education	10	3.70	1.95	2	7
PWC	12	3.67	2.15	1	6
Premiers	10	3.60	1.90	1	7
Health	38	2.89	1.45	1	7

The respondents who rated this issue perceived that "There were too many add-ons, customisations and non-standard SAP programs developed" (Round Three Survey Instrument).

This issue was synthesised from 6 issues identified by 5 respondents (1 IP and 4 Client respondents; 3 Strategic and 3 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Excessive modifications to SAP Base functionality.*

Description: *The excessive modification of SAP functionality has impacted negatively on the functionality available to users and on the introduction of a bug-free program.*

[Reported by: Client/Strategic - DETIR].

Issue: *Functionality.*

Description: *Meeting the business needs of users who have moved from a functionally superior product – both in reality and perceived functionality –to SAP. The need to modify standard code to meet those needs will cause problems and additional work in the version upgrade process.*

[Reported by: Client/Strategic - Health]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

> *The system was changed to fit the Business, the Business was not re-organised to work with the system.*
>
> **[Reported by: Client/Operational - Transport].**
>
> *It is understood this department has limited modifications to this package by comparison to other agencies.*
>
> **[Reported by: Client/Operational – Corrective Services]**

Discussion

This issue speaks of the excess of customisation to the SAP system. It is ranked 24th in importance by the respondents. Implementing organisations usually tailor standard ERP packages to the specific requirements of the enterprise. The 'rich potential' for customising ERP software is what distinguishes it from other packages, allowing for individual configuration and unique ERP implementations (Klaus et al., 2000). The following comments demonstrate that common wisdom amongst ERP commentators dictates customisation of ERP software should be kept to a minimum.

As ERP systems are based on common-practice reference models, business processes may need to be changed to accommodate the software, or the software must be modified to accommodate business practices (Holland and Light, 1999). Harris (2000) suggests that organisations should avoid changes to the software. This minimal customisation strategy, using the vendor's code as much as possible even if this means sacrificing functionality, has been associated with successful ERP implementations (Robinson and Dilts, 1999). This will reduce the need for technical expertise in-house to manage customised code and difficulties managing these modifications when new releases eventuate (Murray and Coffin, 2001). Managers should carefully consider all modifications including their impact on cost, maintenance and effect on other parts of the system evaluated (Harris, 2000). Chang (2002) adds that it is the responsibility of management to decide whether the

organisation changes processes to suit the system or customise the system to best fit the processes.

In Nah and Lau's (2001) eleven factors critical to ERP implementation success, they ranked *Business process reengineering (BPR) and minimum customisation* as the 9th most important factor. Sumner (2000) also reported, from her study of risk factors unique to ERP implementation projects, that project managers had learnt to avoid customising ERP software thereby circumventing cost and time overruns. Janson and Subramanian (1996) associate customisation with such problems as increased information system costs, long implementation times, and they warn it can result in organisations missing out on vendor software maintenance and upgrades. Appleton (1997) also believes that customisation should only be utilised when essential.

In Chang's (2002) study his respondents took issue with too little customisation to meet individual agency needs: *Issue 5 - Implementation across multiple agencies led to sub-optimisation of the system configuration*. Management in CSA wanted SAP to have a generic configuration across multiple agencies, to reduce costs associated with customisation. However, Chang's (2002) survey respondents indicated that because the implementation was across five clients within two departments that had different requirements, this conflict led to an inconsistent application, and led to what they stated as a 'lowest-common-denominator outcome'.

As discussed previously, when looking into the issue of customisation during the upgrade process, Craig Vayo, from CSA and later CorpTech (Vayo, 2004), stated that during their first SAP upgrade they adopted a 'like for like' strategy, introducing new functionality only when it enabled CSA to back out modifications added during the implementation. Given the pressure to upgrade (really a re-implementation) on time and on budget, Vayo was reticent to introduce additional risk to this process. He felt more comfortable with an initial 'replacement strategy' after which he could introduce new functionality over time and in conjunction with future upgrades.

The amount of customisation adopted during implementation can also be considered a knowledge issue. This was discussed in Issue 16 *SAP is not value for money*. Briefly re-iterating the main points, the 'technology swap' approach minimises the

'knowledge stress' on the organisation; end users are not forced into major change and need not unlearn old processes and learn new ones; rather than inflict 'knowledge stress' the software is changed. The stress, and associated cost, transfers to the implementation project team. One might regard this strategy, therefore, as effective ERP lifecycle knowledge management.

The debate over whether to change the organisation to suit the ERP system or change the system to suit the organisation is set to continue for some time yet.

Strategic vs. Operational

Strategic and Operational respondents ranked this issue 26th and 24th respectively demonstrating consensus between the two groups.

Client vs. IP

Client and IP respondents ranked this issue 10th and 13th respectively. These two groups also share a similar view of this matter.

E.2.3 Conclusion

This major issue category is a small category and the issues it contains are not strongly related. The systems integration issue is quite straightforward and notes the complexity and operational difficulties of replacing the interfaces when changing over core systems.

The second issue, however, is critically important and goes to the heart of ERP strategy. *Does one change the organisation to suit the system or change the system to suit the organisation?* While the literature generally suggests the former, Queensland Government agencies mostly adopted the latter strategy or 'technology swap'. A knowledge perspective is advanced to explain the value of a 'technology swap' approach. As seen in the prior major issue category (Costs are too high or benefits relative to costs are too low), this 'technology swap' approach gives the impression that for a high cost system, the benefits are quite low. This issue will be discussed further in Chapter 7.

E.3 Major Issue Category 2: The SAP system is inadequate or difficult to use

This Major Issue Category includes seven issues:

- ✓ **Issue 6: SAP reporting tools difficult to use;**
- ✓ **Issue 27: The reporting from the SAP system is inadequate;**
- ✓ **Issue 17: The SAP system is too complex;**
- ✓ **Issue 9: The organisation has experienced downtime, slow processing or unreliable hardware;**
- ✓ **Issue 34: SAP functionality is inadequate;**
- ✓ **Issue 31: The SAP system does not work as it should;**
- ✓ **Issue 18: Systems controls were inadequate.**

This major issue category contains a set of related issues that describe how the SAP system is inadequate in its support of the agencies' business processes or difficult to use. In the discussion of each of these issues, respondent refer extensively to the prior system i.e. Dun and Bradstreet software, upon which QGFMS was based.

Any new system takes time to settle in (see Ross's lifecycle diagram in Chapter 2). Over time the end users become more familiar with the workings of the system, how to use the tools (e.g. report writer). The technical staff fine tune the hardware and become more familiar with potential risks and problems. As the knowledge of the system increases across the user population, more people become available to help others and answer common questions. After system managers address the critical functional areas they have time to turn their attention to making smaller non-critical areas more efficient. From a timing point of view, this information was gathered within the first years of operation of the SAP system. Some agencies had been operating for 5 or more years, some were conducting major upgrades, others were in the first one or two years of operation and still dealing with teething problems. Using Markus' model (2000a) these agencies were mainly exiting the 'shakedown' phase and entering the 'onward and upward' phase.

Each issue will be discussed in turn. Section 6.2.5.8 will conclude this section.

E.3.1 Issue 6: SAP reporting tools are difficult to use

Table E.16 – Issue 6: Summary descriptive statistics

Issue No:	6	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		2	4	3	28	7	1
Mean		4.90	4.46	5.06	3.67	4.61	5.40
Std Dev		1.92	1.85	1.84	2.00	1.96	1.73
Major Issue Category:		(Factor 2) The SAP system is inadequate or difficult to use.					

The respondents who rated this issue perceived that "It is difficult to extract the required information using the SAP reporting and inquiry tool" (Round Three Survey Instrument).

This issue was synthesised from 18 issues identified by 14 respondents (1 IP and 13 Client respondents; 6 Strategic and 8 Operational respondents) in the Round One survey. Three respondents reported seven separate issues that were assigned to this category.

Some examples of these reported issues follow.

Issue: *Reporting Functionality.*

Description: *The government culture prefers printed reports to online enquiry, particularly management. The standard reports available are generally considered to be lacking in format. The ability to extract information sometimes requires knowledge of drop menus and for irregular users (monthly) these are forgotten, resulting in criticism of the system reporting. The ability to write new reports requires skills that are difficult to enhance when support staff are responsible for a variety of functions.*

[Reported by: Client/Strategic - Tourism]

Issue: *Drill down to information in 'controlling' module.*

Description: *It is a difficult process to access information behind balances in controlling reports.*

[Reported by: Client/Operational Tourism]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Reporting screens are often difficult to manipulate or understand.

[Reported by: Client/Operational – Corrective Services]

Not difficult however inadequate training has been provided.

I find them easy to use.

[Reported by: Client/Strategic - Premiers]

Discussion

Reporting is critical functionality in any ERP. Issues with ERP reporting have been cited by several researchers including Markus et al., (2000a) and Sumner (2000). Sumner (2000) reported that the use of report generators and user training in reporting applications is critical to project implementation success.

This issue was predominantly reported by Client personnel. They found themselves with insufficient skills to adequately use the SAP reporting tools. It is expected that, with time and greater familiarity with the tools, the knowledge base of the reporting tool users will increase providing broader and more accessible support. While the effect of this issue is one of functionality, the cause is knowledge-related. Users commented that the old QGFMS Dun and Bradstreet tool was easier to use and more appropriate. After using the old reporting tool (IE or Information Expert) for so long in the Queensland Government, there were plenty of proficient users. Furthermore, staff were more familiar with and, accepting of, the standards and restrictions of the old tool.

So important was reporting to the implementation of SAP at Health that they employed a strategy of porting all reporting from the old Dun & Bradstreet system to Crystal Reports software, proprietary software that accessed data directly from the

Dun & Bradstreet underlying databases. When implementing SAP they continued to use Crystal Reports as their interface to the system. From the users' point of view, their reporting tool had remained constant and they did not suffer from this issue as much as other agencies.

Staff can download raw data from SAP and manipulate it using Excel and Lotus 123. This download/format approach provides an easy (though less cost-effective) alternative to learning and manipulating SAP reporting tools.

The knowledge management literature talks of knowledge 'stickiness' (Szulanski, 1996) referring to the impediments of transferring knowledge or practices from one party to another. People might be trained in the use of these tools but do not apply that knowledge in their ongoing work practices. Some personnel do not even take the opportunity to train in the tools due to lack of motivation. Szulanski suggested that one impediment to knowledge transfer (and learning) is 'retentive capacity': a knowledge recipient's ability to retain transferred knowledge through institutionalising its use. When this impediment is present it can result in a failure to persist in using that knowledge or practice (the reporting tool) and even reversion to the status quo (Szulanski, 1996). Szulanski (1996) confirmed lack of recipient retentive capacity as a cause of stickiness and argued that overcoming this barrier may require unlearning routinised use of prior knowledge. Change management in SAP projects would benefit by considering this unlearning requirement.

The study of Round One issues using Szulanski's framework (Timbrell et al., 2001), as well as Szulanski's own study, identified a major problem in the Ramp-up and Integration stages of a knowledge transfer to be *lack of retentive capacity*. This reflects the general insufficiency of product knowledge within the end-user community and the transfer strategies to that community. This problem would not be as apparent in the earlier transfer phases, but we speculate may be endemic to the rest of the Enterprise System life-cycle. The findings suggest the need for future research on the recipients of ERP knowledge and their ability to retain that knowledge as well as unlearn legacy system behaviours (Timbrell et al., 2001).

Strategic vs. Operational

For strategic personnel this was their top ranked issue. Strategic level personnel are mainly concerned with the information outputs of ERP and therefore reporting is an important function of the system for them. Operational personnel ranked this issue seventh, indicating they did not find these tools as difficult to use as strategic personnel.

Client vs. IP

The ranking of this issue by Client and IP staff is in stark contrast. Client staff ranked this as their 3rd highest issue while IP staff ranked this issue at 28th. This difference indicates that IP staff did not regard this issue as important as Client staff. Perhaps this difference is reflective of their greater skills in use of the reporting tools. Project teams reported extensive use of IP staff in the development of custom reports. Interestingly PWC staff rated this issue (2.92) much lower than Accenture staff (5.17).

In Chang's (2002) pilot study this was the second ranked issue: *Developing reports is difficult in SAP*. In workshops on this issue, Chang found that groups were diametrically opposed on this issue, with those people more intimate with SAP reporting, touting its advantages. Two other points arising from these workshops were that the field names are in German rather than English, making writing reports difficult for non-German speakers, and the general shortage of experienced ABAP/4 (the SAP reporting tool) programmers during the initial stages of the implementation projects.

While the major issue categories for the issue in this study (*The SAP system is inadequate or difficult to use*) and Chang's study (*Operational deficiencies*) are similar, the evidence suggests that certain groups have the skills and knowledge to overcome this issue while others interpret the lack of skills and knowledge in the tools as a difficulty that affects organisational performance. Table 6.33 shows how the importance of this issue varies from phase to phase with higher scores for the *Know* and *Run* phases. The table is illustrative because it demonstrates the importance of the knowledge required to manipulate the reporting tool in an ERP

particularly in the *Know* and *Up and Running* phases. ERP project managers should plan for this and other potential knowledge deficiencies.

Table E.17 – Phase Data for Issue 6

	Plan	Build	Test	Implement	Know	Run
Mean	3.4	3.6	3.8	3.6	4.4	4.8
Std Dev	2.1	2.0	2.0	2.0	1.9	2.0
Count	58	67	82	70	100	178

E.3.2 Issue 27: The reporting from the SAP system is inadequate.

Table E.18 – Issue 27: Summary descriptive statistics

Issue No:	27	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		7	6	6	31	9	6
Mean		4.74	4.45	4.85	3.56	4.58	5.01
Std Dev		1.89	1.90	1.89	2.31	1.94	1.77
Major Issue Category:			(Factor 2) The SAP system is inadequate or difficult to use.				

Table E.19 – Issue 27: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
Corrective Services	9	5.89	1.17	4	7
DETIR	30	5.63	1.71	1	7
Tourism	6	5.50	1.52	3	7
Education	11	5.36	1.57	2	7
Accenture	6	4.83	2.32	1	7
Transport	29	4.62	1.99	1	7
Health	38	4.50	1.78	1	7
Premiers	10	4.40	2.01	1	7
Public Works	23	4.22	1.68	1	7
PWC	11	3.18	1.99	1	6

The respondents who rated this issue perceived that "The reporting does not meet the needs of the users. It is inaccurate OR not usable OR inflexible OR reports do not contain the proper or necessary information to conduct business" (Round Three Survey Instrument).

This issue was synthesised from 43 issues identified by 34 respondents (0 IP and 34 Client respondents; 13 Strategic and 21 Operational respondents) in the Round One survey. 7 respondents reported 16 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "not meeting the needs of users":

Issue: *Reports.*

Description: *The standard SAP reports often are not suitable to meet the client needs. Therefore multiple custom reports have been developed in ABAP. This adds to maintenance and support costs. Also increases the amount of work required when upgrading.*

[Reported by: Client/Operational - Education]

In relation to the issue of "reporting is inaccurate":

Issue: *Functionality provided does not meet our business needs.*

Description: *At this stage we are unable to obtain accurate financial information with respect to the performance of our business for this current financial year.*

[Reported by: Client/Strategic - DETIR]

In relation to the issue of "reporting is not usable":

Issue: *Running Reports.*

Description: *I find it frustrating that I can't print out all cost codes allocated to the branch at once.*

[Reported by: Client/Operational - Premiers]

In relation to the issue of "reporting is inflexible":

Issue: *Reporting.*

Description: *Reports are generally inadequate and institutes rely on downloads into spreadsheets etc to get the reports they want.*

There is no facility for institutes to design their own reports in SAP.

