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A PROCESS APPROACH FOR UNDERSTANDING STRATEGIC ENTERPRISE SYSTEM IMPLEMENTATION DECISIONS

A thesis presented in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY
in Information Systems
at Massey University, Albany campus, New Zealand

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This is to certify that the research carried out in the Doctoral Thesis entitled "A Process Approach for Understanding Strategic Enterprise System Implementation Decisions" in the Institute of Information and Mathematical Sciences at Massey University, New Zealand;

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CANDIDATE'S DECLARATION

This is to certify that the research carried out for my Doctoral thesis entitled "A Process Approach for Understanding Strategic Enterprise System Implementation Decisions" in the Institute of Information and Mathematical Sciences, Massey University, Auckland, New Zealand is my own work and that the thesis material has not been used in part or in whole for any other qualification.

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A PROCESS APPROACH FOR UNDERSTANDING STRATEGIC ENTERPRISE SYSTEM IMPLEMENTATION DECISIONS

ABSTRACT

Enterprise system (ES) implementation involves large investment of resources for a long period of time before business benefits can be realized, meaning the choice of system is one of the most critical decisions an organization makes. However, a right choice does not guarantee a successful working system because ES implementation is a complex and a dynamic process that involves a mix of technological and organizational decisions. These decisions cannot be structured and need to be revised and reformulated with the pace of implementation. As a result, the understanding of these decisions cannot be separated from the understanding of the implementation process.

A review of the IS literature suggests that the dominant stream of strategic decision-making (SDM) research follows a strategy formulation approach, while research into implementation of strategic IT decisions receives little attention. To fill this gap, this study takes the latter approach both to understand 15 key ES implementation decisions, and to establish a model for facilitating ES implementation that has both a theoretical and a practical significance.

Using the multiple theoretical perspectives of SDM models and through two case studies of ES implementation, qualitative data on the SDM process pertaining to the 15 decisions was gathered to inductively develop a model of the ES implementation process as it unfolded over time. The SDM model reveals ES implementation as a four-phase process: (1) preparation, (2) design, (3) configuration, and (4) realization. For each phase of the model, key activities pertaining to the decision process for these 15 decisions that enabled implementation to move forward are described.

Key words: Enterprise system (ES), enterprise resource planning (ERP), strategic decision-making (SDM), decisions models, process approach, case studies.

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PUBLICATIONS

The publications that have been generated from this project so far are:

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Shakir, M. "Decision Making in the Evaluation, Selection and Implementation of ERP Systems," *Proceedings of the Americas Conference on Information Systems*, Long Beach, California, 2000, pp. 1033-1038.

Shakir, M. "An ES Process Framework for Understanding the Strategic Decision Making Process of ES Implementations," *Research Letters in Information and Mathematical Science* (2:1), 2001, pp. 47-53.

Shakir, M. "Book Review: Technology Acquisition: Buying the Future of Your Business," *ACM SIGSOFT Software Engineering Notes* (27:2), 2002, pp. 73-74.

Shakir, M. "The Selection of Case Studies: Strategies and their Applications to IS implementation Cases Studies," *Research Letters in Information and Mathematical Science* (3:1), 2002, pp. 191-198.

Shakir, M. "Current issues of ERP implementations in New Zealand," *Research Letters in Information and Mathematical Science* (4:1), 2003, pp. 151-172.

Shakir, M. and Hossain, L. "A Study of the ERP Selection Process in New Zealand," In *Enterprise Resource Planning: Global Opportunities and Challenges*, L. Hossain, J. D. Patrick and M. A. Rashid (Ed.), Idea Group Publishing, 2002, pp. 223-244.

Shakir, M. and Hossain, L. "A Study of the ERP Selection Process in New Zealand," In *Enterprise Resource Planning: Solutions and Management*, F. F.-H. Nah (Ed.), IRM Press, Hershey, PA, 2002, pp. 221-242.

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1.1 Enterprise systems and business integration

Information technology (IT) provides organizations with the capability to operate in an effective and efficient manner. In the 1990s, the globalization of business communities worldwide raised the level of competition between organizations (Pettigrew, 1988). Change became the "trademark for the business world" (Rockhart et al., 1996). The ability to act fast in response to the competitive environment became a must for organizations to survive volatile markets. Mergers and acquisitions made possible by reengineering business processes and the improving operational efficiencies increased competition even more. Information integration, through timely reporting on the status of the business, was one of the pillars that enabled organizations to survive this challenging environment (Bingi et al., 1999).

Technology supporting information integration became widely available at a reasonable price during the last decade of the 20th century; therefore, business integration (BI) was adopted by a majority of businesses worldwide. BI, the mechanism through which information is integrated within and outside the organization (Markus, 2000), is realized through the interplay of people, processes, and information systems (IS). Enterprise system (ES)—or enterprise resource planning (ERP)—applications are enterprise-wide packaged software that supports BI and business best-practice. Enterprise systems are costly and take a long time to implement; once implemented, these systems become the base infrastructure for other BI applications, such as supply chain management (SCM), customer relationship management (CRM), data warehousing, and e-commerce.

Investment in BI is regarded as one of the major investments an organization commits to. AMR Research reported that organizational spending on ES applications and related implementation services that was US$18.3 billion in 1999 is growing to US$66 billion by 2003 (Gilbert, 2000; Somers et al., 2000). The growth in the ES application market is driven by the expected growth in: (1) the small and medium enterprise (SME) applications market; SMEs, unlike large organizations, were not part of the rush to ES implementations prior to the year 2000, and (2) business-to-business (B2B) electronic commerce that is essential for successful electronic commerce (Markus, 2000). The B2B e-commerce market is often facilitated through the integration of a Web-enabled

front-end to back-end ES. This market, which is expected to reach $1.5 trillion by 2004, would increase the demand for ES applications as the preferred application platform for BI (Davenport, 2000; Janzen, 1999).

ES applications continue to form a significant part of the IT investment portfolio for many organizations. A report by International Data Corporation (IDC) showed that 58 percent of companies surveyed on IT spending for the year 2000 said that their companies were putting money back into mission-critical applications such as ES and CRM applications, while 23 percent were planning to fund Web-enabled and electronic commerce applications (Scannell et al., 1999). In New Zealand (NZ), ES applications spending, including integration services, was estimated at NZ$791 million or 17 percent of the NZ$4.8 billion total IT spending in 2002 (Pamatatau, 2002).

This section included an overview of the BI applications market. The next section develops the historic and organizational background for enterprise systems. The background to the research problem is then provided and research questions are presented. A definition of strategic ES decisions then follows. The chapter concludes with the conceptual model of the study and an overview of the following chapters.

1.2 Background to ES implementations

This section develops an understanding of the background of ES implementations in organizations. First, an overview of three approaches to software application deployment in organizations is presented. Second, ES applications are defined with an overview of their evolution, benefits, and current and future alternatives.

1.2.1 Software application deployment

Three main approaches to software applications deployment in organizations are: build, buy, or outsource (Anderson et al., 2001). The three approaches are non-exclusive, and it is likely that a combination of these three approaches will exist in any one organization and even in a single implementation. If the three approaches are visualized along a continuum, with 'build' at one end and 'outsource' at the other, a trend of moving away from 'buy' towards the 'outsource' approach can be seen (refer to Figure 1-1).

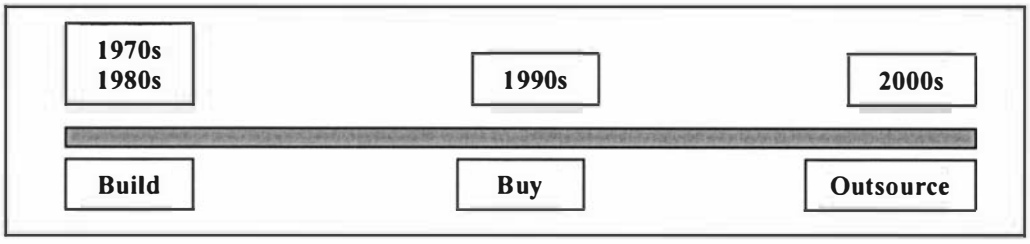

Figure 1-1: Trends in software applications deployment

The trend favors the future dominance of the outsourcing approach. This is facilitated by the popularity of the Internet being a medium for connecting businesses worldwide. Preference for outsourcing is expected to continue, however application deployment is envisaged to include a mix of the three approaches rather than being a deployment dominated by one approach alone. Businesses will still favor building applications they cannot buy or that are strategic to their existence (Anderson et al., 2001). While outsourcing will offer the easy-to-deploy solutions that come with a high dependence upon the solution provider, packaged applications will still offer the cost and time effective best-practice solutions that need to be reconfigured to business preferences.

Each of the three approaches is briefly defined next; outlining their advantages, limitations, and their evolution in a historical context. The build approach is pursued to develop applications in-house. Custom-built applications are specific software applications that are tailored to an organization's specific requirements and are likely to be standalone applications. Each application has its own logic, its own information, and its own user interface (Davenport, 2000). This option requires the availability of personnel and resources during a lengthy development and implementation process.

Reasons for adopting the build approach can include: (1) no alternatives available to buy or rent, (2) the application has a strategic impact on the organization; therefore, custom development is preferred to maintain domain knowledge in-house, and (3) to provide a better fit between the software application and organizational process when fit is of critical importance. Historically, custom development was popular during the 1970s and up until the mid-1980s. Automating manual work processes in organizations, for the purpose of increasing operational efficiency was the major driving force for IS development during this period (Zuboff, 1988).

Technology supporting the development process of custom-built applications continually improved, which significantly supported organizations to do more and more. However, custom development had some major problems that included high costs, longer time-to-implement, scarce IT expertise, and the lack of knowledge to integrate business knowledge and IT (McNurlin and Sprague, 2002).

The buy or packaged application approach came as a response to the problems organizations encountered in developing their applications in-house. Horrible failure stories are evidence of these problems when systems that consumed a large amount of resources were not even put into operation. The buy approach satisfied organizational needs for ready-made applications that had lower costs, less time to implement, and captured the business best-practice.

With the changes in the business environment that started taking place in the 1980s, which included globalization, mergers and acquisitions, and the need to lower operational costs and lead time, packaged applications became popular because they could satisfy the new organizational need for business integration. Business integration was more easily achieved using packaged applications because of the standardized features of the software. Although these integrated packages were commercially available in the 1970s, they started gaining substantial popularity from the mid-1980s, because the technology supporting these applications became mature enough to realize the integration of business processes at an affordable cost. Packaged applications were designed using the business best-practice model, and were continually updated and enhanced by software vendors. With the standardized features they enforced, these systems were the key tools, enabling organizational change or business process reengineering (BPR) that was popular at that time.

These benefits did not come without a price. Packaged applications dictated a certain way for work to be done. And because applications configuration is expensive, manual workarounds were put in place to bridge the gap between the software and the business processes. Furthermore, organizations became more reliant on the software vendors not only for the provision of business applications, but also both for their infrastructure and for their architectural standards. The problem of scare expertise knowledge in implementing packaged applications was also evident.

The outsource or hire approach entails getting a party outside the organization to perform one or more of its IS/IT activities. Specifically, this approach uses the services of an external party to manage the whole or part-process of development, implementation, and maintenance of one or more of the software applications of the organization. There are different varieties to application outsourcing, which are determined by who is responsible for managing each of the applications, data, hardware, personnel or the business process (De Looff, 1995).

Advantages of the outsourcing option include a shorter implementation time, access to scarce IT expertise, and enabling organizations to focus on their core capabilities while keeping abreast of the continuous advancement in technology. The price incurred for these benefits is the reliance on the application service provider, which eventually increases the risk to the business, especially when the outsourcing organization becomes more and more reliant on their software applications and can no longer tolerate an interruption in service. Furthermore, security and legal issues need to be evaluated cautiously when the outsourcing option is considered.

Having reviewed three key approaches to software applications deployment, the next section expands on the buy or packaged software approach. Specifically, it will focus on enterprise systems, which are packaged applications that are designed with business integration being one of its major features.

1.2.2 Enterprise system applications

ES applications fall into the category of packaged software applications with the added feature of integration. Enterprise systems are commonly known in practice as enterprise resource planning applications and are available from vendors such as SAP, Oracle, PeopleSoft, J. D. Edwards, and Baan, which are recognized internationally as the top first-tier ERP vendors (Slater, 1999).

An ES is a mainly-packaged software application that includes a combination of two or more software modules, for example, finance, manufacturing, sales, distribution, human resources, etc. that are integrated to perform the transactional processing of information across the whole organization (Davenport, 1998; Shanks and Seddon, 2000). Modules are designed with integration in mind, they reflect business best-practice, and are mainly

supplied by one vendor. Each software module is designed to integrate into other modules, however configuration and customization is needed during implementation.

Because of the integration capabilities of enterprise systems, these systems became the principal software platform for many organizations. The realization of a software platform became evident in the late-1990s when the capability to integrate an ES to non-vendor specific applications became possible, affordable, and desirable in response to business integration needs and the realization of e-business. Enterprise systems were implemented as a base for extension and expansion (James and Wolf, 2000; Shang and Seddon, 2000).

From an IT infrastructure perspective, an ES becomes the platform for other business applications (Broadbent and Weill, 1997), supporting other intra and inter organizational applications such as SCM, CRM and electronic commerce (refer to Figure 1-2).

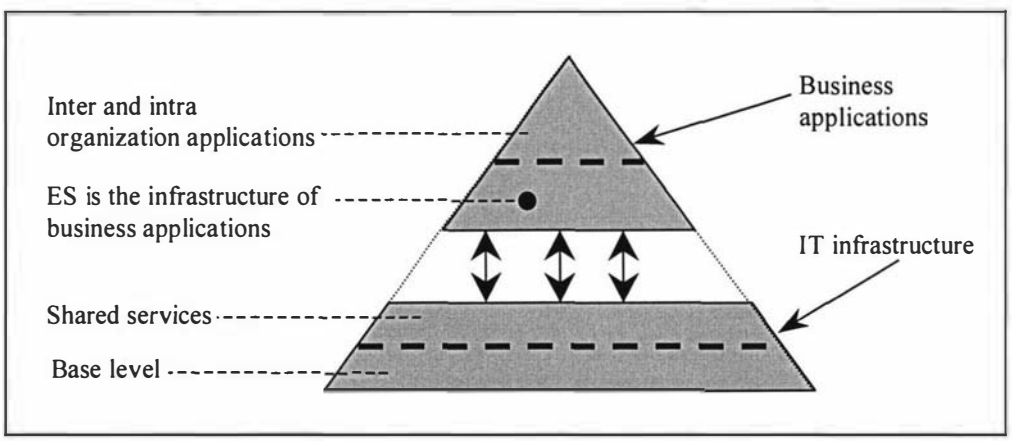

Figure 1-2: ES as a platform for business applications

Note. Adapted from Broadbent and Weill (1997)

Enterprise systems evolved from material requirement planning (MRP) and manufacturing resources planning (MRPII) systems (Chen, 2001; Chung and Snyder, 1999; Davenport, 2000; Klaus et al., 2000; Kumar and Hillegersberg, 2000; Markus and Tanis, 2000). The MRP families were mainly focused on manufacturing operations but were later extended to ERP, which included the integration into other functions within the organization, such as finance, marketing, sales, and human resources.

Table 1-1 presents a historical outline of the evolution of enterprise systems and traces their origins from the 1960s to the twenty-first century. The table outlines the focus of the application, the supporting IT architecture, application users, and the level of integration provided. It is observed from the table that these systems had evolved to include more modules, wider business focus, and more users from inside as well as outside the organization. While the architecture supporting an ES was mainly centralized in the early stages of the evolution of enterprise systems, it is now a mix of the centralized and distributed solutions, which became available and feasible during the 1990s.

Systems	Year	Focus	IT architecture	Users	Level of integration
Inventory control software packages	1950's	Inventory control software applications that are based on traditional inventory concepts.	2-tier architecture (Mainframe)	Plant managers and supervisory staff	No integration
Material requirement planning (MRP)	1960's	A high-level scheduling, priority, and capacity management system, which is built around a bill-of-material process in a manufacturing environment.	2-tier architecture (Mainframe)	Plant managers and supervisory staff	Minor integration
Manufacturing resources planning (MRP II)	1970's	An extension of MRP to shop floor and distribution management activities.	2-tier architecture (Mainframe)	Plant managers and supervisory staff	Integration within the manufacturing environment but not to other functions of the organization
Computer integrated manufacturing (CIM)	1980's	MRP II was extended to product development and production processes that included applications such as computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided quality assurance (CAQ).	2-tier architecture (Mainframe)	Plant managers, supervisory staffs, and design and product-development staff	Integration between manufacturing function and technical design and product development functions, with a focus on an enterprise-wide data model
Enterprise resource planning (ERP)	1990's	MRP-II was further extended to cover areas like engineering, finance, human resources, projects management etc (i.e. the complete set of activities within a business enterprise).	3-tier architecture (client-server) RDBMS and Object oriented programming	Managers, supervisory staff, and end-users	Integration between the functions of the organization including multi-site integration
Enterprise system (ES), ERP II, or ERP of the future	2000's	Most ERP systems are enhancing their products to become 'Inter-organizational' and 'Internet enabled.' New modules are added to the product portfolio, for example, CRM, SCM, data warehousing, and artificial intelligence.	A mix of centralized and distributed architecture (client-server and Internet networking)	Intra as well as extra-organizational stakeholders, including suppliers, customers, and partners	Integration inside as well as outside the organization

Table 1-1: The evolution of enterprise systems

In the late-1990s, the high-end of the ERP market became saturated because most large organizations had already implemented an ERP. In response to the increased

competition in the ES applications market, ERP applications vendors started including other applications as part of their ERP offerings. Enterprise systems evolved to become 'inter-organizational' and 'Internet-enabled.' New modules were added to the product portfolio, such as supply chain management, customer relationship management, data warehousing, and artificial intelligence. In order to achieve this, ES vendors built the new functionalities in-house, and acquired, or made partnerships with, specialized enterprise application vendors. Future ES applications are predicted to be less focused on transaction processing, to include managerial support systems as a standard offering, and to support various documents types, such as multimedia and computer-aided design (CAD) drawings (Kumar and Hillegersberg, 2000).

Organizations have different drivers for implementing an ES (Ross, 1999a). These mostly fall into two main categories. The first is concerned with solving existing business problems including the year 2000 problem, inadequate IT infrastructure, and disparate information systems, particularly in the case of mergers and acquisitions. The second is related to improving future business operations including the support for future business flexibility and growth, reducing operational costs, supporting customer responsiveness, improving data visibility, and making better business decisions.

The different benefits organizations realize when implementing an ES can be categorized into operational, managerial, strategic, IT infrastructure, and organizational benefits (Shang and Seddon, 2000). Operational benefits are those that positively influence the efficiency of the business. Managerial benefits increase business effectiveness through improved decision-making and the better management of resources. Strategic benefits include support for business strategy. IT infrastructure benefits include increasing the flexibility and capability of the infrastructure while lowering its future costs. Finally, organizational benefits include support for organizational learning and personnel empowerment.

A comparison of ES benefits with generic IS benefits in the literature revealed three new features that are particular to ES (Shang and Seddon, 2000). These are the enabling of electronic business, the enabling of global expansion, and improving employees' focus and morale. Although the benefits of improving employee morale can be argued because some ES failure stories provide contradicting evidence to the realization of

these benefits, the use of an ES to support electronic business and global expansion is widely accepted (O'Brien, 2003).

ES applications are not the only solutions to the realization of enterprise integration (EI). Other solutions include best-of-breed systems, object-oriented systems, and data warehouses (Davenport, 2000; Markus, 2000; Pender, 2000).

Best-of-breed applications—or the application integration approach—are collections of the best available applications for a certain task, where more software capabilities are traded for overall system integration (James and Wolf, 2000). Best-of-breed applications are usually supplied from different vendors, including ERP vendors. Although best-of-breed implementations offer more capabilities than packaged ES applications, implementations are more complex, they need specialized expertise, and the technology supporting the integration of different vendors' applications is not fully mature yet (Davenport, 2000; Markus, 2000; Pender, 2000).

Similar to the best-of-breed approach, object-oriented (OO) implementations are understood to be more flexible than packaged ES applications. However, there are still only a few cases of commercially viable OO implementations in a business organization. Nevertheless, ES software is moving towards a component-based design to take advantage of the flexibility characteristic of the OO framework (Sprott, 2000).

Data warehousing solutions involve the aggregation of data from disparate systems within and outside the enterprise. The main advantage of these systems is that internal and external data integration is realized with no change to the source system or the business process (Markus, 2000). Ironically, this is also their main drawback; because data warehousing applications are unable to provide detailed information at the operational level, they do not fully support integration at the business process level.

From the brief review above, it can be concluded that great potential exists for the approaches of best-of-breed and object-oriented applications. The technology supporting those applications is not totally mature, but it is continuously improving. The data warehousing solution, although a viable option with an enterprise-wide focus, has no capability of supporting business processes at the operational level; thus they serve a different purpose. According to this short review, ES applications continue to be one of the most feasible solutions to support business integration. The understanding of ES

implementations is therefore important to overcome the many obstacles organizations face in their pursuit of business integration.

1.3 Background of the research problem

ES implementations commit organizations to a large investment of resources for a long time before business benefits can be realized. As a result, the choice of a system is one of the most critical decisions an organization makes. A wrong choice means not only financial losses but also the loss of the business that becomes very dependent on IT. However, a right choice does not predict a successful working system. ES implementation is a complex and dynamic process which involves a mix of technological and organization interactions.

Decisions on the implementation of an ES are critical to ensure that implementation is carried out to the organization's preferences. However, and because of the dynamic nature of ES implementation, decisions cannot be structured and need to be revised and reformulated with the pace of implementation. And "because enterprise systems are designed for the enterprise, an ES implementation requires many enterprise decisions" (O'Leary, 2000, p. 145)[1]. While an ES implementation broadly involves two types of decisions, strategic and operational, these enterprise decisions are the strategic decisions that significantly impact upon business operations.

The main purpose of an ES is to integrate data and processes across the multiple functions and locations of the organization. Therefore, the input of different interest groups to the decision process is perceived as mandatory to achieving a successful implementation. What adds to the complexity of ES implementation is that decision-makers are a mix of individuals and groups from inside as well as outside the organization.

For the purpose of understanding the complexity of the ES implementation process, a need to understand strategic ES decisions is deemed essential. A review of the IS literature identified that the dominant stream of strategic decision-making (SDM) research has followed a strategy formulation approach, while research into strategic IT decisions has received little attention (Ranganathan and Sethi, 2000; Sabherwal and

[1] The original text used the term ERP not ES.

King, 1992). As a result, there is a lack of research that investigates the decision-making process of the implementation of strategic IT applications, a problem which also applies to ES implementation decisions. The purpose of this study is to provide this understanding using a descriptive process approach to investigating a set of strategic ES implementation decisions in a multiple case study research design.

1.4 Towards a process approach for understanding the SDM process of ES implementation

The majority of previous research into ES implementation has been limited to investigating parts of the implementation process (refer to Table 1-4 that shows the difference in emphasis within a sample of ES implementation studies). One of the main assumptions of this study is that ES implementation is a complex process that needs to be understood using a holistic approach. By dividing the process into segments, we lose an understanding of the whole, which is greater than the sum of its parts (Myers, 1994). Therefore, this study is not limited to investigating strategic ES decisions at the initial stage of the ES project, but traces the different paths some of these decisions follow during the later implementation phases.

Organizational decision-making can be best viewed as a process and not as an event that takes place at one point in time (Garvin and Roberto, 2001); the process unfolds over time and involves many participants at different levels of the organization's structure. The aim of the process approach is to explain the pattern of regularities over time. It is useful in answering the 'how' and 'why' research questions and for generating new process theories (Newman and Robey, 1992). Practitioners value findings of process research because they are easier to understand and are highly relevant (Shaw and Jarvenpaa, 1997).

The strength of process theories is not in predicting an outcome as much as it is in providing the means for looking into the process and the implications that can be drawn from the phenomena rather than the outcome (Mohr, 1982). As a result, the generalization from process theories, which is called analytical generalization (Yin, 1994), is different to that of variance theories. In this study, the process research approach is used to both integrate strategic decision-making with ES implementation and to explain how the decision process contributes to implementation outcomes.

The literature on organizational decision-making, particularly in studies involving strategic applications (e.g., Ranganathan and Sethi, 2000; Ranganathan and Sethi, 2002; Sabherwal and King, 1995; Shrivastava and Grant, 1985; Sillince and Mouakket, 1997), exhibits a number of conceptual lenses that examine the decision process. Despite this diversity that is also reflected in the different terminologies assigned to these lenses, there are dominant similarities in the decision process they abstract. Focusing on decision process patterns, a synthesis of those lenses has elicited five broad types. These conceptual lenses include the *rational, muddling through, mixed scanning, garbage-can,* and *political* decision models (Allison, 1971; Cohen and March, 1972; Eisenhardt and Burgeois, 1988; Etzioni, 1986; Lindblom, 1959; Simon, 1947). Focusing on strategic ES decisions, this study applies these five theoretical perspectives of organizational decision-making to explore decision process patterns.

The theoretical framework for the study of SDM of ES implementation is therefore developed through an analysis of the literature related to strategic ES decisions, strategic decision-making, and ES implementations.

1.5 Research questions

The purpose of this study is to understand the strategic decision processes for ES implementation. Miller and Crabtree (1999) identified up to five aims for any research inquiry; these aims are: identification, description, explanation-generation, explanation-testing, and control. They further suggested that the type of research needs to drive the choice of research objectives, research questions, and the research strategy. This study seeks to satisfy the three aims of the 'identification' of strategic ES implementation decisions, the 'description' of both the strategic decision process and the ES implementation process, and the 'explanation-generation' of both how SDM patterns change over time and how they contribute to implementation outcomes.

This thesis focuses on the SDM process of ES implementation. ES implementation in this study is viewed as the interwoven set of decision processes pertaining to strategic ES decisions. Specifically, this research explores the ES implementation process to answer the following research questions:

- What are the strategic ES implementation decisions?
- How are strategic ES decisions made (who gets involved? how? when? and why?)?

- How are those decisions implemented?
- How does the ES decision process contribute to implementation outcomes?

The multiple case study research strategy is found suitable to answer these 'how' questions. The review of both the practice and academic literature will identify a list of strategic ES decisions. This list will be validated through both a series of exploratory discussions with expert ES stakeholders in both academia, and industry and in conducting mini-ES-implementation case studies. This is discussed in detail next.

1.6 Strategic ES implementation decisions

The purpose of this section is to provide a focus for the study of ES implementation strategic decision processes. First, a synthesis of the generic definition of a strategic decision in the literature is provided. This definition is applied to identify 15 strategic decisions that need to be addressed in the course of ES implementations. Furthermore, the level of significance for each of these decisions is identified through the application of the four dimensions of rarity, consequentially, precursiveness, and complexity (Hickson et al., 1986).

1.6.1 Strategic decision: A definition

A decision is regarded as "an episode, beginning when the organization first became aware of a motivating concern or difficulty and ending with a successful or unsuccessful implementation attempt" (Nutt, 2000, p. 163). Furthermore, a decision is expected to involve "a specific commitment to action—usually a commitment of resources" (Mintzberg et al., 1976, p. 246).

Two broad types of decisions are observed in organizations, operational decisions and strategic decisions. Operational decisions, or the "decisions-to-execute" (Bourgeois and Eisenhardt, 1988, p. 830), occur at lower levels of the organization, are highly repetitive, and can be programmed. Strategic decisions are "grand decisions" (Bourgeois and Eisenhardt, 1988, p. 830) which are "important in terms of the actions taken, the resources committed or the precedents set" (Mintzberg et al., 1976). These decisions are important because they are fundamental decisions that shape the course of an organization (Eisenhardt and Zbaracki, 1992). However, importance is "relative to the organization in which the decision is being made" and the significance of strategic

decisions stems from the belief that they "will play a bigger rather than a smaller part in shaping what happens for a long while afterwards" (Hickson et al., 1986, p. 27).

For a decision to be strategic, it has to be important, non-routine, cannot be programmed, non-recurring, and has no certain outcomes (Gordon et al., 1975; Harrison and Pelletier, 2000; Mintzberg et al., 1976; Nutt, 2000). Table 1-2 provides a summary of strategic decision definitions in the literature.

Table 1-2: Summary of strategic decision definitions

References	Definitions
Bourgeois and Eisenhardt (1988, p. 819)	*Strategic* decisions are "major decisions."
Gordon et al. (1975, p. 7)	"*Strategic* decisions, at the highest organizational levels, are often un-programmed in nature."
Harrison and Pelletier (2000, p. 464)	A *strategic* decision is "non-routine [complex] and non-recurring, with lots of uncertainty inherent in the outcome. ... These decision are made for the most part by middle and upper level managers."
Heller et al. (1988, p. 49)	"*Strategic* decisions are characterized by a relative long duration and low frequency, and are initially initiated and dominated by the top of the organization. Tactical decisions occur more frequently and can be found at lower levels of the organization as well. The distinction related more to impact on the organization than to actual duration."
Hickson et al. (1986, p. 27, 31)	"A *strategic* decision is one in which those who are involved believe [the decision] will play a bigger rather than a smaller part in shaping what happens for a long while afterwards. This is a relative judgment, relative to the organization in which the decision is being made.... [Strategic decisions] include just about every possible subject.... [and they] take on significance for the organization in the eyes of those at the top."
Mintzberg et al. (1976, p. 246)	A *strategic* decision is "important in terms of the actions taken, the resources committed, or the precedents set."
Nutt (2000, p. 163)	A *strategic* decision is "one with considerable importance to the organization because of the magnitude of its resource demands and expected impact."
Pennings (1985, p. ix.)	*Strategic* decisions are "difficult because the stakes were high, so that the implications for organizations were considerable."
Pinfield (1986, p. 383)	"*Strategic* decisions may be regarded as those unstructured, important decisions that help the organization survive and adapt to a changing environment."
Shrivastava and Grant (1985, p. 101)	"Decision is *strategic* because: (a) it involves a commitment of a large amount of organizational resources, (b) it is technically complex, and requires the diverse skills of organizational resources, (c) it is influenced by a variety of external environmental agents, e.g., suppliers of computer systems, organized labor unions, and rapidly changing technology, and (d) it influences many parts of the organization by restructuring the information flows, decision-making loci, and the informal distribution of power and authority."

1.6.2 Strategic ES decisions

An ES is a strategic IS application that is defined as "having a profound effect on the company's success and destiny by (a) influencing or shaping the company's strategy, or (b) playing a direct role in the implementation or support of the company's strategy" (Sabherwal and King, 1992, p. 918). Because of the strategic significance of an ES, ES implementation involves making key decisions that have an impact not only on the technology implemented but also on the organization as a whole. Furthermore, "an IT decision could be strategic, irrespective of whether it is a purely technical decision or an organization decision, as long as its intended impact is perceived as crucial to the organization" (Ranganathan and Sethi, 2000, p. 455).

Applying the definition of a strategic decision presented earlier, strategic ES decisions are those decisions that (1) commit a large amount of organizational resources, (2) have a long-term impact on shaping the ES system and consequently on organizational processes, and (3) are complex because of the intertwining organizational and technological challenges they have to account for. Furthermore, most of these decisions are irreversible and inter-dependent; for example, a study on change in ES implementation suggested that "both—ERP and concrete—are easy to mold when first put in, but nearly impossible to change" (Robey et al., 2001, p. 26).

A list of strategic ES decisions (Table 1-3) was derived from the review of both practice publications (e.g., Bancroft et al., 1998; Bernroider and Koch, 2001; Deck, 2001; Gable, 2000; Greenwood, 2002; Koch, 2000a; Koch, 2000b; Koch, 2001a; Koch, 2001b; Koch et al., 1999; O'Leary, 2000; Ragsdale, 2001; Ross, 1999a; Sandoe et al., 2001; Slater, 1999; Slater, 2000; Slater, 2002; Welti, 1999; Wheatley, 2000) and academic literature (e.g., Agarwal et al., 2000; Axline, 2001, p. 83; Bingi et al., 1999; Brehm et al., 2001; Brehm and Markus, 2000; Brown and Vessey, 1999; Brown and Vessey, 2000; Chen, 2001; Davenport, 1998; Davenport, 2000; Esteves and Pastor, 2001; Holland and Light, 1999; Koh et al., 2000; Kremers and Dissel, 2000; Krumbholz et al., 2000; Light et al., 2001; Markus et al., 2000a; Markus et al., 2000b; Markus and Tanis, 2000; Markus et al., 2000c; Parr et al., 1999; Robey et al., 2001; Ross, 1999a; Ross, 1999b; Ross and Vitale, 2000; Scott and Vessey, 2000; Soh et al., 2000; Willcocks and Sykes, 2000).

Table 1-4 surveys a sample of ES publications to indicate references to strategic ES decisions in each.