[Reported by: Client/Strategic - DETIR]

In relation to the issue of "reports do not contain the proper or necessary information to conduct business":

Issue: *Lack of Useful Reports.*

Description: *Many reports in SAP/R3 require reformatting in an Excel spreadsheet. The standard printouts from SAP/R3 have poor presentation. I cannot run re-ports at a cost centre level for balance sheet items. I cannot obtain a balance sheet at cost centre level. A whole-of government reporting pool could be established for Agencies to choose reports others have produced rather than 're-inventing the wheel'. These reports could then be easily modified to suit a specific Agency without incurring large costs and consuming valuable time.*

[Reported by: Client/Operational - Tourism]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Not sure how to answer this. QHealth has a DSS system that complements the SAP for financial reporting at least. The issue is more to manage the development of both systems to minimise potential for inefficient duplication. At another level, perhaps the extent of custom report developments is an indication of the adequacy of SAP reports – although this may be as much to do with the pace of transition from cash to accrual based management reporting?

[Reported by: Client/Operational - Health]

Another reason to go to F1 (Finance One).

[Reported by: Client/Operational – Corporate Administration Agency]

Largely serves the purpose of the Department, however do need some reports that integrate financials better such as Controlling and Finance. The ineffectiveness of FISB to coordinate this is a major problem as Main Roads and Transport have this available.

[Reported by: Client/Operational - Transport]

Discussion

This is a SAP-specific issue. SAP provides a large array of standard reports and a report writer, Advanced Business Application Programming (ABAP). ABAP is an object-oriented programming environment that generates reports or transactions. The ABAP environment provides some query and automated report generation tools but these are limited. To get the full benefit of the ABAP environment, one must be a competent programmer.

Reporting is the key output of any financial system. Essentially a financial system exists to provide internal information for the running of the business and external reporting in accordance with financial legislation. The customers of the financial system's reporting are therefore management and external authorities. Failure to adequately report from a financial system can have a devastating effect on the business and attract adverse audit reports and in some cases financial penalties.

The vast majority of customers to the reporting system are not trained in the ABAP system nor have they the skills to efficiently use ABAP to create the reports they need. Often they will ask for the data and formulate a report using simpler products such as Excel spreadsheet software. One may conclude, therefore that this issue, that the *reporting from the SAP system is inadequate*, is reported by people who have insufficient technical (ABAP) skills to affect this outcome. They rely on others such as consultants or programmers to supply their reporting needs.

In Chang's (2002) study, he uncovered a similar issue from his respondent pool. This was *Issue 3 - Not all required reports were available at implementation time*. Respondents stated that, while SAP can deliver standard reporting, it did not deliver other necessary reports. These were, for example, validation reports on invoices,

reports on cheques, and reports on payment runs. The major concerns came about because these reports were previously available and were suddenly lost with the implementation of the new system. Several new reports also needed testing and were time-consuming to develop. One such comment from a respondent illustrates the point: "*Business management reporting is virtually non-existent and/or deeply flawed. Limited monitoring and exception reporting produced especially in Accounts Payable module. Cannot get snapshots at a particular date for Aged Debtor Reports etc.*"

These comments from Chang's (2002) study mirror the comments made in this study. If, during the design phase, the project team did not gather sufficient reporting requirements, or they assumed that the standard reports would suffice, then this issue arises immediately after 'go-live'. All of a sudden, management are without the reports they are used to from the old system, generating the issues and comments above from the respondent pool. This creates a large demand on the project team to create the needed reports and backlogs can occur.

Another example of inadequate reporting from a SAP system was investigated by O'Leary (2003) who delved into Microsoft's 1994 SAP implementation. Microsoft found the SAP inquiry tool to be 'cumbersome' (p. 3) and did not meet the company's objectives for reporting. This issue was exacerbated by the company having three classes of users: expert users, casual users, and shareholders and investors. Each user had varying requirements, and the SAP reporting tool could not cater to them all.

The issue of reporting also emerged in Dhaheri's (2002) study into the implementation of Oracle Financial systems in the UAE Finance Department. Despite extensive preliminary data gathering and customisation, reporting designs and customisation still became a major problem.

Niehus et al. (1998) noted that in Transport's SAP implementation project, the reporting requirement was complicated by the need to report both cash and accrual accounting positions. This issue later affected all the agencies in their implementation projects.

Reporting is a major issue in this study. This inadequacy of reporting issue also relates to other issues such as *Issue 20: SAP reporting is expensive* and *Issue 6: SAP reporting tools are difficult to use.* These different issues reflect the different perspectives of the respondents. As mentioned previously, this issue reflects the perspective of the end-user of reports. Issue 6 reflects the perspective of one trying to use the tools to get the reports they or their customers need. Issue 20 reflects the perspective of those responsible for expenses related to generating these customised reports.

This issue is also a knowledge management issue. By not providing sufficient capability within the agencies to generate the reports required, management must either use expensive external (knowledge-based) resources to fill this void or train/hire internal staff.

Strategic vs. Operational

Strategic staff tend to use reports to make decisions while operational staff use them in the conduct of their process responsibilities. Both strategic and operational cohorts agree that this is a critical issue rating it 6th and 9th respectively. As customers of the reports, the strategic respondents ranked this quite highly. From some comments made by strategic respondents (e.g. *There is no facility for institutes to design their own reports in SAP*), they were not even aware of the ABAP functionality.

Client vs. IP

These two cohorts disagree on this issue. Clients rank this issue 6th most important while IP staff rank it towards the bottom at 31st. In the Round One survey, 34 clients reported this issue but there were no IP respondents at all. The IP staff are familiar with the ABAP functionality and its flexibility so perhaps they see SAP as being capable of reporting anything, so long as you have the skills in ABAP. This type of confidence in the system, however, is somewhat misplaced when the capability or resources do not exist to take advantage of such reporting functionality.

There is one final point on reporting functionality and ABAP. To be proficient in reporting one must not only have the technical programming skills but also detailed familiarity with the database structures that make up SAP. As mentioned previously, the data fields in SAP are named in German and are not necessarily comprehensible or intuitive to an English speaking programmer. Finally, to write a report one also needs sufficient analytical skills or a thorough understanding of accounting concepts and practices. This combination of skills is rare and often expensive.

E.3.3 Issue 17: The SAP system is too complex.

Table E.20 – Issue 17: Summary descriptive statistics

Issue No:	17	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		14	13	20	18	17	10
Mean		4.43	4.18	4.28	4.11	4.31	4.64
Std Dev		1.91	1.86	2.05	2.17	1.97	1.81
Major Issue Category:			(Factor 2) The SAP system is inadequate or difficult to use.				

Table E.21 – Issue 17: Respondent organisations' statistics with count >5

Agency	Count	Mean	Std Dev	Minimum	Maximum
Corrective Services	10	5.70	1.42	3	7
Tourism	6	5.33	2.07	2	7
Accenture	6	5.33	1.63	3	7
Premiers	10	4.80	1.81	1	7
DETIR	30	4.73	2.03	1	7
Education	11	4.36	2.29	1	7
Public Works	22	4.05	1.81	1	7
Transport	28	4.04	2.08	1	7
Health	37	4.03	1.59	1	7
PWC	12	3.50	2.20	1	7

The respondents who rated this issue perceived that "Simple processes and procedures seem to be very difficult OR the system has been configured in a complex way OR it is very difficult to support (solve problems in) the system. Inter-relationships in the system are very complex" (Round Three Survey Instrument).

This issue was synthesised from 24 issues identified by 21 respondents (1 IP and 20 Client respondents; 12 Strategic and 8 Operational respondents) in the Round One survey. 3 respondents reported 6 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "Simple processes and procedures seem to be very difficult":

Issue: *Systems complexity.*

Description: *SAP more complex and a much bigger system than the functionality required by small agencies.*

[Reported by: Client/Strategic – Innovation and Information Economy].

In relation to the issue of "the system has been configured in a complex way"

Issue: *Complicated design.*

Description: *Normal business practices used previous to SAP have been replaced with confusing, complicated and unnecessary processes and forms.*

[Reported by: Client/Strategic - DETIR]

In relation to the issue of "it is very difficult to support (solve problems in) the system":

Issue: *Complexity of System.*

Description: *More complex the system, the greater the support effort required to maintain the system.*

[Reported by: Client/Operational - DETIR]

Issue: *On-Going Support: The general complexity of an SAP R/3 system makes undertaking even minor changes a time consuming and costly exercise.*

Description: *The amount of work required to undertake and test even minor changes can be prohibitive.*

[Reported by: Client/Strategic - Education]

In relation to the issue of "Inter-relationships in the system are very complex":

Issue: *System Complexity*

Description: *The complexity of the system makes it challenging for a small system support team (3) to support the configuration, development, testing, security, training, administration, report development and day to day operations of all modules used* **[Reported by: Client/Strategic - Tourism]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

The SAP package has many facets, which may never be used and therefore add to the confusion/difficulty of accessing information

[Reported by: Client/Operational – Corrective Services]

The real problem is that there is a lack of knowledge and training

[Reported by: Client/Operational - DETIR]

Everything can be customised but it is far easier to stay as simple and as close to standard as possible – a lesson we have learned.

[Reported by: Client/Strategic - Premiers]

I like SAP… it just needs practise

[Reported by: Client/Strategic - Premiers]

Discussion

Zack (1998) believes complexity to be one of four knowledge problems (complexity, ambiguity, equivocality and uncertainty). He defines complexity as a situation in which an organisation faces *"many interrelated variables, solutions and methods"*. An organisation responds to *complex* problems by either developing richer knowledge in order to allow issues to be dealt with as a familiar single problem; or by reducing complexity through decomposition to simplified (solvable/familiar) components.

Authors such as Avital and Vandenbosch (2000) have alluded to the complexity of the SAP system and its potential impact on organisations, while others such as Davenport (1998) and Markus and Tanis (2000) cite the lack of ERP product knowledge as a major concern of organisations throughout the 1990's. The integrated nature of SAP means that changes or configuration decisions affecting one module can affect other modules in ways unanticipated by the configuration designers. The comments above also indicate that the respondents thought that SAP is not only complicated but so too are the standard processes it supports.

This can be interpreted as a knowledge-based issue. Once users are more familiar with the workings of SAP, the new processes, the interfaces and underlying data structures, their perception of its complexity will probably reduce. Similarly, once the testing procedures become more streamlined and comprehensive, configuration changes and modifications will no longer take as much time or effort (expense).

Chang reported a similar issue from his preliminary study: *Issue 1 - Complexity of SAP means few, if any, people understand SAP beyond a single module, making overall decisions very difficult.* Like the Round Three comment above from the DETIR respondent putting this issue down to a "lack of knowledge and training", Chang's respondents also commented on the lack of product knowledge being a major problem:for example*: "SAP R/3 is a very complex product that takes a significant amount of time for staff to learn. Appropriate design and problem resolution then becomes a significant issue to manage"*.

Chang's respondents made similar observations about the connection between SAP's perceived complexity and its integrated nature, and the configuration difficulties arising from this level of integration. Both studies noted that while there was available expertise on particular modules, there lacked a holistic overview of the entire system which was necessary in particular for decision-makers to help make holistic business designs. In spite of this necessity, there were real limitations in sourcing experts with an in-depth SAP understanding within a short time. The workshop participants in Chang's case organisation stated that even when there were

external consultants with knowledge on several SAP modules involved, none seemed to have a broad understanding across SAP.

This issue is related to other issues in this study such as: Issue 11 SAP systems knowledge was lacking in the project team, consultants or the vendor; Issue 23 The configuration of SAP was inadequate; Issue 29 The SAP system was customised too much; and, Issue 37 Systems integration was problematic. Each of these issues point to the complexity of the system and the lack of knowledge across the project to make fully informed configuration and modification decisions.

Roy Chan (2003) addresses this issue in his discussion of the importance of *Product-Specific Knowledge* in ERP implementations. Product-specific knowledge is a combination of business and technical knowledge, and is crucial as most ERP software packages have a high degree of complexity. Product-specific knowledge covers four things: (1) understanding of the architecture of the product; (2) knowledge about its functionality and constraints; (3) implementation methodology; and (4) the release strategy or the ERP– specific programming language (like SAP's ABAP).

This issue was ranked 14th overall but one might suggest that as the user base becomes more familiar with the product, the perception of complexity will reduce. System implementers, however, need to be aware that this issue will arise and put in place sufficient training and communication strategies to alleviate the concern in the user base that this complexity issue generates.

Strategic vs. Operational

> The strategic respondents ranked this issue 17th while the operational staff ranked it 10th. Operational staff deal more directly with the system and need a lot more knowledge about its workings. The complexity of the system, therefore, would confront the operational staff more than the strategic staff. The difference in these rankings shows dissent between the two respondent groups on this issue.

Client vs. IP

The client and IP cohorts exhibited consensus on this issue ranking it 20th and 18th respectively.

Complexity is itself a complex issue in the SAP context. It is definitely a theme that ties together or rather expresses a set of interrelated issues reported in this and Chang's study of the ERP lifecycle in Queensland Government. As a general issue it is worthy of more specific research in the ERP context.

E.3.4 Issue 9: The organisation has experienced downtime, slow processing or unreliable hardware.

Table E.22 – Issue 9: Summary descriptive statistics

Issue No:	9	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		22	25	28	30	23	23
Mean		4.10	3.65	3.82	3.65	4.12	4.07
Std Dev		2.14	2.02	2.20	2.29	2.15	2.13
Major Issue Category:			(Factor 2) The SAP system is inadequate or difficult to use.				

The respondents who rated this issue perceived that "This includes: slowness, systems crashes, down-times caused by service providers, slow running reports and network problems" (Round Three Survey Instrument).

This issue was synthesised from 9 issues identified by 7 respondents (0 IP and 7 Client respondents; 3 Strategic and 4 Operational respondents) in the Round One survey. 2 respondents reported 4 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Speed.*

Description: *The system is too slow and regularly "bombs" users off. This is a particular problem when running reports.*

[Reported by: Client/Strategic - DETIR].

Issue: *Down times.*

Description: *At crucial times we have experienced excessive down times – up to 1.5 days which are usually caused by CITEC. These down times have often been around the times of important*

financial deadlines which are dependent on gaining information from SAP resulting in either missing the deadline or placing increasing pressure on staff to meet the deadline once the system was again available.

[Reported by: Client/Operational – Tourism, Racing and Fair Trading]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

It is improving however the early period this was true.

[Reported by: Client/Operational - DETIR]

Alleviated by upgrade of hardware and change in facilities management arrangement being in-house.

[Reported by: Client/Strategic – Public Works and Housing]

Obviously if the hardware is inadequate the system will not function efficiently irrespective of the system.

[Reported by: Client/Operational – PriceWaterhouseCoopers]

Initial sizing estimate was very poor and the agency has suffered since.

[Reported by: Client/Strategic - Police]

Discussion

New systems can sometimes experience hardware teething problems and ERP systems are no exception. This issue was experienced across a range of studies in this research program.

The issue of system performance came up in Dhaheri's (2002) study of an Oracle ERP implementation project at the UAE Finance Department. In this case study, they experienced significant downtime, especially during system maintenance. Sometimes the system would be offline for a full day, stopping all activity. Other hardware problems included printers becoming slow or sometimes ceasing to function. System freezes were common and PCs became unresponsive or crashed at

crucial times. Overall, the respondents in Dhaheri's (2002) study thought that the hardware/system performance was inadequate to meet operational requirements. Apparently, this situation became worse after upgrades.

Chang (2002) also reported hardware and system issue in his study. *His Issue 36 - System performance is inadequate to meet operational requirements.* A respondent from his study reported: *"The response time was inconsistent and therefore it was sometimes impossible to determine whether it was working in the background or whether it had "hung". The wide area network was not stress-tested adequately, resulting in poor response times in certain locations".* Chang's (2002) respondents noted that initially response times were not satisfactory, however, system performances slowly began to improve over time with the addition of more capacity.

Putra (1998) also suggests that due attention be given to the planning and development of appropriate infrastructure to support an ERP system.

Infrastructure planning is difficult. Planners must balance between cost and performance, particularly performance during peak times. It seems that all the ERP systems experienced some downtime and slowness in printing. It is difficult to judge whether this was an ERP problem; or a network, hardware or infrastructure problem; or some combination of the two.

Strategic vs. Operational

Strategic and operational cohorts are in consensus on this issue with both ranking it ranking it 23rd.

Client vs. IP

Client and IP respondents are also in agreement on this issue ranking it 28th and 30th respectively.

E.3.5 Issue 34: SAP functionality is inadequate

Table E.23 – Issue 39: Summary descriptive statistics

Issue No:	34	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		32	32	35	24	31	30
Mean		3.69	3.45	3.49	3.72	3.71	3.66
Std Dev		1.95	1.84	2.02	2.40	1.96	1.96
Major Issue Category:		(Factor 2) The SAP system is inadequate or difficult to use.					

The respondents who rated this issue perceived that "The SAP functionality does not support day-to-day business needs of the organisation" (Round Three Survey Instrument).

This issue was synthesised from 34 issues identified by 22 respondents (4 IP and 18 Client respondents; 11 Strategic and 11 Operational respondents) in the Round One survey. 7 respondents reported 19 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *The use of cost centres to represent the program/projects undertaken by the agency.*

Description: *The programs/projects are dynamic but the cost centre (and profit centre) structure is difficult to manipulate on a year to year basis.*

[Reported by: IP/Strategic - Accenture]

Issue: *The asset module.*

Description: *The assets module does not process revaluations in accordance with Australian standards. This requires manual corrections. Retirement of assets has problems with the tr/fm module.* **[Reported by: Client/Operational – Queensland Audit Office]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Has no functionality for our industry and is unable to be integrated.

[Reported by: Client/Strategic - Police]

Functionality is good – probably insufficient use of capabilities is more to the point.

[Reported by: Client/Operational – Public Works]

Agree to a point – it depends on what the Business is trying to do with it.

[Reported by: Client/Operational - Transport]

Discussion

This issue and the following issue, *Issue 31: The SAP system does not work as it should*, will be discussed together because they are closely related.

E.3.6 Issue 31: The SAP system does not work as it should

Table E.24 – Issue 31: Summary descriptive statistics

Issue No:	31	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		34	34	36	22	30	34
Mean		3.64	3.41	3.45	3.89	3.74	3.47
Std Dev		2.14	2.02	2.22	2.30	2.11	2.21
Major Issue Category:			(Factor 2) The SAP system is inadequate or difficult to use.				

The respondents who rated this issue perceived that "There are bugs and inconsistencies in the system. The system cannot do things that it should be able to do" (Round Three Survey Instrument).

This issue was synthesised from 14 issues identified by 12 respondents (3 IP and 9 Client respondents; 3 Strategic and 9 Operational respondents) in the Round One survey. 2 respondents reported 4 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Unworkability.*

Description: *SAP Stage 1 worked, however, SAP Stage II has not. This has caused major problems at the business unit level.*

[Reported by: Client/Strategic - DETIR]

Issue: *Cheques.*

Description: *Problems with cheque numbering occurred so that when cheques were cashed money went to the wrong accounts.*

[Reported by: IP/Operational - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Some areas of this package remain inadequate due to the cost of customising.

[Reported by: Client/Operational – Corrective Services].

This is more an issue about our skills and implementation choices.

[Reported by: Client/Strategic - DETIR].

Disagree – the Business is not MADE to use the system correctly.

[Reported by: Client/Operational - Transport].

Discussion

This discussion encompasses *Issue 34 SAP functionality is inadequate* and *Issue 31 The SAP system does not work as it should*. In determining these issues following the Round One there was a difference, albeit subtle, between the two issues. Issue 34 denoted the perception by respondents that the SAP system did not provide necessary functionality, that is, that functionality was not available to users from the system. Issue 31, on the other hand, described the fact that the functionality existed but didn't work properly. Either way the outcome is the same: users did not have access to system support for organisational processes and information needs.

The issue of inadequate functionality could have resulted from poor initial needs analysis, poor knowledge of the system and poor configuration. Similarly, the system not working as it should (in other words supporting the needs of users as they expect) would have resulted from the same types of reasons. In *Factor 1 – Poor Management of the implementation project and processes*, several respondents noted issues with knowledge of SAP, knowledge of the organisational context, poor

configuration, poor data conversion and problems with integration. These issues would all contribute to the issues at hand.

Another reality the ERP project team must deal with is the fact that changing policy and business conditions will drive changes to the system. External forces drive the need for modifications and changes to internal and inter-organisational business processes. During the course of the configuration and implementation, modifications and additional process needs are often frozen by the project team. By 'go-live' time there may be a backlog of additional functional requirements but these are lacking in the 'go-live' version.

During the post 'go-live' period, it takes some time for users to get familiar with the system. Many systems are functionally incomplete and, over time, users compensate for this deficiency by developing manual or systemised workarounds, additional personal systems and minor modifications. When a system is first introduced the expectations of users might be very high i.e. they expect a functionally complete system without the need for such workarounds. Sometimes, later versions of the software will address these deficiencies allowing them to decommission the workarounds and personal supplementary systems.

Chang (2002) reported this issue in his SAP study from a different perspective. In his *Issue 37 – SAP lacks some functionality of QGFMS,* respondents to Chang's survey presented the lack of functionality in comparison to the former system. For example one comment from a respondent was: *"At the time of implementation, SAP was not considered to have sufficient front-end capabilities to hand our front office point-of-sale requirements".* The staff, used to the functionality of the Dun & Bradstreet software, believed that the functionality had regressed.

The issue of inadequate functionality in an ERP system emerged in Dhaheri's (2002) study of an Oracle Financial package implementation. A problem with *Operation Deficiency* came about when employees found that, in spite of there being a lot of planning done on data gathering, testing and customisation, there were still forms and reports that needed to be redesigned.

Roy Chan (2003) addresses the necessity for organisations to have *product-specific knowledge* as a requirement for successful ERP implementation. Product-specific knowledge is an appropriate understanding of the systems' functionality and restraints that will lead to more assured support for the organisation's processes.

Strategic vs. Operational

For the *Issue 34 SAP functionality is inadequate*, the strategic and operational cohorts are in consensus in their ranking placing the issue at 30th and 31st respectively. They ranked *Issue 31 The SAP system does not work as it should* similarly at 34th and 30th respectively. Strategic and operational respondents, therefore, saw these issues at a relatively lower level of importance.

Client vs. IP

For both the issues the client and IP respondent cohorts were in dissent. In both cases the client ranked the issues quite low; in their bottom three issues. The IP cohort, however, ranked these in the third quartile at 24th (Issue 34) and 22nd (Issue 31). It is difficult to explain this outcome. Perhaps the IP staff are more sensitive to the issue knowing that they would be held responsible for inadequacies in the needs assessment and design processes that led to these perceptions.

Overall, these issues were ranked in the fourth quartile with *Issue 34 SAP functionality is inadequate* being ranked 32nd and *Issue 31 The SAP system does not work as it should* ranked 34th. One would expect that over time this issue will resolve itself as the support team fine tunes the configuration and processes.

E.3.7 Issue 18: Systems controls were inadequate.

Table E.25 – Issue 18: Summary descriptive statistics

Issue No:	18	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		35	35	30	32	32	31
Mean		3.64	3.39	3.68	3.44	3.66	3.61
Std Dev		1.98	1.83	1.99	2.33	1.92	2.10
Major Issue Category:			(Factor 2) The SAP system is inadequate or difficult to use.				

The respondents who rated this issue perceived that "There is a lack of audit trails OR the security system is inadequate OR the system does not pick up on errors OR there is a lack of validation processes" (Round Three Survey Instrument).

This issue was synthesised from 14 issues identified by 11 respondents (3 IP and 8 Client respondents; 0 Strategic and 11 Operational respondents) in the Round One survey. 2 respondents reported 5 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Security.*

Description: *The security was not implemented on time in this department. We had to use old version 3 security in version 4. This caused numerous problems because of the structures of the two versions are different.*

[Reported by: Client/Operational - Premiers]

Issue: *Data integrity.*

Description: *SAP has no system for validating data entered into the system. Users/operators are supposed to enter data and then print a report (if they can find the appropriate one) and compare it to source documents. As far as I was concerned SAP was a step backwards, but many of the issues I raised were never addressed. In the previous system we had online validation i.e. key fields were entered twice and compared by the software, also dollar amounts were tested against a threshold etc. It was very good.*

[Reported by: Client/Operational - Education]

Issue: *Tables.*

Description: *Not possible to see who last changed entries in a table. No audit trail.*

[Reported by: Client/Operational - Education]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

> *System controls are available in SAP, but have not been implemented efficiently.*
>
> **[Reported by: Client/Operational - Premiers]**
>
> *This is a function of the quality of the people who assign access.*
>
> **[Reported by: Client/Operational - PriceWaterhouseCoopers]**

Discussion

Reliable system controls can result in tangible benefits. Daigle et al. (2005) found that strong system controls results in audit savings i.e. lower audit fees. They maintain that well-documented system controls, placed appropriately and operating effectively, contribute to much more reliable information, and reduce IS audit procedures and fees (Daigle et al., 2005).

Alles et al. (2005) discuss the importance of controls in large scale enterprises. With highly integrated enterprise information systems, such as SAP R/3, the hierarchy of IT controls should reflect the structure of the system. Organising controls appropriately helps to minimise control violations or exceptions such as benign or old user passwords.

From Chang's (2002) study, there were two issues that relate to system controls. The first of these relates to the matter of security; namely, his *Issue 10 Security is difficult to maintain in SAP, resulting in some users being granted too much access and others not having access to data*. The security was considered complex and resource-intensive by many of the users. A sample statement was: "*The difficulties of maintaining the allocation of profiles and their makeup to ensure no user has conflicting rights. This promises to be a contentious issue in the future"*. Chang (2002) noted that security design was largely overlooked in the design phase and not tested sufficiently. The security control concerns arose after 'go-live' when users

started having access problems. Chang suggests that the project team members had higher security access and so did not face these problems during the testing phase.

The second related issue from Chang was his *Issue 20 - System documentation is inadequate, particularly with respect to system design and controls*. There was insufficient documentation concerning the controls configured into the SAP system. A statement from Chang's data, illustrating these problems, was the following: "*Inadequate documentation in relation to the internal control environment which should exist in light of SAP. Quality processes in the technical section were woeful"*.

Vayo et al. (2002) listed *SAP Security Review and conversion* as a critical success factor of the SAP upgrade process. While it certainly is an important consideration, this issue was ranked 35th out of the 37 issues.

Strategic vs. Operational

Strategic and operational respondents showed consensus on this issue. The strategic cohort ranked this issue 31st and operational respondents ranked it 32nd.

Client vs. IP

Client and IP respondents also demonstrated consensus on this issue with rankings of 30 and 32 respectively. One should note, however, that within the IP group Accenture rated the issue as much more important (Mean of 5.17) that PriceWaterhouseCoopers (Mean of 2.58).

E.3.8 Conclusion

This major issue category comprised of issues pertaining to the difficulty that respondents had using the software or the fact that SAP was inadequate to support their business needs.

Several of the issues in this major issue category are knowledge related: *Issue 6 Reporting tools are difficult to use; Issue 17 The SAP system is too complex; Issue 34 SAP functionality is inadequate*; and, *Issue 31 The SAP system does not work as it should*. The knowledge issues reflect the lack of training (see Issue 21), change management (Issue13) and are also associated Issue 33 (lack of acceptance) and the

knowledge issues from major issue category 4 (sufficient SAP knowledge; retention of trained staff; training; and help desk issues).

The symptoms or poor knowledge management in an ERP context show themselves in a variety of ways. This major issue category contains a number of those symptoms. The knowledge management theme will be explored further in Chapter 7.

E.4 Major Issue Category 1: Poor management of the implementation project and processes

This Major Issue Category includes 14 issues:

- ✓ **Issue 2: There was lack of stakeholder/management support and ownership.**
- ✓ **Issue 3: The Project Team did not consult or communicate sufficiently.**
- ✓ **Issue 12: SAP related documentation is insufficient.**
- ✓ **Issue 10: Insufficient resources were allocated to the project.**
- ✓ **Issue 5: The testing of the SAP system was inadequate.**
- ✓ **Issue 13: The change management process has been mis-managed.**
- ✓ **Issue11: SAP systems knowledge was lacking in the project team, consultants or the vendor.**
- ✓ **Issue 15: The project suffered from individual or team lack of knowledge of the organisational context.**
- ✓ **Issue 33: The SAP system suffered non-acceptance, non-use or lack of ownership.**
- ✓ **Issue 14: The data conversion was inadequate.**
- ✓ **Issue 12: The configuration of SAP was inadequate.**
- ✓ **Issue 22: There was poor executive or project management of the SAP project.**
- ✓ **Issue 32: Time management and planning was inadequate.**
- ✓ **Issue 19: The staffing of the project team was mismanaged.**

It is the major issue category that contains the greatest number of issues. Most of them are commonly found in information systems projects and are not necessarily unique to ERP contexts. Some however are very specific to the SAP and ERP environment e.g. *Issue 12 The configuration of SAP is inadequate* and *Issue 11 SAP systems knowledge was lacking in the project team, consultants or the vendor*.

Each issue will be discussed in turn. Section 6.2.6.15 will provide some comment and concluding remarks.

E.4.1 Issue 2: There was lack of stakeholder/management support and ownership.

Table E.26 – Issue 2: Summary descriptive statistics

Issue No:	2	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		6	7	5	1	3	9
Mean		4.76	4.40	4.90	5.33	4.72	4.82
Std Dev		2.04	1.96	2.00	1.75	2.01	2.10
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "Executives and other key personnel did not support OR were not committed to the project OR were not sufficiently involved in the project" (Round Three Survey Instrument).

This issue was synthesised from 16 issues identified by 14 respondents (9 IP and 5 Client respondents; 5 Strategic and 9 Operational respondents) in the Round One survey. 2 respondents reported 4 separate issues assigned to this category.

Some examples of these reported issues follow.
In relation to the issue of "Lack of support":

> **Issue**: *Management support.*
>
> **Description**: *With the introduction of a new system, management support is critical to supporting team members who are working on projects. If they feel that high-level support is not available they will be concerned for their own job welfare after the end of the project. This will affect their attitude to work during the project.*
>
> **[Reported by: IP/Strategic – BHP IT]**

In relation to the issue of "Lack of commitment":

Issue: *Lack of commitment of head office staff to fixing problems.*

Description: *Issues raised are not being resolved. The standard answer seems to be that they are "aware of the problems" - we need resolution – we are all well aware of the problems!!*

[Reported by: Client/Operational - DETIR]

Issue: *Gaining the commitment and support of key departmental executives.*

Description: *The level of executive commitment and support to the project in terms of decision making and involvement in the change process was challenging.*

[Reported by: IP/Operational – Deloitte Consulting]

In relation to the issue of "lack of involvement":

Issue: *Not enough involvement from key agency financial personnel.*

Description: *It is critical that all financial personnel have a thorough understanding of how any new system stores, calculates and reports financial data. Many financial personnel were not assigned to the implementations due to the project go-lives clashing with year end. However, having them involved directly would ensure that the financial system is configured correctly and that year end reports can be produced directly without rework. Operational people will tend to setup the system to meet their needs with minimal regard to whether financial information is being captured accurately and at the appropriate level of detail.*

[Reported by: IP/Operational - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Did not understand the costs of implementing and running. Still don't appreciate costs of regular upgrading.

[Reported by: Client/Operational – Emergency Services]

No one appears to take responsibility if the system cannot do what it should do.

[Reported by: Client/Operational - DETIR]

SAP is not a core business system and is probably too expensive to ever be.

[Reported by: Client/Strategic - Police]

We have complete support and ownership by management.

[Reported by: Client/Operational - Treasury]

Discussion

Project objectives are more attainable with top management support and the alignment of those objectives with strategic business goals (Sumner, 2000). The roles of top management in IT implementations include developing an understanding of the capabilities and limitations of IT, establishing reasonable goals for IT systems, exhibiting strong commitment to the successful introduction of IT, and communicating the corporate IT strategy to all employees (McKersie and Walton, 1991).