Table 1-3: Strategic ES implementation decisions

#	Description
D-01	Decide on evaluation team
D-02	Decide on evaluation partner(s)
D-03	Decide on vendor(s)
D-04	Decide on key business processes
D-05	Decide on functionalities or modules
D-06	Decide on bolt-on applications
D-07	Decide on IT infrastructure
D-08	Decide on implementation team
D-09	Decide on implementation partner(s)
D-10	Decide on implementation strategy (BPR and software customization)
D-11	Decide on go-live strategy (phased, big-bang, or parallel)
D-12	Decide on ES variation strategy (similar or different versions of the same ES)
D-13	Decide on personnel training strategy
D-14	Decide on reporting needs
D-15	Decide on maintenance strategy

Decisions in Table 1-3 are categorized by decision output to provide a holistic way of understanding both the decision situation and the interdependency, if any, among decisions (Gordon et al., 1975). It is acknowledged that the list is not exhaustive, however, the list does provide the content in which the SDM process needs to be explored.

Table 1-4: References to strategic ES decisions in the ES implementation literature

References	Strategic ES implementation decisions														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Al-Mudimigh et al. (2001)			X	X			X		X	X	X	X	X		
Alvarez and Urla (2002)	X	X													
Axline (2001)					X		X	X	X	X		X	X		
Bernroider and Koch (2001)								X							
Besson and Rowe (2002)	X	X	X		X			X		X					
Bingi et al. (1999)	X	X	X			X		X	X	X	X	X	X		
Brehm et al. (2001)										X					
Brown and Vessey (1999)		X			X			X	X	X	X				
Brown and Vessey (2000)	X	X	X					X	X		X		X		
Chen (2001)	X							X		X					
Davenport (1998)					X	X			X	X	X	X			
Holland and Light (1999)				X	X					X	X	X			
Kawalek and Wood-Harper (2002)										X					

(Continued on the next page)

Table 1-3 (continued)

References	Strategic ES implementation decisions														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Klaus et al. (2000)							X			X					
Kremers and Dissel (2000)															X
Krumbholz et al. (2000)													X		
Light et al. (1998)										X					
Light et al. (2001)						X		X	X	X	X	X			
Markus and Tanis (2000)	X	X	X			X		X	X	X	X		X		X
Markus et al. (2000c)					X		X				X	X			
Markus et al. (2000a)				X	X	X	X			X	X		X	X	X
Robey et al. (2001)										X	X		X		
Ross (1999a)					X					X			X	X	X
Ross (1999b)	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Sarkis and Sundarraj (2000)											X				
Scheer and Habermann (2000)					X		X			X				X	
Scott and Vessey (2000)								X			X	X	X		
Scott and Vessey (2002)						X	X	X	X	X	X	X			

(Continued on the next page)

Table 1-3 (continued)

References	Strategic ES implementation decisions														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Soh et al. (2000)										X				X	
Sprott (2000)			X												X
Tarafdar and Roy (2003)	X	X			X		X	X	X		X		X		
Welti (1999)										X	X				
Willcocks and Sykes (2000)	X							X							
Wood and Caldas (2001)										X					

Note. Data conversion and project plan are two decisions that are considered by Axline (2001, p. 83) but are not included in the table above. Data conversion is discussed as part of the go-live strategy (D11) in this study.

- Legend:
  - D01-Evaluation team
  - D02-Evaluation partners
  - D03-Vendor(s)
  - D04-Key business processes
  - D05-Functionalities & modules
  - D06-Bolt-on applications
  - D07-IT infrastructure
  - D08-Implementation team
  - D09-Implementation partners
  - D10-Implementation strategy
  - D11-Go-live strategy
  - D12-ES variation strategy
  - D13-Personnel training strategy
  - D14-Reporting needs
  - D15-Maintenance strategy

This list was validated in two phases. During the first phase, the strategic ES decisions list was discussed and amended in exploratory discussions with expert ES stakeholders in both academia and industry. Three exploratory ES case studies provided further validations during the first phase (Hossain and Shakir, 2001; Shakir, 2000; Shakir and Hossain, 2002). During the second phase, the list of strategic ES decisions was presented to 14 executives from 14 different ES-related practices as part of an exploratory investigation of the current issues on ERP implementations in NZ (Shakir, 2003). All executive participants agreed that the ES decision list was representative of key ES implementation decisions.

While each of the 15 decisions in Table 1-3 is considered strategic, there can be different levels of strategic decisions. Hickson et al. (1986) developed a model that measures the level of significance of strategic decisions along the dimensions of rarity, consequentially, precursiveness, and complexity. Rarity defines the frequency with which the decision occurs. Consequentially defines both the level of commitment and the consequences the decision carries. Precursiveness defines the extent to which a decision constrains future decisions. Finally, complexity defines the uncertainty of the consequences of implementing the decision, as well as the number of parties involved in the SDM process. Furthermore, it is hypothesized that an increase in one or more of these dimensions will increase the strategic level of the decision.

The application of these dimensions to the 15 ES decisions indicates the different levels of strategic significance they possess. Table 1-5 illustrates this application and sorts the 15 decisions from the most significant to the least significant. The significance score for each decision is only an estimate that is both based on a review of ES implementation case studies in the literature and has not been empirically tested. Table 1-5 shows that the two most significant decisions include those that involve selecting the 'vendor' and the 'implementation strategy,' while the least significant are those of 'implementation team' and 'maintenance strategy.'

Table 1-5: Significance of strategic ES decisions

#	Strategic ES implementation decisions	Rarity	Consequentially	Precursiveness	Complexity	
					Uncertainty	Parties involved
D-03	Decide on vendor(s)		√	√	√	√
D-10	Decide on implementation strategy	√	√	√	√	
D-01	Decide on evaluation team		√	√	√	
D-06	Decide on bolt-on applications		√	√		√
D-11	Decide on go-live strategy		√	√		√
D-12	Decide on ES variation strategy		√	√		√
D-02	Decide on evaluation partners		√	√		
D-04	Decide on key business processes			√		√
D-05	Decide on functionalities or modules			√		√
D-07	Decide on IT infrastructure		√	√		
D-09	Decide on implementation partners		√	√		
D-13	Decide on personnel training strategy		√	√		
D-14	Decide on reporting needs		√	√		
D-08	Decide on implementation team		√			
D-15	Decide on maintenance strategy		√			

Note. The significance ratings are based on the Hickson et al. (1986, p. 35) model.
This model is applied to measure the level of significance for each strategic ES decision. Ratings are based on the understanding gained from the review of ES implementation case studies in the literature and has not been empirically tested. The ratings here identified the decisions that are highly significant. These decisions warrant in-depth investigation to reveal more of their specific process details.

This section provided the definition of strategic ES implementation decisions and suggested that those decisions vary in significance. The understanding of the ES implementation process in this study will be achieved through a focus on the decision process pertaining to those 15 decisions.

1.7 The conceptual framework of the study

Figure 1-3 illustrates the conceptual framework or the roadmap to this study of the SDM process of ES implementation. Detailed illustrations of the study's theoretical and methodological models are included in chapters two and three, respectively.

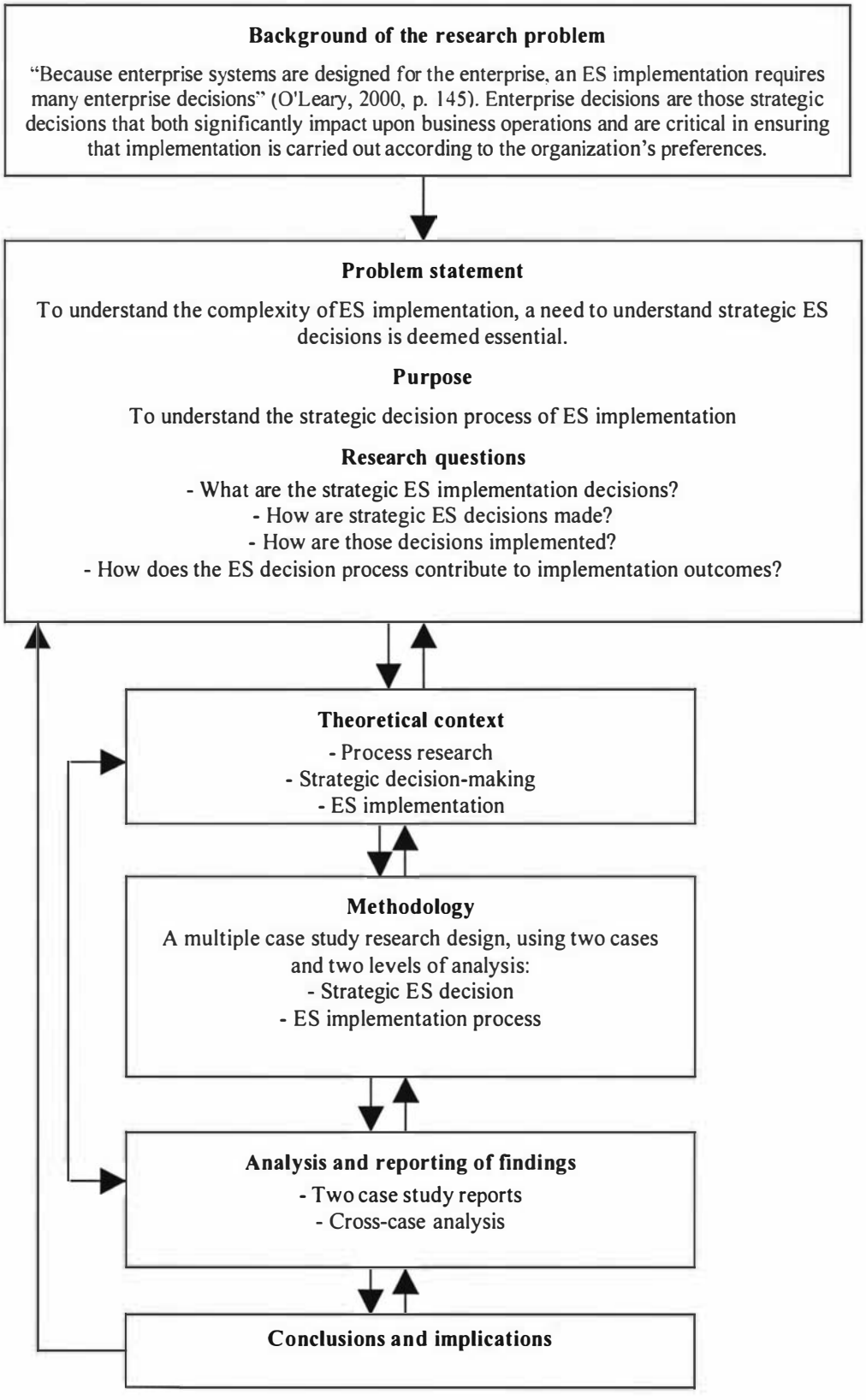

Figure 1-3: The conceptual framework for the study

1.8 Study overview

This study is organized as follows:

Chapter two provides the theoretical context for the study. Literature on the SDM process in organizations, the process research approach, and ES implementations are reviewed to identify the main research constructs.

Chapter three discusses in detail the application of the case study research methodology to answering research questions. The chapter concludes with a presentation of the methodological model of the study.

Chapters four and five present two case studies of ES implementation in NZ. Each chapter includes a case study background, a chronology of main implementation events, and a description of the decision process pertaining to 15 strategic ES implementation decisions.

Chapter six provides the cross-case analysis, noting the similarities and differences in SDM patterns and decision-making focus, between the two cases and with the literature.

Chapter seven concludes on the findings and discusses the implications of the study for both IS practice and IS research. Finally, the limitations of this study are stated and recommendations for future research are presented.

2. Chapter Two: The Strategic Decision Process of ES Implementation

2.1 Introduction

The purpose of this chapter is to provide a critical examination of the existing literature to develop an understanding of the complexity involved in the strategic decision-making process of ES implementation. Focusing on 15 key ES decisions, the study applies multiple theoretical perspectives of organizational decision-making to explore decision process patterns. The study further adopts a process research approach to integrate strategic decision-making with ES implementation and to explain how the decision process contributes to implementation outcomes. The theoretical framework for the study of SDM of ES implementation is therefore developed through an analysis of the literature related to strategic ES decisions, SDM, and ES implementations.

This chapter is structured as follows: First, a process approach to the study of ES implementations is presented and its applicability in this study is justified. Second, the literature on the strategic decision process is reviewed to provide an understanding of the dichotomy of decision models and their implications for understanding ES implementations. Third, a synthesis of the decision-making literature identifies five theoretical lenses for understanding the SDM process of ES implementations. Lastly, this chapter develops a theoretical framework by integrating strategic ES decision-making and the ES implementation process and presents the methodological map for this study.

2.2 Towards a process model for ES implementation

The application of process models to understand the SDM process of ES implementation is proposed in this study. In this section, a background to process research is presented. The application of process research in the IS implementation literature is reviewed. Finally, the suitability of process research to answering this study's research questions is justified.

2.2.1 Process research and variance research

Two types of research are identified in studies of IS implementation: variance research and process research (Markus and Robey, 1988; Newman and Robey, 1992). The difference between the two can be explained by understanding the underlying assumptions of the cause-and-effect relationship each proposes.

2.2.1.1 Variance research

Variance research is concerned with predicting outcomes from identified predictor variables on the basis of the relationship hypothesized between the two (Mohr, 1982). Cause is then necessary and sufficient for the outcome to occur. Therefore, one of the main aims of variance theories is that of prediction.

Variance theories are applied through identifying relationships that can be objectively measured and tested. Results of hypothesis testing can then be generalized to larger populations. The limitations of variance theories however, lie in their reflection of a static picture or "snapshots" of the research setting where time ordering is insignificant to the outcome (Mohr, 1982, p. 43). As a result, the variance research approach is useful for providing answers to the 'what' question, when previous theory is well developed to justify theory extension or re-testing (Shaw and Jarvenpaa, 1997).

2.2.1.2 Process research

A process theory can be simply defined as one that "tells a little story about how something comes about" (Mohr, 1982, p. 44). Process research is concerned with explaining outcomes in relation to the existence of a set of necessary, but not always sufficient, conditions for outcomes to occur. While the focus of variance theories is on the relationship between outcomes and conditions, with process theory the focus shifts to the combination of outcomes, processes, and conditions (Mohr, 1982).

There are two main applications for process theories. The first is future oriented, which is the prediction "that an outcome will occur some proportion of the time." The other is oriented towards the past and includes the description or "reconstruction of the past" (Mohr, 1982, p. 53-45). The two applications are seen as complementary, where prediction relies on both the rich description of past activity and the explanations that can be drawn out of the mix of "external forces and probabilistic processes" (p. 52).

The strength of process theory however, is not in predicting an outcome as much as it is in providing a means of looking into the process and the implications that can be drawn about the phenomenon rather than the outcome (Mohr, 1982). As a result, process theories provide an analytical generalization which aims to explain the pattern of regularities over time (Yin, 1994).

Process theories are useful in answering the 'how' and 'why' research questions, and for generating new theories (Newman and Robey, 1992). They are also more useful than variance theories in dealing with complex relationships through explaining the sequence of events (Crowston, 2000; Shaw and Jarvenpaa, 1997).

Practitioners value findings of process research because they are easier to understand and highly relevant (Shaw and Jarvenpaa, 1997, p. 86). Furthermore, because IS is considered an applied discipline, research that scores high on relevance is much more regarded (Applegate and King, 1999; Benbasat and Zmud, 1999; Davenport and Markus, 1999; Lee, 1999; Lyytinen, 1999).

2.2.2 Process models in the IS implementation literature

Process models have their origins in stage models. Stage models provide a structure that is applied to frame the different patterns the system exhibits over time, into two or more stages. Each stage can then be described by identifying the different activities that take place over that defined period of time. The stage model also assumes that there is a sequence between the stages of the model, which implies that progression over time follows a predefined sequence. Stage models are known for their usefulness in the development of knowledge in different fields, especially when knowledge is scarce (Nolan, 1973).

The main criticism of stage models relates to the extent of the generalization the model predicts. One popular stage model of information systems development is the Nolan 'stages of the growth model' (Nolan, 1973; Nolan, 1979). The model portrays a generalized process model of IT implementation in focusing on the evolutionary change over time in the IT department. The model postulates a relationship between the growth in IT budgets over time and changes in the IT function. According to the model, all organizations go through the sequential stages of initiation, contagion, control, integration, data administration, and maturity (Nolan, 1979). Because the model takes a

normative approach in generalizing the experience of many organizations, it has been criticized for its a priori stages (Boudreau and Robey, 1999). Such criticism, however valid, is a limitation of all normative models.

In the context of IS development and implementation, stage models have proven to be useful as both practical and theoretical tools. The benefits of stage models to practitioners lie in the provision of a framework to guide the management of IS resources; for academics, stage models provide a structure for the study of complex sets of management practice and concepts "that could be stated as hypotheses and empirically tested" (Benbasat et al., 1984, p. 476).

Process models are similar to stage models in their inclusion of a sequence of stages, however they must "supply the external forces and probabilistic processes constituting the means by which that sequence of events is understood to unfold" (Mohr, 1982, p. 53). In providing these extra details they will be capable of answering not only the 'how' question through the description of past events, but also the 'why' question of "how an outcome will occur some proportion of the time" (Mohr, 1982, p. 53). Both process and stage models have a descriptive purpose, however, the prediction each provides is different. Stage models use variance theory to explain the cause-and-effect relationship between pre-identified factors. The prediction of a process model stems from understanding the probabilities of the process and the forces driving it.

In a review of process models in IS implementation, Volkoff (2001) indicated that process research picked up after Markus and Robey's (1988) call for further research. Volkoff identified four broad approaches to process studies in IS. These are: (1) the instrumental task approach, (2) the communicative action approach, (3) the cyclic social process approach, and (4) the alternatives lenses approach.

The instrumental task approach falls within this study's definition of stage models; it focuses on both identifying instrumental tasks in the IS implementation process and on the sequence of these tasks. In a study of event sequences in 53 organizations, Sabherwal and Robey (1993) took this approach to identify instrumental IS implementation activities and constructed a taxonomy of six distinct implementation processes. Reflecting on the application of this particular approach to the study of ES implementation, Volkoff concluded that "instrumental tasks of an ES implementation

process are closely tied to a vendor's standard methodology" (2001, p. 16); therefore this approach is best suited to study the efficacy of different implementation methodologies, otherwise instrumental tasks become part of the study's context.

The communicative action approach focuses on the actions between IS implementation stakeholders where the intention is to identify periods of stability that are characterized by a prevailing attitude and events that trigger the transition from one period to the next. Using Robey and Newman's study (1996) as an example, Volkoff concludes that this approach to study ES implementation is infeasible. An ES implementation often involves the iterative design of business processes during system configuration, therefore, there would both be too many triggering events and short, not long, periods of stability in between. As a result, data collection needs to be ongoing on a daily basis. The application of the communicative action approach in a study of ES implementation requires an intensive investment of data collection resources and this may only be possible by taking an action research approach in which the researcher becomes an active member of the implementation team.

The cyclic social process approach conceptualizes IS implementation as an iterative process of design and implementation. Whilst design is an exploratory phase with the purpose of defining goals and drawing system boundaries, implementation identifies the target system and organizational change requirements needed to meet those goals. Citing the Gasson (1998) study as an example, Volkoff concluded that the "model is sufficiently general to encompass both proprietary design and package implementation" (2001, p. 19). Moreover, its main focus is on the former and therefore has little to add to the ES implementation process.

The alternative lenses approach examines IS implementations using multiple theoretical perspectives. These multiple perspectives "are not seen as mutually exclusive but rather as complementary, and differentially during the different phases" of system implementation (Volkoff, 2001, p. 19).

In a case study of a traditional IS design and development project, Newman and Noble (1990) studied user involvement using the four theoretical models of learning, conflict, politics, and garbage-can. In explaining their case study findings, they noted that these models had different strengths and weaknesses and were therefore complementary in

two aspects: (1) one model's weakness was offset by another model's strength, and (2) when some of these models only applied to certain phases of the development process; others were applicable to fill the gaps that would otherwise have been left empty. The alternative lenses approach therefore provides a richer perspective to explore the complex phenomenon of ES implementation.

This section concludes with a justification for adopting a process approach in this study of the SDM process of ES implementations.

2.2.3 Using a process approach to understand the SDM process of ES implementation

In considering this study's main research question, process research is found to be more suitable to exploring the SDM process throughout the phases of ES implementation. Although process theories complement variance theories, they are less commonly found in the IS literature (Montealegre and Keil, 2000).

A process approach is believed to be essential to reveal the dynamics associated with strategic ES decisions, therefore, it is used in this study to understand the SDM process of ES implementation. Taking this particular perspective, understanding will be achieved through the application of the multiple theoretical perspectives of organizational decision-making to explain how and why decisions unfold over time.

Accordingly, this study builds on the academic literature that addresses understanding the difficulties of ES implementation through the use of process models (Brehm and Markus, 2000; Markus and Tanis, 2000; Parr and Shanks, 2000; Ross and Vitale, 2000). In brief, a proposed process model of ES implementation includes identifying both the phases and the decisions that drive the movement from one phase to the next (Markus and Tanis, 2000; Montealegre and Keil, 2000). This makes it the best approach to answer this study's research questions.

2.3 The strategic decision process of ES implementations

This section starts by discussing the dichotomy of SDM approaches. A comparative framework relating the two approaches is presented and the approach best suited to understanding strategic ES decisions is recommended. Next, five theoretical SDM

models are suggested to provide a complementary understanding of the complex decision-making process during the implementation of an ES.

2.3.1 The dichotomy of SDM research

Understanding the SDM process of ES implementation requires further understanding of the dichotomy of SDM research. A review of the decision-making literature identified two approaches: descriptive and normative. The two approaches are better understood when positioned at each end of a continuum, the normative at one end, and the descriptive at the other. Table 2-1 compares the two approaches along six dimensions: research questions, research purpose, practical applications, methodology, data requirements, and generalizability.

Table 2-1: A comparative framework of SDM models

Questions	Normative		Descriptive	
	Prescriptive	**Normative**	**Descriptive**	**Pure descriptive**
What *question* can the model answer?	How will things happen?	How should things happen?	How are things believed to have happened?	How did things actually happen?
What is the *purpose* of using the model?	Prediction and direction	Planning and control	Understanding and reporting	Exploring and describing
What type of *evidence* is needed to build the model?	Quantitative	Quantitative and qualitative	Quantitative and qualitative	Qualitative
What research *method* is more suitable?	Surveys, experiments, and simulations	Surveys, experiments, simulations, and multiple case studies	Case studies and surveys	Case studies, action research, and ethnographies
What level of *detail* is required for data collection?	Low	Medium	Medium	High
What is the degree of *generalizability*?	High	Medium	Medium-Low	Low

The *descriptive* approach provides accounts of "how things actually happen" (Makridakis, 1990, p. 12). Descriptive decision models are constructed on the basis of actual events that took place in the past and through the collection of empirical data. As the name implies, the main purpose of the descriptive approach is description, where description is the "discourse intended to give a mental image" of a real-life experience (Merriam-Webster, 2002). One variation of the descriptive model is the *pure descriptive*

model. A pure descriptive model emerges from the context of a particular decision situation where no two models are exactly the same.

Descriptive models are used for providing description, exploration, understanding, or reporting on real-life decision processes. These models rely mainly on qualitative evidence that require a high level of detail. Because of these requirements, case studies, action research, and ethnographies emerge as suitable research methods that enable eliciting these "departures from recommended procedures" (Nutt, 1984, p. 415). The level of generalizability of descriptive models is low because context is highly relevant. As a result, the descriptive approach supports a theoretical generalization as opposed to the statistical generalization that is supported by the normative approach.

The *normative* approach provides accounts of "how things should happen" (Makridakis, 1990, p. 12). Normative models are generalized representations of descriptive models that specify "norms or standards" (Merriam-Webster, 2002); therefore, they illustrate ideals. *Prescriptive* models are one variation of normative models that have a predictive capability; they are "designed to prescribe a desirable procedure but not necessarily to describe the decision process" (Gordon et al., 1975).

According to the above definition, normative models are ideal representations of descriptive models that are applied to a specific problem domain. They have a higher level of abstraction and are useful for planning and control. Because of their generalizable nature, they require more rigorous methods for which surveys, experiments, simulations, and multiple case studies, are deemed suitable (Shaw, 1971). In comparison with the descriptive approach that captures the "departures from recommended procedures" (Nutt, 1984, p. 415), the normative approach illustrates those procedures.

While normative decision models are considered suitable to reflect the domain of operational decisions, descriptive models are more suitable to study strategic decisions (Gordon et al., 1975). The normative approach has the disadvantage of imposing a framework on the data and wrongly leading to the assumption that decision procedures follow a neat sequence of steps. In the Mintzberg et al. study (1976), it was observed

that normative models of strategy formulation[2] made little difference in the behavior of the organizations studied because they were unable to cope with the complexity that existed at the strategic level. Findings of another study that explored the decision-making process in 78 case studies revealed that "nothing remotely resembling the normative methods described in the literature was carried out. Not even hybrid variations were observed" (Nutt, 1984, p. 446).

Considering this study's research questions as stated in chapter one, it can be concluded that a descriptive approach better serves this study's objectives. The advantage of using a descriptive approach to study the ES implementation strategic decision process lies in its ability to bring forth real-life experience. Using intuition to organize decision activities, patterns of the decision-making process emerge from the data the researcher examines (Nutt, 1984). This approach becomes infeasible, however when a large number of cases have to be assessed. As a result, the descriptive approach is more suited to the study of a few cases where the results provide a theoretical rather than a statistical generalization (Yin, 1994).

This section provided an understanding of the dichotomy of SDM research approaches. Both the descriptive and normative approaches were compared to suggest the suitability of the descriptive approach in this study. Next, five conceptual models of organizational decision-making are reviewed to provide five lenses for examining the SDM process of ES implementation.

2.3.2 Theoretical models of the SDM process

While a decision was earlier defined as a commitment to action that can end up with a successful or unsuccessful implementation, the decision process is defined as the interrelated set of activities leading to a decision (Gordon et al., 1975; Mintzberg et al., 1976; Nutt, 2000). The study adopts this definition to examine the decision process for 15 strategic ES decisions (as identified earlier in chapter one).

The literature on organizational decision-making, particularly involving strategic applications, exhibits a diversity of conceptual lenses that examine the decision process.

[2] *Strategy formulation* is the planned strategy or the strategy that "determines subsequent decisions" (Mintzberg, 1977, p. 29). However, when a "decision converges into a strategy," it constitutes *strategy formation.*

Despite this diversity, something which is also reflected in the different terminologies assigned to these lenses, there are dominant similarities in the decision process they abstract. Focusing on decision process patterns, a synthesis of those lenses elicits five broad types or five conceptual lenses. These include: *rational, muddling through, mixed scanning, garbage-can,* and *political* (Allison, 1971; Cohen and March, 1972; Eisenhardt and Burgeois, 1988; Etzioni, 1986; Lindblom, 1959; Simon, 1947). Table 2-2 lists these five SDM models, and describes the assumptions and the decision-making process for each. The models are reviewed next to provide a comparative analysis of their underlying assumptions and decision process details.

Table 2-2: Conceptual models of the SDM process

Model	Assumptions	Process
Rational (Allison, 1971; Simon, 1947)	Theoretically, decision-makers seek the best alternative to maximize goal achievements. In practice, however, decision-makers only look at alternatives that meet minimum standards.	The ideal decision process includes a series of sequential steps, which are: (1) identify the problem, (2) diagnose, (3) develop alternatives, (4) consider consequences, (5) evaluate, (6) select best alternative, and (7) implement and evaluate. In practice, satisfying solutions are good enough solutions that are reached by narrowing the range of alternatives. The decision-making process is cyclic and learning is part of it.
Muddling through (Lindblom, 1959)	Decision-makers make small incremental changes through successive and limited comparisons starting from the present situation, and with no set of clear objectives.	Successive comparison is an alternative to using theory that guides the decision-making process for the rational model.
Mixed scanning (Etzioni, 1986)	Decision-makers pursue incremental decisions that are made within a framework for an existing mission and policy.	Clear objectives guide the successive comparison. The model is a mix of the rational and muddling through models.
Garbage-can (Cohen and March, 1972)	Decision-makers scan for matches among solutions, problems, and participants.	A decision does not begin with a problem and end with a solution; decisions are a product of organizational events. A decision is not made until a problem matches an existing solution. The decision-making process relies on chance rather than rationality.
Political (Eisenhardt and Burgeois, 1988)	Decision-makers use their power to influence the decision process.	Politics arise due to the different and sometimes competing interests of decision-making stakeholders.

2.3.2.1 Rational

The *rational* model (Allison, 1971; Miller, 1987; Sabherwal and King, 1992)—which is also referred to as the comprehensive (Bourgeois and Eisenhardt, 1987; Bourgeois and Eisenhardt, 1988; Fredrickson, 1984; Fredrickson and Mitchell, 1984; Stein, 1981), computational (Butler et al., 1991), root method (Lindblom, 1959), planning (Mintzberg, 1973; Mintzberg, 1978), appraisal (Nutt, 1984), or the instrumental model (Stein, 1981)—is based on the assumption that decision-makers seek and select the best alternative to maximize goal achievements. The decision-making process is viewed as a series of sequential steps that start with the identification of the problem and follow to problem diagnosis, development and evaluation of alternatives, selection, implementation, and finally evaluation.

The rational model has been widely criticized for both its ideal assumptions that do not fit the complexities of real-life decision situations (Cohen and March, 1972) and for neglecting the social process in reaching decisions (Hickson et al., 1986). As a result, the rational model is sometimes categorized as a model of problem solving and not of decision-making (Hickson et al., 1986). Recognizing these limitations, it can be concluded that the rational lens provides a normative perspective of the SDM process (Hoy and Tarter, 1995). For that reason, the rational model in the above definition is deemed of little use to the descriptive purpose of this study. However, it provides a theoretical benchmark against which other models can be compared (Allison, 1971).

A better and a practice-oriented definition of rational decision-making is the bounded rational model (Eisenhardt and Zbaracki, 1992; Simon, 1947; Stein, 1981)—which is also referred to as the analytical (Bourgeois and Eisenhardt, 1987), computational (Thompson, 1967), constricted (Cray et al., 1988; Cray et al., 1991; Hickson et al., 1986), formal (Harrison and Pelletier, 2001), judgmental (Butler et al., 1991), linear convergence (Langley, 1990), managerial autocracy (Shrivastava and Grant, 1985), planned (Sabherwal and King, 1995), procedural rationality (Dean and Sharfman, 1993; Dean and Sharfman, 1996), search (Mintzberg et al., 1976; Nutt, 1984), sequential (Langley et al., 1995), or the thinking first model (Mintzberg and Westley, 2001).

Using this definition of rational decision-making, decision-makers are rationally bounded, looking at alternatives that meet minimum standards. Through narrowing the

range of alternatives, decision-makers choose satisfying solutions. The decision process is cyclic and learning is an integral part of this process. This definition that offsets some of theoretical limitations of rational decision-making is adopted in this study.

2.3.2.2 Muddling through

The assumptions underlying the *muddling through* model (Lindblom, 1959)—which is also referred to as the adaptive (Mintzberg, 1973; Mintzberg, 1978), dynamic design (Mintzberg et al., 1976), disjoint (Stein, 1981), incremental (Bourgeois and Eisenhardt, 1987; Bourgeois and Eisenhardt, 1988; Etzioni, 1986; Fredrickson, 1984; Fredrickson and Mitchell, 1984; Sabherwal and King, 1995), machine bureaucracy (Fredrickson, 1986), sporadic (Cray et al., 1988; Cray et al., 1991; Hickson et al., 1986), or the systemic bureaucracy model (Shrivastava and Grant, 1985)—recognize that the starting point for some decisions lacks a set of clear objectives. Despite that, the decision-making process continues with decision-makers making only small incremental changes on the basis of limited comparisons to the present situation. Successive comparisons produce non-ambitious decisions that are tied to the status quo.

While there is an expectation that all strategic decisions should have their objectives defined prior to taking further action, SDM studies sometimes report the contrary (Cohen and March, 1972; Mintzberg and Westley, 2001). The strength of the muddling through model lies in its descriptive capability to identify a recurring pattern of the SDM process.

2.3.2.3 Mixed scanning

In practice, not all strategic decisions are achieved through the execution of one single decision. Instead, several decisions in consecutive increments may be needed to achieve an objective. However, each incremental decision is made within the overarching objective of one grand decision. The *mixed scanning* model (Etzioni, 1986)—which is also referred to as the adaptive (Shrivastava and Grant, 1985), assertive (Miller, 1987), compromise (Thompson, 1967), iterative (Langley et al., 1995), logical incremental (Stein, 1981), modified search (Mintzberg et al., 1976), provincial (Nutt, 1984; Sabherwal and King, 1995), or the seeing first model (Mintzberg and Westley, 2001)—is a synthesis of both the rational and muddling through models.

The primary assumption of the mixed scanning model is that incremental decisions are made within a framework of clear objectives. This model addresses the weaknesses of both the rational and muddling through models. The model further acknowledges the contribution of the learning process that results from the trial and error of making incremental decisions (Etzioni, 1986). Experience provides the insight for shaping future decisions.