Executive support is a major factor for success in ERP system implementations. Such implementations tend to change business practices and the organisation in general (Prasad et al. 1999; Murray and Coffin, 2001). Management must be involved in the change process, monitor progress and provide ongoing direction (Prasad et al. 1999). ERP implementations test accountability, responsibility and communication (Koch et al. 1999). Measures of accountability must be formalised and tied directly to management performance plans (Murray and Coffin, 2001).

The KPMG Global IT Project Management Study (2005) found that, generally, top management support and involvement was a major factor that contributed to project success. A number of authors (Brown and Vessey, 1999; Esteves et al. 2002; van Slooten and Yap, 1999) agree that, in ERP implementation projects in particular, top

management support is crucial. Brown and Vessey (1999 p. 411) observe that one of the most widely cited variables critical to the successful implementation of a large customised system is top management support. Esteves et al. (2002, p. 1381) also found that sustained management support is one of the most critical success factor in ERP implementation projects.

A balancing view comes from Scott (1999) who claims that, although an absence of management support and commitment could lead to project failure, management over-commitment can be equally as devastating. The reason for this is that errors in judgment may arise, as well as an unnecessary project escalation, as seen in the FoxMeyer debacle (Scott, 1999).

One way to drive top management and stakeholder support for an ERP project is the appointment or existence of a project champion. ERP projects need a 'champion' to market the project across the organisation (Sumner, 2000). By appointing an executive level individual with extensive knowledge of the organisation's operational processes, senior management can monitor the ERP system implementation, because the champion has direct responsibility for and is held accountable for the project outcome (Clemons, 1998). Nah and Lau (2001) rated having a project champion the sixth most important critical success factor for ERP implementations. Bancroft (1996, p. 67) also lists the provision of superior executive championship for ERP projects as one of nine critical success factors.

Strategic vs. Operational

Operational staff rated this as their third most important issue. Operational staff recognised that, without management support and ownership, the project would not resolve implementation or other outstanding issues. Strategic staff rated this issue 9th in the first quartile, demonstrating their appreciation of the issue but neither showing clear dissent or consensus with operational respondents.

Client vs. IP

Respondents from the implementation partners were quite vocal on this issue. Whereas the client respondents rated this issue highly at number five, for the

IP staff, this was their number one issue. The reputation of the IP is dependant on a successful outcome from the project and so they recognise the importance of ownership and commitment from client executives who control the resources that effectively drive the project's successful outcome.

Niehus et al. (1998) reported (from their study of Transport) the need for management support and 'ownership' of the project at all levels. They identified this issue as being central to successful implementation. When the departments split during a machinery of government change, however, the existing executive sponsorship was lost. The implementation proceeded nonetheless, with limited management support, guidance and leadership. This departmental split resulted in an implementation that occurred without an executive level project champion, and without a project director who "spoke the language of the new executive team". As a result, the implementation "became an IT project rather than a business project".

Chang (2002) reported a similar issue in his study of CSA and their clients*: Issue 22 – Lack of ownership/responsibility by agency personnel at the project level*. A respondent from Chang's (2002) study noted: "*Agency project personnel were slow in making decisions compared to the private sector, due to the inherent 'don't want to be blamed if anything goes wrong issue'. This led to a preponderance of project team members and others being tied up in meetings"*. Another respondent comment was that "*The overall impact is that the implementation timeframe is longer than what would be required in the private sector and therefore more expensive"*.

In summary, this and other studies show that management support and ownership drives stakeholder commitment and this leads to a more successful ERP project outcome.

E.4.2 Issue 3: The Project Team did not consult or communicate sufficiently.

Table E.27 – Issue 3: Summary descriptive statistics

Issue No:	3	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		10	10	4	12	5	14
Mean		4.57	4.20	4.91	4.28	4.66	4.42
Std Dev		2.08	1.96	2.04	2.24	2.00	2.21
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

Table E.28 – Issue 3: Respondent organisations' statistics with count >5 plus OFST

Agency	Count	Mean	Std Dev	Minimum	Maximum
OFST	1	7.00		7	7
DETIR	30	6.03	1.35	2	7
Accenture	6	5.83	2.40	1	7
Transport	28	5.46	1.45	1	7
Corrective Services	8	5.38	1.92	2	7
Education	11	4.64	1.96	1	7
Police	5	4.60	2.07	2	7
Health	38	4.21	2.18	1	7
Emergency Services	5	4.20	2.59	1	7
Public Works	21	4.14	1.85	1	7
PWC	12	3.50	1.78	1	6
Premiers	8	3.50	2.39	1	7
Tourism	6	3.00	1.55	1	5

The respondents who rated this issue perceived that "The project did not consult widely enough OR with the right people. Users did not know what was going on. Problems were not communicated widely or quickly enough. Issues were recorded during consultation but not acted upon. The project team did not communicate amongst themselves" (Round Three Survey Instrument).

This issue was synthesised from 28 issues identified by 23 respondents (6 IP and 17 Client respondents; 9 Strategic and 14 Operational respondents) in the Round One survey. 5 respondents reported 10 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "not consulting widely enough OR not consulting with the right people":

Issue: *Consultation.*

Description: *The SAP staff during the implementation did not consult the users as to the effect any changes they did to SAP would happen to the users work. For example, when an upgrade to SAP occurred AR debts were not rolled over into the new version.*

[Reported by: Client/Operational - DETIR]

In relation to the issue of "Users did not know what was going on":

Issue: *Communication.*

Description: *The Corporate SAP team do not always send on information. They may change the reporting and the Districts are not told. Just find it in a report.*

[Reported by: Client/Strategic - Health]

In relation to the issue of "Problems were not communicated widely or quickly enough":

Issue: *Communication.*

Description: *The SAP Implementation Team did not communicate problems in a timely manner until recently (when they were forced to).* **[Reported by: Client/Strategic - DETIR]**

In relation to the issue of "Issues were recorded during consultation but not acted upon":

Issue: *Advice from us not taken into account.*

Description: *When designing SAP, I was involved in workshops discussing our business. We raised a number of issues relating to how we wanted SAP to work etc, however these issues in the most*

part were not taken into account. A pre-conceived idea was already in place.

[Reported by: Client/Strategic - DETIR]

In relation to the issue of "The project team did not communicate amongst themselves":

Issue: *Education of project staff.*

Description: *All staff needed to understand not just the product, but how the project would be run. Expectations needed to be set both within the agency and implementation partner staff.*

[Reported by: IP/Operational - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

In the planning stage when potential problems were identified the project team did not listen.

[Reported by: Client/Operational - DETIR]

The structure of the communication of the project was compiled in such a way that it was not aimed at the lowest level of End User, but rather it was only addressed to the management level, where it flowed back and forth continuously, but from whence it seemed to almost stop, and then only "spurts" of selected information was allowed to filter down to the lower levels of the Business.

[Reported by: Client/Operational – Main Roads]

No consultation with major Health Districts during implementation.

[Reported by: Client/Operational - Health]

Discussion

There is much evidence in current literature that points out the importance of communication as a success factor for IT projects. Nah and Lau (2001) ranked communication fourth in their eleven factors critical to the success of ERP

implementations. Slevin and Pinto (1987) identified communication as a key component across all ten factors of their Project Implementation Profile. They maintained, "Communication is essential within the project team, between the team and the rest of the organisation, and with the client" (p. 60). Lack of communication within and between teams was also considered an indicator of troubled IS projects by Havelka et al. (2004).

Poor communication has many harmful consequences in management of IT projects generally. Bugajska and Schwabe (2005) draw on Luftman et al. (2002), who state that communication and social aspects are important enablers for business-IT alignment when considering collaboration between IT and business units. Connections (created by free flowing communications) between business and IT planning influence short-term alignment (Reich and Benbasat, 2000) and companies that successfully align these goals create a culture of collaboration between business and IT executives (Curtis et al.,, 2004).

Chornoboy and Gardner (1990) state that the relationship between client and consultant is a crucial component of project success. This two-way flow, as they call it, can either lead to completion or result in failure. If the flow is maintained, then the success of the project becomes likely. However, if communication breaks down, then a negative impact will likely result in project failure. One problem area they identify with regards to this relationship is *personality conflicts* – these occur more often between client staff and consulting staff. It is up to the respective parties to identify and manage potential problems. Conflicts are handled usually by the level of trust and the nature of the impediment, but can be dealt with by discussing them in the open with respect to each view. Bugajska and Schwabe (2005) also cite Taylor-Cummings' (1998) research which demonstrates that the culture gap between IT personnel and business people is a major reason for many system development failures.

Roy Chan (2003) found that communication was a critical factor in ERP implementation. He cited *communication*, *co-ordination*, and *co-operation* as three

factors of critical importance in effective integration of his five knowledge types for successful management of ERP software.

Alex Chang (2002) described an issue in his study that resonates with this issue: "*Lack of consultation with operational level users meant that operational requirements were not met.*" Chang (2002) reported that his survey respondents felt that information gleaned from the users was not always taken into consideration. He also noted that staff that spent significant time using the system appeared to have been the least consulted in regarding its use and operation.

This issue was also noted in the related studies within this research program by Putra (1998), Vayo et al. (2004), Ng (2003) and Dhaheri (2002). All of these studies referred to the critical nature of communication within the ERP context.

Strategic vs. Operational

Operational staff rated this issue fifth while Strategic staff rated the issue fourteenth. From the above comments, it seemed that management was better informed that operational staff. Furthermore, the operational staff seemed to feel that the project team did not consider their input sufficiently and that the design, implementation and resolution of problems suffered as a result.

Client vs. IP

The Client respondents rated this issue more highly than IP respondents. Perhaps this demonstrates a difference between communication practices in the client and IP cohorts. Within the agency listing, one notes the high rating given to this issue by DETIR, an agency that did not use a single implementation partner.

Clearly, this is an important issue for ERP projects and IT projects in general. The issue raises the impact of not only poor communication by the project team to the community of end users but also the perception that the project team were not listening to the needs of end users. It is recommended that ERP project managers give this issue consideration.

E.4.3 Issue 12: SAP related documentation is insufficient.

Table E.29 – Issue 12: Summary descriptive statistics

Issue No:	12	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		11	9	8	20	4	16
Mean		4.56	4.28	4.70	4.00	4.70	4.31
Std Dev		2.00	1.91	2.07	2.30	2.05	1.90
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "Various types of documentation were cited as being substandard or non-existent. This includes online documentation such as help files, manuals, and help desk tools. Documentation is found to be out-of-date" (Round Three Survey Instrument).

This issue was synthesised from 12 issues identified by 11 respondents (1 IP and 10 Client respondents; 1 Strategic and 10 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Handover.*

Description: *Numerous flaws/shortcomings in the delivered system requiring extensive corrections. Inadequate/non-delivery of system documentation.*

[Reported by: Client/Operational - DETIR]

Issue: *Training.*

Description: *At the time of initial implementation, the training providers told us that the training would be vastly different from the live version. The manuals we were given also were totally useless.*

[Reported by: Client/Operational - DETIR]

Issue: *On-line documentation.*

Description: *On-line documentation not sufficiently detailed to implement new configuration. If a problem arises, it is necessary to refer*

the matter to Financial Systems and Training, Treasury Dept. or OSS note. Often, the documentation does not even state the program to be run, or the menu path, for a specific task. **[Reported by: Client/Operational – Family Services]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

We need a decent User Manual and access so that we can solve our own problems.

[Reported by: Client/Operational - DETIR]

Documentation provided by consultants is very good and makes using the system easier.

[Reported by: IP/Operational - PWC]

SAP Training documentation (manuals) are the worst, totally inadequate.
[Reported by: Client/Operational - Health]

Description:

Huber (2005) listed "no or insufficient documentation of installed software and systems" as one of the ten worst computer validation mistakes committed. Havelka et al. (2004) share this same concern, citing limited or lack of documentation on tasks completed or technical specific as an indicator of troubled IS projects.

Chang reported a similar finding in his study: *Issue 20 – System documentation is inadequate, particularly with respect to system design and controls*. A comment from one of his respondents about this issue was "*Inadequate documentation in relation to the internal control environment which should exist in light of SAP. Quality processes in the technical section were woeful. Little documentation, no reviews, improper practices in transport, to name a few".*

Dhaheri (2002) noted the lack of documentation in his study of an Oracle ERP implementation. This lack of documentation extended to online help and user manuals made available at the time of implementation. This issue extended into the post-implementation phase: when modifying or updating a module, the user manual

was not updated to coincide with the changes. Putra (1998) listed the supply and maintenance of documentation as a critical success factor for ERP project success while Vayo et al. (2002) catalogued it as a success factor in ERP maintenance and upgrade projects. Vayo et al. (2002) specifically mentioned the need for a central repository of documentation and ownership and accountability for its upkeep.

Strategic vs. Operational

This is a point of dissension between the strategic and operational respondents. The operational respondents reported this issue much more often in the first survey round. They ranked this issue as their fourth highest in the Round Three survey while the strategic cohort reported the issue only once in the Round One and ranked it sixteenth. Lack of documentation is an issue more likely to affect the operational staff directly and so would be more important to them.

Client vs. IP

Again, this issue is a point of dissention between the cohorts. It was recognised only once by the IP cohort in the Round One but ten Client respondents noted this issue. In many cases the IP staff were responsible for the generation of the project and systems documentation. The comment above made by the IP respondent in the Round Three survey that supports the quality of the documentation, therefore, is not unexpected. Overall, Accenture staff rated the issue higher than PWC staff, though the reasons for this are unclear from the data.

Documentation and its adequacy have been cited in four of the studies in the "ERP Lifecycle Knowledge Management" research program. While conventional wisdom in the IS literature denotes the importance of documentation, a separate and dedicated study of this important issue is warranted in the ERP context.

E.4.4 Issue 10: Insufficient resources were allocated to the project.

Table E.30 – Issue 10: Summary descriptive statistics

Issue No:	10	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		12	11	17	2	12	12
Mean		4.50	4.20	4.44	4.89	4.50	4.50
Std Dev		2.16	2.07	2.30	2.35	2.12	2.23
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

Table E.31 – Issue 10: Respondent organisations' statistics with count >4 plus OFST

Agency	Count	Mean	Std Dev	Minimum	Maximum
Accenture	6	6.33	0.82	5	7
OFST	1	6.00		6	6
DETIR	30	5.83	1.88	1	7
Corrective Services	9	5.22	1.92	1	7
Transport	28	4.71	2.16	1	7
Police	5	4.40	1.52	2	6
Tourism	5	4.40	1.82	2	7
Health	38	4.24	2.22	1	7
PWC	12	4.17	2.55	1	7
Emergency Services	5	4.00	2.35	1	6
Education	11	4.00	2.00	1	6
Public Works	21	3.62	2.11	1	7
Premiers	8	3.13	1.55	1	5

The respondents who rated this issue perceived that "Insufficient money and staff were allocated to the SAP project. The staff resources were inexperienced OR there weren't enough people to implement in the time period OR staff were not released from their duties sufficiently to assist in the project. There was not enough technical infrastructure/capacity to run and/or maintain the SAP system" (Round Three Survey Instrument).

This issue was synthesised from 31 issues identified by 27 respondents (11 IP and 16 Client respondents; 11 Strategic and 16 Operational respondents) in the Round One survey. 4 respondents reported 8 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "staff resources were inexperienced":

Issue: *Resources.*

Description: *Not enough of the right people were devoted to the project. Some of the people were not skilled at all or had little knowledge of accounting issues particularly accrual accounting.*

[Reported by: Client/Strategic - DETIR]

In relation to the issue of "enough people to implement in the time period":

Issue: *Resource allocation.*

Description: *Support unit under-resourced – staffing insufficient to both maintain and enhance.*

[Reported by: Client/Operational - Education]

In relation to the issue of "staff not being released from their duties sufficiently to assist in the project":

Issue: *Workload.*

Description: *Employees are outside of the project team, expected to be involved on the project as well as do their usual work.* **[Reported by: Client/Strategic - Transport]**

In relation to the issue of "There was not enough technical infrastructure/capacity to run and/or maintain the SAP system":

Issue: *Number of System Users Allowed Per District*

Description: *The licensing restrictions applied to our District made it and continue to make it difficult to improve business practices, as we are often forced to terminate existing users to facilitate the addition of another. This licensing restriction was not clearly identified and communicated to this District at the beginning of the rollouts.*

[Reported by: Client/Operational - Health]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

> *Inappropriate resources. Consultants that are engaged that have no knowledge (whatsoever) of the area, however are then considered experts thereafter when Department staff could have done a better job at a lower cost. The default for anything is to get consultants in and the knowledge goes with them. Also a problem whereby the support agency is stripped of staff to complete work on a Project and then they are understaffed. Most resources were provided by Main Roads – not Transport.*
>
> **[Reported by: Client/Operational - Transport]**
>
> *Since the last upgrade the systems is frustratingly slow.*
>
> **[Reported by: Client/Strategic - Health]**

Discussion

van Slooten and Yap (1999) names two types of insufficient resources in ERP projects: a shortage of human resources and a shortage of means.

'Insufficient human resources' refers to there being insufficient numbers of personnel to conduct the required activities. Such activities might be supported by a smaller number of more expert, and hopefully more productive, people or a larger number of less expert, less productive staff. The perception, therefore, of insufficient human resources could be that there are enough people but they don't have sufficient expertise to support the activities, or there simply aren't enough people but their expertise level makes them more efficient in their knowledge work. The balance between sufficient numbers and sufficient expertise is a knowledge management issue.

Shipps and Zahedi (1999) also discuss the lack of manpower as being a serious inhibitor in the growth and expansion of IT. They assert that inadequate staffing is a stumbling block for IT-related projects. Dhaheri (2002) also found in his study that there was a constant shortage of staff who had the relevant and appropriate ERP experience.

Shortage of means is the extent to which the means available for a project are insufficient (van Slooten and Yap, 1999). With this particular inadequacy, Jiang and Klein (2001) for instance considers the assignment of 'tight dollars' at the beginning of a project as one form of resource insufficiency. It can also mean insufficient technical resources where the allocated hardware cannot handle the systems load.

Havelka et al. (2004) list four components of resource inadequacy: lack of budget, lack of people, lack of time, and lack of materials for the project. They consider one possible cause of resource shortages is their allocation to other projects. Another cause of resource disparity Havelka et al. (2004) discuss is resource managers 'dragging their feet on tasks'. This issue of non-commitment to resources by management is mentioned by Dong and Ivey (2000) who state that a lack of support for resource allocation may lead to indifference or deliberate resistance to the ERP system implementation. Further, "dragging of feet" can use up the resource of time, which is irreplaceable.

The issue of resource allocation goes to the heart of success in an ERP implementation. One of principal aims of this and Chang's (2002) study is to provide some guidance on improving the allocation of resources across the ERP lifecycle. Putra (1998) also refers to the importance of resource allocation. He mentions the importance of estimating and planning for sufficient ERP project issues as well as post-implementation issues. Vayo et al. (2004) agree, noting the importance of appropriately skilled resources be applied in an upgrade process. Vayo et al. also point out that availability of resources in the organisation is also a factor to consider. Chan (2003) includes this resource planning capability in his *project management knowledge type*. He maintains that project management knowledge is a critical success factor for ERP.

Strategic vs. Operational

Strategic and Operational staff agreed on the ranking of this issue. Both cohorts ranked it as the twelfth most important issue in the study.

Client vs. IP

There was, however, a fair disparity between the views of Client and IP staff. IP staff rated this issue as their second most important. This indicates that IP staff did not believe that Client staff were either available or sufficient in numbers or expertise to support the ERP project. The organisation that ranked this issue highest was Accenture (Mean 6.33). OFST also ranked this issue highly (at 6). The success of the ERP project has the capacity to affect perception of the IP as the guiding project manager. The allocation of insufficient resources to a project challenges the ability of the IP to deliver a quality result. Because the IP staff see this issue as important but the Client cohort does not, the potential for friction between the two parties arises.

Resource allocation is related to project planning, project management, executive commitment and can ultimately impact on a variety of other issues such as inadequate support and help desk training and user training. The restriction of investment in an ERP project may prove to be more expensive for the organisation in the long run.

E.4.5 Issue 5: The testing of the SAP system was inadequate.

Table E.32 – Issue 5: Summary descriptive statistics

Issue No:	5	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		13	14	7	14	8	17
Mean		4.46	4.05	4.72	4.28	4.60	4.23
Std Dev		2.18	2.02	2.22	2.61	2.08	2.34
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that “There was insufficient testing of the system before scheduled phased rollout/’go-live’. Production environments were released too soon” (Round Three Survey Instrument).

This issue was synthesised from 7 issues identified by 7 respondents (0 IP and 7 Client respondents; 1 Strategic and 6 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

Issue: *Both stages of the implementation have been poorly executed.*

Description: *The implementation of the new system over two financial years has lacked organisation and been poorly managed. The system was not adequately tested and debugged before introduction.* **[Reported by: Client/Strategic - DETIR]**

Issue: *Rushed introduction of Stage II with insufficient testing.*

Description: *Insufficient testing has meant that the systems are not working and there is lack of action in correcting.*

[Reported by: Client/Operational - DETIR]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Project team did not test well. Concentrated on providing customised screens and processes rather than ensuring critical business components were correct. **[Reported by: Client/Operational – Emergency Services]**

No testing was done in a simulated environment under stress.

[Reported by: Client/Operational - DETIR]

Parts were highly tested, but again, when problems were found, there was not money or the system was unable to be corrected to do what was needed.

[Reported by: Client/Operational - DETIR]

Discussion

Testing is commonly found in ERP implementation methodologies (Markus and Tanis, 2000; Parr and Shanks, 2000) and ERP upgrade processes (Vayo et al., 2004).

Nah and Lau (2001) rank *software development, testing and troubleshooting* tenth in their eleven factors critical to ERP implementation success. Although these are vital functions for ERP success, unrealistic deadlines may lead to reduced testing and training (Murray and Coffin, 2001).

Huber (2005) calls "no or insufficient testing and documentation" as one of the ten worst computer validation mistakes committed. Coincidentally, he also places the issue of "too much testing" in this category. The issue of inadequate testing was also a concern of Lombardi (1998), who found that (with the advent of the year 2000, when he wrote his article) a looming problem was the prevention of bugs making their way back into remediated software. This article subsequently pushed for tighter project management and a stronger testing ethic.

A severe example concerning the lack of testing in the ERP context was the FoxMeyer case (Scott, 1999). The ERP implementation was disastrous, and although this was largely attributed to being a management failure, the issue of testing was connected to the decision not undergo a phased implementation approach. Because of this, pre-implementation testing was inadequate. The implementation teams did not test transaction input thoroughly.

A similar issue reported by Chang (2002) was: *Issue 13 – Inadequate system testing left many errors in the implemented system*. From this issue, one observation was that *'Testing was undertaken in a "perfect" environment and in some situations, inadequate testing was conducted. Each of the functional/process teams did not spend enough time on the many SAP integration/development points until the Testing phase – which caused a lot of rework. More attention should be paid earlier in the project"*.

Chang (2002) found that the reasons for this were largely due to a rushed implementation to meet schedules and deadlines. In an effort to meet the 'go-live' dates, many problems were left to be "fixed later". As a result, many users of the system found that erroneous transactions and application failures occurred because of insufficient testing. Putra (1998) calls "the need to test the new system so that it meets the users and business requirements" a necessity. Dhaheri (2002) also reported

inadequate testing in his study of ERP in Abu Dhabi. He noted that even though a lot of time was spent on data gathering, testing and customising, there were still some forms and reports that needed to be redesigned.

In his research, Roy Chan (2003) suggests that for test procedures, an effective measure is having users highlight what business needs are not met and have the technical team modify the system accordingly. This reinforces the point of cooperation and communication being crucial to testing phases of project implementations as well as other facets of project implementation and management.

Strategic vs. Operational

Strategic staff ranked this issue about halfway (17th) in the set of 37 issues. They recognize it as important because it affects data integrity. On the other hand, given a choice between thorough testing and meeting project deadlines, there are indications from the respondents that meeting go-live deadlines was considered more important. A point made by Vayo, an executive from CorpTech (transcript) noted that when he was with CSA (see Chang's (2002) study) and implementing the human resources component of the ERP implementation, he went to great lengths to postpone the 'go-live' date to ensure adequate testing. This action differed from when the initial ERP financials component was implemented, and the system went live with insufficient testing (Chang, 2002).

For operational staff, however, the issue of inadequate testing is ranked 8th, in the top quartile of the rankings. Poor testing, the resultant subsequent rework and system problems impact directly on the operational staff.

Client vs. IP

Client staff ranked this issue 7th while IP staff ranked it 14th. System problems and rework that result from inadequate testing impact more upon Client staff than IP staff. The difference in rankings, however, indicates dissent on its importance.

Overall this issue is ranked thirteenth, putting it into the second quartile of rankings. The agencies that ranked testing most highly were DETIR and Transport. DETIR did not use an implementation partner for its ERP project. The Transport ERP project was the first in Queensland Government, and one of the first government ERP implementations for SAP worldwide. While these two situations might be reasons for their respondents to rank this issue highly, it is more likely that the insufficient testing arose from decisions by individuals who were inexperienced in projects of this type.

E.4.6 Issue 13: The change management process has been mismanaged.

Table E.33 – Issue 13: Summary descriptive statistics

Issue No:	13	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		17	18	15	7	16	20
Mean		4.26	3.93	4.49	4.50	4.33	4.15
Std Dev		2.10	1.99	2.20	2.38	2.10	2.10
Major Issue Category:		(Factor 1) Poor management of the implementation project and processes.					

The respondents who rated this issue perceived that "The importance of change management was under-estimated OR the change management effort was under-resourced" (Round Three Survey Instrument).

This issue was synthesised from 11 issues identified by 11 respondents (3 IP and 8 Client respondents; 6 Strategic and 5 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

On the issue of the "change management being under-estimated":

> **Issue:** *Change management.*
>
> **Description:** *Change management had a minor role in the implementation process considering the magnitude of the changes being introduced.*
>
> **[Reported by: Client/Strategic - Health]**

On the issue of "the change management effort was under-resourced":

Issue: *Change Management.*

Description: *The whole process of change management was poorly considered, under resourced and not comprehensive. It appears we took a strategic decision to train based on the project teams understanding of SAP and its functionality rather than buying in the expertise to five a much wide appreciation .In short more time required, more money needed.*

[Reported by: Client/Strategic - DETIR]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

There was insufficient consultation and training to manage the change.

[Reported by: Client/Operational - DETIR]

Change management was not allowed to take place. Government agencies are, generally, unaccepting of broad (and quick) change. This principle was enforced by management's lack of ownership on this issue.

[Reported by: IP/Operational - PWC]

Our process was managed well.

[Reported by: Client/Strategic – Public Works]

Discussion

Change management is a skill to help effectively implement change and thereby reap the proposed benefits (Thomas, 2000, p. 1415). Project and change management strategies are, according to Thomas (2000), a genuine necessity for all managers in any business environment. Having change management skills enables "change aligned to a project to be implemented with less resistance."

Change management is a critical success factor for ERP projects (Brown and Vessey, 1999). Scott (1999) came to a similar conclusion after studying the

implementation of SAP at FoxMeyer. She concluded that FoxMeyer's inadequate system of change management policies and procedures contributed to its ERP project failure and subsequent bankruptcy.

Al-Mashari (2000) sees the SAP R/3 system as an enabling tool for crucial changes to the business process. Al-Mashari (2000) cites Cooper and Markus (1995) who define "change management in the R/3 context … as involving all human, social-related and cultural change techniques needed by management to ease the transition to and minimise organisational resistance of the new R/3 environment" (Al-Mashiri, 2000, p. 977). As part of strategic planning (which also encapsulates gap analysis and project strategies), Al-Mashari (2000) speaks of the importance of change justification. Change justification is a process that consists of developing taxonomies of benefits that can reflect the advantages and disadvantages that R/3 may have on the organisation.

Al-Mashari also cites a major contribution by Clark and Garside (1997) who developed and empirically validated a best practice model for change management, which consists of the following five facets:

- *Commitment* – covers recognizing the level of change needed, ownership, and the provision of adequate resources;
- *People* – relates to the social and cultural aspects of change;
- *Communication* – covers issues related to internal and external communication;
- *Tools and Methodology* – relates to training, education and other tools necessary to ensure effective and smooth change; and,
- *Interactions* – synchronizes changes with other operations happening in the organization.

In his study, Chang (2002) did not report the mismanagement of the change process but he did note the intensity of change within the Queensland Government context in his *Issue 38 - Timing of implementation was inappropriate because of change*

underway in the public sector. The timing of the ERP project, which coincided with other changes, was a source of frustration.

Putra (1998) discussed in-depth the relevance of change management to ERP implementation success. He gives two reasons why change management is important in ERP projects: (1) The introduction of ERP software packages is a result of dissatisfaction with the current situation or a realisation of new opportunities which can be gained; and (2) These changes are reactive (environmental pressures and a need to understand the nature of change) and anticipatory (anticipation of future pressure and focus of attention on achieving change). Bancroft (1996, p. 67) suggests that to be successful in an ERP project one must ensure the project manager is capable of negotiating equally between the technical, business, and change management requirements. Vayo et al. (2004) suggest change management must be supported by business commitment and business support and decision making suggesting a connection to the issue of executive support. Dhaheri (2002) and Chan (2003) both noted a connection between good communication practices and success in change management.

Strategic vs. Operational

The operational and strategic respondents ranked this issue 16th and 20th respectively indicating general consensus on its importance.

Client vs. IP

IP staff, however ranked this issue 7th, much higher than client respondents who ranked it at 15th. It is possible that the prior experience of the IP staff gave them a better appreciation of the importance of change management in an ERP project and perhaps a better basis to judge the change management processes transpiring in the agencies. While in the Round One survey change management was viewed more negatively, in the Round Three comments, client staff tended to observe that the change management was being managed well.

It is interesting to note that Transport, the most mature agency implementation of SAP ranked this issue the highest.

This research suggests that change management is a complex issue and related to a number of other issues including executive commitment and communication to end-users.

E.4.7 Issue 11: SAP systems knowledge was lacking in the project team, consultants or the vendor.

Table E.34 – Issue 11: Summary descriptive statistics

Issue No:	11	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		18	17	16	15	19	18
Mean		4.26	3.94	4.48	4.22	4.29	4.21
Std Dev		2.18	2.07	2.26	2.24	2.13	2.26
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

Table E.35 – Issue 11: Respondent organisations' statistics with count > 4

Agency	Count	Mean	Std Dev	Minimum	Maximum
DETIR	30	5.67	1.92	1	7
Transport	28	4.39	2.25	1	7
Police	5	4.20	2.28	1	7
Education	11	4.09	2.02	1	7
Health	38	4.05	2.14	1	7
Emergency Services	5	4.00	1.87	2	6
Public Works	21	3.90	2.14	1	7
Corrective Services	8	3.88	2.53	1	7
Premiers	9	3.78	2.33	1	7
PWC	12	3.33	2.02	1	6
Tourism	5	3.20	1.92	1	6

The respondents who rated this issue perceived that "SAP systems knowledge was lacking in the project team, consultants or the vendor. There was a lack of available expertise about SAP in the project team OR in the consultants assisting the project OR from the SAP company personnel. At times, no-one implementing SAP could explain the impact of a configuration decision on the rest of the system" (Round Three Survey Instrument).