2.3.2.4 Garbage-can

According to the *garbage-can* model (Cohen and March, 1972; Eisenhardt and Zbaracki, 1992)—which is also referred to as the anarchies (Langley et al., 1995), behavioral (Stein, 1981), doing-first (Mintzberg and Westley, 2001), fluid (Cray et al., 1988; Cray et al., 1991; Hickson et al., 1986; Nutt, 1984; Sabherwal and King, 1995), inspiration (Butler et al., 1991; Thompson, 1967), organizational process (Allison, 1971), professional bureaucracy (Fredrickson, 1986), or the uncontrolled divergence model (Langley, 1990)—a decision does not begin with a problem and end with a solution; decision-making is an outcome of the interrelationships between problems, solutions, participants, and decisions.

Garbage-can decisions are a product of organizational events. Decision-makers scan for matches between solutions, problems, and participants, meaning a decision is not made until a problem matches an existing solution. Therefore, the decision process relies on chance rather than rationality. Because decision-making heavily relies on chance, the garbage-can model is perceived as one that does not solve problems well (Hoy and Tarter, 1995). However, it does allow decisions to be made and problems to be resolved (Cohen and March, 1972).

2.3.2.5 Political

The *political* model (Allison, 1971; Bourgeois and Eisenhardt, 1988; Dean and Sharfman, 1996; Eisenhardt, 1989b; Eisenhardt and Burgeois, 1988; Eisenhardt and Zbaracki, 1992; Mintzberg et al., 1976; Pettigrew, 1973; Sabherwal and King, 1992; Sabherwal and King, 1995; Shrivastava and Grant, 1985; Stein, 1981)—which is also referred to as the bargaining (Butler et al., 1991), controlled collegiality (Langley, 1990), entrepreneurial (Mintzberg, 1973; Mintzberg, 1978), interaction (Miller, 1987),

or the judgmental model (Thompson, 1967)—is one in which politics replaces organizational goals.

The political model is mainly concerned with the roles of different individuals and groups in the SDM process and their influence on a decision outcome (Hickson et al., 1986). Politics arise due to the different and sometimes competing interests of decision process stakeholders. In this study, politics is defined as the observable, but sometimes covert, actions by which decision-makers use their power to influence a decision (Eisenhardt and Burgeois, 1988).

The review of the five conceptual models clearly shows that no single lens can exclusively represent one particular SDM situation (Hickson et al., 1986). Conceptual lenses can only approximate reality in capturing dominant characteristics of the decision process.

This study attempts to describe and understand ES implementation through investigating 15 key ES decisions. In agreement with Stein (1981), not all decisions can be best described using a single lens. Therefore, the advantage of applying alternative conceptual lenses to those decisions is to expose the different aspects of events surrounding ES implementation.

> Models do not compete to provide the best representation of strategic decision processes. Rather, each of them is capable of representing adequately some subset of decisions. This means that all the models are, a priori, valid descriptions of real decision-making processes. (Stein, 1981, p. 924)

The next section describes the characteristics of the SDM process. These characteristics are the constructs proposed by this study to capture the five conceptual lenses to describe the SDM process.

2.3.3 Characteristics of the SDM process

A review of the SDM literature identified two approaches to the study of the decision process: the phase approach and the attributes approach (Sabherwal and King, 1995). The phase approach focuses on the phases in the decision process and describes decision-making in terms of what follows what (Mintzberg et al., 1976; Nutt, 1984; Nutt, 2000). The attributes approach conceptualizes decision-making in terms of the key

attributes or characteristics of the decision process (Cray et al., 1988; Sabherwal and King, 1995).

It is argued in this study that the application of the attributes approach provides a better understanding of the SDM process because it captures the contextual complexities of ES implementations without being drowned in decision phase details. Furthermore, a study of decision-making characteristics can be achieved in retrospect through utilizing semi-structured methods for data collection; most informants provide a better and more valid recall of events when data collection methods are not highly structured.

The study of SDM characteristics draws upon different variables and levels of analysis from informants' decision stories (Langley, 1999). Those variables identify the conceptual lens most suited to describe the events of ES implementations. The review of SDM process literature (Cray et al., 1988; Sabherwal and King, 1995) identified five key variables: duration, objectives, participation, analysis, and planning.

Table 2-3 lists SDM process variables, and provides both a definition and operational measures for each variable.

Table 2-3: SDM process variables

Variables	Definitions	Measures
Duration	The temporal extent of the SDM process.	The length of time from the first deliberate action towards a decision until the time a choice is made and, if needed, is authorized. A decision may be associated with one or a set of durations that signify the number of times changes pre-empted revisiting the initial choice.
Objective(s)	The aim of implementing the decision.	The details of the overarching objective for each strategic decision. In particular, it is important to question if objectives are: - Well defined (clear) or ambiguous? - Aligned (across other strategic decisions) or conflicting?
Participation	Involvement (who is involved?): The type of stakeholders involved in the SDM process.	The identification of major stakeholder groups in the SDM process. Those include: - At the intra-organizational level: Top management, user departments, and the IS function. - At the inter-organizational level: Evaluation/implementation partner(s), vendor(s), customers, and suppliers.
	Centrality (who is dominant?): The extent to which SDM is concentrated in the hands of one stakeholder group.	As above
	Influence (how are they involved?): The level of stakeholders' involvement in the SDM process.	The leadership style model, which hypothesizes an inverse relationship between the influence of the leader and the freedom by group, is adopted.
	Formality (what organizational mechanisms facilitate stakeholders' participation?): The types of organizational structures established to support ES implementation.	The three main types of organizational support structures are: - Applications team - Project management group - Steering committee
Analysis	The extent to which decision alternatives are evaluated prior to making a decision.	In particular, it is important to question: - The number of alternatives considered - The comprehensiveness of the evaluation process
Planning	The future horizon to a decision.	The period in the future considered for decision implications.

2.3.3.1 Duration

Decision duration or decision time is recognized as one of the self-evident characteristics of the SDM processes (Hickson et al., 1986); duration is defined as the length of time that passes between the first deliberate action towards a decision and when a choice is made and, if needed, is authorized. This study extends this definition to consider the recurrent revisiting of strategic decisions made during system implementation. This is especially important in systems implementation projects because strategic decisions often change direction during the life of the project, either because of an earlier mismatch of the system's objectives or for the need to accommodate unforeseen events.

It is noted, however, that a decision is a concept that is difficult to measure. A valid measurement of decision duration is better achieved when measurements are made relative to other decisions. The duration variable is of particular importance to the muddling through and mixed scanning models because both imply that the decision process is iterative, and that a decision is best described as a collection of small decisions rather than one grand decision.

2.3.3.2 Objectives

Decision objectives are defined in terms of the aim of implementing the decision. There may be one or several objectives to a decision. While some objectives are identified prior to making decisions, the literature provides examples of objectives that are identified after the decision is made (Cohen and March, 1972; Mintzberg and Westley, 2001).

The objective variable is applicable to the five conceptual models. A clear and predefined objective is observed for both the rational and mixed scanning models, while no clear agreements on objectives is demonstrated by the muddling through model. Actions are the means for making decisions using the garbage-can model; meaning objectives are defined subsequently. The political model emphasizes the existence of different types of objectives that are held by different stakeholders of the decision process. While some of these objectives are advertised, others are hidden.

2.3.3.3 Participation

Stakeholders' participation in the SDM process involves the identification of the various individuals or groups that influence the making of decisions and the roles they play. Although the definition of strategic decisions assumes that senior management lead the SDM process, other groups within the organization may be involved as well. A review of strategic investment decisions concluded that the decision-making process is an "incremental activity, involving many people and groups at various levels, often over lengthy time periods" and that despite the fact that "top management retain final approval, the real decisions take place much earlier in the process" (Butler et al., 1991, p. 396).

Another study noted that "participation in the strategic process is not limited to a few individuals who are located at the very top of the organization" (Fredrickson, 1984, p. 459). Many individuals at a variety of levels throughout the organization participate in information gathering and processing activities that contribute to making strategic decisions. Participation in the decision process includes the *involvement, centrality, influence,* and *formality* of the SDM process. While all participation variables are part of the contextual variables for eliciting decision stories, they are particularly useful for political lens analysis.

Three key stakeholders capture involvement in the SDM process of ES implementations. They are: the client organization, the evaluation or implementation partner(s), and the vendor(s). However, and because the focus of ES implementation is continuously expanding to include integration across the supply chain, other stakeholder groups, such as customers and suppliers, are emerging as influential. Within the organization implementing the ES, the IS literature further identifies three main sub-groups that have an impact on the SDM process. They are: top management, user departments, and the IS function (Sabherwal and King, 1995).

Centrality is defined as the extent to which SDM is concentrated in the hands of one stakeholder group.

Most strategic decisions in the context of ES implementation are made in a group context. Therefore understanding the involvement of key stakeholders can be complemented with an understanding of the influence of these parties in the SDM

process. The level of influence can be captured in terms of the stake in the decision each group member has. The Tannenbaum and Warren (1958) taxonomy of leadership styles is used to provide a descriptive model for understanding the extent to which SDM stakeholders share their decision-making power (Vroom, 2000, p. 84). Figure 2-1 displays the five leadership styles that capture the relationship between the influence of the leader and the freedom of the group, where 'decide,' when the leader makes a decision, lies at one end of the continuum and 'delegate,' where the group is responsible for making the decision, lies at the other end.

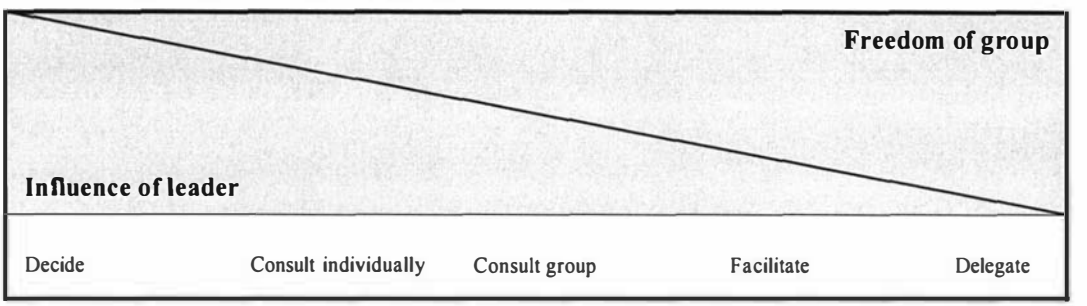

Figure 2-1: Taxonomy of leadership styles

Note. From Tannenbaum and Warren (1958)

Formality pertains to the type of temporary and/or permanent organizational structures established to manage ES implementation. There are three organizational structures that facilitate the implementation of strategic information systems projects. These are the steering committee, the project management (PM) group, and the applications team.

Both the applications team and the PM group are "formally constituted to accomplish a certain task but they are finite" (Mallory et al., 1983, p. 202). The steering committee for the ES project, even though it is a temporary organizational structure that has a limited life, is likely to be "positioned well within the formal institutional framework" of the organization (p. 202). Other groups are "informal in origin and composition, and temporary arising in the course of the particular decision" (p. 202). For ES implementation, these may include vendors' referral sites, clients, and suppliers.

2.3.3.4 Analysis

Analysis is defined as the extent to which decision alternatives are evaluated prior to making a decision. Analysis considers both the number of alternatives considered and the level of comprehensiveness of the evaluation process.

2.3.3.5 Planning

Planning is defined as the future horizon to a decision and is concerned with the period in the future considered for decision implications.

Although the focus of both the analysis and planning attributes is on the phase preceding that of the making of a decision, it is acknowledged that decision-making is a cyclic process, and that major IT decisions often get revised and change direction during implementation. Understanding the extent of planning and analysis in the SDM process is believed to be important in eliciting one major variation between the rational, mixed scanning, and garbage-can models (Mintzberg and Westley, 2001). Table 2-4 illustrates how the changing values of these two variables can indicate three different SDM models.

Table 2-4: Analysis and planning variables for three SDM models

	Focus of the pre-decision phase in three models		
SDM variables	**Rational**	**Mixed scanning**	**Garbage-can**
Analysis	High	Low	None
Planning	Long range	Long range	None

Note. Adapted from Mintzberg and Westley (2001)

2.3.4 Summary

A summary of the proposed associations between these SDM characteristics and the five descriptive SDM models is included in Table 2-5. Table 2-5, which uses the findings of the two studies of Mintzberg and Westley (2001) and Sabherwal and King (1995) and adapts them to the case of ES implementation, provides a benchmark against which the five SDM models can be compared. The table's empty cells denote that there is no significant relationship between some SDM variables and the corresponding decision model. This outcome emphasizes this study's earlier argument that not all measures are relevant to each of the five SDM models. Consequently, each model emphasizes a subset of those measures.

Table 2-5: Associations between SDM characteristics and SDM models

SDM characteristics	SDM models				
	Rational	**Muddling through**	**Mixed scanning**	**Garbage-can**	**Political**
Duration		Longest		Quickest	
Objectives					
Clarity	High	Low	High		
Conflict	Low	High	Low	Low	High
Participation					
Involvement/ influence	Top mgt/High	Top mgt/Low User dept/High IS/High Ext stakeholders/High	Top mgt/High IS/High	Top mgt/Low User dept/Low IS/Low	Top mgt/High User dept/High IS/Low
Centrality	Top mgt	IS Ext stakeholders	IS		
Formality	High	Low	Low		
Analysis	High	Low	Low	Low or none	
Planning	Long-range	Short-range	Long-range	Short-range or none	

Note. Adapted from Mintzberg and Westley (2001) and Sabherwal and King (1995)

Mintzberg and Westley (2001) argued that no universal decision process exists. In particular, they suggest that the rational approach that is widely reported as the dominant decision-making approach in organizations, needs to be complemented by the mixed scanning and the garbage-can approaches. Because of business complexity, each approach serves a particular purpose. Rational decision-making works best when the issue is clear; the mixed scanning approach is necessary when several elements need to be combined together to produce a creative solution; and garbage-can decision-making is preferred when the situation is novel and confusing. As a result, "no organization can

do without any one approach" (Mintzberg and Westley, 2001, p. 93). A recent study by Ranganathan and Sethi (2002, p. 78), which explored rationality in strategic IT decisions, confirmed this, suggesting that real world decision processes follow a hybrid of theoretical models, which should also include the "political to incremental to garbage-can models of decision-making."

The Sabherwal and King's (1995) seminal study of the decision processes involving IS applications surveyed strategic IS decisions in 81 companies to generate an empirical taxonomy of five alternative ways of making decisions. The five approaches—planned, incremental, provincial, fluid, and political—correspond to the five descriptive SDM models reviewed earlier (i.e. in the same order: rational, muddling through, mixed scanning, garbage-can, and political). Those models are noted for being distinct in terms of the activities they involve, thus they provide an a priori model against which the data can be tested.

The strong IS background of the Sabherwal and King study provides interesting insights into the participation construct that portrays the involvement, influence, and centrality of the different stakeholders in IS implementation projects. Another interesting finding of the same study associates the shortest and longest duration with the muddling through and garbage-can models respectively.

While no major disagreement exists between the findings of the Sabherwal and King study and those proposed by the earlier definitions of the five descriptive SDM models, the planning characteristic variable of the mixed scanning decision-making approach is an exception. The 'long-range,' not the 'short-range' value, is adopted here because it better describes the mixed scanning decision process defined in this study.

This section provided a review of SDM characteristics, their definitions, and operational measures. The next section provides a summary of this chapter and proposes a design blueprint for the study of the SDM process of ES implementation.

2.4 Summary

A process model of ES implementation provides theoretical as well as methodological guidance for the conduct of this study. The process approach integrates the understanding of SDM processes with those of ES implementation activities. Process

models are also useful to explain variation across time and provide a structure for both the reporting and the examination of empirical results with different theoretical SDM models.

Using multiple theoretical lenses is reported to provide a better understanding of the system development process (Newman and Noble, 1990; Sillince and Mouakket, 1997). Citing previous research, Newman and Noble suggest that multiple theoretical lenses better explain the same empirical situation because at one point in time, only one was relevant. Their study findings conclude that each model provides only part of the overall understanding of the complex process of system development. This study adopts the multi-theoretical approach of SDM models to understand the SDM process pertaining to 15 ES implementation decisions. This objective is achieved by the following steps:

First, the review of the literature in this chapter identified five theoretical models to study organizational decision-making. These multiple lenses are applied to study the SDM process pertaining to the 15 key ES implementation decisions that are listed in chapter one.

Second, the theoretical lenses are used as a background structure to collect data from two organizations for their SDM experiences in implementing an ES. The lenses provide the reference point for data collection, data organization, and data analysis. Care is taken to ensure that the theoretical framework does not frame data but provides a structure for pulling data together for further analysis and interpretation to answer research questions. Key categories that emerge from the data are added to enrich the pre-defined model.

Third, a process model for each of the two case studies is developed. The model is unique to each case and describes ES implementation through the sequence of events pertaining to the 15 key decisions. The findings of the two case studies are compared to provide an analytical generalization of the two process models.

Finally, insights from the findings of the cross-case comparison are discussed with reference to the theoretical lenses. The aim is to apply these models to develop an understanding of the SDM process, rather than to test a set of propositions. Figure 2-2 illustrates the methodological map for this study. The next chapter reports on the detailed design and application of the case study research methodology in this study.

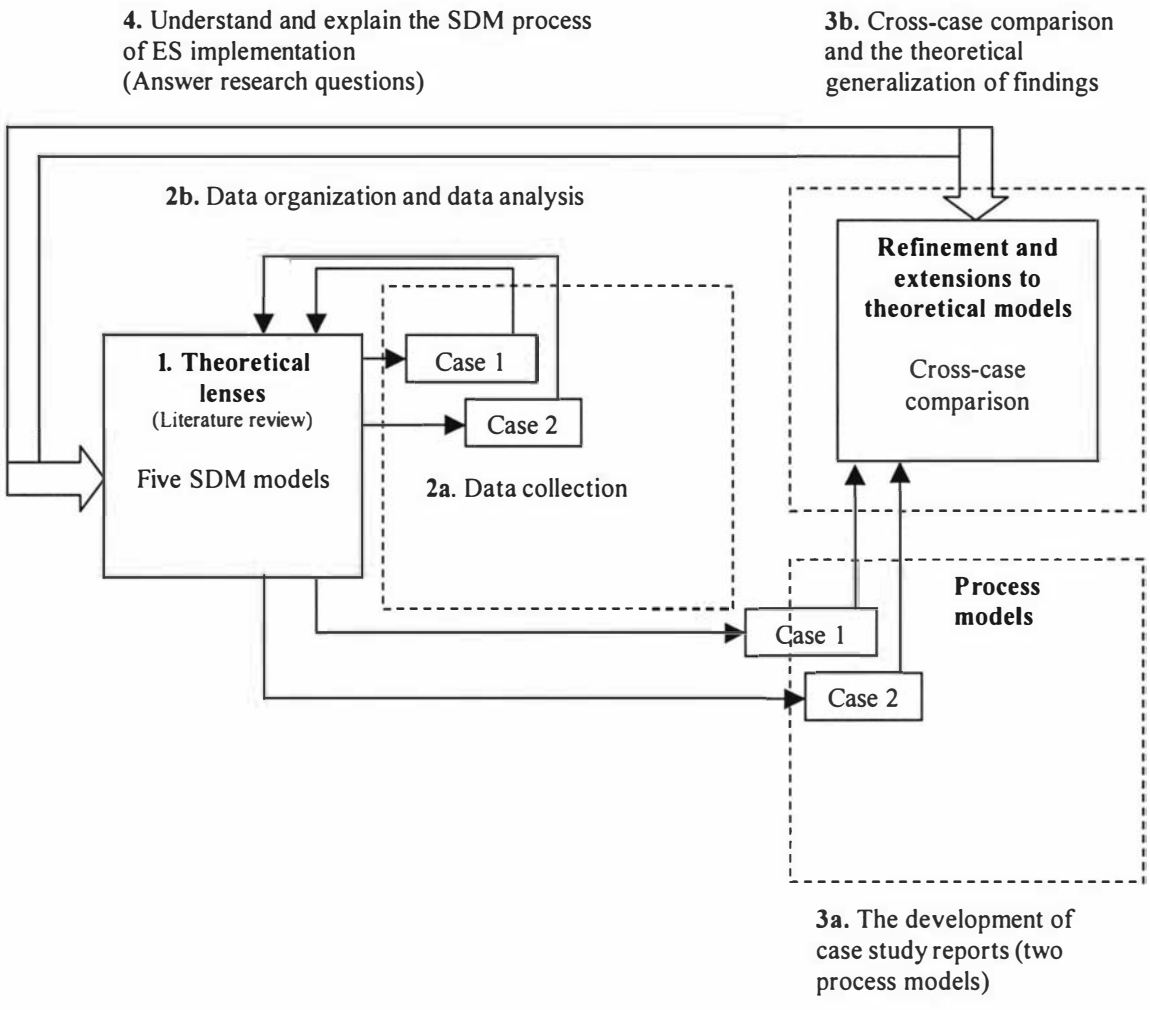

Figure 2-2: The methodological map for the study

3. CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Given the research questions and the limited knowledge of organizational experiences with ES decision-making, the focus of this research is to understand the details of ES implementation strategic decision processes. The exploratory nature of the research questions precludes a research design that involves a large number of cases, thus the first trade-off that shaped this methodology sacrificed breadth for depth.

To achieve both richness and theoretical parsimony, this study takes an idiographic research approach that is complemented by the use of the alternate templates strategy of the five theoretical SDM models reviewed in chapter two. Whereas the idiographic research approach emphasizes a context-dependent description of the SDM process to accomplish richness (Leonard-Barton, 1990; Luthans and Davis, 1982; Markus and Robey, 1988; Mohr, 1982), the alternate templates strategy provides the means for attaining theoretical parsimony (Cray et al., 1988; Langley, 1999; Lewis and Grimes, 1999).

Even though the two approaches may well relate to two different research paradigms—the interpretivist and the positivist[3]—this study is in agreement with Lee (1991) who argues that the "two different approaches are mutually supportive, not mutually exclusive" (p. 363).

Under the positivist umbrella, case study research can achieve one or more of three objectives: testing theory, description, and exploration. The aims of interpretivist case studies are the same with the exception of testing theory. Theories are not only "guidelines and frameworks for conducting ... research. ... [They] also provide ways of encapsulating the findings from the work" (Walsham, 1993, p. 14). In combining the idiographic research approach with the alternate templates strategy, a semi-positivist

[3] The two most dominant paradigms that constitute the overarching umbrellas under which IS case studies are researched are the positivist and the interpretivist. From a positivist perspective, the nature of reality is objective, singular, and independent from the researcher, and the researcher is independent from what is being researched. The assumptions adopted in the interpretivist paradigm are that reality is subjective, multiple, and constructed by both the study participants as well as the researcher. While there are essential differences between the two paradigms in both their ontological and epistemological assumptions, both agree on key guidelines to case research designs (Shakir, 2002). Shakir illustrated the

focus—incorporating positivist and interpretivist case study guidelines—that better achieves research objectives was adopted. Detailed reporting of two case studies of ES implementation in NZ provided the primary data to fulfill this objective.

This chapter explains the research methodology for this study. The objectives of this chapter are:

- to justify the application of the case research strategy in answering the study's main research questions
- to explain the components of case study research design
- to establish quality tests in research design
- to decide and apply guidelines for case study selection
- to illustrate data collection methods, procedures, and instruments
- to discuss how data from multiple sources of evidence are organized, integrated, and analyzed
- to explain the choices made in writing the case study report
- to clarify and provide the guidelines for fulfilling the ethical considerations of anonymity and confidentiality in this study
- to present the methodological model of the study with a foreword to the next chapter

3.2 Justification of the research methodology

It is acknowledged that all scientific methods have their strengths and weaknesses, with no single method that is superior to all. Weighing the strengths and weaknesses of different methods can therefore be one approach for identifying the method most suitable to answering research questions.

With no research strategy that is inherently the best, the choice of a strategy depends on both the topic being investigated and the current knowledge of the topic (Benbasat et al., 1987). The fundamental question motivating this research is *"how are strategic ES decisions made?"* A review of the ES implementation literature suggests that concepts relevant to the research problem have not been investigated thoroughly enough to devise hypothesis testing (Martin and Cheung, 2000; Parr et al., 1999; Sarkis and Sundarraj,

similarities through mapping Yin's (1994) guidelines for case study research, which represent the positivist approach, to Klein and Myer's (1999) seven principles for evaluating interpretive case research.

2000). This situation suggests that to address this study's research questions, a description of the decision-making process should be the first step.

Case study research focuses on exploration, description, or explanation of a social phenomenon when the dominant research goal is "making facts understandable" (Ragin, 1999a, p. 1150). This is the preferred strategy when investigating the 'how' or 'why' questions about a contemporary set of events over which the investigator has little or no control, and when the boundary between the phenomenon and the context are not clearly defined (Yin, 1994). Case studies are also useful tools to capture the knowledge of practitioners and to develop theories from this knowledge (Benbasat et al., 1987). Table 3-1 lists three of the most widely cited definitions of case study research in IS.

Table 3-1: Technical definitions of case study research

Reference	Definitions
Yin (1994, p. 6, 13, 15) Times cited: 793 (ISI Web of Science as of 2003-05-27)	Case study "is the preferred strategy when the 'how' or 'why' questions are being posed," "investigates a contemporary phenomenon" "in real-life context," "which the investigator has little or no control over," "especially when the boundary between the phenomenon and the context are not clearly defined," "copes with many variables of interest," "relies on multiple sources of evidence," "benefits from the prior development of theory to guide data collection, data organization, and data analysis," and "focuses on exploration, description or explanation."
Benbasat et al. (1987, p. 370) Times cited: 185 (ISI Web of Science as of 2003-05-27)	"A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups or organization). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used."
Eisenhardt (1989a, p. 534) Times cited: 1,059 (ISI Web of Science as of 2003-05-27)	"The case study is a research strategy which focuses on understanding the dynamics present within single settings...Case studies can involve either single or multiple cases and numerous levels of analysis.... [They] combine data collection methods such as archives, interviews, questionnaires, and observation. The evidence may be qualitative, quantitative or both. ... Case studies can be used to accomplish various aims: to provide description, test theory or generate theory."

This research study addresses the contemporary phenomenon of ES implementation, which the researcher has no control over; it is largely exploratory and addresses the 'how' and 'why' questions. Furthermore, one of the distinctive features of case study research is its ability to provide for a holistic investigation of real-life events, which are the SDM process and the ES implementation process. While precision and generalizability are the main strengths of both experimental and survey research respectively, the main strength of case research lies in maximizing realism (McGrath as cited in Dennis [2001]).

For this reason, a case study research methodology has been used to explore the SDM process of ES implementation practice in NZ. As suggested by Eisenhardt (1989a) and Yin (1994), two cases are studied to enable the generation of theory.

3.3 Case study research design

This section starts with a discussion of the case study strategy in IS research. The answers to four key design questions then follow. The quality of research design is then defined along the two dimensions of research validity and research reliability. Measures to ensure research quality are suggested.

3.3.1 The application of the case study strategy in IS research

The design and implementation of research design in this study was informed by the Benbasat et al. (1987) seminal paper on the application of the case study strategy in IS research. The paper reviewed four IS implementation case studies that had been selected to enable a theoretical replication in highlighting a diverse set of methodological issues. Table 3-2 summarizes the strengths and weaknesses in the practice of the case research strategy that were highlighted in that study. The strengths represent a list of best-practice items that were considered in both research design and the reporting of findings. Similarly, weaknesses were identified as possible problem elements and were at best avoided.

In summary, the strength of a case study research design can be achieved by providing for: thick description, description of IS history, detailed description of events, triangulation, data validation, explanations of case outcome, and description of methods.

While the list of strengths are mainly concerned with the operationalization of research design, the list of weaknesses mainly addresses the two issues of research purpose and the reporting on methodology. An unclear research purpose becomes apparent when the study offers no justification for the research purpose, no specification of research objectives, and no definition of research questions.

Missing information about methodological choices regarding the selection of research sites, units of analysis, data sources, and research methodology are other signs of weakness. Not including the details of the research methodology makes it difficult for the future researcher to learn from a study (Franz and Robey, 1987). Franz and Robey further identified an element that was missing in the Benbasat et al. (1987) weakness list, this being the lack of attention to theory. The strength of the study's theoretical foundation is considered a key feature that distinguishes research case studies from other types of case studies, such as teaching and practice-oriented cases (Yin, 1994).

Table 3-2: Strengths and weaknesses of the case study research strategy

Issue	Strengths	Weaknesses
Case description	Detailed description of the history of the implementation process over a period of time. Description of events in such detail that readers can make their own distinctive interpretations if they wanted to.	There is a lack of detailed description of case studies.
Research objectives		Research purpose was not clearly justified because of not providing a "clear description of where ... topics fit in the knowledge building process ... (drift, description, exploration, and explanation)" (p. 380). "The objective of the study was seldom clearly specified" (p. 378). There is a lack of a clear definition of research questions.
Validation	Checking accuracy of a case study report through sending the report draft to informants, including the two groups of those interviewed and others who had not been interviewed. Ensuring triangulation and the convergence of case study evidence through the organization and integration of evidence; evidence is best organized according to the elements of the theoretical framework of the study and the organization starts at the earlier stages of data collection. "For a given topic, side-by-side presentation of all comments made by each interviewee for each topic was provided" (p. 377). Providing "explanations for the outcomes based on what was observed from the cases" (p. 378).	
Methodological choices	Providing details of data collection methods, procedures, and instruments. One example involves including a list of the interview questions in the appendices section of the case report.	There is a lack of explanation regarding the choice of the research site. There is a lack of explanation regarding the unit(s) of analysis. There is a lack of "details about the data collection methodology" (p. 375).

Note. Adapted from Benbasat et al. (1987)

This section provided a review of common strengths and weaknesses in the application of the case study research strategy. The next section discusses how these issues were addressed in the operationalization of research design to maximize strengths and avoid weaknesses.

3.3.2 Four questions of research design

Research design is considered the action plan that links the data collected backward to the study's research questions and forward to the study's conclusions (Yin, 1994). The main purpose of research design is to answer the four questions of: "what are the research questions? what data are relevant? what data to collect and how? and how to analyze the results and report the findings?" (Yin, 1994, p. 20). Figure 3-1 illustrates the four questions, indicating both their sequence in the research process and the corresponding thesis chapters where they are addressed. Although arrows in Figure 3-1 are pointing in one direction, going back and forth is part of the iterative nature of the research process; circular arrows are omitted for the purpose of clarity.

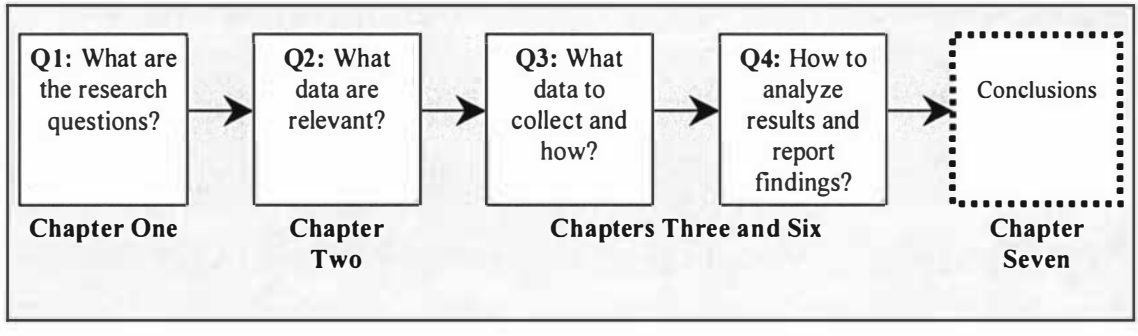

Figure 3-1: Four questions in research design

The first question was addressed through the formulation of the research questions. Chapter one provided an elaboration on research background, the definition of the research problem, and the formulation of the research questions.

The second question was addressed in the development of the theoretical framework of the study. Chapter two provided a critical analysis of the literature that resulted in adopting a process research approach and the application of five lenses for examining the SDM processes of ES implementations.

Providing detailed answers to the third and fourth questions are addressed in both chapter three and chapter six. This chapter establishes the guidelines for data collection,

data integration, data analysis, and the write-up of the case study report. Chapter six further reports on the analysis strategy in this study. Figure 3-2 summarizes the answers to the four research design questions in this study.