This issue was synthesised from 29 issues identified by 24 respondents (3 IP and 21 Client respondents; 10 Strategic and 14 Operational respondents) in the Round One survey. 5 respondents reported 10 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "Lack of available expertise about SAP in the project team":

Issue: *Support Services.*

Description: *Unqualified personnel supporting system implementation. People in these areas have little idea on functionality of system.* **[Reported by: Client/Strategic - DETIR]**

In relation to the issue of "Lack of available expertise about SAP in the consultants assisting the project":

Issue: *Implementation partner.*

Description: *Coopers and Lybrand was the implementation partner. I would have appreciated greater understanding of operator interface issues on their part, and also a greater emphasis on interpersonal skills and building relationships with EQ staff. They seemed to have a great propensity to saying "no you can't do that" or "that's a procedural issue that you will have to resolve". Also some of them just did not have adequate knowledge of SAP.*

[Reported by: Client/Operational - Education]

Issue: *Level of skilled SAP consultants.*

Description: *The SAP skills of consulting resources initially engaged by the Department were limited.*

[Reported by: IP/Operational – Deloitte Consulting]

In relation to the issue of "A lack of available expertise about SAP from the SAP company personnel":

Issue: *Help Desk*

Description: *The SAP help desk is understaffed and cannot answer all enquiries adequately. Users are contacting me directly to assist them with problems they are having and not the help desk.* **[Reported by: Client/Operational - Education]**

In relation to the issue of "At times, no-one implementing SAP could explain the impact of a configuration decision on the rest of the system":

Issue: *Pre Go-Live Implementation Partners.*

Description: *Having little/no understanding of the system and how it is going to impact on the end-users is frustrating in hindsight. A lot of trust goes with the Implementation Partners and I feel because the Implementation Partners are not "Government", some confusion was apparent about some Departmental procedures. Configuration decisions would have been made without the depart-mental representatives understanding what the impacts were or what options were available.*

[Reported by: Client/Operational – Public Works and Housing]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Totally ignored the effect of customisation on future support and upgrades.

[Reported by: Client/Operational – Emergency Services]

A big problem when we implemented as Premiers were early adopters. SAP skills are now readily available and so not an issue anymore.

[Reported by: Client/Strategic - Premiers]

As most agencies use SAP the pool of available resources is increased, and system knowledge is improving over time.

[Reported by: IP/Operational - PriceWaterhouseCoopers]

Discussion

This is a key knowledge management problem in ERP and other IS implementation projects. Jiang and Klein (2001) found that lack of project team expertise and lack of team expertise within individuals was a significant risk in software projects implementation. After studying SAP R/3 software projects, van Slooten and Yap (1999) reported lack of knowledge, experience and skills of the R/3 reference model as an impediment for project teams.

A more pronounced example is in the FoxMeyer case investigated by Scott (1999). At the peak of the FoxMeyer ERP project, there were more than 50 consultants aboard, however, Computergram (1998) maintained that Andersen Consulting used the FoxMeyer project as a "training ground" for inexperienced consultants, and turnover was high. The lack of SAP knowledge resulted in project setbacks which, albeit were temporary, led to FoxMeyer claiming that SAP treated them as "guinea pigs".

Chan (2003) spoke regularly of the importance of consultants in ERP projects. He stated that, with ERP systems being complex IT applications, implementing them are knowledge-intensive tasks. Experience from a wide range of participants is needed, including business and IT departments, project managers within the organisation, and external consultants. The knowledge of the product residing within these individuals is an important factor in the successful completion of the ERP project.

Chang (2002) reported a similar problem in his study, *Issue 6: Shared knowledge among project team members was a problem – agency staff did not understand SAP and implementation personnel did not understand agency requirements*. From his evidence, it was clear that there was an absence of SAP knowledge among the project participants.

Dhaheri (2002) also uncovered major concerns regarding SAP knowledge inadequacy in his study on the implementation of the Oracle ERP system within the Abu Dhabi Government. One of his major issues was *Lack of Consultancy*, under which fell the sub-issue of: "*consultants were not capable of handling FMS*

problems, and it seemed as if they were working with Oracle Financial for the first time." This indicates that consultants in the project team had inadequate ERP knowledge. This was exacerbated by his reported issue *Lack of Sufficient Knowledge and Knowledge Management*, which reported that the finance department employees, who had knowledge of the client processes, had little or no understanding of Oracle functionality. Furthermore, there was a shortage of staff that had experience with Oracle Financials.

Strategic vs. Operational

The strategic and operational respondents ranked this issue 18th and 19th respectively demonstrating a consensus between the two cohorts.

Client vs. IP

The Client and IP respondents also agreed on the importance of this issue with ranks of 16th and 15th respectively.

The agencies ranked this issue around the centre of the Likert scale with DETIR ranking it more highly that the rest. DETIR tends to report high rankings across most of the issues, reflecting their very troubled implementation project. The IP firms did not rank this issue highly.

The historical recount in Chapter 4 talks about how the demand for SAP consultants drove the consulting firms to offer large salaries to anyone with SAP R/3 experience. They recruited trained staff from FISB, and anywhere else they could, to supply sufficient staff for implementation projects. To counter this, the Queensland Government offered a salary 'top up' to keep experience SAP staff within agencies. Even with these strategies in place, the problem was that SAP was a complex product and knowledge of its workings was a scarce resource for several years in the mid 1990s. It wasn't until staff had worked through a complete implementation and agencies had the systems functioning, that people gained sufficient experience and knowledge to be proficient in implementation projects. The Round Three comments above support this notion with the general observation that this was once a problem but it isn't any longer.

This issue indicates that the knowledge requirements to support a series of implementation projects of this complex system, were not taken into account in any initial strategy. Knowledge management was not a mainstream issue until the late 1990s; consequently there was little guidance on this kind of knowledge risk when planning commenced in the early 1990s.

E.4.8 Issue 20: The project suffered from individual or team lack of knowledge of the organisational context.

Table E.36 – Issue 20: Summary descriptive statistics

Issue No:	20	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		20	20	21	11	21	22
Mean		4.18	3.86	4.25	4.28	4.22	4.11
Std Dev		2.01	1.90	2.06	2.02	1.93	2.16
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "The individuals in the project team AND/OR the team as a whole did not fully grasp/understand the business requirements of the organisation leading to poor configuration and design decisions. Project team members did not have sufficient expertise in certain areas to configure and implement the system properly" (Round Three Survey Instrument).

This issue was synthesised from 31 issues identified by 27 respondents (7 IP and 20 Client respondents; 11 Strategic and 16 Operational respondents) in the Round One survey. 3 respondents reported 7 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "The individuals in the project team AND/OR the team as a whole did not fully grasp/understand the business requirements of the organisation leading to poor configuration and design decisions":

Issue: *Incorrect Business Processes.*

Description: *Business Process Blueprints prepared for design of system did not accurately reflect the Departments Business. Some Business Analysts employed from within Department may not*

have had appropriate skills to develop these blueprints for system design. **[Reported by: Client/Strategic - DETIR]**

Issue: *Agency personnel involvement in Implementations.*

Description: *Agencies should ensure they that provide sufficient resources for implementation projects (as opposed to relying on Implementation Partner resources). This will ensure a) greater buy in into the final solution; and b) up skilling of agency resources. These resources need sufficient knowledge of existing business processes and have the ability to make decisions; and or know the appropriate people to contact. Where possible, the agency personnel should not be contractors!*

[Reported by: IP/Operational - Accenture]

In relation to the issue of "Project team members did not have sufficient expertise in certain areas to configure and implement the system properly":

Issue: *Lack of knowledgeable staff on Design team.*

Description: *The project tasked with implementation of SAP into our Department did not contain enough staff with expert knowledge in each area. Therefore as a result it was frustrating for us expert staff who had to explain how it should work to those getting paid a fortune to actually design the workings.* **[Reported by: Client/Strategic - DETIR]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

It appeared there was a lack of knowledge of reporting and end user requirements.

[Reported by: Client/Operational - DETIR]

This occurred and is occurring in module specific areas.

[Reported by: Client/Strategic – Public Works and Housing]

The main consultants were fresh off the plane from Canada and knew nothing about Queensland, Queensland Government or the Department yet would not listen to and blamed Department staff for many problems experienced.

[Reported by: Client/Operational - Transport]

Discussion

Chornoboy and Gardner (1990) refer to lack of knowledge of the organisational context as a major problem area, and, coupled with the inability to admit this knowledge inadequacy, causes more issues than any other factor. They state that the source of this problem is usually on the client side in the case of mixed project teams, especially when the client does not admit there is an absence of knowledge of their own business processes. Another decisive element of ERP implementation success or failure is related to the knowledge, skills, abilities, and experience of the project manager and to the selection of the right team members, who should not only be technologically competent but also understand the company and its business requirements (Kapp, 1998).

Similarly, van Slooten and Yap (1999) found that with the SAP context in particular, a lack of clarity and stability within the organisation might be problematic during ERP implementation, as the R/3 system will have a massive impact on business operations after implementation. It is important for the organisation to understand the extent of this impact, and to know exactly what the business does. This clarity and stability consists of goals, needs and requests of the users, and a sound specification of the functional requirements (van Slooten and Yap, 1999). In the case of consultant use, an effective communication channel can also help address these dilemmas (Chornoboy and Gardner, 1990).

Murray and Coffin (2001) identified a commonly cited critical success for ERP implementations in their *Factor 2: Business Processes/Rules are well understood and functional requirements built from these processes are clearly defined before selecting an ERP product.* ERP project abandonment frequently occurs when the system does not match current business practices (Koch et al. 1999). To establish a

company's business processes and rules, Jenson and Johnson (1999) recommend using business modelling techniques, documenting business events, identifying tasks and who performs them, and diagramming the flow of information, as well as conducting a gap analysis comparing current practices with those provided by the ERP system.

One of SAP's strengths is the existence of standard 'common practice' process models. The SAP R/3 software directly supports these pre-defined models. The further one diverges from these process models, the more customisation and configuration work is required. In several issues reported in this study, commentators espouse the wisdom of minimal customisation. They suggest it is better to redesign the organisation's processes to the software process models. In example, Somers and Nelson (2001) maintain an ERP system alone cannot improve organisational performance. To achieve the greatest benefits provided by an ERP system, it is imperative that the business processes are aligned with the ERP system (see also Sumner, 2000).

However, this does not mean that the design effort should ignore the existing processes altogether. Common practice process models will not necessarily meet the needs of every organisation. The redesign effort, therefore, cannot over rely on these process models. One respondent reflected this position by noting *"The system designed seems to have been driven by what consultants knew about SAP rather than what they knew about our Department."*

At the same time, to work within, or partially manage a cross-functional business process does not necessarily mean that you understand it. The best way to understand fully a process is to map it but this takes interviewing expertise, the right tools and the ability to stand back and see what is really happening. After the mapping of the current state of the process, one can start the redesign process towards a future state. To be fully effective, those involved in redesign require both intimate knowledge of the organisational process AND detailed SAP knowledge, the latter preferably on a practical level. Another issue (*11*) has already described how *SAP knowledge was lacking in the project team, consultants or the vendor.* The

combination of a lack of organisational context, and lack of SAP systems knowledge within the project team, coupled with *Issue 3 The project team did not consult or communicate effectively* contributed to substandard design and configuration.

Chang (2002) combines the points expressed in Issue 15 (this issue) and Issue 11 (*SAP knowledge was lacking in the project team, consultants or the vendor)* when reporting a similar issue in his preliminary study: *Shared knowledge among project team members was a problem – agency staff did not understand SAP and implementation personnel did not understand agency requirements.* Chang (2002) reports that problems occurred during implementation decision processes when the agency staff did not have sufficient knowledge of how SAP worked and implementation partner staff did not have sufficient knowledge of the agency requirements. Further, whereas skills transfer was a prime objective of the implementation project, the research found that knowledge sharing within the project team was problematic (similarly reported in Issue 3 of this study).

In his research, Putra (1998) identified the following: *Issue 16 - Gap analysis issues and business requirements identification and resolution.* He defines gap analysis as the process of identifying business requirements to be addressed by the new system. He includes in this analysis the acquiring of knowledge of the organisational context and discovery of its business requirements. Putra also discusses appropriate Architecture and Infrastructure establishment by the client organisation to ensure that the business is equipped for the new system, is aware of organisational capabilities in this regard, and can handle any future expansions.

A major problem area identified by Dhaheri (2002) was *Lack of sufficient knowledge of the organisational environment*. In his study, the issue manifested itself through the consultant in charge of the Oracle project having no government ERP implementation experience in UAE. Again, respondents believed this contributed to a substandard outcome.

Chan (2003) identified this need for knowledge of the organisational context. He categorised this in his ERP knowledge model as Business Knowledge; in particular, *organisational knowledge, like business process management, communication*

policies, or document management; and *educational knowledge and knowledge about enterprise culture, social norms and behaviours*. He goes on to state that *Business knowledge is often a prerequisite for the exploration and appreciation of software functionality*.

Strategic vs. Operational

There was consensus between these two cohorts on this issue. The strategic respondents ranked this issue 22nd while operational respondents ranked it 21st.

Client vs. IP

There was dissent between the client and IP respondents on this issue. Clients ranked this issue 21st while IP respondents ranked it 11th. It is possible that IP respondents saw this issue as being aimed at their lack of knowledge of the organisational context.

It is easy to assume that IP staff are the cause of this issue but that is not necessarily the case; as mentioned earlier, simply because a client staffer has worked within a process does not mean that they can adequately describe it or represent the needs of the organisation.

It is the role of the IP to put in place mechanisms to elicit the business requirements from the client and configure these into the ERP. If this process breaks down because their elicitation techniques are flawed, then the IP is to blame. If, however, the IP elicits the requirements in good faith from a client representative, but the client staffer misrepresents the process design needs, the process configuration will be flawed.

This is a complex issue and strongly tied up with other issues such as SAP knowledge was lacking in the project team, consultants or the vendor and The project team did not consult or communicate effectively. In the development of a successful configuration of an ERP, there are many potential points of failure. Project managers and client executives must be cognisant of these if they want to ensure success in ERP projects.

E.4.9 Issue 33: The SAP system suffered non-acceptance, non-use or lack of ownership.

Table E.37 – Issue 33: Summary descriptive statistics

Issue No:	33	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		23	23	25	6	22	27
Mean		4.08	3.75	4.05	4.50	4.15	3.96
Std Dev		2.01	1.88	2.17	1.92	2.04	1.98
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "Users did not accept the system OR did not use the system OR were fearful of using it. Some staff tried to avoid it OR disown it" (Round Three Survey Instrument).

This issue was synthesised from 22 issues identified by 18 respondents (12 IP and 6 Client respondents; 7 Strategic and 11Operational respondents) in the Round One survey. 4 respondents reported 8 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *User Acceptance of new procedures.*

Description: *Flowcharts developed, new forms developed but not used.*

[Reported by: IP/Operational - OFST]

Issue: *Not enough ownership from the users.*

Description: *Often the users did not like the change or did not want to learn the new methods of doing things. As a result a lot of support was required and some functionality (specifically workflow) became redundant because users simply didn't want to or refused to use it as it should be.*

[Reported by: IP/Operational - Accenture]

Issue: *Inability to establish and bed down a Support Structure prior to 'go-live'.*

Description: *Due to the change in Government and the Public Service employment structures it was impossible to get an agreed Support Structure in place prior to Go Live. This meant that we could not adequately upskill/knowledge transfer to the Support Team, because we didn't know who they were!!! This also reduced the incentive of Agency Personnel to take ownership because they did not know if they were going to be supporting it or not, so they had no incentive to learn/take ownership prior to being told they would be in the Support team. This Agency also decided to split the Support Teams into one dedicated to Financials (and situated and owned by Finance division) and another Support Team for the other SAP Components (which reported via the IT Division). This led to communication problems, finger pointing and confusion over responsibilities.*

[Reported by: IP/Strategic - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Initially rejection post-go live. Mods and hardware upgrades have alleviated this.

[Reported by: Client/Strategic – Public Works and Housing]

It usually doesn't gain wide acceptance at least not initially.

[Reported by: IP/Operational - PWC]

This was well managed.

[Reported by: Client/Strategic - Health]

Discussion

Lauer and Rajagopalam (2002) note that resistance or non-acceptance toward a new system and its usage has long been a problem for successful IS projects. The success of new systems lies with individual users, who react in different ways to technology.