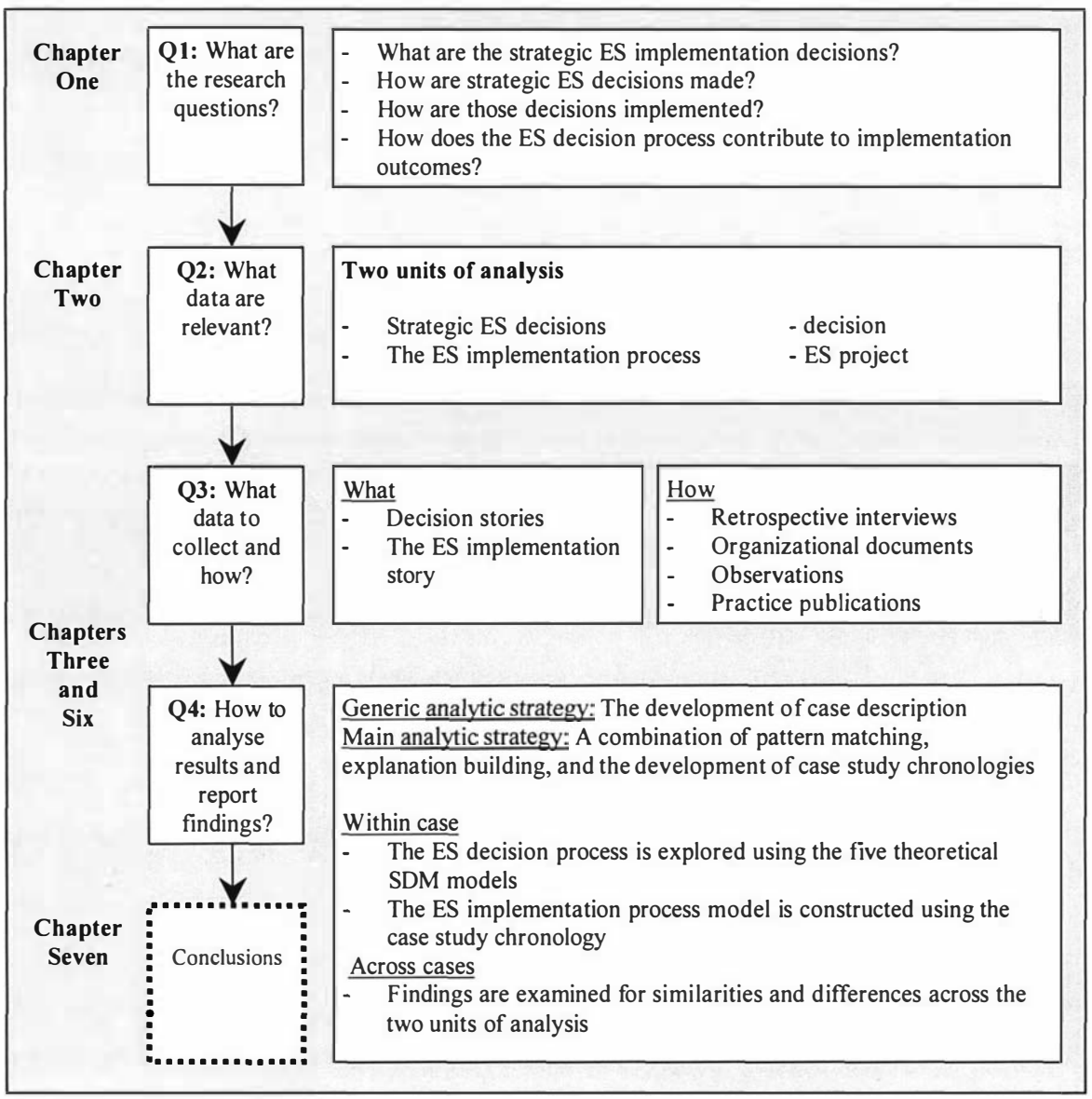

Figure 3-2: Answers to four research design questions

3.3.3 The quality of research design

Four tests are used to establish the quality of case study research design; these are: construct validity, internal validity, external validity, and reliability tests (Yin, 1994). Both definitions and applications of these four tests in this study are explained in this section. Measures to ensure that the four tests were addressed helped both to

acknowledge the anticipated pitfalls and to take preventive actions in order to increase the study's rigor.

3.3.3.1 Construct validity

Construct validity addresses establishing correct operational measures for study concepts to ensure data collection is based on those measures and not on the researcher's subjective decisions (Yin, 1994). Yin suggests two steps to meet this test: (1) selecting study objects in alignment with the study's objectives, and (2) demonstrating that operational measures for these objects reflect the essence of what needs to be captured.

The selection of study objects includes both the selection of cases and the selection of informants; the two are discussed in section 3.3.5 and section 3.5.1 , respectively.

The tactics suggested to achieve construct validity include using multiple sources of evidence (triangulation), getting feedback from informants, and establishing a chain of evidence (Miles and Huberman, 1984; Yin, 1994). The next section (3.3.4) provides a detailed review of triangulation and its application in this study.

The validity of interviews in this study was established in three ways: (1) in successive follow-up interviews, (2) in requesting the review of interview transcripts by informants, and (3) in holding a feedback session (Heller et al., 1988; Hickson et al., 1986; Yin, 1994). Each of these components is discussed in detail below.

The researcher used the opportunity of follow-up interviews to check the reliability of the data collected earlier. To achieve this, the researcher's interview notes included issues that needed further discussion. These issues were later clarified either in face-to-face follow-up interviews or through a brief telephone call.

All interview transcripts were emailed to informants asking them to review the transcript and to note any discrepancies. Informants were later contacted to approve the inclusion of selected quotes in the final draft of the case study. All informants agreed with the content of their interview quotes, although a few did suggest minor changes.

A feedback session with the key contact person in each of the two case study organizations took place. The feedback session (Hickson et al., 1986) is both an

opportunity to verify the ES implementation process model as well as an opportunity to clarify any misunderstandings experienced by the researcher.

Establishing a chain of evidence is similar to the practice of criminal investigation. It is based on the notion that an external observer will be able to follow the "derivation of evidence from initial research questions to ultimate case study conclusions" (Yin, 1994, p. 98). That external observer needs to follow the steps of the research process in two directions: forwards, from research-questions-to-conclusions and backwards, from conclusions-to-research-questions.

Figure 3-3 illustrates the way the chain of evidence concept serves to link the different elements in a case study. In this study, a chain of evidence was pursued through citing portions of the case study database, maintaining the documentation of the database, ensuring that the data collection protocol was followed, and indicating an explicit link between the data collection protocol and research questions (Yin, 1994).

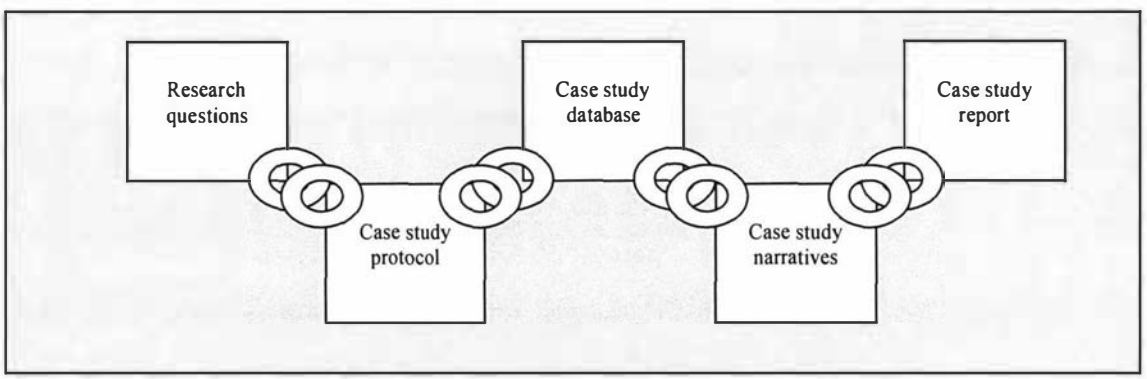

Figure 3-3: The chain of evidence in case study research

Note. Adapted from Yin (1994, pp. 98-99)

3.3.3.2 Internal validity

The main concern for the internal validity of case studies is that of making inferences (Yin, 1994). This issue is particular to case studies because not all events can be directly observed. The validity case study research aims to achieve is the assertion that another researcher facing the same data would reach analogous conclusions (Miles and Huberman, 1984). Miles and Huberman (1994) further suggest that the verification process is ongoing and is concurrent with data collection.

The three questions that need to be addressed to establish internal validity are: "is the inference correct? Have all the rival explanations ... been considered? [And] is the evidence convergent?" (Yin, 1994, p. 35).

Internal data validity was established during the conclusion stage of data analysis when findings were verified for their "plausibility, sturdiness, and validity" (Miles and Huberman, 1984, p. 24). This study applied the two data analysis techniques of explanation building—in the form of an iterative pattern matching of rival explanations—and the development of case study chronologies to address internal validity. Further details are included both in the data analysis section of this chapter and in the report on the analysis strategy of chapter six.

3.3.3.3 External validity

External validation—or the limited generalizability of the findings—is established through the replication logic of the two-case study design (Creswell, 1994; Yin, 1994). The 'selection of case studies' section in this chapter provides further details on the replication logic in this study.

3.3.3.4 Reliability

Reliability is concerned with the possibility of replicating the case study using the same procedures and getting similar results (Yin, 1994). However, because the case study considers many variables that are immersed in organizational settings, it is almost impossible to replicate the case. Therefore, the emphasis of the reliability test is not on the replication of the results of one case by doing another but on following similar procedures. Therefore, reliability is achieved through: (1) the use of a case study protocol, (2) the detail documentation and reporting of both data collection and data analysis strategies, and (3) the development and maintenance of the case study database.

The main limitation to reliability is the difficulty to exactly replicate a data collection process in the organizational dynamic context. Establishing high-level guidelines before the start of data collection and documenting changes in these guidelines when they changed during the course of data collection is one solution to overcome this problem (Howe and Eisenhardt, 1990). As recommended by Bourgeois and Eisenhardt (1988) and Yin (1994), these guidelines were applied through the development of the case

study protocol, the use of similar entry and exit procedures to case study sites, and in similar organization of the case study database.

3.3.3.5 Summary

Table 3-3 summarizes the application of the four quality tests during different phases of the research process. It is noted that reliability and construct validity are mainly addressed during the data collection phase of the research process; external validity is established during the design phase and internal validity is demonstrated in the data analysis phase.

Table 3-3: Quality tests in case study research

Test	Research phase	Procedures	Procedure details
Construct validity	Data collection	Triangulation of data, methods, and informants	– Multiple methods: retrospective interviews, observations, and examinations of documents and practice publications – Multiple sources of evidence: five primary informants plus others using the snowballing technique
	Data collection	Feedback from informants	– Conducting successive follow-up interviews – Requesting the review of interview transcripts by informants – Holding a feedback session
	Research design Data collection Research closure	Chain of evidence	– Making an explicit link between the data collection protocol and research questions – Designing and applying a data collection protocol – Maintaining the documentation of the database – Citing portions of the case study database in the case report
Internal validity	Data analysis	Answering the three questions of: – Is inference correct? – Have all rival explanations been considered? – Is the evidence convergent?	– Applying the two data analysis techniques of explanation building—in the form of an iterative pattern matching of rival explanations—and case study chronologies – Conducting several iterations in comparing theory and data and examining both the literature which conflicts with emerging theory and literature discussing similar findings
External validity	Research design	Applying the theoretical replication logic	– Developing criteria for selecting case studies using the theoretical, not the sampling, replication logic
Reliability	Research design	Developing the case study protocol	– Conducting both exploratory interviews with key ES stakeholders and three pilot ES implementation case studies
	Research design Data collection Data analysis	Developing and maintaining the case study database	– Using both MSWord and the NVivo qualitative software application to manage the four elements of the case study database, which are: case study notes, case study documents, data displays, and case study narratives

Note. Adapted from Bourgeois and Eisenhardt (1988), Howe and Eisenhardt (1990), Miles and Huberman (1984), Miles and Huberman (1994), and Yin (1994).

3.3.4 Triangulation

This section explores the definition of triangulation and explains its application in case study research. Furthermore, the strengths and limitations of this technique are compared.

Triangulation is widely known in the fields of navigation, geometry, land surveying, and military strategy as the method that applies multiple points to locate the position of an object (Denzin, 1989a; Patton, 1990). The main purpose of triangulation in research is to establish research validity. There are four types of triangulation: data, methodological, theoretical, and personnel triangulation (Denzin, 1989a; Trauth and O'Connor, 1991). Because this chapter is mainly about research methodology, the first two types of triangulation are discussed here and these are jointly referred to as methodological triangulation.

Methodological triangulation is defined as the "combination of methodologies in the study of the same phenomenon" (Denzin, 1989a). It is one means of "blending and integrating a variety of data and methods" (Jick, 1979, p. 603). In more detail, triangulation "refers to checking inference drawn from one set of data sources by collecting data from another source" (Trauth and O'Connor, 1991). Because it is impossible to exactly replicate a data collection process in a dynamic organizational setting, triangulation provides the means to overcome limitations to research validity. While different statistical tests are used to ensure the quality of research design for quantitative studies, it is triangulation that serves a similar purpose for qualitative studies (Yin, 1994).

In case studies, triangulation allows the researcher to reach confidence in the results, especially when convergent findings are sought (Jick, 1979, p. 609). Convergence is established when findings point in the same direction, even though data were collected using multiple methods from multiple sources of evidence. As a result, the construct validity of research increases.

In this study, triangulations of data, methods, and informants were applied. Multiple methods included retrospective interviews, observations, and examinations of organizational documents and practice publications. Multiple sources of evidence

mainly focused on five primary informants plus others identified using the snowballing technique. More details are provided in the data collection section of this chapter.

3.3.5 The selection of case studies

The multiple case study approach has been chosen "because evidence from multiple cases are often considered more compelling" (Yin, 1994, p. 44). Furthermore, multiple cases enable the generation of theory (Eisenhardt, 1989a; Yin, 1994). Two case studies of ES implementation in NZ provided the primary data to fulfill this objective. This section discusses the detail of the case selection process for this study.

While the aim of sampling in an experimental or survey study is generalization and prediction, for a multiple case study the aim of selecting cases is to "create and test new interpretations" (Kuzel, 1999, p. 34). Hence, the sample does not need to be representative of a larger population—as is the case for experimental and survey studies—because for case studies, the focus is on information richness (Kuzel, 1999; Patton, 1990). Discussions of sampling decisions in the literature apply not only to case selection but also to the selection of informants, events, and processes. The focus of this section, however, is the application of sampling decisions to the selection of cases (Kuzel, 1999; Miles and Huberman, 1994; Patton, 1990).

There are three main approaches to the selection of case studies (Ragin, 1999a; Yin, 1994). First, cases are selected because they are extremes. This strategy is often the most suitable approach for single case study research. Second, cases are selected because they are typical. Several cases are often required to provide an in-depth understanding about conventional practice. Finally, cases are selected for theoretical reasons because "they challenge a widely held theory or because they support a widely questioned theory" (Ragin, 1999a, p. 1139).

This study adopts the second approach by selecting typical cases of ES implementation that provide an in-depth understanding about strategic ES decision-making practice. Because this research is largely exploratory, the examination of a diverse set of data from two cases provides for a theoretical replication of the findings. This type of generalization from the two case studies is called analytical generalization or the generalization of "a particular set of results to some broader theory" (Yin, 1994, p. 36).

It is widely recognized that the selection of case studies should not be a haphazard activity; the selection and evaluation process needs to be justified, fully documented, and reported to the case study audience in order to provide the context for judging the sample. To ensure the quality of multiple case study research, the two conditions of appropriateness and adequacy are suggested to drive selection decisions (Kuzel, 1999).

Appropriateness is to demonstrate the fit between the purpose of the research and the phenomenon of the inquiry; adequacy is concerned with how much is enough or how many cases are needed (Kuzel, 1999; Miles and Huberman, 1994; Patton, 1990). The application of those two conditions in this study is discussed in the following paragraphs.

To satisfy appropriateness, the question that needs to be answered is: how to sample cases? A purposeful sampling strategy is one approach in meeting the appropriateness condition of case selection. Patton (1990) proposes as many as 16 different purposeful sampling strategies. Table 3-4 lists those strategies and their operational definitions.

Table 3-4: Purposeful sampling strategies

Sampling strategies	Definitions
Extreme case	The case demonstrates unusual manifestation of the phenomenon, such as an outstanding success or a notable failure.
Intensity case	The case is information rich but not an extreme case.
Maximum variation	The cases, despite having diverse variations, exhibit important common patterns that cut across variations.
Homogeneous	The cases exhibit minimal variation, therefore, analysis is simplified and the study is focused.
Typical case	The case illustrates what is typical, normal or average.
Stratified purposeful case	The case illustrates characteristics of a particular subgroup to facilitate comparison, and not generalization or representation.
Critical case	The case permits logical generalization to other cases because if it is true to this one case, it is likely to be true to all other cases.
Snowball	The case of interest is referred by people who know people who are knowledgeable about cases that are both information rich and form good examples for the study.
Criterion	Cases are picked because they meet a predetermined criterion.
Theoretical	The cases are manifestation of a theoretical construct that is used to examine and elaborate on it.
Confirming and disconfirming	The cases elaborate on initial analysis to seek exceptions or test variations.
Opportunistic	The cases emerge from following leads during fieldwork.
Random purposeful	The cases are randomly selected from a large sample for the purpose of increasing credibility, and not for generalization or representation
Politically important case	The case is selected or eliminated because they are politically sensitive cases.
Convenience	The case is selected on the basis of saving effort, time, and money. The case is a candidate example of information-poor and low credibility cases.
Combination	The cases are flexible, and meet different interests and needs.

Note. Adapted from Patton (1990, pp. 182-183)

These sampling strategies are noted to have different aims. However, in considering their definitions, six clusters can be identified. These are significant versus ordinary cases, different versus similar cases, and predetermined versus ad hoc selected cases. Table 3-5 illustrates these six clusters and the sampling strategies that each cluster includes.

Table 3-5: The six clusters of sampling strategies

Clusters		Sampling strategies	is contrasted to	Sampling strategies	Clusters
Significant cases		Extreme case Intensity case Critical case Politically important case	⟷	Typical cases	Ordinary cases
Different cases		Maximum variation Random purposeful Stratified purposeful case	⟷	Homogeneous cases	Similar cases
Predetermined cases	Field determined	Snowball Opportunistic	⟷	Convenience cases	Ad hoc cases
	A priori theory	Criterion Theoretical Confirming and disconfirming			

The significant-cases cluster includes the purposeful sampling strategies: the extreme case, intensity case, critical case, and the politically important case. The significant-case strategy is contrasted with the typical- or the ordinary-case strategy.

The different-cases cluster includes the maximum variation, random purposeful, and the stratified purposeful sampling strategies. The different-case strategy is contrasted with the homogeneous- or the similar-case strategy.

The predetermined-cases cluster includes either fieldwork-based or theory-based sampling strategies. Field-determined strategies are the snowball and the opportunistic sampling strategies. The a priori-theory strategies are the criterion, theoretical, and confirming-disconfirming strategies.

The predetermined-case strategy is contrasted with the convenience strategy, for which cases are selected on the basis of convenience. The convenience strategy, although the most popular, is regarded as the "least desirable" because it does not satisfy the appropriateness condition as defined earlier (Patton, 1990, p. 180).

The benefit of these sampling clusters is to provide a guideline for case study selection. For a multiple case study research design, the proposed strategy is to include choices in three of the six contrasting clusters. In a single case study design, the sampling strategy is to involve choices in the two clusters of significant vs. ordinary and predetermined vs. convenient cases. This is because the different vs. homogenous strategies only apply to multiple case designs.

The application of Table 3-5 to facilitate the selection of cases in this study resulted in a combination strategy of typical cases, different cases with maximum variation, and field-determined cases. These choices satisfied the purpose of the study that materialized in the research question(s) presented in chapter one. An explanation of these choices in relation to this study is discussed next.

Because this study is exploratory, the typical case strategy is suitable to "describe and illustrate what is typical" (Patton, 1990, p. 173) in the SDM process of ES implementation. Patton advises that the selection of these cases needs to be done with the cooperation of the case key informants because they are the ones that can "identify what is typical."

Semi-structured interviews were conducted with 14 key players of ES implementations in NZ including ES vendors, ES consultants, IT research firms, and an ES hardware vendor (Shakir, 2003). Research participants reported their interpretation of a typical case in terms of their particular experiences. The findings defined a 'typical' case as an ES implementation project within the top 1000 NZ companies where the number of employees is one hundred or more. The findings further suggested that the ERP market of large organizations was saturated, meaning typical cases of ERP implementations in NZ are those that are either happening in SME-sized organizations or are second phase or what is called phase II[4] implementations in large organizations.

SME implementations are likely to be new implementations of two or more core ERP modules. They can be single or multi-site implementations and ERP vendors are likely to be involved in implementation management. The majority of SME implementations

[4] Phase II is the terminology used to describe the stabilize phase following implementation go-live. During that phase, new system upgrades and improvements are undertaken. Other popular terminologies that convey similar meanings are 'ERP Second Wave' (Deloitte Consulting LLC, 1999) and 'ERP II' (Hilsgen, 2001; Osborn, 2000).

aim to be 'vanilla[5]' using only core ERP modules. However, this may not always be possible depending on business specialization. The cost of these implementations range from NZ$700,000 to NZ$3 million and the number of users is around one hundred. Phase II implementations in large organizations include major upgrades to existing enterprise systems. These upgrades often add more modules to the core ES and are likely to include considerations for choosing a different ES vendor.

The choice in the second pair of clusters (i.e. similar vs. different) went for maximum variation or to obtain different cases. Although selecting different cases can make the analysis challenging, this feature contributes to increasing the strength of the results because "any common patterns that emerge from great variation are of particular interest and add value in capturing the core experiences" of the cases (Patton, 1990, p 172). The maximum variation criteria used to select cases in this study are different ES vendors and different industries for case study organizations.

For the third pair of clusters, the predetermined case strategy was chosen over the convenient case strategy. This strategy included both the snowballing and opportunistic approaches. During the exploratory investigation phase of this study and in conversations with ES consultants, ES research firms, and ES vendors, several ES implementations were suggested. Opportunities arose to investigate cases that seemed relevant; relevant cases were those that satisfied the two above guidelines of the 'typical' and 'maximum variation' strategies.

The criterion sampling strategy was also applied to ensure that the ES implementation process in the cases selected had started in a timeframe set at no more than one-and-a-half years before the first site-entry visit and no less than six months before that visit. The starting point for this predefined period is the organizational decision identifying an enterprise resource planning (ERP) system as the system of choice; deliberations prior to this decision that may have considered other systems are not included.

There are two reasons for imposing the timeframe criterion. The first is suggested by the literature on strategy implementation and the purchasing of capital expenditure

[5] *Vanilla* is a term used to describe an ES implementation that is characterized as having minimum software customization. In such implementation, where a difference exists between business practice and the best-practice design of the software, the business changes to fill the fit gap. Vanilla implementations have an IT rather than a business focus and are favorable because they comparatively cost less and take less time to implement.

(Johnston and Bonoma, 1981b; Mintzberg et al., 1976). Key informants start to forget the detail of the SDM process when interviewed several months past the date the events happened. The second is to ensure that cases are 'information rich' (Patton, 1990). The six-month minimum period was adopted to ensure that ES implementation was progressing, and that the additional six-month period allocated to data collection would be sufficient to investigate a case of typical ES implementation. The timeframe criterion was validated with key stakeholders of ES implementation in the exploratory phase of the study (Shakir, 2003).

The sampling strategies and their application to the selection of the two cases in this study were discussed to illustrate how this study satisfies the 'appropriateness' condition, which is the first condition applied to a quality multiple-case design. Satisfying the second or 'adequacy' condition, which guides the number of cases is discussed next.

Kuzel (1999) suggests a set of guidelines to ensure adequacy. The first is flexibility in choosing cases; even when criteria for case study selection are developed at the outset of the study, an interdependency between the cases can exist in a way that choosing the first case can affect the choice of the second case, and so on. The second guideline is concerned with information saturation of both evidence and alternative explanations of cases. Information saturation is usually achieved when cases are information rich. However, saturation is a subjective concept that can only be interpreted when linked to both the purpose of the study and its guiding theoretical framework.

There is no agreement in the literature on the number of cases in a multiple case study design (Patton, 1990). However, it is widely accepted that the number of cases can be determined in a trade-off between the breadth and depth of the case study inquiry. In-depth information is required for a small number of cases while less depth is acceptable when the number of cases increases (Glick et al., 1990).

Although the general guidelines for case research (Yin, 1994) recommend that the replication logic[6] of the study should determine the number of cases (i.e. two to three cases for a literal replication and six to eight cases for a theoretical replication). This

[6] A literal replication entails choosing similar cases that are expected to achieve similar results. A theoretical replication entails choosing different cases, which are expected to achieve different results (Yin, 1994).

study was limited to two case studies, trading depth for breadth. Because this research is largely exploratory, the aim is to provide for a theoretical replication of the findings through the examination of a diverse set of data.

While the goal of case study research is to provide an understanding of "how conditions fit together to produce an outcome" (Ragin, 1999b, p. 1226), case comparability with the application of the theoretical replication in this study is based on sharing and contrasting theoretical concepts, and does not revolve around similar outcomes and common conditions. Two different cases were selected for this study. This choice was made in light of the study's main objective of 'understanding the SDM process of ES implementation in NZ.'

Criteria for selecting the two participant organizations included a combination of size, industry, and profit making status. Practical considerations included the important condition of organizational willingness to cooperate with the researcher. Table 6-1 provides a cross-case comparison of the two cases.

3.3.6 The unit of analysis

This study uses two units of analysis or what is called an embedded case (Yin, 1994). The two units are: (1) the strategic ES implementation decision(s) and (2) the ES implementation process. The advantage of an embedded case design is to prevent the shift in focus that is a common problem for single unit-of-analysis case designs. That problem occurs when the "entire nature of the study shifts during the course of the study" (Yin, 1994, p. 42).

An embedded case design is not free of its shortcomings. One common problem in embedded case study design is the shifting of the inquiry to the sub-units of analysis. If that occurs, the original phenomenon of interest becomes the context rather than the target of the study. To overcome this problem, this study conceptualizes ES implementations as a collection of 15 key implementation decisions. The decision process for each of these 15 decisions is then explored using the SDM process variables identified in chapter two.

While data collection and data analysis focused on the decision process pertaining to those decisions, the overall aim of this study was to understand the ES implementation

process. Hence, the decision process was considered as a concerted effort towards the achievement of key implementation events, thus, bringing the focus from the decision level-of-analysis to the implementation level-of-analysis. The four key implementation phases of preparation, design, implementation, and realization that were identified through the review of the ES implementation literature (Bancroft et al., 1998; Burns, 2002; Davenport, 2000; Francalanci, 2001; Markus and Tanis, 2000; O'Leary, 2000; Parr and Shanks, 2000; Ross, 1999a; Ross and Vitale, 2000; Sandoe et al., 2001; Sarker and Lee, 2000; Shanks et al., 2000; Souza and Zwicker, 2001; Sumner, 2000). The four-implementation phases were validated with case study data to integrate strategic ES decision-making with the ES implementation process.

3.4 Research design blueprint

The previous sections mainly dealt with design level choices and concluded with a two-case study design approach with two embedded units of analysis. This section deals with the operationalization of research design prior to the start of data collection.

3.4.1 Preparation for data collection

In preparing for data collection, Yin (1994) recommends addressing four key issues. These are the researcher skill-set, researcher training, the case study protocol, and the pilot case study. While the first two are related to the researcher conducting the investigation, the other two are related to the formalization of case study design. The application of the first two issues in this study is discussed here. The case study protocol and the pilot case study are discussed in the following section.

While validity in quantitative studies is concerned with both instrument construction—to ensure that the instrument measures what it is meant to measure—and a standardized administration of the instrument, validity in qualitative research relies to a great extent on the "skills, competence, and rigor" of the researcher (Patton, 1990, p. 14). Wolcott (1990) suggests nine prescriptive activities the qualitative researcher needs to follow to increase research validity in qualitative research. These are:

- Talk little and listen a lot
- Be candid
- Record accurately
- Seek feedback
- Begin writing early

- Try to achieve balance
- Let readers see for themselves
- Write accountably
- Report fully

The researcher's skill set principally includes personality traits, which are soft skills that are highly judgmental in nature and are difficult to be structurally taught and learned. The minimum skill set consists of four main elements that the case study researcher needs to master (Yin, 1994). These are: (1) interacting with case study informants—listening and asking questions, (2) maintaining flexibility in case study design, (3) building familiarity with the issues investigated, and (4) controlling bias in interpreting the findings. Details of the development of the researcher's skills in this study are discussed next.

Prior to the start of primary data collection, which mainly included interviews with case study informants, a list of interview questions was prepared and documented as part of the case study protocol. However, carrying out fieldwork never followed exactly the predefined list of questions. Listening as well as making observations during the interview directed the researcher to improvise in asking questions within the scope of the case protocol. Listening was therefore a complex process of making on-the-spot interpretations of the "important message between the lines" (Yin, 1994, p. 57). Those messages lead to further questions.

Another tactic the researcher employed in this study was to spend approximately one hour before each interview to briefly go through notes and transcripts of previous interviews, in order to keep informants responses in mind while probing for further questions.

Flexibility is the second skill the researcher needed to develop. The researcher was flexible in following the research design blueprint and was open to new opportunities without compromising research rigor. Minor changes to research design were introduced and documented. One example of such change was refining interview questions. The experience in earlier interviews suggested that informants reported their experience of the SDM process as a story rather than as answers to a semi-structured list of questions. Therefore, all detailed questions were eliminated because the researcher

could not use them in fear of breaking up the flow of speech. The interview instruments before and after the revision are included in Appendix A and Appendix B, respectively.

The third important skill is the ability of the researcher to be familiar with the issues studied. Being familiar with both the theoretical framework and the practical applications of the phenomena under study are required to enable the researcher to make judgmental decisions during data collection. A review of the academic literature on both SDM and ES implementations, an exploratory investigation of current ES practice in NZ (Shakir, 2003), exposure to the practice literature on ES application, and three pilot case studies (Hossain and Shakir, 2001; Shakir, 2000; Shakir and Hossain, 2002) enabled the researcher to achieve the familiarity needed.

The fourth skill is controlling bias. This can be achieved through being "open to contrary findings" (Yin, 1994, p. 59). To achieve that, multiple interpretations of the findings were discussed, during which the researcher was open to divergent as well as convergent findings (Jick, 1979; Trauth and O'Connor, 1991).

The ultimate aim of developing this set of skills is to enable the researcher to act in a role similar to that of a detective in a case of criminal investigation (Leonard-Barton, 1990; Yin, 1981; Yin, 1994). While there is no cookbook recipe that advises how to test the researcher for these skills, being aware of the four requirements at the outset of the research and testing the researcher's experience during the pilot phase of the research helped in developing and enhancing those skills.

Yin's discussions of the researcher's training are related to a research project where more than one person is involved, which is not applicable for this particular study. For this research project that involved one researcher, the practice of the seminar experience recommended by Yin (1994) was applied. During the course of this study, the researcher pursued several opportunities for seminar presentations including informal departmental seminars, international information systems conference presentations, and international doctoral consortia (Shakir, 1999; Shakir, 2000; Shakir, 2001a; Shakir, 2001b). Feedback on research design as well as leads to seminal papers and expert scholars were the main benefits of those seminars. One indirect benefit to these presentations was the clarification of researcher's thinking (Frost and Stablein, 1992).

This section discussed four essential skills for a case study researcher and their applications in this study. The case study protocol phase discussed next explains the formalization of this study's research design.

3.4.2 The case study protocol

One of the essential elements of case study design is the case study protocol. As illustrated earlier in Figure 3-3, it represents a major link in the 'chain of evidence,' linking research questions to case study findings. Furthermore, it operationalizes the design blueprint and is a critical measure for addressing research reliability.

Developing the case study protocol was an iterative process that took place during the pilot phase of research design. It is acknowledged that case study design is never complete at the outset of the study (Eisenhardt, 1989a). As a result, the design needs to be "altered and revised after the initial stages " (Yin, 1994, p. 52). However, in order not to violate research integrity, it was better that these changes take place during the pilot phase.

The pilot phase was conducted concurrently with the review of the literature (Hossain and Shakir, 2001; Shakir, 2000; Shakir and Hossain, 2002). There are two main benefits to this approach. First, a pilot study ensured that the theoretical framework guiding the study is not only grounded in theory, but is also applicable to the study of a real-life problem. Second, the pilot study enhanced the quality of research design by establishing, validating, and testing suitable measures along the four dimensions of construct validity, internal validity, external validity, and reliability (as discussed earlier in this chapter).

The three main elements of the case study protocol in this study included field procedures, the interview instrument, and the guide to the case study report. The first two are discussed next. The case study report is discussed in section 3.7 .

In the early stages of this research, exploratory interviews were arranged with academics, Ph.D. students, ES consultants, ES vendors, and business managers of organizations implementing an ES. The initial sample aimed to include a minimum of two people from each of these categories, however the total number of informants was

slightly higher. The main purpose of these interviews was "to translate research objectives into specific questions" (Denzin, 1989b, p. 107).

At the start of the pilot study, interviews were open and unstructured. The focus of these early interviews was mainly the discussion of the ES implementation process. Informants were encouraged to discuss the implementation process plus any issues they perceived as important. After conducting four or five interviews, a list of questions was developed, a background to the study was written, and several matrices to aid data collection were prepared. In tandem with the development of the theoretical framework of the study, the list of interview questions became more concise and in harmony with the literature review.

During the later stage of the pilot study, a semi-structured interview instrument was tried in the field. After several interviews, the instrument proved too long during the one-hour interview; therefore it was shortened. Furthermore, there was no time during the interview to fill in the pre-configured matrices; therefore these were discarded. A table listing strategic ES decisions was the only appendix retained for the later primary data collection interviews (refer to Appendix C: Strategic ES implementation Decisions).

3.5 Data collection and data integration

Prior to data collection, the case study protocol was developed, tried, tested, and reformulated during the pilot phase of the research; the protocol provided the guidelines for both data collection and data integration. This section elaborates on these two activities. Data collection mainly addresses the application of the multiple sources of evidence; data integration includes data organization, integration, and maintenance as part of the case study database.

3.5.1 Data collection

Data collection is the intensive phase of the research process when answers to research questions are materialized. This study used multiple methods and multiple sources of evidence (Denzin, 1989b; Jick, 1979; Yin, 1994). Data were collected using observations, interviews, and the examination of both company documents and industry publications.

Because of the exploratory nature of the study, interviews were chosen as the primary data collection tool. When data collection for the main case studies started, the interview instrument was still long for the one-hour duration of the interview. Solutions to this problem included scheduling more than one session with some informants and the use of data displays. Feedback on these displays assisted to confirm or disconfirm case background information instead of going through the same details with all informants.

After collecting background information, information was documented, summarized, and presented in figures, charts, or tables. The researcher in later interviews used these summaries and visual displays to verify her understanding. Informants were invited to provide feedback on these data displays during the research interview. Most data displays went through several revisions until no new information became available—applying the triangulation of information in both interviews and organizational documents.

Retrospective data collected from key informants in these interviews were used to reconstruct both the ES implementation story and the decision-making stories for each of the 15 strategic ES decisions. One main advantage to the retrospective case study approach is that the data collected is focused. In a comparison between retrospective case data and participant observation case data, Leonard-Barton (1990) reported that retrospective data were focused on the important events and decisions of the case. On the contrary were intensive case data. That data was often 'useless,' unless the informant had a significant role in the process investigated.

The review of the literature, however, showed that there are concerns about the validity of retrospective data (Huber and Power, 1985; Miller et al., 1997; Nutt, 2000). These problems stem from "inappropriate rationalization, faulty post hoc attribution, and simple lapses of memory" (Miller et al., 1997, p. 189). Furthermore, informants are believed to present the desirable, rather than the actual, image of events history (Huber and Power, 1985). However, retrospective reports have been used extensively in many studies of strategic decision-making, organizational change, and IS implementations (Eisenhardt, 1989b; Glick et al., 1990; Mintzberg et al., 1976; Nutt, 2000; Orlikowski, 1996).

Miller et al. (1997, p. 190) examined the problems of retrospective reporting and concluded that "retrospective reporting is a viable research methodology if the measure used to generate reports is adequately reliable and valid." Six measures were applied in this study to ensure the validity and reliability of interview data. Table 3-6 lists and describes those measures.

Table 3-6: Validity and reliability measures for retrospective interviews

Measures	Description
Use free reports (versus using the forced report alternative)	Informants were encouraged to say that they did not remember if that was the case.
Consider the influence of the questions on informants' responses	A semi-structured interview approach was applied; the researcher guided the interview but allowed the interviewee to elaborate on the issues discussed.
Pre-test of interview questions prior to the primary data collection phase	Interview questions were pilot tested to ensure that interview guidelines could be adhered to and that interview details were addressed and documented—especially the selection of an appropriate set of interview probes.
Triangulate evidence	Case study evidence was triangulated across multiple informants and other sources of evidence (e.g., observation, examination of company documents, practice literature).
Seek the most knowledgeable informants	Relying solely on informants' job or responsibility title to assume that they carry out the roles they should is not enough. The researcher sought nominations from the key contact person in each case but validated those referrals with the other informants.
Ask for simple facts and concrete events rather than past opinions or beliefs	Informants were encouraged to describe events the way they happened, instead of the way they should have happened.
Ask to recall facts in the near past	Informants were asked to recall events that took place no longer than two years in the past.
Motivate informants	Informants were motivated to provide accurate information through: ensuring confidentiality and anonymity, arranging a convenient time and place for the interview, limiting the duration of the interview to one hour or less, and promoting the benefits of expected research findings to the organization.
Validate interview details with informants	Three methods were adopted: all informants were asked to review interview transcripts and provide feedback, a follow-up interview was conducted with the same informant, if needed, and the key contact person in each case reviewed the final draft of the case report and provided his or her feedback to remove any misunderstanding or inconsistencies.

Note. Adapted from Glick et al. (1990), Huber and Power (1985), Miller et al. (1997), Nutt (2000).

In-depth interviews were conducted with selected participants. Because this study is largely exploratory, interviews were open-ended and semi-structured. A copy of the final interview instrument is included in Appendix B: Interview Questions (Rev. b). The

initial list of informants for each case included the business sponsor of the ES project, one member of the steering committee other than the business sponsor, the ES internal project manager, the ES external project manager, and one manager of an ES specific module.

Using the snowball interview technique (Johnston and Bonoma, 1981a, p. 149), additional people were added when the implementation story told by a key informant showed that others had a significant role in the SDM process of ES implementation. Although the Johnston and Bonoma study initially identified only one key informant at the outset of the investigation, this study started with five key informants to both reduce bias and increase the validity of the results. Additional informants included the ES vendor, the ES consulting partner, and the ES implementation partner, if any of these individuals was not already represented in either of the internal or external project manager roles.

Table 3-7 was used as a guide for the selection of case study informants. The list of informants was developed on the basis of the review of the literature of ES implementation case studies and the feedback received from pilot case study informants (Hossain and Shakir, 2001; Shakir, 2000; Shakir, 2003; Shakir and Hossain, 2002).

Interviews were recorded, and then transcribed during the early stages of data collection. Notes taken during the interview session, which included both the researcher's observations and reflections, complemented the interview transcript.

Table 3-7: A guide for the selection of case study informants

Informants	Role description in ES implementation
Informants required	
Business sponsor of the ES project	is likely to be the managing director or the CEO of the organization implementing the new ES
One member of the SC other than the business sponsor or the internal project manager	is usually represented by one of the business managers
ES internal project manager	is usually represented by one of the business managers, but can sometime be an external contractor
ES external project manager	is likely to be from either the vendor or the consulting partner. This person has both the technical and project management experience for running large projects, and is usually the one taking responsibility for the project as a whole
One manager of an ES specific module	is the manager of one ES module such as financials, human resources, manufacturing, etc
Additional informants—depending on case details	
ES vendor	is the vendor's representative on the ES project
ES evaluation partner	may be involved at the initial phase of the ES project
ES implementation partner	may be involved during the implementation phase of the ES project

3.5.2 Data integration and the case study database

Data integration is the activity concerned with both managing and linking the different types of data that originate from different sources of evidence as part of one repository. The documentation and integration of case study evidence is the first phase of data analysis; starting data integration as soon as data collection starts is a recommended approach to coping with the 'nuisance' of qualitative data (Miles, 1979; Miller and Crabtree, 1999; Yin, 1981). Figure 3-4 illustrates the intertwining concept of data integration and analysis along the timeline of the study.

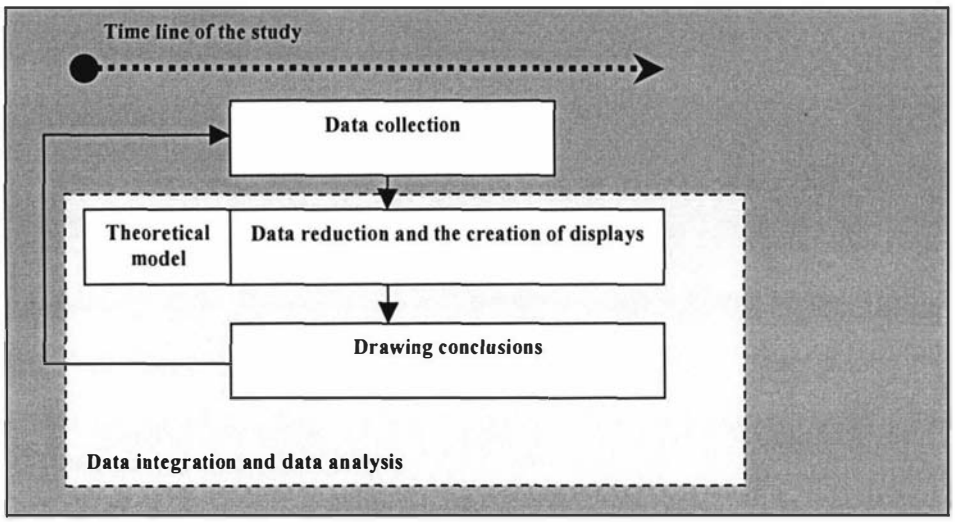

Figure 3-4: The phasing of main research activities in qualitative research

Note. Adapted from Miles and Huberman (1994, p. 10, 12)

The case study database is the repository that pulls together all the data collected for the research study. Keeping track of research documents provides an audit trail of the research process (Guba and Lincoln, 1981). Establishing and systematically managing the case study database is important for facilitating data reduction, the creation of displays, and the drawing of valid conclusions (Miles and Huberman, 1984).

Case study notes in this study included the documentation of interview transcripts, observations, and document analysis in electronic, paper, or audio format. Case study notes were firstly organized by type of media, secondly, by case, and thirdly, chronologically.

Case study documents include all documents collected from each case study organization. These documents, which included company and ES project information were in both paper and electronic formats. An index of these documents was maintained to enable the instant retrieval of any item. Furthermore, a cross-reference to case study notes was included whenever appropriate.

Dealing with qualitative data is burdensome because of the large number of narratives that come from different sources of evidence (Yin, 1981). Yin further contends that one mistake most novice researchers make is to spend too much time and effort on the documentation of the case leaving the analysis to the end, until all evidence had been gathered. By then, the researcher feels lost in the huge amount of data, wondering where

to start and where to end. The two elements of the case study database that can help to overcome this problem are the data displays and the case study narratives (Yin, 1981).

The data display part of the database is a step towards analysis. Data is "developed into a wide range of matrices, graphs, networks, and charts" (Miles and Huberman, 1984, p. 24). The main benefit of a data display is to help "understand what is happening, and to conduct further analysis or take action based on that understanding." In this study, for example, displays allowed data to be compared across the phases of the ES project, across decisions, and between the two case studies.

The fourth part of the case study database is case study narratives. Case study narratives bring analysis another step forward because they cover the levels of analysis within each case and across cases. Case narratives are simply "open-ended answers to the questions in the case study protocol" (Yin, 1994, p. 97). In this study, data was first organized around each case study and in the following categories: (1) summary background of the organization, (2) background of key informants (3) background of key ES stakeholders, (4) chronology of IS implementation, and (5) chronology of ES implementation. Second, the data was organized around the 15 strategic ES decisions. Although interview transcripts formed the larger part of case study data, data elements were integrated from different sources of evidence that included evidence from interview transcripts, observations, research memos, company documents, and practice publications.

Hypothetically, case study narratives try to answer research questions at the two levels of granularity, single case, and cross-case questions. Synthesis of case study narratives, therefore, became the basis for developing case reports. Some scholars have a negative disposition to this approach because of its tendency to impose one perspective on the data. This is always possible when the approach is rigidly applied.

The two software applications used to manage the integration of data elements, thus maintaining the flexibility of working with the data, were MS Word and QSR NVivo (2002). This was particularly useful in categorizing the data for different ES decisions because most interviews were interactive and often questions were answered by interviewees out of sequence. Furthermore, the use of the qualitative software application QSR NVivo allowed for flexibility for moving data elements around as the

analysis progressed. This makes it possible for other investigators, although hypothetically in this study, to step in either to verify the analysis or even to look at the data from a different perspective. Further details on the application of QSR NVivo in the data analysis are provided next.

3.6 Data analysis

Data analysis is defined as the process of "examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of a study" (Yin, 1994, p. 102). Analysis is not an easy task because the process is highly subjective, depending on both the skills of the investigator and the choice of a suitable technique. Data analysis began as early as the start of data collection and data integration phases of the research.

Analyses carried out during the early phases of the research are called the "general analytic strategies" (Yin, 1994, p. 104). Yin suggests two generic strategies in this phase; the first is guided by the theoretical constructs of the study and the second involves developing a case description. This study used the later approach.

The main analytical strategy applied in this study is a combination of explanation building in the form of an iterative pattern matching of rival explanations and the development of case study chronologies. This approach involves developing several explanations of the facts of the case followed by a conclusion based on the single and the most compelling explanation. It is called explanation building because the "final explanation may not have been fully stipulated at the beginning of a study" (Yin, 1994, p. 111).

The pattern matching technique was used to compare the empirically observed patterns with the five SDM models discussed in chapter two. When patterns coincided, the internal validity of the case study was strengthened (Yin, 1994). Several iterations of the comparison process between the theoretical framework and the empirical findings were carried out until the researcher was satisfied that all rival explanations had been explored for each case, therefore, maintaining internal validity. Further comparisons across the two cases followed to establish external validity. Additional details on the application of this analysis strategy in this study is included in section 6.5

The development of case chronologies is particularly useful in the case of ES implementation because they allow the exploration of causal events over time (Langley, 1999). This exploration allowed the examination of the "how and why questions about the relationship of events over time" (Yin, 1994, pp. 117-118). Cross-case analysis followed to discuss the similarities and differences between the two cases and helped the formation of a "general explanation" (Miles and Huberman, 1994).

Because case studies mainly rely on qualitative data, one common problem associated with structuring the data is developing too many categories with the assumption that everything is relevant (Yin, 1981). Two approaches to avoiding this data overload problem are applied in this study.

The first approach involves using a coding scheme. A coding procedure was used to reduce the information into categories (Creswell, 1994). To facilitate an efficient and effective analysis (Yin, 1981), the scheme was constructed in a manner that was not too elaborate. In order to achieve this, a limited categorization of the data was adopted.

Data were firstly coded by both case and by ES decision. Secondly, data were coded by people, business, and IS categories. People sub-categories included both the key informants and the key actors in the case. Business sub-categories included key business processes, organization structure, customers, suppliers, etc. IS sub-categories included legacy systems and ES applications. Sub-categories of ES applications were developed to include project background (e.g., project structure, core modules, costs, users, timeline) and key implementation phases. During the analysis, however, 44 more categories that are pertinent to different aspects of the implementation process emerged from the data. Data were coded into those categories as 'free nodes' to enable later retrieval. A small part of this data was used in the final analysis of this study.

The second approach involved the use software tools such as MS Word, QSR NVivo, Inspiration, and Decision Explorer to facilitate analysis. QSR NVivo is part of a family of software that is designed to support qualitative data analysis (Miles and Huberman, 1994).

Data analysis during the early phase of this research verified the applicability of QSR NVivo in this study (Shakir, 2003). QSR NVivo pulled together many different categories to enable a focused view of the data. The software tool also allowed detailed

analysis when the researcher wanted to dig deep into the data (Gibbs, 2002). Both Inspiration and Decision Explorer are concept-mapping software that allowed transforming coding categories into data displays. In particular, QSR NVivo has an export function that allows the creation of outputs that can be read by Decision Explorer.

3.7 The case study report

Case study findings are reported in a narrative, descriptive form. Matrices, graphs, charts, and diagrams are also used to illustrate patterns, comparisons, and relationships, wherever appropriate. Three measures were used to ensure that report writing avoided some of the pitfalls commonly associated with case studies (Yin, 1994).

First, the write up of the case report started at the early stages of data collection. Addressing report writing early helped not only in the analysis later, but also helped in making the task manageable, thus leaving plenty of time for revising and improving.

Second, as advised earlier in the design blueprint section, the compilation of the case database was separate from the case report. Storing case study information in a central database reduced the bulkiness of the case report.

Third, information systems scholars were identified as the target audience for the case study report. Unlike other types of research strategies, case studies have a diverse set of potential audiences that could include colleagues, practitioners, special groups, and funders of research. Therefore, the identification of a target audience was an essential part of case study design because "each audience has different needs, and no single report will serve all audiences simultaneously" (Yin, 1994, p. 129). With information systems scholars as the target audience, one important characteristic the report managed to demonstrate was the "relationships among case study, its findings, and previous theory" (Yin, 1994, p. 129).

Yin (1994, p. 134) identified three formats of the case study report, the classic narrative format, the question-and-answer format, and the multiple-case narrative (individual cases are not separated into individual chapters). For this study, the question-and-answer format is adopted. All three formats support multiple case studies. However, the

question-and-answer format has the advantage of facilitating cross-case comparison—not only in the composition phase but also when reviewed by readers.

Furthermore, and because the sequence of events over time is important in exploring, describing, and explaining the ES implementation process, case study evidence was presented in a chronological order. Chronological details were checked to ensure that all phases of ES implementation received considerable attention and that no disproportionate emphasis was made to either earlier or later phases (Yin, 1994).

The structure of this thesis followed the "linear-analytic structure" which is commonly known as the standard classical approach for composing research papers, particularly in the interdisciplinary field of information systems. Case study reports in chapter four and five follow the first three chapters of problem identification (chapter one), the review of the literature (chapter two), and research methodology (chapter three). Cross-case analyses are presented next in chapter six. Chapter seven discusses conclusions, implications, limitations, and suggestions for future research.

General guidelines for composing the two case study reports and their position within the structure of this thesis were discussed in this section. The next section discusses the ethical considerations, specifically addressing both issues of anonymity and confidentiality in this study.

3.8 Ethical considerations: Anonymity and confidentiality

Two main ethical considerations were addressed in this research, anonymity and confidentiality of both the case study organizations and the case study informants.

Confidentiality is defined as the process of protecting the information collected from both the participating organizations and informants in this study from being disclosed to parties they were not advised of, or have agreed disclosure to in advance (Merriam-Webster, 2002).

Appendix D, 'Research Information Sheet,' includes this study's confidentiality agreement. Each informant was either emailed or posted the research information sheet prior to the research interview. At the start of each interview, the researcher briefly explained the content of the research information sheet, including the procedures

employed by the researcher to protect confidentiality, and answered any questions the informant had. These procedures included the use of interview tape-recording, transcriptions, and the storage and sharing of all forms of the data collected (audio tapes, electronic and paper copies of interview transcripts, interview notes, observation notes, and company documents).

All interviews were tape-recorded. Only the researcher and one professional transcriber had access to these tapes. The researcher received interview transcripts in electronic formats and later ensured that original copies of these files were deleted off the transcriber's computer. The researcher also requested that all tapes be returned after receiving the transcripts; she listened to every tape and filled the missing words in each transcript before storing it. Each informant was emailed a copy of his or her interview transcript and was invited to identify additions, deletions, or alterations. During the research interview all informants had given their consent to receive the transcripts later by email.

Anonymity is defined as the process of protecting the identity of both organizations and the research informants from being identified (Merriam-Webster, 2002). In case study reports, pseudonyms were used to protect the privacy of informants and their respective organizations. Furthermore, all controversial and sensitive comments were placed in a broader interpretive context for the purpose of making these comments non-attributable to one particular informant.

Although anonymity is not considered a desirable outcome in the final case study report (Yin, 1994), the researcher believed that the anonymity agreement was necessary to gain access to case study organizations for two reasons. First, the strategic decision-making process of ES implementation is a sensitive topic, especially when senior management are major participants. Second, the cross-case comparison was shared between case study organizations as an incentive to their participation in this study. As a result, organizations would have been reluctant to participate in the study and share the findings had the identity of informants been disclosed.

It is noted that anonymity cannot be guaranteed in case studies because of the rich contextual data they include. However, using pseudonyms for organizations and informants is one measure that can marginally prevent linking ES implementation

stories with their respective organizations. Furthermore, anonymity can prevent hostile reactions from informants, who might reject case study results when negative findings are attributed to these individuals or their respective organizations.

Other hostile reactions might include withdrawal of the initial approval to include the case study in the final research report or threaten to pursue litigation. One technique Yin (1981) suggests to overcome this problem is not to present the findings of only one case to its respective organization, but rather to include other cases and the cross-case analysis part as well. This can reduce informant disagreement with case findings because they feel that the findings are more collective than personal.

In this study the above technique was modified to ensure the validity of findings. The feedback of the key contact informant in the organization was first sought on a descriptive case report to validate findings. The final case study report was delivered to each organization at a later date and included a revised case description, findings, and the cross-case comparison.

This section discussed the ethical considerations in this study. The next section provides a snapshot of this chapter and presents the methodological model of this study.

3.9 The methodological model of the study

Figure 3-5 presents the methodological model of the study. The model was developed to illustrate the main stages of the research process, particularly focusing on the application of the principles of case study research design.

During the initial phases of the research process, the emphasis was on developing an understanding of research background through extensive reviews of the practice literature and ES vendors publications as well as exploratory interviews with key participants in the ES implementation process that included organizations implementing enterprise systems, ES vendors, ES consultants, and academics teaching or conducting research in the domain of ES. This process facilitated both the development of the research problem and a set of research questions, both of which provided several leads to the exploration of the academic literature.

The review of both the literature and several iterations of research questions led to the refinement of the theoretical framework of the study that is presented in chapter two. The case study research strategy was selected as the preferred research methodology, dictated by both the research questions and previous development of theory.

Three pilot studies (Hossain and Shakir, 2001; Shakir, 2000; Shakir and Hossain, 2002) explored the application of the theoretical model to ES implementation stories, particularly focusing on strategic ES decisions. These helped to sharpen research questions and focus research constructs. Furthermore, the multiple case study research design was refined, and quality measures were defined and documented as part of the case study protocol in preparation for primary data collection.

Data collection was managed primarily by the researcher using interviews, observation, and the examination of company and ES implementation documents. Data were organized, reduced, and integrated as part of the case study database. This process was considered the initial phase of data analysis.

Formal analyses followed in the form of the development of case descriptions, explanation building, and the case study chronologies. Separate case study reports were developed. Cross-case analysis compared the two cases for both similar and conflicting findings. Several iterations followed until theoretical saturation initiated drawing the study's conclusions and research closure.

3.10 Conclusions

This chapter reported on the research design for this study. The multiple case study design was suitable to answering this study's research questions. Case study design included the identification of measures to ensure research quality and the planning, preparation, and application of certain procedures for design to be realized in the two case study reports, the cross-case analysis, and the conclusions to this study.

The next chapter presents the first of the two case studies.

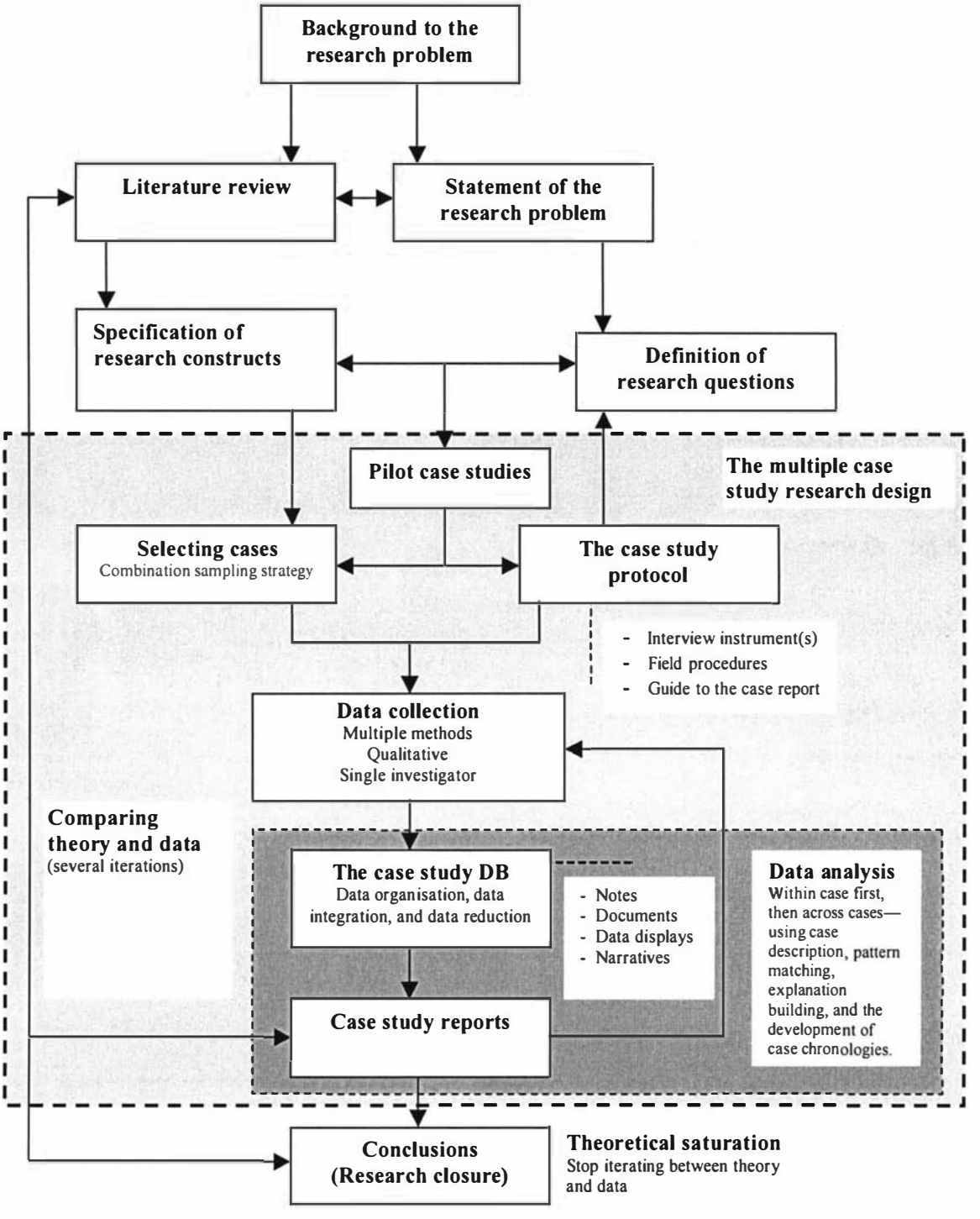

Figure 3-5: The methodological model for the study

Note. Adapted from Eisenhardt (1989a), Miles and Huberman (1994), and Yin (1994)

4. Chapter Four: DistCo Case Study

4.1 Overview

This chapter presents the data collected from one of the two retrospective case studies—the implementation of the J. D. Edwards OneWorld ES application at DistCo, a magazine distribution company in NZ. The chapter starts with a general description of the company, information systems, and the ES project. It then provides an introduction to the study's key informants. This is followed by a detailed account of each of the 15 strategic decisions that are the focus of the decision-making process in this study.

4.2 Organization background

DistCo is a magazine distribution company that was established in NZ more than a decade ago. The company describes itself as NZ's "most experienced magazine distributor, with the largest range of magazines." The company is a wholly-owned subsidiary of NZ's largest newspaper publisher, NZ Newspaper Publisher (NZNP).

The range of publications distributed by DistCo includes magazines, Sunday newspapers, and specialized magazine subscriptions. This includes more than 4,000 titles to 7,200 outlets or 60% of the market share in NZ. Logistically, the company makes more than 1.2 million individual delivery stops annually, during which 87 million copies of magazines and newspapers are distributed. Retail outlets are split into five main channels: supermarkets, bookshops, dairies, service stations, and specialty outlets. Table 4-1 provides a profile of DistCo.

Table 4-1: Organization profile

Categories	DistCo
Business	The distribution of magazines and newspapers. The business also manages specialized magazine subscriptions
Type of organization	A business (for profit) organization
Ownership	A wholly owned subsidiary of NZ's largest newspaper publisher
Business units	Main Retail (allocation and physical distribution of publications for publishers—mainly magazines), Gossip (airfreight delivery of magazines), and Planet Solutions (specialized subscriptions).
Mission statement	"DistCo is at the heart of the most vibrant, energetic, competitive, and successful magazine market in the world. We strive to have the best understanding of magazines and the magazine market, and provide our clients with the most effective marketing and distribution services."[7]
Customers	Three main groups: publishers, retail outlets, and readers
Reach	National (within NZ)
Company Size	300 employees NZ$200 million (approximately)

DistCo has three main business lines, Main Retail, Gossip, and Planet Solutions. Main Retail is the primary focus of the business. It includes the allocation and physical distribution of NZ and overseas publications from publishers to retail outlets.

Gossip is an airfreight delivery service for English and American magazines both into NZ and into retail stores. These magazines cost more than main retail offerings, however customers are willing to pay extra for the timely delivery of select publications.

Planet Solutions was established in the late-1980s to extend DistCo offerings to specialized subscriptions; it has three divisions: subscription management, mail management, and part works. The subscription management division provides a database management service that is tailored to each publisher's needs. Mail management handles fulfillment work that includes wrapping, folding, sorting, envelope filling, stickering, and promotional mailing. Part works is a subscription service for serial publications that includes sending the customer a regular pack containing a number of issues with the provision of filing binders.

DistCo's business model is to act as the intermediary between publishers and retailers. The business is configured around a push strategy—pushing publications into retailer

outlets. The number and collection of these publications depends on different factors that include type of outlet, location, time of year, and promotional offerings.

Generating profit for the business depends on increasing sales in retail outlets and decreasing returns. Therefore, allocations—which is the process of allocating magazines to individual retail outlets—is considered the key business process in this type of business. Allocations needs not only provide for maximum sales and minimum returns, but also provide visibility of magazines on the retailers' shelves. The allocations forecast—what needs to be available on the shelves, where, and when—is based on historic data and is adjusted on the basis of promotional offerings.

Logistics management—or the physical distribution of publications—is another key business process. Its contribution to profit generation, however, is mainly through efficient use of resources to minimize operational costs.

The three types of customers in this business are publishers, retailers, and readers. Publishers are the direct source of revenue in this business and are therefore the key customers. Retailers are provided with publications on a sale-and-return basis. The retailers' impact on DistCo's bottom line is affected by the efficiency of interactions. The reader's relationship with DistCo is indirect, except for the subscription service. Figure 4-1 draws the relationships between DistCo and its customers to illustrate the company's value chain.

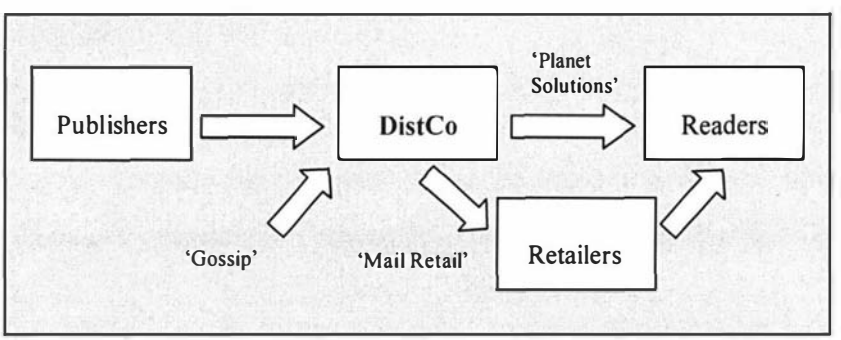

Figure 4-1: The business value chain

This section provided a background to DistCo and its business operations. The next section presents the history of information system implementation at DistCo and the ES project background.

[7] Source: The back of a DistCo business card.

4.3 IS and ES project background

The DistCo IS applications environment evolved from software that was designed in the 1970s (see Table 4-2). The software was replaced with a Wang-based financial solution in 1988. Starting in late-1994, the Wang equipment could no longer cope with the increasing information processing demands. Therefore, software applications were converted to run on Hewlett Packard (HP) computers in a Unix environment using the Wang emulation package, 'Resource Cobol.' DistCo adopted this conversion approach as opposed to purchasing additional proprietary Wang hardware because of concerns for Wang's unstable financial position. In mid-1995, the conversion was completed and the system went live with the same old 'look and feel' interface as before.

Table 4-2: Chronology of IS implementation

Date	Event
1980s	The 1970s software DistCo was unstable
1988	The old software was replaced with a Wang-based financial solution on Wang hardware. A temporary solution for the magazine system went live.
1994-1995	The Wang equipment could no longer cope with the increasing information processing demands, therefore, these applications were converted using an emulation package 'Resource Cobol' to run on Hewlett Packard (HP) computers and a Unix platform. The system went live in 1995.
1995-1998	System modifications addressing improving system's performance continued as an ongoing process. The need for additional functionality was carried out on a reactive basis by applying modifications and patches. With no relational databases in place, the programming backlog increased making it difficult to make changes. At a cost of NZ$180,000 per annum in salaries, three full-time programmers were employed to handle enhancements.
1998-2000	The Y2K initiative (duration: 18 months) that addressed fixing software bugs in legacy systems was started and given priority over new system implementation. A new financial controller was appointed.

System modifications continued to be an ongoing process. Those modifications focused on improving the system's performance rather than changing business requirements. Enhancements to cater for additional functionality were carried out on a reactive basis by applying patches to the system in response to modification requests. As the number of requests grew in number, the programming backlog increased, and it became increasingly difficult to make changes. At a cost of NZ$180,000 per annum in salaries, three full-time programmers were employed just to handle those enhancements.