They conducted a case study (Lauer and Rajagopalan, 2002) on the implementation of a new product tracking system at a major auto manufacturer. Although the system was integrated to overcome certain functional inadequacies, users resisted it due to issues such as lack of trust in the system; lack of knowledge of the system; fear stemming from prior experiences with the system; and, the fact some employees had short times left before retirement, and so never adopted the system. Lauer and Rajagopalan (2002) state that to counteract user resistance, it is necessary for implementers to develop an understanding of that resistance and develop strategies to overcome it.

Tetlock (1999) gives six types of user resistances: (a) voiced objection; (b) decision avoidance including buck passing, procrastination and obfuscation; (c) corner cutting such as work-arounds; (d) sabotage i.e. active efforts to subvert the intent of the implemented program (e) exit from the organisation and (f) grudging compliance.

Stewart (1998) found in a study of IT executives that many business unit managers were part of the problem of non-acceptance of a new system by promoting lack of ownership. One comment was the following: "*As a business person who has become an IT manager, I can see it from both sides – the resistance of the business to take ownership of the opportunities and then apply the resources needed for success*" (p. 130). Stewart suggests that for system acceptance and ownership to be taken seriously there needs to be an effective relationship between business managers and IT managers.

Putra (1998) explores the issue of non-acceptance at the user level and suggests that it helps to have users involved in the selection and implementation the software package. He states that "*Having users involved in the implementation process is that it promotes the new system and increases the systems acceptance*".

Strategic vs. Operational

Strategic and operational cohorts ranked the importance of this issue 27th and 22nd respectively, indicating a consensus on its significance.

Client vs. IP

The client and IP respondents disagreed on its importance. Clients ranked this issue 25th while IP staff ranked the issue 6th most important. It is the role of IP staff to be involved in the ERP project but eventually they will leave the organisation and move to another project. Ideally, a successful project outcome would be that client staff adopt the system implementation that the IP staff have worked so hard to configure. Clearly, evidence of non-acceptance or lack of ownership by the client staff would be somewhat frustrating to IP staff who may interpret this as a rejection of their effort and advice.

IP management know the importance of ownership and acceptance of systems as important markers of implementation success. Lack of ownership by management can lead to non-acceptance by operational staff.

A related issue is the training provided to operational staff after 'go-live'. The respondents suggested lack of training and the consequent lack of knowledge in the users on how to use SAP contributed to their going back to their old ways. As discussed previously, Szulanski (1996) refers to a knowledge recipient's ability to retain transferred knowledge through institutionalising its use as *retentive capacity*. If this ability is lacking then difficulties in integrating knowledge may result in failure to persist in using it and even reversion to the status quo (Szulanski, 1996). Szulanski (1996) confirmed lack of recipient retentive capacity as a cause of stickiness and argued that overcoming this barrier may require unlearning routinised use of prior knowledge. A study by Timbrell et al. (2001) confirms that retentive capacity is an issue in the post go-live (Up and Running) phase of this ERP context.

E.4.10 Issue 14: The data conversion was inadequate

Table E.38 – Issue 14: Summary descriptive statistics

Issue No:	14	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		25	27	27	27	27	24
Mean		3.95	3.59	3.84	3.67	3.93	4.00
Std Dev		2.14	1.94	2.24	2.43	2.08	2.25
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "Lack of data preparation has led to inaccuracies, items in suspense accounts and errors in the SAP system. Data was not cleansed properly prior to uploading to the new system" (Round Three Survey Instrument).

This issue was synthesised from 10 issues identified by 9 respondents (2 IP and 7 Client respondents; 2 strategic and 7 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Non Current Assets.*

Description: *Millions of dollars of non current assets have been put into suspense accounts due to many reasons, one of which was the uploading from the old SAP/R3 to the new version.*

[Reported by: Client/Operational - DETIR]

Issue: *Legacy systems and data.*

Description: *The quality of the legacy data caused significant problems during the implementation, primarily in data definition, and conversion.*

[Reported by: IP/Operational - Accenture]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Always a challenge when converting from a number of different systems and structures.

[Reported by: Client/Strategic - Premiers]

Legacy data, which was adequate for a stand alone system in most cases, was deficient for corporate use. Users had a distorted image of the quality of their legacy data & found it difficult lose their "own" data. Adherence to a

cataloguing standard (no brand names or colloquials in short name) difficult for some users.

[Reported by: Client/Operational - Health]

Data seems to have migrated well.

[Reported by: Client/Operational]

Discussion

ERP project personnel face difficult technical issues when transferring data from one system to another. Often, there is not a one-to-one match between the data structures in these disparate systems. Furthermore, the format of individual data fields can differ, as can pre-production verification tests. Relatively clean data in one system can become sullied data in another. Complicating the situation for Anglophones, the data fields in SAP are meaningfully named, but in German.

In a research study of risk assessment for ERP systems amongst Big 5 firms, Wright and Wright (2002) discovered that among the 30 participants they interviewed, 18 percent said that poor data conversion was a problem in the aftermath of implementation. Respondents indicated that project teams performed data conversions inadequately.

A possible explanation for this data conversion issue comes from Nelson (2002), who states that, while high quality data is at the forefront of many organisational initiatives in the information age, a number of companies still assign low priority for data quality investments. In support of this assertion, Nelson quotes PriceWaterHourseCoopers (2001) who state that data management is "addressed at the wrong level, in the wrong place, and in the wrong way across too many corporate organisations" (PriceWaterhouseCoopers, 2001, p. 16). Other explanations for data quality inadequacy given by Nelson are: data quality problems are unknown or remain ignored (Khalil and Harcar, 1999), poor data quality may well be the norm rather than the exception (Redman, 1995) and that smaller IT units may lack adequate resources to back data quality initiatives. Eckerson (2002) states that a consequence of inadequate data conversion has the possibility to hinder

companies at the strategic level, through making it difficult to initiate strategies such as data warehousing, customer relationship management (CRM) and e-business. To address this issue, Nelson (2002) developed a conceptual framework for Data Quality Management adoption and implementation, relating to three environmental factors, being the Industry Environment, Organisational Environment and the IT Environment.

Chang (2002) reported a similar issue in his study: *Issue 18 – Errors were found in data converted from former QGFMS*. Here, the errors from the old system, transferred to the new ERP system, impacted upon the organisation. One respondent stated: *Cleansing and converting vendor master data became an issue due to the greater number of shorter fields facilitated in SAP compared with the old QGFMS data created some confusion in GL accounts, assets, and costing (controlling).*

Putra (1998) also broaches the importance of data transfer and conversion as a key facet of successful implementation. He states that *"Data conversion is needed because the different types of data stored in the old system contain a range of data that would be time consuming to re-enter to the new system, and data in the old system may have been validated and conversion process will eliminate typing errors"*. This is also supported by Taylor (2004) who identifies data conversion as a significant risk factor in vendor-driven IT projects.

The issue of erroneous data integration was also uncovered by Dhaheri (2002) in his assessment of Oracle Financial implementation in a financial department. While the Oracle ERP was being implemented, several errors in data conversion were found in the integration with in-house software.

While certainly an important IT issue in moving from legacy systems to new ones, data conversion was ranked overall at the bottom of the third quartile of issues at 25th. Interestingly, the organisation that ranked it highest was Accenture (Mean 5.33) while PWC ranked it much lower at 2.83 (Mean). DETIR, an agency that had many troubles in its implementation also ranked this issue highly.

Strategic vs. Operational

The strategic and operational cohorts tended to agree on the importance of this issue ranking it at 27th and 24th respectively. While aware of the issue, the number of people directly affected by it would be minimal, being those responsible for accounting reconciliations and those mapping the data fields from one system to the other in the design phase. Ultimately, personnel would see this issue as resolvable.

Client vs. IP

Similarly, client and IP staff agreed on the ranking of this issue, both putting it at 27th. Again, the staff would ultimately see this issue as passing in the short term.

The importance of this data conversion issue depends on the systems function. For example, project teams would take more care with data conversion in payroll and human resource systems because mistakes are more likely to be noticed by the system's customers. In essence, each employee audits a payroll system continuously. For a debtors system, however, the mistakes are more likely to be addressed when a debtor's balance is increased erroneously. If one's debt decreases, the debtor may not inform the organisation.

E.4.11 Issue 23: The configuration of SAP was inadequate.

Table E.39 – Issue 23: Summary descriptive statistics

Issue No:	23	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		27	24	24	25	26	29
Mean		3.90	3.66	4.12	3.72	3.94	3.85
Std Dev		2.09	1.98	2.07	2.47	2.09	2.09
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "The configuration of SAP did not accurately reflect the business process OR need of the organisation and could have been improved" (Round Three Survey Instrument).

This issue was synthesised from 17 issues identified by 15 respondents (3 IP and 12 Client respondents; 7 Strategic and 5 Operational respondents) in the Round One survey. 2 respondents reported 4 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Help Desk.*

Description: *Although the operators go out of their way to help they are also wading through a system which should never have been released in the state it was. It wasn't even close to being useable.*

[Reported by: Client/Operational - DETIR]

Issue: *Incorrect Business Processes.*

Description: *Business Process Blueprints prepared for design of system did not accurately reflect Departments Business. Some Business Analysts employed from within the Department may not have had appropriate skills to develop these blueprints for system design.* **[Reported by: Client/Strategic - DETIR]**

Issue: *System configuration.*

Description: *Perhaps as a result of the rushed implementation, there are question marks over whether enough time was spent in investigating options for the configuration of the system to best meet Queensland Health's needs.*

[Reported by: Client/Strategic - Health]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Configuration of Inventory Management & Controlling within the project - not adequate.

[Reported by: Client/Strategic – Emergency Services]

Due to lack of senior management input.

[Reported by: Client/Strategic - DETIR]

This was due to conflicting Strategic directions.

[Reported by: Client/Strategic - DETIR]

Discussion

The inadequacy of the configuration in this study is a SAP specific issue. It is only after the design has been completed and the system released that agency personnel see the effect of configuration decisions on the final outcome. What becomes clear to the implementing agency is that many basic configuration decisions are irreversible without a full re-implementation of the system. This realisation of configuration inadequacy results in 'finger pointing' at those responsible for the design. Given the other points arising from this study, such as the fact that few or no SAP experts really understand the effect of configuration decisions across modules, and the problems with the project teams not listening to the concerns and requirements of some operational staff, this issue is probably another expression or manifestation of other issues in this study.

Strategic vs. Operational

Strategic and operational respondents tended to rank this issue similarly at 29th and 26th respectively.

Client vs. IP

The client and IP cohorts were also in agreement on the importance of this issue ranking it 24th and 25th respectively.

One may speculate that this issue reflects a maturation of understanding of the SAP environment by agency personnel. This understanding would arise from their new familiarity with the SAP oriented process of design, and a more formalised view of the agencies processes and functional requirements. It is interesting to note that Accenture ranked this issue highest of all organisations surveyed, followed by DETIR. DETIR had many problems with their implementation throughout all phases. Eventually DETIR did reconfigure SAP in a major reimplementation project.

E.4.12 Issue 22: There was poor executive or project management of the SAP project.

Table E.40 – Issue 22: Summary descriptive statistics

Issue No:	22	Overall rankings using mean of		Perspectives			
		Maximums	Means	Client	IP	Operational	Strategic
Rank		30	30	23	8	28	33
Mean		3.78	3.52	4.17	4.39	3.93	3.52
Std Dev		2.10	1.96	2.16	2.20	2.07	2.14
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "The overall departmental implementation process was unsatisfactory OR Implementation strategies were unclear OR The project is still experiencing problems as a result of initial poor project and executive management OR Senior consultants under-performed" (Round Three Survey Instrument).

This issue was synthesised from 32 issues identified by 23 respondents (7 IP and 16 Client respondents; 12 Strategic and 11 Operational respondents) in the Round One survey. 7 respondents reported 16 separate issues assigned to this category.

Some examples of these reported issues follow.

In relation to the issue of "The overall departmental implementation process was unsatisfactory":

Issue: *Both stages of the implementation have been poorly executed.*

Description: *The implementation of the new system over two financial years has lacked organisation and been poorly managed. The system was not adequately tested and debugged before introduction.* **[Reported by: Client/Strategic - DETIR]**

In relation to the issue of "Implementation strategies were unclear":

Issue: *Managing scope of the Project.*

Description: *Project scope was constantly "evolving" instead of being fixed.* **[Reported by: Client/Operational - DETIR**]

In relation to the issue of "The project is still experiencing problems as a result of initial poor project and executive management":

Issue: *Lack of commitment of head office staff to fixing problems*

Description: *Issues raised are not being resolved. The standard answer seems to be that they are "aware of the problems" - we need resolution – we are all well aware of the problems!!*

[Reported by: Client/Operational - DETIR]

On the issue of "senior consultants under-performed":

Issue: *Quality of external consultants*.

Description: *The implementation at DETIR has been plagued by poor performance of the external consultant, and contractors employed by the consultant. Lack of ANY supervision of the initial contractors from Seatac in Sydney by the consultant (Harte Shepherd and Long) led to them being dismissed by the project manager. Although the second group of contractors (from Brightstar) were better, this level of performance, particularly by Harte Shepherd and Long staff, has continued throughout the project.*

[Reported by: Client/Strategic - DETIR]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Budgets blown out to the extreme and staff expected to make up for poor management. Work delivered way beyond financial and human resource budgets. In some cases very poor risk management and no Project Management whatsoever. No post-Project review to determine that some managers should not be Project Managing and these same managers have the experience and are put in charge of the next Project; regardless of their previous performance. No ability to look to other staff who may be more

capable of Project Managing. Very little direct involvement from Qld Transport management.

[Reported by: Client/Operational - Transport]

It was never going to be a good situation to have a Programmer with extremely limited communication skills and no ability to look beyond the system and consider the end users and did not care once they had left the Project – these people managing the Project out of a book. Way too easy to blame Department staff for their mistakes.

[Reported by: Client/Operational - Transport]

Project fully implemented on time and within Budget.

[Reported by: Client/Operational - Health]

Discussion

The vast combination of hardware and software and the myriad of organisational, human and political issues make many ERP projects huge and inherently complex, requiring new project management skills (Ryan, 1999). In its global project management survey, KPMG (2005) found that poor project management processes and lack of executive sponsorship and management buy-in were two significant factors which contributed to IT project failure. KPMG also note that only 51 percent of boards surveyed in their study were aware of project risks and benefits. Additionally, only 20 percent of organisation executives have a basic level of awareness of risks and benefits.

Taylor (2002) mentions that the "number one reason" for many project failures is a lack of leadership. He states that effective leadership consists of being able to communicate corporate goals and inspire a shared vision. If top management does not share the vision with those involved in the project, the project will subsequently fail.

Chang (2002) reported a similar issue in his ERP study: *Issue 27 - Lack of leadership at senior levels*. One respondent from his study stated "*The process of new system implementation was led by relatively unknown accountants. Little or no*

responsibility ownership at the highest levels. From middle management down, there was not enough ownership generated for the agency to undertake a proactive role in preparing for the micro changes that were to take place".

Putra (1998) also cites the importance of executive steering committee and team leaders as crucial components of team structure in ERP implementation projects and Nah and Lau (2001) ranked project management as the fifth most critical factor to ERP implementation success.

In Chan's (2003) study of ERP lifecycle knowledge management, he lists project management knowledge as one of the required types of knowledge needed in an ERP context. Chan defines Project Management Knowledge as including the management of human resources, time and cost to accomplish the objectives of a project; and the planning, organising and controlling a project with various time and cost constraints.

In this study the respondents referred not only to poor project management but also poor management by the executives who directed the project managers. Respondents cast blame upon executives for hiring poor project managers and consultants.

Strategic vs. Operational

The strategic and operational cohorts tended to agree on the ranking of this issue, placing it 33rd and 28th respectively in the fourth quartile.