There being no underlying relational database had become the major weakness in the system. As a result, it was not possible to use query tools to extract information. With no controls over the redundancy and inconsistency of information stored in the system, it was not possible to maintain data integrity. Both the ES business case and the capital expenditure report cited several examples of contradictory results in publishers' reports that embarrassed the business. Extracting information from the system was a major effort every time. While extract programs could manage that process, the program needed to be configured for every request. This always frustrated staff who often needed to report summary information.

One interesting example that demonstrates the operational inefficiencies in DistCo's systems was reported by one of their major retail outlets. DistCo was ranked as the 'second largest provider of paper.' The financial controller (FC) who project managed the ES project for DistCo explained:

> We rank up there with the bread and the milk guys with the number of transactions we generate for their accounts payable department. Therefore, we're seen to be at the high-end of intensity as far as costing them money to do business with us. This is where the e-transactions will definitely give them [Main Retail] benefits. (FC)

The FC was appointed in 1998 when DistCo was amid their Y2K preparations. Attention to these problems was highlighted in the process and an investigation process into alternative system offerings started. Senior management decided, however, that Y2K preparations took first priority.

The FC lead the investigation process in cooperation with DistCo Australia. The process took almost two years to reach the stage when the business case for the new system was approved by the parent company NZNP. During those two years, DistCo's senior management had familiarized themselves with application offerings in the market place through talking to vendors, clients, and business partners. The sale of DistCo Australia during that time slowed the process a little.

Having the go ahead from NZNP, DistCo issued a request for proposals (RFP) to six invited vendors. A lengthy evaluation process followed, which ended with the selection of the OneWorld ES from J. D. Edwards. J. D. Edwards was chosen to be the implementation partner as well.

This implementation of the J. D. Edwards OneWorld ES at DistCo included the two core ERP modules of distribution and financials. The distribution module is focused on magazine allocations. The system handling magazine subscriptions (Planet Solutions) was not part of this implementation. Integrating this system into J. D. Edwards was to be considered as part of a phase II implementation. Table 4-3 provides the ES project summary.

Table 4-3: ES project summary

Categories	ES implementation at DistCo
ES product name & version	J. D. Edwards XE
ES core modules	Distribution and financials (new implementation)
Number of users	80 users
Cost of implementation in dollars	Approximately NZ$3 million that included NZ$700,000 in hardware, NZ$500,000 in software, and NZ$1,800,000 in implementation costs (both internal business and consultancy work costs).
Number of locations	Two locations, the company's head office in the North Island and a small warehouse in the South Island
Implementation management/ consultancy	Direct implementation with J. D. Edwards
Go-live	July 2002
Post-implementation or phase II plan	Software functionalities supporting the subscription management division, Planet Solutions, would be implemented as part of phase II, pending system case approval.

4.4 ES implementation and the SDM process

ES implementation in DistCo is both large in size and a heavily customized implementation. The aim of the ES implementation was to consolidate the disparate systems the company used to maintain and achieve instant access to valid information. Using its valuable store of historic data, DistCo would also be able to improve managerial decision-making by means of improved business reporting. Having the advantage of a better reporting system is key to gaining a competitive advantage in the magazine distribution business. Table 4-4 provides a summary of the ES project objectives for DistCo.

Table 4-4: ES project objectives

ES project objectives
- To replace unsupported software
- To retain publishers at risk because of concerns about existing systems
- To increase process efficiency and data accuracy
- To make DistCo an organization easy to do business with
- To improve data and system security
- To enhance competitive advantage through improving IS support for allocations
- To improve management reporting
- To better utilize employees' skills through reducing repetitive and mundane tasks
- To retain and recruit quality staff through providing state-of-the-art supporting IT tools

The ES implementation process at the DistCo can be divided into four phases, preparation, design, implementation, and realization. The preparation phase included three stages: request for information (RFI), RFP, and contract negotiations. The focus of the preparation phase was on organizing implementation teams and choosing the appropriate technology.

The three main activities of the design phase included defining system specifications, training users, and developing a prototype for the new system. During the design phase, both technology and configuration issues took center stage.

The implementation phase still focused on configuring the ES using its design blueprint. One major technology decision, the IT infrastructure (D07) was reviewed during that phase.

The realization phase started when the system went live and focused on stabilizing the new system to run smoothly. Developing a vision for the new system was an incremental process throughout the four phases.

The DistCo case data show that most of the 15 strategic ES decisions were addressed during the two early phases of preparation and design. Several of those decisions, however, were considered again. These decisions related to the key business processes (D04), software configuration (D05), IT infrastructure (D07), implementation strategy (D10), go-live (D11), and reporting needs (D14) decisions. The fit-to-business and cost considerations were the driving force behind many of these decisions.

Figure 4-2 plots the 15 ES decisions across the four implementation phases to capture the sequence of ES decisions across time. Figure 4-2 also shows the decisions that had been reconsidered more than once. A brief description of the implementation process during each phase is provided next.

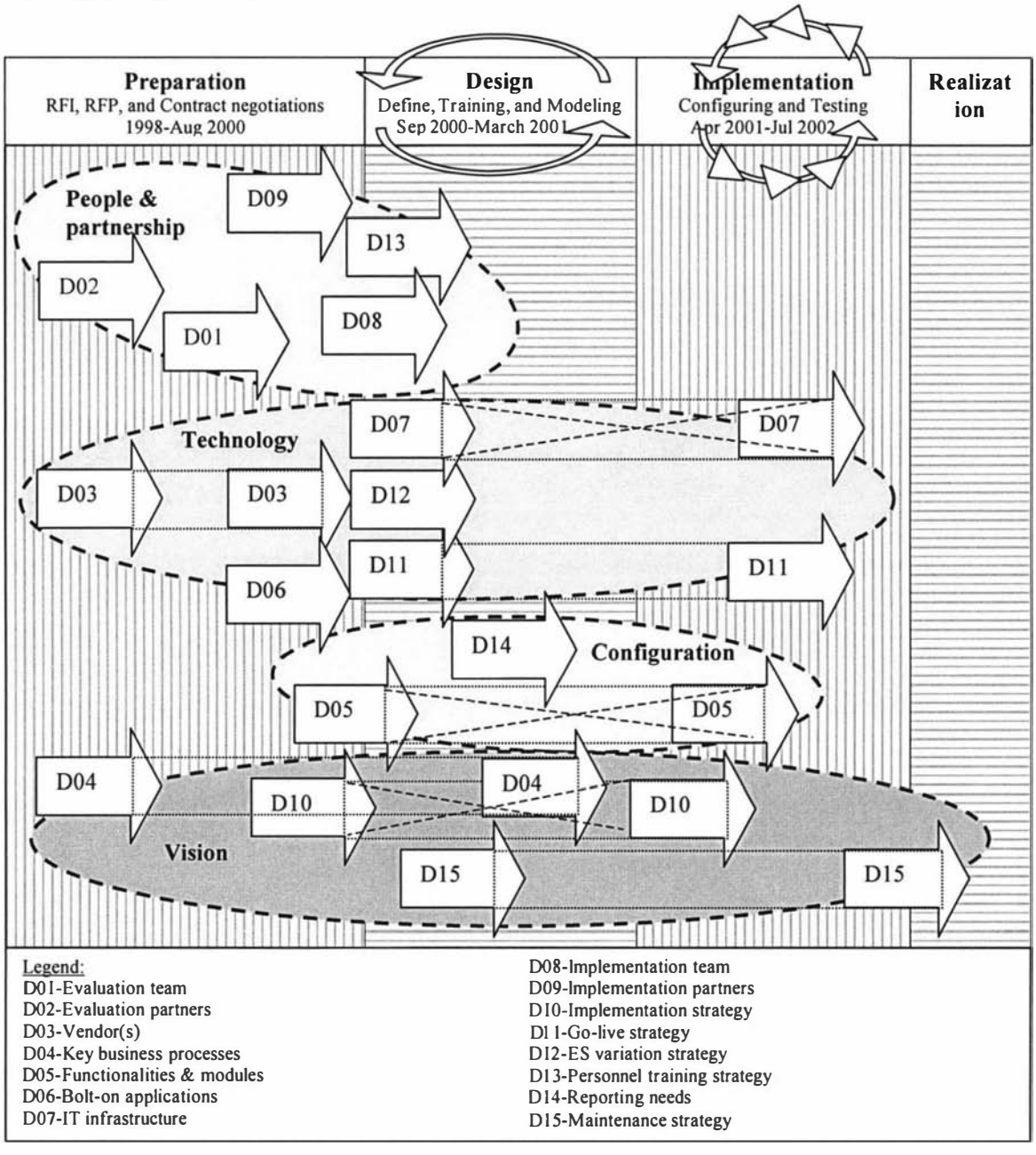

Figure 4-2: Strategic ES decisions across four implementation phases

The preparation phase

The preparation phase took approximately two and a half years—from mid-1998 until mid-2000—during which 11 of the 15 ES decisions were addressed. The focus of these decisions was on team and partnership formations (D01, D02, D08, D09, and D13),

software technology selection (D03, D06, and D07), software configuration (D05), and vision development for the new system (D04 and D10). Table 4-5 provides a chronology of the main events during the preparation phase.

Table 4-5: Chronology of events during the preparation phase

Date/decisions	Events
1998 D04, D02, and D03	- The new appointed financial controller (FC) championed the implementation of the new system. In partnership with DistCo Australia, a request for information (RFI) to prospective vendors was issued with a plan for a joint system implementation.
1999 D03 and D02	- The RFI process stalled because of the sale of DistCo Australia. The newly appointed FC was responsible for the sale process that lasted 12-18 months. - The new system's business case[8] that was submitted to the NZNP board considered three alternatives: (1) upgrade (twice as expensive), (2) best-of-breed, and (3) single vendor (ERP). Despite a minor disagreement, NZNP agreed to proceed with the request for proposals (RFP) to quantify both costs and risks. - An informal consultation with A Consulting sought advice on the formalization of the RFP.
February 2000 D04 and D03	- A minor business process reengineering exercise took place. It was followed by an organizational restructure and staff reductions. - The RFP highlighted the two key areas of allocations and e-commerce, and included four parts: (1) An outline of the RFP process, (2) narrative and flowcharts of system requirements, (3) questions that vendors were asked to respond, and (4) a business scenario to help vendors understand DistCo's requirements. The RFP was issued to six vendors. Vendors were selected as a result of the earlier RFI exercise conducted jointly with DistCo Australia to include: o Two best-of-breed vendors (MJ Systems and Geac Australia (Matrix systems)), and o Four ERP or ES vendors (Geac Computers NZ, Intentia, JBA International, and J. D. Edwards NZ)
March 2000 D03	- A meeting was arranged to offer assistance to the three responding vendors, Geac Australia, Intentia, and J. D. Edwards.
April 2000 D03 and D01	- A strengths-weaknesses-opportunities-threats (SWOT) analysis of the three proposals was developed to dictate the content of future vendors' demonstrations. Vendors were also allowed access to DistCo's people. The IT Manager in consultation with the DistCo project management team developed a scoring sheet to facilitate the comparison of the three offerings.
April-June 2000 D03 and D08	- Each vendor's demonstration was held over two days and included a detailed agenda. The evaluation team, an NZNP representative, and several key DistCo staff attended and completed a scoring. Following these presentations, J. D. Edwards and Intentia were short-listed.
June 2000	- The NZNP board approved capital expenditure[9] for the new system.
July-August 2000 D03, D05, D06, D07, D09, D10, D11, D12, and D13	- Workshops with J. D. Edwards and Intentia were conducted to allow for a more detailed exploration of both software functionality and supporting IT infrastructure. A number of reference sites were also contacted. Scoring results indicated J. D. Edwards as the winning candidate. However, contract negotiations were pursued with both vendors to gain the leverage of active competition. DistCo further sought legal advice before finalizing the contract with J. D. Edwards.

[8] Source: Distribution and Management Information Systems: A Discussion Paper (October 1999).
[9] Source: CAPEX Request for a Distribution and Management Information System (June 2000).

The decision process leading to the choice of the ES vendor (D03) that included investigation, evaluation, and selection was the most lengthy and comprehensive process when compared to the other 14 decisions. The process started with the exploratory phase of the RFI in collaboration with DistCo Australia. This phase was a big learning experience for DistCo's senior management. The parent company NZNP and ES vendors had a big influence on vendors' short-listing decisions that marked the end of this stage and the start of the next stage—the RFP.

During the RFP stage, DistCo invited bids from six vendors and evaluated responses from three. The PM team led a structured evaluation process that included the evaluation of written responses as well as vendors' demonstrations. Interaction between the vendors and the business was encouraged to enable presentations that focused on DistCo's processes. By the end of the RFP stage, DistCo had short-listed both J. D. Edwards and Intentia. More detailed exploration of software functionality (D05) and supporting IT infrastructure (D07) followed. A number of reference sites were also contacted to validate the conclusions reached by DistCo's scoring results that favored J. D. Edwards.

Contract negotiationss were pursued with both vendors to have the leverage of active competition between them. DistCo further sought legal advice before finalizing the contract with J. D. Edwards. A detailed specification of all modifications (D05) was included in the contract documents.

Besides the choice of the vendor (D03) and the preliminary consideration of the IT architecture (D07) during the process, the other technology decisions made during the preparation phase were those of bolt-on applications (D06), going-live strategy (D11), and the ES variation strategy (D12).

DistCo had initially opted for an implementation strategy (D10) with minimum customization. As a result, the minimum customization approach restricted bolt-on applications (D06) to one reporting application. Most informants agreed that 'big-bang'[10] was the only feasible going-live strategy (D11) for DistCo. Although the going-live strategy was reconsidered twice during the life of the ES project, later evaluations

[10] 'Big-bang' is the term used to describe the going-live approach when all software modules become operational at one point in time. Compared to the other two alternatives of phased and parallel, the big bang is the most cost effective approach; however, it is very high risk.

confirmed that because of the integrated nature of business operations, other alternatives were infeasible. As for the ES variation strategy (D12), it was agreed that there would be one main implementation at the head office in the north island and that the south island office would get a mirror implementation with an access only privilege.

Going through the vendor selection process, all people and partnership decisions were made. No formal evaluation partners (D02) were included in the process except for the mandated collaboration with DistCo Australia and the informal advice from a business colleague on formalizing the RFP.

The FC in consultation with the managing director (MD) selected the key people on the DistCo evaluation team (D01). These two parties also made a similar decision on selecting steering committee members. The FC, the IT Manager, and the DistCo Business Consultant fell into PM team roles because of their earlier involvement in the software acquisition process. The three-person PM team jointly made the decision to form the applications team (D08).

The choice of the vendor had both influenced and been influenced by the implementation partner (D09) decision. One of the key strengths of J. D. Edwards was their implementation model in which the ES vendor takes the role of the implementation partner. The choice of the vendor had guided the personnel training strategy (D13) of train-the-trainer that J. D. Edwards often uses to empower their clients and develop the business ownership of the new ES.

Vision focus decisions during this phase were those of the key business processes (D04) and implementation strategy (D10). DistCo staff had a clear understanding of what constituted key business processes. No outside help or brainstorming exercises were therefore needed to identify that these were the allocations and logistics. In spite of this, the 'vanilla' implementation approach (D10)—minimum customization of the ES software—that DistCo had initially adopted, contradicted their understanding of their unique type of business. Further down the track and during the design phase, DistCo began to realize that minimum customization was not an option, especially for allocations. A review of system specifications accompanied by a reengineering of the allocations business function would delay the ES project as the implementation strategy changed to heavy customization.

The design phase

The design phase lasted approximately 8 months—from mid-2000 until April 2001—during which 5 of the 15 ES decisions were addressed. The focus of these decisions was two-fold: technology (D07 and D11) and software configuration (D05 and D14). As a result of the need to revise software configuration (D05) midway through the design phase, clarifications of DistCo's key processes (D04) were pursued to enable making informed decisions. This delayed the ES project causing the go-live date (D11) to be postponed by three months at the end of the design phase.

Table 4-6 provides a summary of the main events during the design phase. Using the same terminology[11] informants used in recalling these events, the three main activities during the design phase are defining system specifications, training the users, and developing the a prototype for the new system.

One major technology-focused decision during the design phase was that of the IT infrastructure (D07). The focus of that decision was the choice of both hardware and operation system platforms. The J. D. Edwards implementation team refrained from recommending a favored architectural solution and referred the DistCo PM team to their international competency center.

When DistCo sought proposals from the leading hardware vendors in the market, they were confused by the disparate responses they received. An objective comparison of these proposals could not be made and meeting the vendors' sales staff did not clarify these discrepancies. Using this preliminary understanding of software platform requirements, the DistCo PM team issued a detailed RFP to the same vendors to enable an objective comparison. Evaluation results indicated that the Windows 2000 platform was favorable in terms of both performance and cost, therefore it was chosen.

[11] This is the same terminology that J. D. Edwards used as part of the structured methodology they followed during implementation.

Table 4-6: Chronology of events during the design phase

Date/decisions	Events
September 2000	- The ES project started with a planned go-live date of July 2001.
September-December 2000	- The define phase (one week in duration): The high-level project plan developed during contract negotiations was expanded. It included the development of a detailed project scope and a project plan. A kickoff meeting for the project team was arranged; this was the first time the whole team got together to both set the expectations and identify potential risks.
	- The training phase (four-five weeks, until early October 2001): The project team underwent training on the standard J. D. Edwards software. The main purpose of this phase was to provide team members with the ability to pick the pieces of the system they wanted to use with the help of J. D. Edwards consultants. This phase ran in parallel with the modeling phase.
	- The modeling phase (started during September, overlapping with training, and finished at the end of January 2001): A prototype of a final system was developed. The prototype was considered the bare bones of the system configuration. It included enough details to prove that the system would hang together and actually work. In this phase, system deliverables were compared to business requirements and potential changes were identified to solve any mismatches. At the end of this phase, a form of decision-making process took place to identify "which ones we're going to do, which ones we're going to defer and which ones we'll not do at all" (Project Manager-JDE). After an integrated testing that lasted two weeks, J. D. Edwards submitted a revised price estimate.
January-March 2001	- The revised price estimate came up double the initial price. A process of cutting out software functionality started to bring the price down. All the people involved in the process were brought together in a round table discussion to make these decisions. A new version specification was developed and signed off.
	- The revision of business requirements had triggered a business process redesign for allocations. This required longer time than expected because the process "ended being a whole ground up restructuring" (Project Manager-JDE). The final specification for the allocations module was significantly different to the way it was originally proposed. A new forecast for the go-live date was set to September/October 2001.

Later system performance tests during the implementation phase proved unsatisfactory. To solve the problem, a Citrix thin client implementation was adopted with an additional spending of $50,000. The DistCo PM team believed that their extensive research should have highlighted that particular problem in advance. However, a breakdown in communication between J. D. Edwards, DistCo, and the hardware vendors might have caused the problem.

Configuration focus decisions included decisions on software functionality (D05) and reporting needs (D14). At the end of the preparation phase, DistCo had a broad view of software functionalities that continued to develop during the design phase. The first cycle of defining requirements[12], training users, and developing the system prototype ended with a system that was too costly to implement.

During the second cycle, business specifications were revised with a focus on including only critical components and cutting out the nice-to-have. While the applications team was more involved during the first cycle, the PM team took the responsibility for priority decisions during the second cycle.

Reporting configurations (D14) were developed in tandem with software configurations. The focus, particularly during the second cycle was on producing reports that were similar to what DistCo used. All suggestions for new reports were postponed to a post go-live phase.

The implementation phase

While most of the 15 decisions had been considered prior to the implementation phase, implementation saw further consideration of software configuration (D05), IT architecture (D07), and the go-live (D11) decisions.

The two main activities during the implementation phase were configuring the ES using the design blueprint and system testing. Problems during testing had signaled more issues that system design needed to address. Many incidents, therefore, had been instigated when software configuration decisions (D05) were made. As discussed before, a major change to the IT platform (D07) was needed to overcome serious performance limitations that were only identified during system testing. Table 4-7 provides a summary of the main events during the implementation phase.

[12] J. D. Edwards used a structured methodology that has six steps. These are: (1) defining requirements, (2) training users, (3) building system prototype, (4) testing, (5) implementing, and (6) refining.

Table 4-7: Chronology of events during the implementation phase

Date/decisions	Events
April-September 2001	- The configure phase (April-September 2001): The system prototype was completed and configured in readiness for go-live. The process involved customizing the software to suit the business, identifying interfacing requirements, data conversion requirements, customer reporting requirements, and final hardware configuration.
September 2001 -July 2002	- The testing phase: This testing phase included the three steps of stress testing, integrated testing, and acceptance testing. The stress testing was to verify system loading. Integrated testing was a test that included data that had been converted to the new system with all the modified software, customer reports, and system configuration as intended for go-live. The acceptance test included testing the software with end-users as opposed to members of the project team, which was the case for integrated testing. The testing phase ends with final data conversions, data setups, and data loading in preparation for go-live.
	- When testing started, there was still a lot of re-work coming out. Rework continued to come out when "a couple of modifications started blowing out on estimate. ... And since September [2001] and still now, DistCo are in integrated test mode where they're trying to go and test the whole system." (FC). Another problem was that "almost all the J. D. Edwards consultants who were involved in the implementation left J. D. Edwards at end of December [2001]. ... [This meant that] a lot of the knowledge about the detail of how the modifications worked and also a lot of the skill base insofar as how to actually test a system—to test the modifications in the context of DistCo—walked out the door." (Project Manager-JDE).
July 2002	- Project go-live

At the end of the design phase, DistCo had revised its expected go-live (D11) date to September 2001. During implementation, a continuous evaluation of system performance and risks was performed. As soon as testing started, DistCo realized that they had hit a big wall and that testing was "going to be a big beast...you turn around the corner and there's another great hill there to climb up and that's been the nature of the project " (FC).

Due to unsatisfactory testing results, the go-live date was deferred more than once. DistCo had accepted that the design phase took longer than expected because the system was reconfigured. However, the testing phase was expected to go smoothly. An incremental go-live approach (D11) was considered but was briefly discarded because it was not suitable for the integrated nature of business operations at DistCo. Testing continued in an iterative process until satisfactory results on both performance and reliability were achieved.

The realization phase

Interview data collected prior to system go-live indicated that DistCo lacked a clear strategy for the post go-live phase (D15). Most informants agreed that post go-live decisions would depend highly on how well the new system was received by both users and senior management. Senior management further added that future upgrades, enhancements or adding new modules to extend system functionalities would still need to go through a similar justification process to that which this implementation was subjected to.

This section described ES implementation at DistCo and briefly discussed the 15 strategic decisions made during the process. ES implementation was described in four phases. The first is the preparation or the acquisition phase, which is divided into the three stages of RFI, RFP, and contract negotiations. The next three phases are related to system implementation and include the design, implementation, and realization phases.

Figure 4-3 draws a simple PERT chart of the 15 decisions that shows decision dependencies. These dependencies help to construct the ES implementation story as a series of 15 decision stories, the details of which are presented in section 4.6 .

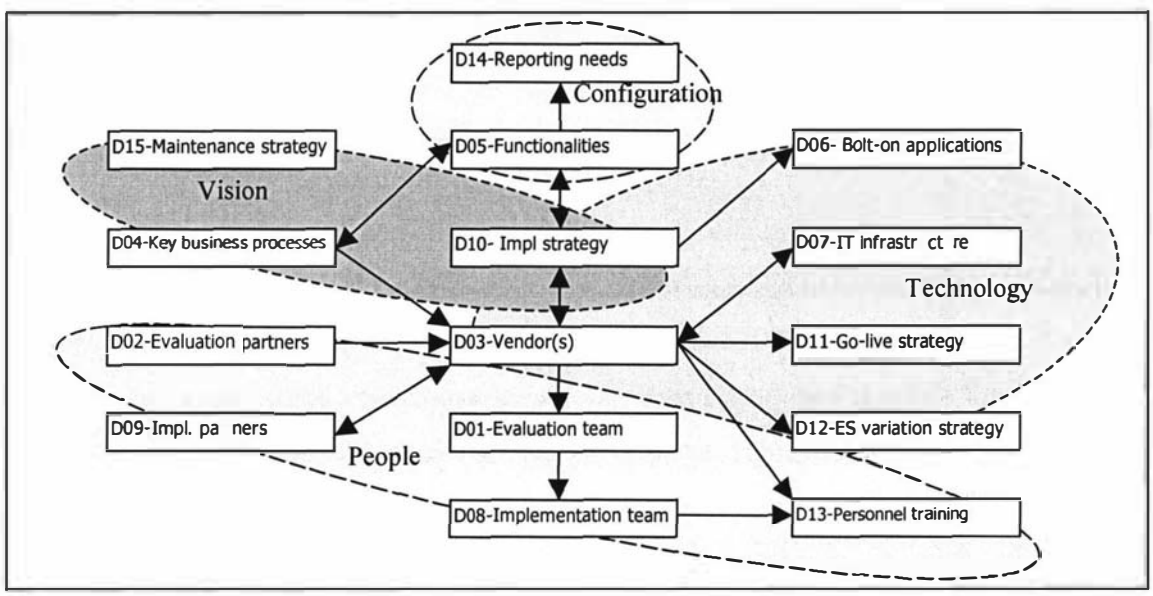

Figure 4-3: Dependencies between ES implementation decisions

Before presenting a detailed account of the decision process for each of the 15 strategic implementation decisions, the next section introduces the key informants in this case.

4.5 Key informants

Empirical data from research interviews, during February-July 2002 provided the basis for constructing the 15 strategic decision stories. The descriptive account of each decision mainly utilized informants' quotes to both construct and validate those stories. A brief introduction to the key informants in this case is therefore needed to provide the reader with a background to the important actors in this case. This section fulfills this need.

Using the criteria for the informant's selection discussed in the methodology chapter, six key informants were identified for this case. Table 4-8 lists informants' organizational job descriptions and their roles in the implementation of the J. D. Edwards OneWorld XE.

Table 4-8: Key informants

Name and job description	Role in ES implementation
Business Consultant DistCo	The Business Consultant is a retired employee who has a long history of working for DistCo. He participated in ES acquisition and became responsible for overseeing the allocations module during implementation. His current involvement with DistCo is part-time on special projects.
Operations Manager DistCo	The Operations Manager who joined DistCo in October 2001 became a member of the ES steering committee.
Invoicing Team Leader DistCo	The Team Leader was responsible for overseeing ES implementation for the logistics module.
Implementation Project Manager J. D. Edwards	Project Manager-JDE was the vendor's project manager of the ES project leading a team of J. D. Edwards's implementation consultants.
IT Manager DistCo	The IT Manager was a member of both the ES steering committee and the ES project management (PM) team.
Financial controller (FC) DistCo	The FC was the project manager of the ES project. She was promoted to the general manager's role in August 2001. To avoid confusion in citing informants' quotes, she will be always referred to as the FC throughout this study.
Managing director (MD) DistCo	The MD was the business sponsor for the ES project as well as being a member of the ES steering committee. She left DistCo in August 2001 to take the general manager position with another NZNP subsidiary.

Two potential informants that could not be interviewed for this study included the chief information officer (CIO) for NZNP and the J. D. Edwards director of the ES project.

The CIO was also the parent company's representative on the ES steering committee and became the ES business sponsor when the FC was promoted to the MD position. He

had left NZNP when data collection started and was relocated to a distant part of the country.

The Project Director-JDE was the J. D. Edwards client relationship manager for the ES project. Her main role was managing the client-vendor relationship and representing J. D. Edwards at the ES steering committee level. She was interviewed once prior to the start of the primary data collection. During that interview, she discussed issues particular to the J. D. Edwards approach in ES implementation that shed some light on J. D. Edwards's management of ES projects. Her role focused on providing J. D. Edwards's senior management with detailed visibility and buy-in into the project and reciprocating the client's organization senior management involvement on the ES steering committee.

The FC, MD, Business Consultant, IT Manager, Team Leader, Operations Manager, and Project Manager-JDE have been interviewed. A brief introduction to the background of each of those informants is provided next.

Business Consultant

The Business Consultant has been with DistCo for approximately 40 years. He retired in 1999 when DistCo was exploring the market for ES vendors' offerings—the RFI stage. The Business Consultant's involvement in previous years centered on organizing the distribution of the magazines to individual retailers—the allocations process. Because of his extensive experience, he was selected to be a key participant in the acquisition and implementation of the new system.

Part of his involvement in the ES acquisition process, during the RFI stage, included visiting a magazine distribution company in America and a system vendor in Australia. During implementation, he was the team leader responsible for configuring the software supporting DistCo's key business process, allocations.

Operations Manager

The Operations Manager joined DistCo in October 2001. One criterion for choosing her for this role was her prior experience in the SAP implementation of the procurement modules at a big NZ organization. By the time she joined the company, most of the ES

key decisions had already been made and implementation was at the integrated testing phase with a go-live target of December 2001.

The Operations Manager described her involvement in the ES project as 'high-level' focusing on both budget and progress in her particular area of responsibility. She was the least experienced of those on the project with respect to knowing its history, however, she provided useful insights because she had come in at the end and had prior experience with ES implementation.

Team Leader

The Team Leader managed the logistics team of the ES project whose responsibility covers the bringing together of all the magazines for distribution. Logistics handles the receipt of the product into the system when allocations have been made. They also manage distribution schedules prior to the production of invoices. In summary, the logistics team handles all the scheduling of the product for distribution.

Being a team leader of the logistics department and having a long history of working with the company, she was approached to be part of the evaluation and the implementation teams of the ES project team. The business knowledge component was a key criterion for choosing the DistCo team on the project. In her case, it was the job she did everyday. Logistics is an area where the business starts and then flows through to all the different departments. Therefore, logistics people have a good knowledge of the implications changing business processes have on other business functions.

Her involvement in the ES project started at the RFP stage. As a member of the DistCo evaluation team, she read vendors' proposals and sat through demonstration sessions. She later evaluated, scored, and discussed these proposals with the DistCo team. During the design phase, her role involved describing the DistCo business practice to the J. D. Edwards consultants responsible for defining system configurations. She later managed personnel training in her area.

The Team Leader pointed out that the major difficulty her team needed to overcome related to the improvement of their computer skills. At the start of the ES project, the logistics team skills were far behind both the technologists and senior management. For a diverse team, people have "different abilities and some people do find it a lot harder

than the others" (Team Leader). However, going through the process, their skills have improved extensively.

Project Manager-JDE

The Project Manager-JDE, a head implementation consultant for J. D. Edwards, was the project manager of the ES project who was accountable to both J. D. Edwards and DistCo. His PM duties included both the technical and application side of ES implementation. He attended steering committee meetings to communicate the status of the project and future plans. He also raised potential changes to scope during steering committee meetings. His responsibilities also included selecting the consultants working on the project, setting up the project plan, escalating implementation problems to and from DistCo, tracking the spending on the project, and doing formal status reporting.

His first contact with DistCo was during the pre-sale process. He assisted the sales team in pricing and organizing consultants' resources for bringing the deal together. Time wise, he was involved in the last two months leading up to the sale—the actual sale process was four to six months in duration.

IT Manager

The IT Manager was the information services manager who was responsible for "the technology itself, the actual infrastructure that the system sits upon, and equally understanding how the system is going to meet DistCo business needs" (IT Manager). He joined DistCo at the end of the RFI stage; his active involvement in the ES implementation started in formulating the RFP and sending it to the market.

The IT Manager is known among his colleagues to be technically competent and a great researcher. One of his recognized achievements was the handling of the complex and challenging task of hardware acquisition. Being both the head of the IS function and a member of the ES steering committee, he worked very closely with the FC in her role as the project manager, where each person's experience contributed towards a business oriented implementation. His involvement in ES implementation has seen him taking a leadership role, especially since the FC was promoted to the general manager's role midway through the process. He described their complementary experience in the following way: "It's very much a case of backing each other up, probably backing her

up more often in the sense that she's not able to assist me in technical issues" (IT Manager).

Financial controller (FC)

Having a strong background in change management, the FC joined DistCo in 1998. The company then was busy considering its Y2K plans—whether to fix legacy systems for Y2K problems or implement a new system. She had taken an active leadership role in ES implementation since the RFI stage. Her active involvement included both roles of the ES champion and the ES project manager. She eventually headed DistCo in the role of the MD.

During the initial phase of exploring ES offerings, she spent a considerable amount of time away from NZ managing the sale process of DistCo's sister company, DistCo Australia. During that time, she became actively involved with DistCo Australia in their search for an ES vendor. Later, she took an active decisive leadership role in the ES project and was therefore involved in all of the 15 decisions explored in this study.

Managing director (MD)

The MD was the managing director of DistCo during the acquisition and implementation of the ES. Being the managing director, she was also the business sponsor for the ES project. She left DistCo to head another NZNP company—NZNP Magazines—in August 2001. When she left, the NZNP CIO and its representative on the ES steering committee, took over the role of the business sponsor.

4.6 Strategic ES implementation decisions

This section provides a detailed account of the decision process for each of the 15 strategic decisions in the implementation of the J. D. Edwards One World XE ES application at DistCo. Empirical data from research interviews provided the basis for constructing these decision stories. Other sources of information included observation, organization documents, and industry publications.

Decision stories will be presented in the sequence they were addressed in this case. The sequence across time and the dependencies between decisions were elicited in the analysis of case study data. Data displays that captured decision-making over four

phases of implementation were revised several times through triangulating the evidence and validating displays with the key informants of this case (refer to Figure 4-2 and Figure 4-3).