Client vs. IP

There was dissent, however, between the client and IP staff on this issue. IP staff ranked this issue 8th while client staff ranked the issue 23rd. This is an interesting result because often IP staff were responsible for project management in conjunction with the client personnel. By ranking this issue highly it suggests that they would be referring to client project management and executive management shortcomings; it being unlikely they are referring to their own performance. This finger-pointing had been referred to in Chang's (2002) study. A similarly interesting result in this issue analysis is

that the organisation that ranked this issue the highest was Accenture, an IP firm.

It is not surprising that the issue was ranked highly by DETIR. DETIR had a problematic ERP implementation project and eventually had to call in consultants to redesign and re-implement SAP. A key point from their implementation is that they did not use a large consulting firm as an implementation partner, but rather hired individual project managers and contractors. The comment from DETIR above is telling, describing the lack of oversight by the executives and consultants in central coordination roles.

E.4.13 Issue 32: Time management and planning was inadequate

Table E.41 – Issue 32: Summary descriptive statistics

Issue No:	32	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		33	33	29	9	29	32
Mean		3.69	3.41	3.74	4.33	3.76	3.57
Std Dev		1.97	1.84	2.05	2.06	1.95	2.00
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "The project ran out of time OR missed deadlines OR did not plan sufficiently OR rushed the work OR underestimated the time it would take to complete the project work" (Round Three Survey Instrument).

This issue was synthesised from 14 issues identified by 14 respondents (1 IP and 13 Client respondents; 8 Strategic and 6 Operational respondents) in the Round One survey.

Some examples of these reported issues follow.

Issue: *Implementation Timeframe.*

Description: *Insufficient time for initial implementation, resulting in re-implementation.*

[Reported by: Client/Strategic - DETIR]

Issue: *Legacy systems.*

Description: *Legacy systems required providing differently formatted and extra information in the change to accrual accounting. Delays from the legacy units were long and therefore "squashed" the project's timeframe.*

[Reported by: Client/Operational - DETIR]

Issue: *Timing.*

Description: *The strict timetable and schedule of District rollouts of SAP resulted in an inadequate timeframe for review of data prior to and post go-live periods. This applied also to the Corporate Cataloguing which often ended up being uploaded at the very last minute, with little or no verification prior to upload.* **[Reported by: Client/Operational - Health]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

This was due to lack of executive decision, not due to project management.

[Reported by: Client/Strategic - DETIR]

Far too rushed – The most important phase – the Planning was inadequate as a result.

[Reported by: Client/Operational - Transport]

Project fully implemented on time and within Budget.

[Reported by: Client/Operational - Health]

Discussion

Jurison (1998) believes that despite the fact that some projects fail because of technical reasons, most projects fall short because of poor management. Beneath this umbrella of management, Jurison (1998) lists several areas which can contribute to poor planning if not addressed effectively: project planning, project tracking and

control, change control, project leadership, and best practices. Time management is central to project management.

Morgenstern (2000, p.12) defines time management as an activity which consists of "identifying what's important to you, and giving those activities a place in your schedule, based on your unique personality needs and goals". According to Jurison (1998), IS departments are increasingly finding themselves at odds with rising pressure to deliver quality applications and software both on time, and within the allocated budget. Changing requirements that occur midway through a project are often caused by user uncertainty; what this results in is an industry where overruns in cost and late deliveries, bad reliability and user disgruntlement are becoming more frequent.

Chang (2002) identified a similar issue in his preliminary study: *Issue 11 - Requested system functionality was sacrificed in order to meet implementation deadlines.* In the CSA managed implementations, tradeoffs had to be made in order to ensure the project stayed on track, with one comment being the *"on-line requisitioning and outline agreement functionality… has not been used due to a number of factors e.g. timeline for implementation, price of licenses, and lack of resources"*.

Roy Chan (2003) also cited a similar issue as a meta-knowledge factor. He found that one of the most significant impacts upon effective ERP implementation is project management and specifically time management within project management. Putra (1998) mentioned the importance of doing a comprehensive risk analysis prior to an ERP implementation project. He draws project planning and time management together citing the risk of "*poor scope definition resulting in unscheduled project extensions"*.

Strategic vs. Operational

The strategic and operational cohorts ranked the importance of this issue similarly at 32nd and 29th respectively.

Client vs. IP

The Client and IP perspectives, however, differed radically with clients ranking the issue 29th in the fourth quadrant and IP staff ranking the issue 9th. It is not surprising that IP staff regards time management as important given that time is the basis of their profitability. For an ERP project, consulting firms will charge based on time. Even if the price charged to the client is fixed, internally the firm measures its profit based on the time spent by its personnel on the project. Any time overrun, borne by the consulting firm, represents a decay of their profit from the engagement. Therefore, consulting firms will tend to charge more for time delays attributed to the client; usually this is built into the contract. But time delays caused by the consultants or those they cannot attribute to the client represent a loss of profit.

Overall this issue was ranked 33rd but time management and planning is regarded differently by client and IP staff. Note that Accenture was the organisation that ranked this issue as the most important.

E.4.14 Issue 19: The staffing of the project team was mismanaged

Table E.42 – Issue 19: Summary descriptive statistics

Issue No:	19	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		37	37	34	16	35	37
Mean		3.39	3.11	3.54	4.17	3.59	3.04
Std Dev		2.01	1.83	2.21	1.95	2.06	1.87
Major Issue Category:			(Factor 1) Poor management of the implementation project and processes.				

The respondents who rated this issue perceived that "Inappropriate people were selected for and allocated to the project team. The selection process was flawed. People were chosen because they were available and not on the basis of their skills" (Round Three Survey Instrument).

This issue was synthesised from 17 issues identified by 15 respondents (6 IP and 9 Client respondents; 7 Strategic and 8 Operational respondents) in the Round One survey. 2 respondents reported 4 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Selection of Project Team Members.*

Description: *Perceived "flawed" selection process with a bias towards TAFE. Project team not representative of the Dept.*

[Reported by: Client/Operational - DETIR]

Issue: *Wrong people on the project team.*

Description: *Focused on systems skills in preference to business knowledge.* **[Reported by: IP/Operational - OFST**]

Issue: *Inappropriate agency personnel nominated as business process owners.*

Description: *After design decisions had been signed off by Agency nominated Business Process Owners and subsequently implemented, other individuals in the Agency then disagreed with the decisions. The nominated individuals continually fought against process change…which led to an increase in modifications to the software which in turn led to an increase in risk and workdays required to implement modifications.* **[Reported by: IP/Strategic - Accenture]**

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

This was due to lack of resource allocations to the team rather than mismanagement.

[Reported by: Client/Strategic - DETIR]

This is a very sensitive area. No one knew SAP when we first commenced. Things are different know. Plenty of expertise available at present.

[Reported by: Client/Operational - Transport]

Probably the worst example of all implementations in Qld Government. To my knowledge the only Project where Consultants were made the Project

Managers and they acted accordingly, such as cutting costs, not even consider something that was "out of scope", redefining things to then be "out of scope" to reduce costs and lie and deceive and deliberately misrepresent situations to have Department staff removed and replaced by Consultants "at a small price."

[Reported by: Client/Operational - Transport]

Discussion

This issue arises because the wrong people were selected to work directly in the ERP project team. They were not familiar enough with the business processes of the organisation or alternatively did not have the technical or business skills and knowledge to make a suitable contribution in their project role. Feldman (2002) discusses the troubled nature of project team staffing mismanagement, stating that "poor staffing structure and practices contribute to the 'suck factor' of many IT departments". One of the problems in the IT industry he identifies is that IT departments are organised by technology disciplines, rather than a business focus. Johnson-Lindsay and Lederer (1999) share a similar viewpoint suggesting that when organisations fail to align business strategy with human resource management practices there is an increased risk of marketplace failure.

Roy Chan covers the management of human resources within the focus of project management knowledge. He cites Francalanci (2001), who states that human resources within IS implementation activities can represent the difference between actual and estimated costs. This means that the identification of appropriate ERP knowledge among project personnel (human resources) can lead to a decrease in costs. Moreover, by managing the personnel involved in implementation activities the organisation can identify key users and ensure the know-how needed to manage the system after its implementation is developed.

Strategic vs. Operational

There was consensus between strategic and operational respondents on this issue, both ranking it at a low level of importance at 35th and 37th respectively.

Client vs. IP

> IP staff ranked this issue at 16th, much higher than the client staff ranking of 34th. Accenture staff, in particular, ranked this issue highest with a mean score of 5.50. In the Round One comments by the IP respondent, it is apparent that the selection of inappropriate client staff in the project team, who did not have the backing of others in the agency, caused problems and delays in the project. This would have frustrated the IP staff whose role it is to coordinate and design new processes based on the advice of the client staff.

Chang (2002) noted a difference in work ethic between client and IP staff in project teams. It is possible that this issue arises from the tension between those two groups. It is also possible that respondents not chosen for the project team felt they would have been more appropriate choices.

E.4.15 Conclusion

This major issue category describes several common project management and information systems issues. It also includes some issues that are specific to the SAP and ERP environment e.g. *Issue 12 - The configuration of SAP is inadequate* and *Issue 11- SAP systems knowledge was lacking in the project team, consultants or the vendor*.

The SAP systems knowledge Issue 11 and *Issue 15 – Lack of knowledge of the organisational context* are important knowledge management issues to the ERP lifecycle. These issues will be discussed in the knowledge management theme discussion in Chapter 7. While many of these issues are important, their presence in this study's list of issues is neither surprising nor unexpected. Most have been dealt with thoroughly in prior literature. In particular, the more common issues are *Issue 2 – Management support, Issue 3 – project team communication, Issue 10 – insufficient resources, Issue 5 – inadequate testing, Issue 13 – change management, Issue 14 – data conversion, Issue 22 – executive and project management, Issue 32 –*

Time management and *Issue 19 – project staffing*. These issues will not be dealt with further in any great detail unless they relate to other issues under discussion.

E.5 Major Issue Category 7: Organisational restructuring affected implementation effort

This Major Issue Category includes only one issue:

- ✓ **Issue 36: The SAP system was adversely affected by the Machinery of Government.**

This major issue describes the effect of the Queensland Government changes to its departmental structures on the SAP implementations. During the course of the SAP R/3 implementations across the Queensland Government, there have been several parliamentary elections. When the Government changes, the incoming administration implements their own set of ministerial portfolios and preferred structure of departments and agencies. Government personnel refer to this restructuring of departments as the Machinery of Government (MoG). When the new structure differs substantially from the status quo, it can affect ongoing system implementations.

Such was the case in November 1995 when the Labor Government was defeated by the National-Liberal Coalition. They reorganised agencies in the Queensland Government affecting some early adopters. It happened again in 1998 when Labor regained government. The move towards a shared services approach (see Chapter 4) alleviates this Machinery of Government issue to some extent.

E.5.1 Issue 36: The SAP system was adversely affected by the machinery of government.

Table E.43 – Issue 36: Summary descriptive statistics

Issue No:	36	**Overall rankings using mean of**		**Perspectives**			
		Maximums	**Means**	**Client**	**IP**	**Operational**	**Strategic**
Rank		36	36	33	5	33	36
Mean		3.57	3.34	3.55	4.53	3.65	3.44
Std Dev		2.14	1.97	2.27	2.10	2.08	2.23
Major Issue Category:			(Factor 7) Organisational restructuring affected implementation effort.				

Table E.34 – Issue 36: Respondent organisations' statistics with count > 4

Agency	Count	Mean	Std Dev	Minimum	Maximum
Accenture	5	5.20	2.49	1	7
DETIR	29	4.62	2.08	1	7
PWC	12	4.25	1.96	1	7
Tourism	5	4.20	1.92	2	7
Transport	25	4.04	2.24	1	7
Corrective Services	9	3.44	2.55	1	7
Public Works	22	3.27	1.93	1	7
Premiers	9	3.22	2.28	1	7
Police	5	3.00	1.87	1	6
Education	10	2.90	1.60	1	5
Health	37	2.70	1.85	1	7

The respondents who rated this issue perceived that "Changes to departments and internal departmental structures affected the SAP system configuration and implementation" (Round Three Survey Instrument).

This issue was synthesised from 8 issues identified by 7 respondents (1 IP and 6 Client respondents; 1 Strategic and 6 Operational respondents) in the Round One survey. 1 respondent reported 2 separate issues assigned to this category.

Some examples of these reported issues follow.

Issue: *Constant Restructuring.*

Description: *While flexible, SAP R/3 does not expect your entire organisational structure to be uprooted and redesigned on a regular basis. Buckets of cost neutral money are pumped into restructuring with no appreciation for the difficulties of transferring objects (eg. assets) between structures, especially when it should 'appear' as though the restructure occurred 6-12 months before it really did.*

[Reported by: Client/Operational – Family Services]

Issue: *Configuration changes due to change of Government etc.*

Description: *With the change of Government or ministers, departments are changed and moved. This requires a lot of configuring to ensure that the new department needs are met.*

[Reported by: Client/Operational – Tourism, Racing and Fair Trading]

In the Round Three survey, respondents commented on their weightings of importance of the issues. Some Round Three comments on this issue included:

Not a very nimble system in terms of responding to significant organisational changes.

[Reported by: Client/Strategic – Premiers]

Changes affect SAP configuration.

[Reported by: IP/Operational - PriceWaterhouseCoopers]

Discussion

The implementation most affected by the first change of government in 1995 was the Transport implementation. This was the first SAP implementation in Queensland Government. Transport is a large agency that regulates all facets of transportation including roads, shipping, air traffic and trains. Its major infrastructure responsibility is the main roads network in Queensland. When Labor gained power in 1989, it combined the Main Roads ministry and the former Transport ministry into one large Transport portfolio and agency.

In 1995, when the Coalition regained power, it split this large department back into two, Main Roads and Transport. This split meant that the project team had to restructure all the cost centres to suit the new reporting requirements. Rather than splitting the project into two implementations, the two new agencies decided to maintain the single instance of SAP R/3 within the Department of Transport. Transport would manage SAP for both agencies in a shared services arrangement.

From 1998, when Labor regained power, over time they redistributed some parts of the portfolios across the agencies or split agencies to suit ministerial preferences. For example, they split the Department of Education, Training and Industrial Relations (DETIR) into the Department of Education and Training and the Department of Industrial Relations. They also moved parts of portfolios across agencies, in example Fair Trading, Housing, and Sport.

Chang (2002) would not have met this issue in his preliminary study of five agencies because Machinery of Government changes did not affect these agencies. Similarly other individual studies of agency implementations, such as Putra (1998), were not affected either.

Strategic vs. Operational

The strategic and operational cohorts ranked this issue 36th and 33rd respectively, both placing its importance quite low in this list of issues.

Client vs. IP

There was considerable dissent between these two cohorts. The IP staff ranked this issue 5th highest while client staff ranked it in the bottom quartile at 33rd. These MoG changes affect the IP considerably. If the MoG change occurs during the implementation, the IP is forced to renegotiate extensively any fixed price contract it has in place. This is due to the considerable rework required. It forces up the price, giving a further impression of the high cost of implementation. It also affects IP workforce planning and scheduling of staff across ERP projects.

The MoG change can also change the structure and personnel in the agencies meaning that IP staff must establish new lines of communication and perhaps accede to new demands from executives with their own views on process, reporting and ultimately technical configuration of the ERP. Client staff also find MoG changes frustrating because they also have to redesign the system but perhaps they are more resigned to it as a necessary part of working for the government.

E.5.2 Conclusion

This major issue category has one *Issue 36 - The SAP system was adversely affected by the Machinery of Government.* This issue describes how SAP implementations were affected by the reorganisation of Queensland Government agencies that regularly occurs mostly after a change of government but can also occur during a

government's term. There were two changes of government in Queensland during the peak implementation period of SAP in the late 1990s. One occurred early in the implementation period in 1995, mostly affecting the early adopters such as Transport. The other occurred in 1998, having a broader effect on implementations. One could speculate, and there is no evidence to support this, the development of the shared services initiative could have been driven in part to reduce the effect of MoG changes.