4.6.1 Key business processes (D04)

DistCo used neither brainstorming workshops nor strategic planning consultants to identify key processes. It was clear in all informants' responses that business operations center around allocations. Allocations is complemented by logistics or the physical distribution service. Whilst allocations determines what the shops receive, the distribution service affects the physical picking, packing, and distribution of the product. Having a strong warehousing-distribution operation gives DistCo the opportunity to extend its future product offerings.

> DistCo had been through some strategic planning some three years prior. We knew exactly what our core competencies were and therefore what we needed to focus on, [and] the things that we really needed to be good at as a business to succeed. Allocations was the fundamental business process amongst those eight objectives and that was the only pure business process that was amongst those objectives. So it was absolutely clear. (MD)

> I guess the distribution side of it is was one of the key processes. The fact that we're on a sale-and-return basis is pretty unique to our business. (Team Leader)

> We only had one business really and that is distributing magazines as far as this project is concerned. So what we were focusing on was the detail of that process—how we receive goods and how we go about it in the various sources of goods, the shipping information that comes with that into the allocations and the distribution process, how we pass that down to the pick-and-pack, how we bring it back, how we then manage quick collection, how we deal with returns and the processing of claims to publishers, the payments to publishers, and obviously over all that the reporting of results. (FC)

> The decision on whether or not we went with this company or that company centered around their ability to handle our allocations processes. ... It was critical. If the vendor could not handle the development of the allocations software, they would be no good to us. They may have the best suite of financial accounts payables software, a very good warehousing system, but for us, the allocations part of it was our core business. If we start sending the shops out there the wrong quantities, our business suffers. We send them too many, they have a problem and we're in trouble. If we don't send them enough, they sell out, we lose business and our publishers are not happy. (Business Consultant)

4.6.2 Evaluation partner (D02)

DistCo partnered with DistCo Australia during the exploratory investigation phase for new system acquisition with a prospect of a future joint venture during ES implementation. The partnership decision with DistCo Australia was initiated by the parent organization, NZNP in order to consolidate the two companies resources towards a standard solution.

No other evaluation partners were included except for the intermittent informal involvement of A Consulting—a management consultancy firm—at the end of the preparation phase. This involvement was in the form of advice to the FC from an A Consulting employee whom she attended university and worked with before. The advice was general and focused on assistance with formalizing the ES RFP document because "None of us had written one [an RFP] of that magnitude before so we wanted to make sure we'd done a reasonable job" (FC).

Two issues had influenced DistCo not to formally use the services of a professional evaluation partner. The first is DistCo's clear determination to take ownership of its new system implementation—this was also one of the driving issues leading to vendors' selection. DistCo's believed that the nature of the work they do is unique; therefore it was difficult to get outsiders to understand the specific details of their business and apply this understanding within the short time of system evaluation. The DistCo MD elaborated on this issue in the following:

> The company [DistCo] is well connected to other distributors worldwide, so we knew that there weren't people in our business who actually had a robust solution that would suit our market, so there was no point in engaging consultants in our view. We felt that if we couldn't as a team evaluate whether a solution was robust enough, then we weren't doing our jobs. (MD)

The second issue is the financial constraint of getting the parent company to approve funding for the selection and evaluation phase. DistCo had to do extensive research first before they could move to formal system evaluation. Once they reached that point, they had already finished the major part of their exploratory investigation and had decided on formal evaluation criteria.

4.6.3 Vendor (D03)

The investigation and selection process for an ES system vendor was the most comprehensive when compared to the other 14 decisions. The findings of this case indicated that it took a considerable time, approximately two years until a vendor was chosen. The process was thorough in that a few iterations of vendor screening were conducted. Furthermore, the selection decision has a clear long-term future perspective.

The SDM process that leads to ES vendor selection can be described in the context of the three sub processes of the RFI, RFP, and contract negotiations.

Request for information (RFI)

The RFI was an exploratory investigation process to identify potential vendors. The 18-month long process started in 1998 in collaboration with DistCo Australia and ended in October 1999 with the NZNP board approving DistCo's new system's business case. The end of the RFI stage signified the start of the RFP stage when DistCo proceeded with a formal invitation for bids from selected vendors.

The primary objective of the RFI stage was to research the availability of systems that could meet the unique needs of business operations in the magazine distribution industry. The RFI process was mainly managed by DistCo's FC. The FC joined DistCo in 1998 and later became the ES project manager. The focus of the decision-making process during the RFI stage was screening and then short-listing potential vendors. Two parties influenced decision-making during this phase, DistCo's parent company NZNP, and ES vendors.

NZNP influenced the vendor screening process in the following ways:

First, NZNP mandated collaboration between DistCo NZ and DistCo Australia. This mandate ended after the sale of DistCo Australia, but because the sale process took a considerable period of time—18 months—and the FC managed the sale process, that partnership had a substantial influence on system choice. DistCo Australia followed behind DistCo to implement a J. D. Edwards ES.

Second, NZNP indirectly ruled out potential vendors such as SAP that were known for their costly and complex implementations because "We would never get approval for

SAP implementation from NZNP, so we didn't bother to go down that route any further," the FC explained.

Third, DistCo were "under a lot of pressure—from NZNP—to go best-of-breed not ERP, hence the reason to include the Matrix type solutions in the mix" (FC). NZNP's concern was that DistCo was going a route "no one in the group had gone before" (FC). Nevertheless, the findings of the RFI stage had identified potential shortcomings to best-of-breed implementations. Using this information, DistCo's senior management was successful in persuading the NZNP board to carry on to the RFP stage to quantify the costs and risks of the different alternatives.

The main influence ES vendors had on short-listing decisions was the amount of detail they provided to explain how the ES application could satisfy DistCo's business needs. PeopleSoft, for example did not get short listed because they failed to identify their "strengths in the areas that DistCo were looking for" (FC).

Request for proposals

The RFP started at the end of the RFI stage that produced a vendors' shortlist. The process included issuing a formal RFP to six vendors and evaluating bids to identify a favorable vendor. The RFP stage took approximately eight months and ended in July 2000 with a choice of J. D. Edwards. Contract negotiationss followed to formalize the acquisition process of both the software license and implementation services.

DistCo issued a formal RFP to six vendors and received only three responses that were evaluated in several iterative cycles. DistCo had a clear focus to what they expected in invited vendors' replies with explicit instructions laid down in the written RFP documents. These instructions asked vendors to illustrate how the proposed system would meet DistCo's key business process of allocations.

All vendors were first required to come and meet the evaluation team and ask questions to further clarify DistCo's business requirements. Vendors were also instructed to later present their solution demonstration at DistCo and not at the vendors' premises—a common practice for most vendors at the time. Throughout the process, DistCo learnt that they "had to push them at times" and that it was their responsibility to continuously ask vendors to give detailed answers to tendered solutions. Except for J. D. Edwards,

the two other vendors failed to provide in-depth answers to DistCo's questions during the final demonstration sessions.

A detailed description of the RFP process can be better provided in the exact words of three of DistCo's informants: FC, Business Consultant, and Team Leader. The FC's account of the RFP process is summarized in the following:

- We issued the written RFP ... asking them [vendors] to make a full written response.

- We developed detailed score sheets ... and we got ... the evaluation team to score [the responses] ... to enable them to see whether they [ES vendors] had answered the questions that we'd asked and that these areas were covered off to our satisfaction.

- We ran some sessions with the vendors to give them an opportunity to find out more about our business.

- We then ran a series of demonstrations and asked the vendors to come and present on our premises. At this point, we had never set foot in any of their premises and we asked them to present to us on key and specific areas. And we were very targeted about the way we asked them to present those things. We didn't want to see full demonstrations. They did comply, though they didn't want to. They wanted us to come to their place. They wanted to do the demonstration the way they wanted to do it, but they played the game. We were specific about what we wanted to see. The questions that we asked them [were] about demonstrating that they could build an allocation system—how they would square off some key issues as far as we were concerned. We weren't interested in seeing, for example, a full demonstration of how the general ledger worked or how the credit control functioned. It was given in that they were going to be able to do those things. We just wanted to see the things that we felt were going to possibly be issues in our implementation. So with a bit of arm-twisting, they complied, which worked pretty well.

- Out of that we got down to a point where we asked them all back to do summary presentations to the NZNP representative [NZNP CIO] who was on the steering committee and to the MD who had actually been out of the country during those initial demonstrations. [This demonstration] focused on anything that we felt were issues or problems within that area. Having got to that point, we were working with three possible vendors. At that point ... we dropped [the] Matrix [solution] out and went down to two [vendors].

- We then asked them [Intentia and J. D. Edwards] to run workshops for us in some key areas in both financials and distribution on their sites. We did four one-day workshops and each one of them with the key evaluation team. Again, [we were] quite focused about

what we wanted to see on those days. What we want to cover for us was how they were going to address these particular issues.

- In all the demonstrations the team had score sheets, which we collated, and at the end of those sessions we ran discussions about whether we felt that the issues had been addressed... [Having collated votes], I'd go back to them and say 'well this is how you voted.' Then they'd say 'yes,' or 'I'm surprised we've come out with that result.' There'd been those that have voted one way and not the other. We'd have a bit of discussion about why and those sorts of things. It helped them to understand how they had scored in a particular way. ... Out of that we got down to where we felt that J. D. Edwards was our preferred vendor.

- Then we started to spend more time with J. D. Edwards, talking to them about the solution in more depth ... [leading to] contract negotiations and obviously entering into a contract with them. So that was the process; it's fairly detailed.

The Business Consultant's account of the RFP process is summarized in the following:

- That was a long process ... very long process, meeting with the vendors and then, as a group, evaluating each individual proposal ... and assessing those parts of the proposal that were relevant to our own particular part of the business.

- We had to push them at times. There were times when we felt that they had not perhaps covered—this applied to both companies—some aspects in enough depth. It was a question of going back to them and getting them to go through it and present in more detail to us how they would develop a solution. The onus was on us to push them to come back to us with as much information as they could.

- We really went through a system of marking. We assessed each one on specific questions. ... I personally wasn't involved in anything to do with detailed assessment in respect to costs or anything like that. Senior people were directly involved there.

- There were some general areas that each of us could make a comment on but when it came to this specific solution that you were looking at in your area. Well, there were only one or two people within the team that could really make a final judgment on that. But it was up to them [senior management] the bringing it all together in the end.

The Team Leader's account of the RFP process is summarized in the following:

- We did go through and evaluate, and we scored ... then we sat down and discussed as a team, what we thought. The final decision was further up the line but we certainly had an impact on what we thought. (Team Leader)

The analysis of interview data highlights five issues that were important to DistCo in choosing an ES vendor. These issues that are summarized in Figure 4-4 are discussed next.

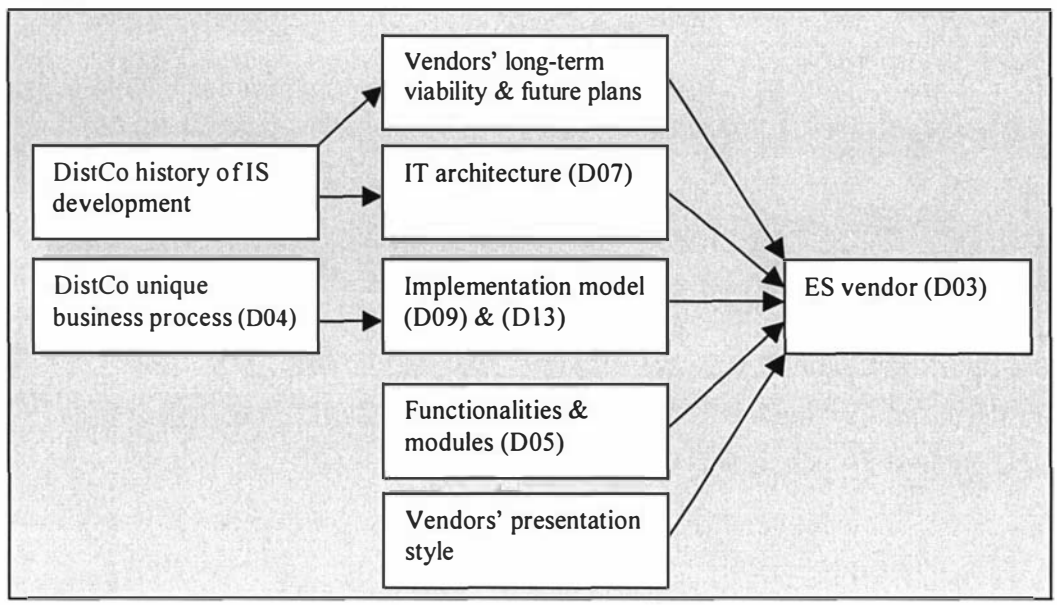

Figure 4-4: Issues influencing the choice of the ES vendor

The first issue was the long-term viability of the vendor and their plans for the future. DistCo's concern for the vendors' viability had its origins in a previous disappointing experience with Wang systems (refer to 4.3). DistCo wanted to ensure that future enhancements of standard system functionalities would be accommodated by vendor's upgrades. Instead of continuous re-work, DistCo's developers would focus on supporting core business processes to maintain the company's unique competitive advantage.

A second issue was the flexibility of the IT architecture. This also has its roots in DistCo' previous experience with system implementation. The flexibility of the IT architecture was considered a key issue in evaluating ES vendors' solutions. This indicates a dependency between the IT architecture (D07) and ES vendor (D03) decisions during system acquisition. The flexibility of J.D. Edward's IT platform that was not available as part of Intentia's solution, strengthened their odds of being the preferred vendor.

> The issues and reasons that finally tipped the balance for J. D. Edwards was that we felt that they were ahead in a technology sense. (FC)

The third issue was the vendors' implementation methodology. In their RFI investigations, and particularly in talking to organizations that had recently implemented an ES, DistCo's management realized that implementation ownership was key to implementation success. All informants clearly acknowledged this issue explaining that DistCo is "too unique of an industry" to find outside implementation expertise (FC).

> We felt that culturally, we were much more aligned to J. D. Edwards and their clients. ... Intentia's clients tended to be very much IT department driven as far as the decisions about solutions. (FC)

The fourth issue was software functionality, particular the forecasting functionality needed for the allocations module. It was critical that DistCo gets "very very good forecasting methods" (Business Consultant). At the final choice stage, J. D. Edwards gained a definite lead over Intentia because they offered "a choice of different forecasting methods" (Business Consultant).

> The Matrix product was well short of our expectations and certainly short of our current functionality in our old clunky legacy system. But we put it up there as a comparison and as another option. (FC)

> Part of the business is very much dependent on forecasting sales of magazines in shops based on a shop sales history. That was one area where we were able to weigh up very carefully the two companies. J. D. Edwards offered us a choice of different forecasting methods. The other company (Intentia) was going to look very hard at what our current system of forecasting is and really pick the bones out of us. (Business Consultant)

The fifth issue was the competence of the vendor's sales people, particularly during final demonstrations, when DistCo's specific questions were answered. Although each vendor's presentation style was ignored when summing up the scores, informants' feedback suggested that it still made a difference. They noted that 'confidence in the person presenting' helped to select the vendor of choice and discount the less prepared.

> The other company [Intentia] representative was very hesitant. Perhaps he hasn't done enough homework beforehand. That was another area that was very important and gave you confidence in the people that you were working with. (Business Consultant)

Contract negotiations

The contract negotiations stage is a confirmatory process to authorize and formalize vendor's choice. The process started in July 2000 when the NZNP board authorized expenditure for the new system. This stage took 2-3 months and ended with the start of the training phase, the first of the six-phase implementation process of the J. D. Edwards OneWorld software.

DistCo ended the RFP phase with two comparable offerings from J. D. Edwards and Intentia. Although contract negotiations were to leverage the two offerings against each other to get a better price, there was a preliminary agreement that J. D. Edwards was more suitable. Reference site investigations during the contract negotiations stage confirmed this choice.

Talking to client reference sites gave J. D. Edwards an advantage over Intentia. Those referrals suggested that the focus of J. D. Edwards's implementations were business oriented, while Intentia's implementations were more technology focused. Intentia clients were described to be "very much IT department driven as far as the decisions about solutions" (FC). From a temporal perspective, it is interesting to note that comparison happened at the time when Y2K projects were still the focus for many implementations at that time. Intentia's clients were among organizations that were "putting an ES to overcome Y2K problems" (FC).

Once J. D. Edwards was in the preferred vendor status, they were asked to develop draft system specifications. The purpose of this document was to ensure that both parties—DistCo and J. D. Edwards—had reached a clear understanding of scope, particularly the modifications required for the allocations module. This was not a standard procedure for J. D. Edwards. Several times, they expressed to DistCo that "they had never done so much work before a contract ... [considering] that it's non-chargeable because it's pre-sale" (FC). This marked the first decision-making cycle of defining the system functionally (D05), details of which are discussed in section 4.6.8 .

The specifications became part of the contract DistCo signed with J. D. Edwards near the end of 2000. To gain more leverage, DistCo negotiated a fixed price payment for the system prototype. The agreement further stated that DistCo could walk out the contract if the detailed price estimate pending the development of the prototype was too high.

4.6.4 Implementation partner (D09)

DistCo remained undecided during both stages of the RFI and RFP about the type of implementation partnership (i.e. vendor-implementer vs. third-party implementer) they would engage in. Retaining ownership of their system implementation was an important objective to DistCo. 'Ownership' was mentioned in almost all informants' comments. Involving a third-party implementation partner was considered to sabotage the business ownership of the new implementation. For that reason, no commitment was made until DistCo decided upon the ES vendor.

It was only during contract negotiations that a decision was made that no third-party implementation partner would be involved. In particular, that decision was confirmed after reference checking client's sites. The feedback pointed in the direction that "the vendor should implement it themselves and don't get involved with a third-party" (FC). Another referral illustrated a negative "example of the consultants taking control of the project, no input from the business, and all the horror story stuff" (FC). In the following, the FC described the events leading to the final decisions:

> We left that as a question to be solved once we chose who would be our software vendor...when we made them [J. D. Edwards] preferred vendor, we were still open, although we were probably swaying to go with them anyway. By the time we'd done all our referencing with them, we had definitely made up our minds that we wanted them to implement. (FC)

An earlier negative experience that affirmed this choice was a presentation to DistCo Australia by one of J. D. Edwards's accredited providers. The FC described the incompetence of the third-party implementer:

> I've seen one of the three accredited providers make a very big mess of presenting to DistCo Australia what they could bring to a project during their evaluation. That put a big cross next to their name because they blew it. I've never seen a professional firm make such a mess of presenting. They just misread the audience so badly and so that put a negative view as far as that particular organization was concerned. (FC)

4.6.5 Evaluation team (D01)

The definition of the evaluation team in this study is the team that is formed to explore, investigate, and evaluate different vendors' offerings for the purpose of selecting an ES

vendor. The FC in consultation with the MD was responsible for selecting evaluation team members.

> They were key people in the business, key publisher business managers, and somebody key from the warehouse. Somebody key from each department was there so that they could certainly see what was being offered and decide which was the best one that suited our business practices. (Team Leader)

The team selection process was informal. The decision was described as a "quite a straightforward decision ... as to who should be involved" (MD); it was "just cherry picking" people within the business (FC). The criteria for membership included "key people within the business, who had the best knowledge of the business ... [the] most capable of making decisions ... [and] the busiest people in the business" (Business Consultant). The FC summarized selection criteria in the following:

> Key people within the organization who had knowledge of the business, who would be particularly critical or evaluate strongly ... who would ask good questions, who were looking for specific things out of the new system, and who were the most critical of our current system. So therefore, they would be looking for some of the solutions to those issues. (FC)

In the end, the evaluation team was:

> A mixture of senior managers from the company, an NZNP representative as a stakeholder representative, and practitioners from the business who were working with the existing tools and who understood what outcome they required from their particular process. (MD)

The evaluation team included ten members. Four of which are key informants in this study: the FC, Business Consultant, IT Manager, and the Team Leader. The other six were the promotions manager, publisher business manager, account executive, applications team leader, and retail services manager.

Senior management wanted to achieve an ES implementation that that "had the backing and support of all the people in the business" (IT Manager). Therefore, mixed representation on the evaluation team was needed to bring together the different perspectives DistCo stakeholders had. And while NZNP was "probing for [a vendor] that is a well known, legitimate, financially sound company with a strong likelihood that the company's business would continue into the future," senior management were opting for "a solution focus" that satisfies business needs (MD). Therefore, it was

important to include operational staff because their concern was evaluating the change in business processes and questioning if change could deliver the results they needed in their day-to-day operations.

4.6.6 Implementation team (D08)

Three teams were formed to manage the implementation of the new ES. These are the steering committee, the PM team, and the applications team (refer to Figure 4-5: ES project structure). The decision process for team formation is discussed next.

Steering committee

DistCo's senior management, NZNP, and J. D. Edwards jointly influenced the selection of committee members. The main role of the steering committee was managing communications and relationship issues and keeping stakeholders formally informed, particularly the MD and the NZNP's representative.

Halfway through implementation (August 2001), the MD left the company. The FC was promoted to the MD's position and continued to lead ES implementation in her second role as the ES project manager.

Project management team

The FC fell into the project manager's role because of her active involvement during system acquisition. The Business Consultant, a retired DistCo employee who had a 37-year history with the company was involved since the early system investigation, during the RFI stage. The IT Manager who joined the team at the RFP stage, provided a complementary technical IT experience. The three had their names on both the system's business case (1999) and the system capital expenditure report (2000) that were submitted to the NZNP board for approval.

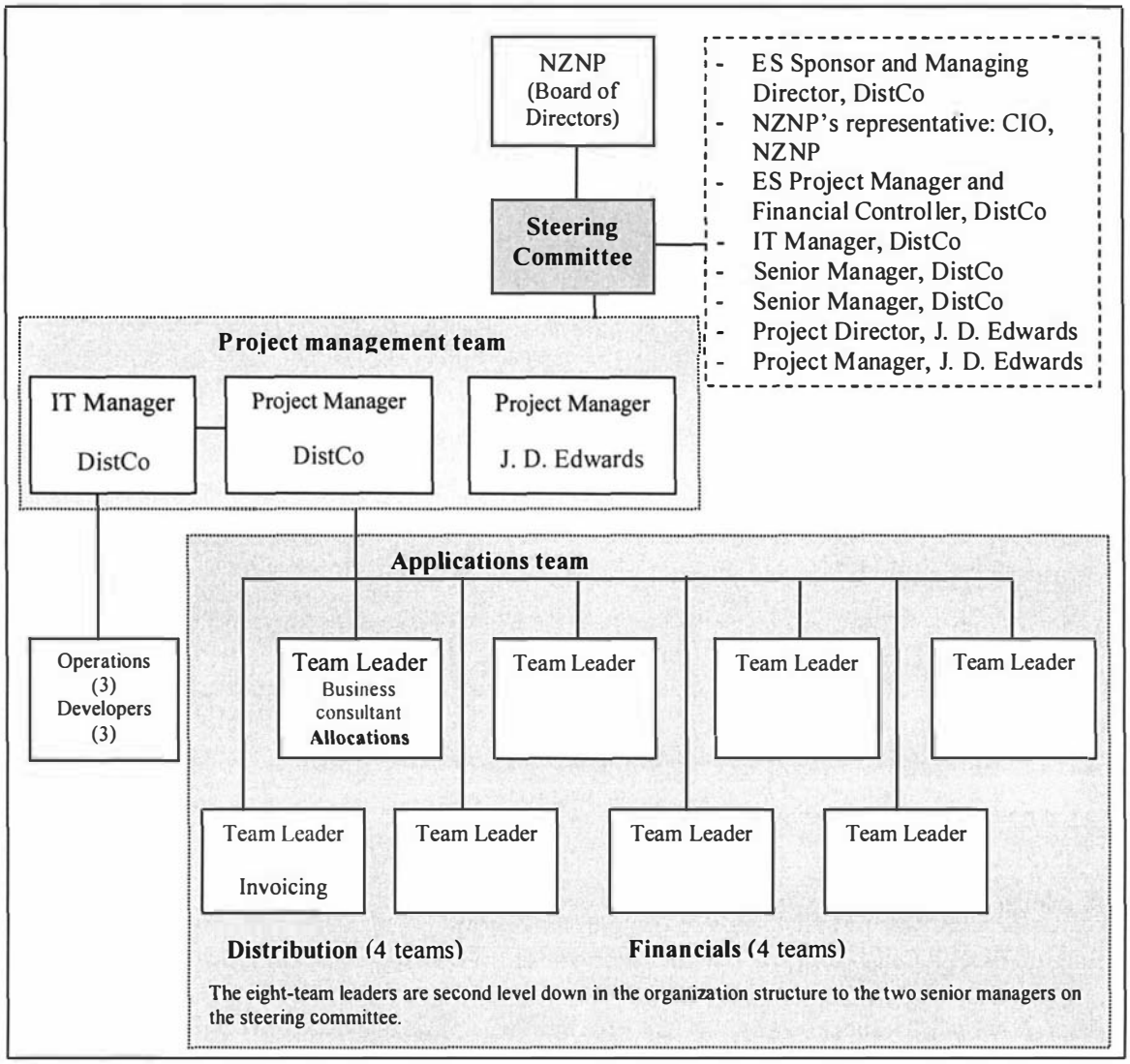

Figure 4-5: ES project structure

During implementation, the Business Consultant's role evolved to focus on system configuration, as he became the team leader for the allocations module. Both the project manager and the IT Manager continued to lead the ES project in what was described as the work of "Siamese twins" (FC).

Until the FC appointment in the MD's position, She and the Business Consultant were the only two members of the DistCo implementation team that had dedicated their time fully to the ES project. All other members were part-timers with dual responsibilities.

Applications team

The DistCo three-person PM team influenced the selection of the applications team. The applications team included operational team leaders that were two levels down the

organization structure. Except for the Business Consultant, team leaders could not be made available full-time on the project because of their day-to-day work commitments. The Project Manager-JDE was the person responsible for allocating J. D. Edwards consultants to the applications team as needed.

4.6.7 Implementation strategy (D10)

> Our premise has been as 'vanilla' as possible but we knew that that was never going to be completely the case and we have reengineered processes where possible. (FC)

Although the initial plan for new system implementation was "to be as 'vanilla' as possible" (FC), actual implementation was heavily customized. The 'vanilla' approach was favorable because it is both quicker and cheaper during implementation, as well as in future system maintenance and upgrades. The heavily customized implementation was influenced by the unique nature of DistCo's business operations. In the following, most informants agreed that for some parts of the business, there was no alternative but to customize:

> It wasn't a matter of purchasing anything that was standard off-the-shelf. It all had to be modified to meet our requirements. ... There are some parts of our business where there's absolutely nothing that they have. It just had to be customized to meet our needs because there's no alternative. (Business Consultant)

> There had to be modifications to the basic system. We knew we were going to write programs to handle it—to have a modification...of course a lot of it, in the distribution side, just didn't fit. A lot of it had modifications. My particular area, most of it has been modified. (Team Leader)

> It is so hugely modified. Of all the implementations we have in NZ, it is probably coming close to being one of the most heavily modified. (Project Manager-JDE)

> It wasn't until really over a period of months and months where we understood the product better and they understood our business better that we could actually start to see how we were going to mesh the modifications into the core product. The two weren't going to fit together terribly well. ... There were some wins because we actually understood more about the product. We said 'well, okay here's an opportunity for us to reengineer our business.' (IT Manager)

> Our goal was to be as 'vanilla' as possible. We knew going into this implementation that we could not be 100% 'vanilla' because there is not a magazine distribution module available to do what we wanted to do. (FC)

> I think there was a desire for it to be as 'vanilla' as possible with recognition that because of the unique importance of allocations and the fact that in a sale-and-return environment there's not as much emphasis placed on certain aspects of the financial process that that would need modification. That was the prevailing philosophy; if we can possibly change our business to go 'vanilla' in areas of the business where it doesn't matter, fine. But we can't compromise on the sale or return aspect of our business which means there's not a strong emphasis on purchase orders in our business because the shipping documents tend to act as that. And allocations; we wouldn't change our business in that regard. Those are the things that we'd modified the software to but the rest was 'vanilla.' So it was somewhere in between. (MD)

Even though DistCo had done their homework during the acquisition process, the amount of software customization far outweighed initial project estimates. Before signing the contract, J. D. Edwards was to demonstrate that the software was able to cope with DistCo's unique way of doing business and to provide an estimate of all modifications. Two-day workshops were organized to pin down in detail DistCo's business requirements, during which the DistCo's team, with the help of J. D. Edwards's consultants walked through both the distribution and finance processes. The result of these workshops was the specifications document that J. D. Edwards developed to quantify costs.

The development of the business prototype later saw a major change in these specifications. The new cost estimate was a big surprise for the DistCo team. The FC recalled that J. D. Edwards "developed requirement specifications for those items and came up with a price and then we all fell off our chairs."

DistCo attributed the problem to a "big knowledge gap" between the DistCo and J. D. Edwards teams. DistCo truly believed that they have communicated all the information needed to explain their business requirements to the J. D. Edwards consultants during the preparatory workshops before and upon formalizing the contract.

To bring the costs down, cost cutting exercises followed. These literally tore apart all earlier assumptions on modification requirements. A "less fancy route" approach was taken, with "compromises all the way through" (FC). A change of focus towards delivering a functional solution overrode the "dream that DistCo had when [they] had stars in (their) eyes when (they) had started" (FC). The business requirements were cut down significantly, with cut-off functionalities scheduled for a phase II implementation. The people in the business were continuously consulted. They were asked to make

decisions on what was important and what was not and to demonstrate the benefit if a piece of functionality was important.

Revisiting system specifications had necessitated a thorough examination of business processes and the development of detailed process documentation. That, in addition to an increased understanding of ES software capabilities, triggered a BPR exercise that started building significant delays into the project.

> At the end of January ... we had to go through and re-cut the specifications...The original modifications for allocations was written on the basis of their understanding what the business was and telling us how they thought the system could work but they also expressed an interest in going through and improving their existing process—process redesign. So we had the Business Consultant and one of our consultants going through a whole design process with allocations and coming up with a really good answer—really good solution. But it ended up taking much much more time than we expected. We never expected that there was so much redesign that was going to be required. (Project Manager-JDE)

Senior management started to emphasize the need to change business practice and worked formally to educate people "to be open to looking for the opportunity for change" (FC). Informants explained how they contemplated both software configuration and business process improvement decisions in the following statements:

> Right at the very start.... we have done it this way. We are not necessarily going to continue to do it this way. Because, if we have software that demands that we make a change, and that change is appropriate, and will do the job better, well, that's fine; we will make that change. (Business Consultant)

> We certainly tried to mold our business around the basic system wherever we could. We were fully aware that the less modifications, the less hassles we would have further down the track. We looked on each process and how we could work around it in the J. D. Edwards system. And if that wasn't at all possible then we had to go for a modification. We did try to as much as we could to fit it in with the existing system. (Team Leader)

> It was certainly something that was consciously discussed; the word 'vanilla' was around a lot at that time so it wasn't something that was subliminal. It was actually quite overt as to whether we were deciding one thing or the other. There were certain parts of the business where it was viewed that 'yes we can change' and therefore we'll try and go 'vanilla.' And there were certain parts of the business, 'no it's far too important you must change.' And that was part of the tendering process that people understood and they were expected to present on how they would modify

themselves and their software to meet our business needs. It was genuinely somewhere between the two. (MD)

My role is being the bad cop on the project most of the way, trying to push people back to 'vanilla' wherever possible. So they'd had to make their case to me and then ultimately to the steering committee if they wanted to go any more that those gaps than we had found initially. And some of those had gone through. (FC)

We [J. D. Edwards] went through [cost cutting exercise] and pruned the thing down to its absolute bare minimum. But still it was big. DistCo always recognized right from the very beginning that although in a theoretical sense we had processes that would suit their business with some modification, we'd always recognized that it was going to be a lot of the fundamental parts we're going to change. What we didn't realize was just how extensive those changes were going to end up. Everybody was really concerned about the allocations side of the process and that ended up being very much a clip-on onto the side of the system. So it's quite standalone but it's all the processes to support the payment processing and to support the distribution of the product [newspapers and magazines] that have actually ... modified the core product [the ES software]. (Project Manager-JDE)

4.6.8 Functionalities and modules (D05)

In deciding on software functionalities, the focus was not on which piece of functionality to buy, but what needed to be implemented because "with J. D. Edwards you get the whole thing anyway; it's just about which bits you use" (FC). Therefore, those decisions can better be described as configuration decisions.

Although initial decisions on software functionalities can be traced to the early phases of the software acquisition process when DistCo collaborated with DistCo Australia to explore the ES market, it was not until the RFP stage that those decisions started to crystallize. The exploratory phase involved visiting vendors and getting advice from similar businesses overseas. The core modules decision was made then, mainly by senior management. That decision was documented in the system's business case that was submitted to the NZNP board for approval.

During the RFP stage, DistCo structured their RFP to seek answers for specific questions that focused on how to operationalize allocations being the key business process. By the end of the contract negotiations phase, DistCo had a requested J. D. Edwards to include a draft specification of all modifications in the contract documents.

Midway during the design phase that included the three steps of defining requirements, training users, and building the system's prototype, a major revision of system specifications was undertaken. The release of the first prototype had signaled that the price was double initial estimate and that system specifications had twice as many modifications as had originally been planned.

In an effort to bring cost down, DistCo had to revisit all their earlier configuration decisions. They ran cost cutting exercises that tore apart all earlier assumptions regarding modifications asking the questions: "Was it necessary? What were the alternatives? Was there another route?" (FC). The steering committee had high involvement in the decision process leading to these huge cost cuts as they "had to make some pragmatic decisions at certain times to do with: What is a must have? What is a need-to-have? And what is a nice-to-have?" (MD). These nice-to-have functions were classified as non-mandatory and were postponed until phase II.

As a result of having to revisit software configuration decisions and with an increased understanding of software capabilities, the implementation team started exploring alternatives to improve existing business practice. Consequently, those latter decisions were made in parallel with BPR decisions. Because the BPR initiative caused a considerable delay to the project, configuration decisions were not finalized until the end of the design phase in April 2001. Still, problems with system testing during implementation had included a few incidents when configuration needed to be reviewed.

As illustrated in Figure 4-3, there is a double loop dependency between the configuration (D05) and the implementation strategy (D10) decisions. Therefore, additional details on DistCo configuration decisions can be found in the previous section. In the following, informants further portray their views of the decision process leading to configuration decisions.

> At the end of January 2001, we came up with the initial pricing; it was an extremely big price. DistCo couldn't afford that so we decided to go through a process of trying to cut out functionality as much as we could and that required a number of things. It required us basically to have a round table with all the people involved in the process ... then we had to go through and re-cut the specifications ... come back with a new version specification, [and] get sign-off on that. That particular process took about two months to do. It was something we hadn't budgeted on. ...

Actually, it had another benefit as well because what it enabled us to do was actually look at all the modifications as a coherent whole. ...Certainly, we did find instances of where individually written [modifications] didn't hang together. It wasn't necessarily a reflection on J. D. Edwards. It was also a reflection on DistCo not realizing that if they did this ... then this wouldn't necessarily tie up with this part over here as well. So it brought a delay into it straight away. When you once finished that process and came up with a final price, we weren't going to meet the July 2001 date because we hadn't even started doing the development at that point in time. (Project Manager-JDE)

Referring back to their [J. D. Edwards] earlier response and comparing it with the detailed proposals that had come out of the meetings that I had with their consultant, we tried to determine ... whether they had covered in broader detail what was in the earlier document or whether there was a vast difference between the two. That was an area of some considerable discussion and consultation and negotiation and there needed to be a little bit of give and take on both sides. That was still happening back in March 2001 really. (Business Consultant)

This comes down to when we were actually part of the implementation team and we documented the processes that the business carried out at that moment. We sat around in our little groups—distribution group—and ... mapped out exactly what needed to happen, how it flowed through to other areas. Based on that, we went into more detail so that the consultants could get a feel of what the requirements would be for the modifications. So the reports were written and the pricing came back from J. D. Edwards and of course it was well over our budget. So decisions had to be made on where we were going to make cuts. I wasn't involved in that part of decision-making; it was done above my head. In fact, in some cases it really wasn't communicated where we were making our cuts. We found out that we weren't getting certain things, sometimes by accident. A lot was cut back. (Team Leader)

Initially it was vendor recommendation based on us describing our processes. ... Then as we go into more detail during the prototype phase, it was the consultant [J. D. Edwards] saying I would approach it this way. (FC)

4.6.9 Reporting needs (D14)

Decisions about reporting needs were considered as part of documenting existing systems in preparation for establishing the new system's requirements. The report register in-use was the starting point. Some reports were also suggested by the business and were added at the start of the project. The final list of reports, for which senior management were the key decision-makers, was defined after considering priorities in terms of when the report was needed after go-live; the closer it was needed to the go-

live date, the higher it scored. With only a few exceptions, all new reports were postponed to the post go-live or the realization phase.

In the following, informants describe their insights into the decision process for reporting decisions:

> The understanding is that we'll get exactly the same reports that we currently get so as I say, business reengineering will happen once the process is in rather than perhaps doing it the other way round. ... If I had the opportunity to write some of the reports up front, I might have been a lot more vocal. If I'd been here may be a year earlier, I'd have said 'it's mandatory. I want these reports,' which currently aren't written at all. (Operations Manager)

> One of the first parts of the modeling phase [The J. D. Edwards methodology] is to go through and identify all the outputs from the existing system and then to go through and rank them ... as either being 'critical,' 'important,' or 'nice-to have.' Once we've identified that we'll then go through and try to determine how we're going to fill that requirement and of course we'll try to look for a standard system equivalent for it. ... Through the modeling phase, we'll go through and try and identify how we're going to satisfy each of those reporting requirements where it has to be custom report or it can be satisfied into the standard reports. But we'd only do that for the 'critical' reporting we wouldn't necessarily do it for the 'nice-to-have.' Usually what we try to do is we try to work on the basis of go-live with the critical, some of the 'important' ones, none of the 'nice-to-have' reports with the intention of getting live as quickly as possible. And then once the client is live, they'll then go through and reassess the reporting requirements. ... So it's during the configure phase when we actually do the final setup of all those reports and test the completed system with those reports in place. The actual decision about the ranking of the reports is effectively done by the project team members but signed off by either the end-users or the project manager, saying 'yes I agree that is 'critical' or' it's not critical. We can make do without it.' (Project Manager-JDE)

> What we did was we documented all the reports that we used in the system at that moment. We evaluated them to see if we still needed them or if we didn't and how that they would best fit. We approached all the different areas, asked them for all the reports that they used, had a look at what they were trying to get out of them, and then had a look at OneWorld and how we were going to produce the same documentation. ... These decisions were made at a higher level. (Team Leader)

> We did that as part of documenting the existing system. We went about identifying all the reports currently used by the business in each of the areas. ... We obviously, through the process, added a number of other reports that are evident that we will require. We've reviewed those reports against the reports we have to identify whether OneWorld could produce those or at least cover the information required in those, or else we had to write the reports. (FC)

4.6.10 Bolt-on applications (D06)

DistCo considered two types of bolt-on applications, reporting applications and specialized functionality applications. A reporting application is a software module, which is sold by a third-party vendor other than the ES vendor and is used to extract the data stored in an ES and present them in non-standard configurable business-oriented reports. The J. D. Edwards "software normally can only print on a laser printer. To be able to print on a matrix printer, or to be able to put it up on a Web site, or to email it" a bolt-on application is used (Project Manager-JDE).

DistCo continued to use the same report-writer they were using prior to ES implementation. Therefore, no decision-making activity took place regarding the selection, evaluation, and choice of reporting applications. DistCo also implemented a document and image management application for customer invoices that went live before the ES go-live. This application, which was eventually linked to J. D. Edwards, was similar to the reporting application because its main function was to extract and present data in a special format.

Specialized applications provide functionality that extends ES software offerings. DistCo's senior management had decided that they "wouldn't go past a point of what is effectively a bolt-on," therefore they "never planned to take the ERP system past where the current magazine distribution system goes, which is at the point of the warehouse" (FC). These functionalities—the integration of the warehouse information system into the ES—were postponed to a second phase implementation. The one exception was enhancing the functionality of the warehouse Microsoft Access database to receive and pass back data from J. D. Edwards OneWorld.

Decisions on bolt-on applications were considered by senior management of the "magnitude (that they) were always made at the steering committee level" (MD). From a decision-making process perspective, the steering committee would determine if a specialized solution would exist as part of J. D. Edwards. If not, they would identify a suitable application to provide for the missing functionality. Then, "that concept would be taken out into the business to be tested with the people who were practically working on it day-by-day for their input" (MD). This is clearly a top-down approach in which senior management consulted operational team leaders to finalize, not action these decisions. The MD, which was also the ES project sponsor further explained:

> That was the way it worked. We [senior management] didn't go to them saying we don't know what to do. What do you think? We'd go to them and say this is what we believe. What do you think? (MD)

4.6.11 IT infrastructure (D07)

IT infrastructure decisions are these that concern the physical infrastructure (hardware and networking) and the software operating system capable of supporting the new ES. For the physical infrastructure, DistCo had a working network structure that included a wide area network connection to its regional warehouse in the south island, for which no changes that involved a major investment were needed. The same was true for PC terminals, which were able to handle the J. D. Edwards OneWorld functionalities. However, new servers and an operating system platform were needed.

The identification of system requirements for the hardware and supporting operating system was perceived as a 'challenging,' 'huge,' and a 'difficult' process for DistCo.

> The hardware stuff was very difficult. It was an area that I knew very little about. ... It was a huge task at the time ... I learnt a lot in the process. (FC)

The J. D. Edwards implementation team refrained from suggesting a particular configuration or a preferred solution. Instead, they referred the DistCo PM team to their international competency centers for input on system performance requirements. DistCo took these high-level requirements to three hardware vendors in NZ and received three extremely disparate estimates in terms of the technical architecture. When the IT Manager later met with the three vendor's sales representatives to identify the reasons behind this variation, each confirmed that their estimates were both correct and fully capable of supporting DistCo's proposed implementation. These responses were considered of such poor quality that "it was so difficult to try and compare one solution to the next" (IT Manager). With three different offers, the evaluation process was made more difficult because J. D. Edwards chose not to get involved, the FC commented:

> We were getting extremely disparate type physical solutions being proposed to us [by the hardware vendors]... J. D. Edwards stood back from; they actually didn't want to be part of that decision-making process. They will introduce you to the people and they will facilitate things but they didn't want to be blamed for the hardware. (FC)

DistCo used the evaluation process to establish evaluation criteria to "compare apples with apples" (IT Manager). The criteria were the basis for a RFP DistCo issued to source the IT platform. A Windows 2000 server that delivered a mixture of thin and fat client to desktop PCs was adopted. That solution was found adequate to support J. D. Edwards OneWorld within acceptable performance levels; however, later tests during implementation proved otherwise and a change costing $50,000 to a Citrix platform followed.

The DistCo PM team regarded the decision process leading to the initial choice very confusing. They truly believed that their extensive research should have highlighted the problem in advance. The FC described the process in the following:

> And nobody had picked up on that when we'd been presenting it. I guess maybe we hadn't highlighted it. Again, it's a confusion issue but we felt that we'd explained exactly what we were going to do and nobody pointed this out. So you couldn't have multiple applications open within OneWorld and things like that, which of course is one of the big pluses for our operational people. (FC)

4.6.12 Go-live strategy (D11)

All informants agreed that the 'big-bang' option was the only alternative. Other approaches, phased or parallel, were infeasibility because of high costs and unsuitability to the integrated nature off DistCo's business—from both a functional and a product perspective. Informants discussed the go-live decisions in the following:

> It was discussed very early in the piece and left. ... The decision was made to go with a 'big-bang'—go-live altogether. (Business Consultant)

> I think we always thought we would go that way. I don't think we really are at any stage sorted in any other phasing. (Team Leader)

> It was something that was pretty obvious; there wasn't really an alternative strategy. The thing with the business is that because their financials and distribution were so integrated [that] it wasn't possible to separate them from a functional basis. ... From a product point of view, they have a number of brands in the market and conceivable, they could have had a particular brand to go-live on. But for the same kind of reasons where all the work goes through the same warehouse, it probably had been logistically quite difficult to have the two systems running side by side in the warehouse, particularly the warehouse. So it was a bit of a no brainer. ... We always try to go in phases, so we can deliver as much benefit as quickly as possible. So 'big-bang' is always the final option. But in the case of this business, phasing just wasn't an option. (Project Manager-JDE)

> We've never believed that it could be phased because it's not like we've got lots of sites to bring them on... It's a cautious 'big-bang' in the sense that's why we keep pushing our dates out ... to make sure we've got all the ticks ... to eliminate teething problems as much as possible. (FC)

> No [other option], not really. 'Big-bang' with the old system sitting behind, just in case—to be reverted if necessary. Flick of the switch stuff. (MD)

Prior to go-live, concerns about the stability of the News Media system in the J. D. Edwards OneWorld environment pre-empted a review of the go-live decision. The News Media system was using a separate environment; therefore, linking the two systems together was risky. If it were not to function properly, it would cause huge ramifications to the business. As a risk measure, the old News Media system ran in parallel with the J. D. Edwards system for a few weeks until all tests were clear. The Operations Manager explained:

> We're very very worried that if it [News Media system] doesn't work perfectly in J. D. Edwards OneWorld from dot—from 'big-bang'—that it will cause huge ramifications on our business. ... Certainly there is the strong likelihood that the News Media system that's running on a slightly separate environment could be maintained in parallel. ... The intention, I believe would be that we would run [the News Media system] in parallel for maybe one, two, or three weeks just in case (Operations Manager).

In summary, the go-live strategy was considered at three points in time. First, it was evaluated at the start of the project when finalizing the contract with the vendor. A decision to use the 'big-bang' strategy was made. Second, during the implementation, delays started building up into the project. An incremental go-live strategy was deliberated but found infeasible.

> As we got near our first go-live target date, which was back in July [2001], it moved out towards end of year. The question then was 'should we go with a partial?' The answer then was 'no,' but it was reevaluated...the kick is from the point of view of IT people. They have their requirements in this area. Because there's a lot of conversion required from the old system, they saw problems. I don't think from their point of view it was a very difficult decision to make at all. (Business Consultant)

Third, when the project approached the planned go-live day, a parallel implementation for the News Media system was considered. A decision was made for that system to run in parallel for a few weeks until all reliability issues were cleared.

In preparation for a 'big-bang' go-live, extensive pilot testing took place for a lengthy period of time during which the new system was partly operational. Two main tests were performed. The first was to pass the data through the new system and then check its consistency with the data maintained in the old legacy system. The second was to load operational data to test system performance. Testing took approximately one year longer than planned.

DistCo described it as 'a cautious big-bang' because they wanted to make sure that all possible problem scenarios had been considered. They admitted that there would still be teething problems but they wanted to eliminate those as much as possible. An interesting analogy was that business operations were considered similar to a bank. Therefore, the new system needed to prove a high level of reliability before go-live. This is one important issue that contributed to project delay.

> It was more important for the business to get it right than to do it quickly. People rely on distributors and in a way you need to be more like a bank; you need to be thoroughly reliable. It would have been cavalier to go-live with any risk attached to that whatsoever. So the decisions to delay will undoubtedly have been around process problems and the right decisions were made. It didn't matter that going live was now rather than a year ago. (MD)

4.6.13 ES variation strategy (D12)

The ERP implementation at DistCo follows the model of one main site implementation and access from many. This multi-site implementation model is becoming very popular in NZ, especially now that the technology enabling access to the ES is more mature and less expensive (Shakir, 2003). This is especially true for medium-size organizations like DistCo that has a presence in more than one region in NZ. DistCo's head office is based in the north island. The company has one regional office in the south island, which handles all local products' distribution for that region. However, all imported products are packed at head office before being distributed throughout NZ.

The main system implementation is at head office. The south island office that only has access privilege went live simultaneously with head office. No alternatives approaches to system installations in the two regions were considered. The PM team made the decision when finalizing the contract with J. D. Edwards. The detailed specifications that J. D. Edwards had prepared during the design phase confirmed this choice. The

south island branch manager was a passive participant who only received briefing of system implementation during the training sessions at the DistCo's head office.

> The business process in the south island office works exactly the same as it does in here [head office]. There's nothing any different about what they're getting than what we've got. [It is] exactly the same process just different location. (Team Leader)

> From a locality basis their [DistCo] south island store only does some of the process that are done in here [head office], so it would have been very hard to have the south island [operations] for example as a standalone operation using either the old or new system with the rest of the business running the other part of it. So from a site base, it wasn't going to be possible. ... It's similar to what happens here. So it's only a very small part of the process [that] actually happens down there. A lot of the work is actually done for them here anyway. (Project Manager-JDE)

4.6.14 Personnel training strategy (D13)

DistCo adopted the train-the-trainer approach for personnel training since the early stage of negotiating a contract with J. D. Edwards. Both DistCo's senior management team and J. D. Edwards consultants has a stake in this decision. There are several reasons for this choice. First, it was too difficult to find trainers that would understand the DistCo's unique business process. Involving DistCo staff would also help to elicit the business knowledge those employees had gained over long years of working with the company. Plus staff "were to be an ongoing resource for the business when the system went live" (MD).

> It was a pragmatic decision. Some of the allocations processes are very detailed and you have to understand the business to understand why things are done. So it would be pointless trying to bring somebody in from outside as a specialist trainer without specialist business knowledge. ... There was a focus on enabling people internally to act as trainers in the key processes so as they could also then answer questions once they'd gone live and provide solutions. We weren't dependent on the consultants. (MD)

> Because when it comes to improving a system, even though they're implementing our software and our consultants understand the software side of it, you don't have the detailed understanding of what each user does in their particular job. ... We do actually offer end-user training and 'vanilla' software, but in a place like DistCo generally that's not appropriate because so much of their systems were modified. There are a few little parts of their system where they could potentially take that 'vanilla' end-user training. (Project Manager-JDE)

> We want to obviously retain as much of the knowledge in-house as we can. ... The guys have learnt a lot about trying to turn their knowledge into a training course, which is a whole different

> process. ... They know their teams really well. They already have a training role as part of their responsibility as team leaders for those teams. (FC)

Second, Cost was a major factor to choosing this training strategy. It was less costly to train internal people than to bring external consultants.

> It was price that drove that. (FC)

> We [J. D. Edwards] do actually find that one-on-one training [train-the-trainer] is being quite a cost effective way of doing it because it means that the project team member who's training the end-user both has an understanding of the software and a detailed understanding of the business. (Project Manager-JDE)

Third, because the implementation was delayed for a considerable period of time, the train-the-trainer strategy was more than appropriate in keeping everyone—both team members and system users—in touch with implementation progress. Continuous training was maintained in preparation for the shifting go-live date.

> Train people as near as possible to the go-live date on the assumption that people will be trained and within a very short space of time will be into using it. (Business Consultant)

> Our challenge will be to keep that up-to-date and well managed to go forward. (FC)

All module team leaders were given training on training. The DistCo project manager, with help form a J. D. Edwards consultant, held the initial training sessions where module team leaders were given instructions on the general application of the OneWorld software. Because some of DistCo's people were nervous at the start, these sessions focused on building people's confidence in their ability to train. Each of these team leaders took responsibility for guiding personnel in their functional areas. Training was handled either as a team or on a one-on-one basis depending on the needs of the individuals in each function.

The initial training sessions had identified that people had various levels of expertise in terms of working with the Windows software. Therefore, special Windows training sessions followed to bring people up to speed in handling Windows applications. For the J. D. Edwards OneWorld training, the original plan was to train end-users near the go-live date. The assumption was that people would be trained and within a very short space of time they would use the system. However, because the go-live date was postponed several times, the implementation team continued to run refresher training.

Some of these sessions, time permitting, were ongoing for an hour every morning. The Team Leader is quoted reporting that the results were impressive.

4.6.15 Maintenance strategy (D15)

The maintenance strategy in this study is defined as the plan DistCo intends to undertake upon going live with the new ES, which can include implementing new ES modules, upgrading existing modules and integrating the ES with other systems. This next phase is referred to as phase II.

Except for one informant who mentioned that integrating the 'Planet Solutions'—the system supporting the magazine subscription function—would be next on the list, plans for phase II were unclear. How much of phase II was to be developed 'in house' and the extent of J. D. Edwards's involvement was not known[13] (at the time the research interviews took place). Phase I needed to be bedded down first before a strategy for the next phase could be defined.

Decisions for phase II implementation were not to be considered until the new system had "bedded in (for at least) six months to a year" (MD). These decisions are considered "business decisions" and would still need a return on investment justification and an approval by the NZNP board.

> There are certain functions that are described as phase II. But whether the phase II is picked up will be a matter of whether NZNP wishes to invest more. Whether the business return can be proven from the investment in those applications. I think ... once the new system's been bedded in, give it six months to a year; ... it will be looked at again. But it will be a business decision. (MD)

Plans for future upgrade were also vague. However, because the go-live was postponed for more than a year, DistCo continued to implement OneWorld upgrades and service packs on a regular basis. DistCo had shared development work with DistCo Australia and that necessitated working in parallel to be able to pass objects between them without any difficulty. Despite upgrade complexity, DistCo was motivated by the prospect of being able to sell part of their development work to DistCo Australia.

[13] This may be due to a methodological limitation in this study because all interviews took place before implementation go-live

Whether this cooperative relationship between DistCo and DistCo Australia is going to continue in the future is not clear because the implementation at DistCo Australia is shifting along a different route. This relationship would be reconsidered once the implementation of DistCo Australia is live and their final solution is clearly defined. One advantage of keeping up-to-date with new releases of OneWorld is that DistCo had become "already quite experienced in the process of upgrading" (FC). However, because the new ES is heavily modified, DistCo are warned that upgrading to new release will not be an easy job.

> We've obviously continued to take those upgrades and things like that. With a highly modified site that's not as simple as it would seem but we've been upgrading right through the process. So the version of OneWorld that we installed when we started the project is not the version we will go-live on. So we're already quite experienced in the process of upgrading and taking service packs and upgrades through the exercise, and we'll continue that process. ... Because we have shared some of our development work with the DistCo implementation in Australia, we're currently working in parallel to make sure that we stay with the same version at all times so [that] we can pass objects between ourselves without any difficulty. (FC)

> DistCo are still running with the version of software that came out about the middle of last year...Since no release has come out then no motivation to upgrade...Because the software is so heavily modified, it's going to be a major issue remerging the modifications with new release. There's been no discussion about when they might upgrade to a new release, but if they were to do it, it'd be only because there's a particular functionality in the release that would drive them to do that. (Project Manager-JDE)

5. Chapter Five: Health Board Case Study

5.1 Overview

This chapter presents the data collected from one of the two retrospective case studies—the implementation of the Oracle 11i ES application for the Health Board, a public health service provider in NZ. The chapter starts with a general description of the organization, information systems, and the ES project. It then provides an introduction to the key informants in this study. This is followed by a detailed account of each of the 15 strategic decisions that are the focus of the decision-making process in this study.

5.2 Organization background

The Health Board is a non-profit public organization that is NZ's largest provider of public hospital and health services. It has approximately two million patient contacts annually and provides regional services for 30 percent of NZ's population. The organization is structured around seven business units that include four specialist teaching hospitals, community health services, mental health services, and clinical support services. The Health Board vision focuses on patients' needs. Being a non-profit organization, surplus funds are allocated to supporting patients, research, and education. Table 5-1 provides the organization's profile.

Table 5-1: Organization profile

Categories	Health Board
Business	The provision of public hospital and health services.
Type of organization	Non-profit organization
Ownership	Public organization
Business units	Four specialist teaching hospitals, community health services, mental health services, and clinical support services.
Mission statement (1999-2000)	"The Health Board will provide New Zealand's finest comprehensive health service through excellence and innovation in patient care, education, research, and technology."[14]
Customers	Patients (two million patient contacts annually)
Reach	Regional (within NZ)
Organization size	8,500 employees $600 million budget for the year 2000/2001

[14] Source: Health Board Annual Report (1999-2000).

In 1999, the NZ government initiated a change program in the health sector. As part of the program, 21 District Health Boards (DHBs) were introduced throughout NZ to bring a local focus to governmental funding. Each DHB is responsible for improving, promoting, and protecting the health of the populations it serves. For their catchment area, DHBs are delegated the responsibility, previously assigned to the health funding authority, for making decisions on the mix, the level, and the quality of the health services that are publicly funded. They are also responsible for entering into agreements with providers for health service delivery.

DHB decisions are made on the basis of local needs, within national guidelines. Funding is based on the size and characteristics of the population of the district each DHB serves, however a few nationally funded services still exist.

As part of the 1999 reforms, DHBs are required to ensure that the community has a voice in money spending decisions. Therefore, one requirement of the NZ Public Health and Disability Act 2000 is for DHBs to consult the community about their strategic plan. The legislation gives everyone a government-backed right to be kept fully informed about the board's actions and achievements.

The 'strategic plan' is one of two key planning documents for the Health Board; the other is the 'annual plan.' The strategic plan is a five-to-ten-year document developed in consultation with the community and endorsed by the Minister of Health. It describes local goals and objectives that need to be consistent with the government's health strategies. The strategic plan is updated on a regular basis, setting new directions for the future as both new information becomes available and as environmental changes occur. The plan not only considers the provision of health services but also the broader scope of population health.

The annual plan is a negotiated document between the Health Board and the Minister of Health that is supported by a statement of intent and a funding agreement. It sets out the operational plan for the Health Board, taking into account its special responsibilities as a regional and national referral center. The statement of intent is scrutinized each year by the minister to check the Health Board's performance in relation to health targets and to compare its progress to other DHBs.

The Health Board is one of three DHBs in this region that share a vision to promote close cooperation for the provision of health services. The Board is made up of eleven members: seven elected, and four appointed. All Board members report directly to the Minister of Health.

This section provided a background to the organization. The next section describes the context of ES implementation at the Health Board.

5.3 ES project background

During the early implementation phase of the national health reforms, ConsultCo, a big-five consultancy firm was engaged to assess the strengths and weaknesses of the supply chain management function at the Health Board, with a view to provide recommendations for the improvement of that function. The product of that engagement was a supply chain optimization (SCO) review report. The SCO review identified problems in business operations and suggested a combination of an organizational restructure, BPR, and systems implementation to accomplish the change program.

The core financial modules of Oracle 10.7 ES had been implemented in 1997 and were operational at the time the SCO review was conducted. That implementation however, was heavily customized and could not provide for realizing the new strategic vision that aimed to "standardize, consolidate, and integrate services ... and control finances."[15]

In addition to the recommendation of the review above, the Health Board was informed in early 1999 that its existing ES application, Oracle 10.7 financials, was going to be de-supported by Oracle by the end of 2000, leading to the realization that a major system upgrade was urgently needed. As a result, and in partnership with ConsultCo, a system's business case was developed with a view of rectifying these problems. The business case included eight key objectives that were linked to the Health Board's strategic plan. These are summarized in Table 5-2.

[15] The Strategic Plan for the Health Board 2002-2007 (March 2002).

Table 5-2: ES project objectives

ES project objectives
The ERP business case was developed to support the achievement of eight key objectives that were identified by senior management and that primarily relate to the support of the supply chain. They also reflect the wider objectives of the Health Board that included the changes in culture required to both implement the new strategic plan and develop collaboration with other health service providers - Objective 1: To enable achievement of the savings identified in the Health Board strategic business plan - Objective 2: To have the ability to account for savings realized through an appropriate standard costing mechanism within inventory - Objective 3: To have reporting systems that enable management by exception and the control of rogue expenditure - Objective 4: To implement procurement through a standard requisition process with a catalogue environment - Objective 5: To implement processes to satisfy the company requirement for delegation of authority and risk management of the procurement process - Objective 6: To have a platform in place which: ▪ Positions the Health Board to enter into external shared services with other local health care providers ▪ Facilitates internal interconnectivity, which allows for the consolidation of accounts payable, inventory management, internal logistics, and enables external supply chain connectivity. - Objective 7: To implement the 'Health Board Way' throughout the supply chain process, with a particular focus on standardization of processes, integration of systems, and consolidation of service - Objective 8: To act as a catalyst for the change in business processes and work practices.

Note. Adapted from the Health Board ERP System Business Case (June 2000, p. 25)

Despite the problems the SCO review had identified with the Oracle 10.7 system, there was an agreement that the new implementation would still be an Oracle ES. The Health Board would have had to write-off the huge investment in the Oracle 10.7 system if it chose to change to a different vendor. Therefore, the business case for the new system was written with a focus on an Oracle upgrade and implementation that was financially justifiable.

Organizational restructuring started by the end of 1999 and saw new job descriptions written to fulfill the new organizational design. New jobs were advertised. All new roles had a focus on system implementation experience in preparation for a re-implementation of ES applications to support the change program. Table 5-3 presents a chronology of the ES implementation background at the Health Board.

Table 5-3: Chronology of ES implementation background

Date	Event(s)
1997	- Implementation of the core financial modules of Oracle 10.7 enterprise system at the Health Board. Implementation was heavily customized.
Early 1999	- The NZ Government initiated the health reforms program, with a new strategic vision that aimed to "standardize, consolidate, and integrate services ... and control finances."
	- The Health Board was informed that the Oracle 10.7 enterprise applications were to be de-supported by Oracle by the end of 2000. As a result, a major system upgrade was needed to address the loss of future support.
Mid-1999	- The newly appointed CFO recruited a Redesign Manager to project manage and review both the supply chain and the finance functions in partnership with ConsultCo, a big-five consultancy firm. The output of that partnership was the supply chain optimization (SCO) review.
End of 1999	- A new system's business case was initiated to resolve the majority of the SCO review recommendations with the consideration of a major system upgrade. The CFO became the ES project sponsor.
	- The organizational restructure process started. New organizational roles were established and new positions advertised with the recruitment process finalized by March 2000.

The recruitment process continued to fill new positions. Existing staff were invited to apply for the new jobs. Those people who were not suitable for the new roles were assisted through a redundancy process. Job advertisements started November 1999 but it was not until March 2000 that most of these positions were filled. By then, all newly appointed employees had started Oracle 10.7 training. Although there was a clear understanding that the existing Oracle 10.7 implementation was inadequate, the main purpose of the training was for these people to get a feeling both of how the software works and how it can be configured to deliver business needs.

The final business case the board approved in July 2000 compared two upgrade alternatives. These involved an upgrade from Oracle 10.7 to either Oracle 11 or Oracle 11i ES applications. While Oracle 11 was in operation since 1999, Oracle 11i was a new release that was to be launched in NZ in June 2000. The Health Board chose the upgrade to the Web-enabled Oracle 11i applications to avoid the need to undergo further upgrades a short time later. A profile of the ES implementation project is included in Table 5-4.

Table 5-4: ES project summary

Categories	ES project profile: Health Board
ES product name & version	Oracle 11i
ES core modules	Financials (upgrade), fixed assets, and procurement (new implementation)
Number of users	8,500 users including 120 power users
Cost of implementation in dollars	Approximately NZ$2.3 million that included NZ$1.7 million for hardware, software, consultancy, and internal costs; plus NZ$650,000 for operational costs, including backfill and change management.
Number of locations	One instance implementation on multiple sites (seven business units on two geographically distributed sites).
Implementation management/consultancy	3rd party implementer: ConsultCo, a big-five consultancy firm.
Go-live	December 2000 was the go-live for Oracle 11i financials and procurement. Go-live for fixed assets was delayed until January 2001.
System upgrade	August 2001was the go-live for the ES upgrade to Oracle 11.5.3. The upgrade was not planned in advance, thus it was addressed through a change of scope and adjusted funding.
Post-implementation or Phase II plan	Implementation for the two core modules of human resources and payroll were planned to start by mid-2001. However, this was not possible due to both the need to stabilize existing implementation and the lack of funding. The Phase II implementation is expected to take place sometime in 2004.

The new implementation was divided into two phases. Phase I included a major upgrade to the financials core modules and new implementations for both fixed assets and self-service procurement. Phase II included the core modules of human resources and payroll. Although the system's business case included an implement-all alternative plan during 2000-2001, it was understood that this option was both too risky and too expensive to be approved by the board. Table 5-5 illustrates the chronology of ES implementations at the Health Board.

Table 5-5: Chronology of main ES implementation events

Date		Event
January-March 2000	-	New positions, which included people who later took active roles in ES implementation, were filled.
March-May 2000	-	All new recruits received training on the Oracle 10.7 applications.
	-	A request for proposals for implementation consultancy services was issued. Bids were received and evaluated with the winning bid going to ConsultCo.
June 2000	-	The new version of the Internet-enabled Oracle 11i application was released.
July 2000	-	The system's business case was submitted to the board and approved.
August 2000	-	ES implementation project started. The phase I implementation included core financials, fixed assets, and procurement modules.
December 2000	-	ES implementation goes live. Implementation was completed as planned and on budget for all modules except fixed assets. Change-over time stretched from one to three weeks.
January 2001	-	Fixed assets implementation was completed. The delay was due to both data quality problems and decreased system performance during the December go-live.
May-August 2001	-	An ES upgrade to Oracle 11.5.3 was initiated to overcome the many problems with the quality of Oracle 11i applications. The upgrade was not planned in advance, thus it was addressed through a change of scope and adjusted funding.
September 2001	-	The post-implementation review report was released. It confirmed the achievement of all of Phase I implementation objectives.
February-December 2002	-	Data collection for this case study started. All interviews were completed by the end of December 2002.
May 2003	-	Data verification with the key contact at the Health Board.
2004	-	Phase-II implementation (of both HR and payroll) that was initially planned during 2001-2002 was postponed. Phase II implementation is expected during 2004.

5.4 ES implementation and the SDM process

ES implementation at the Health Board is a large-size implementation with a medium-size budget. The SCO review had identified purchasing as a key operational task that had suffered in a devolved purchasing environment. One main recommendation of this review was to consolidate disparate organizational information systems as a major step towards SCO. Using the directions laid out in the SCO review report and strong leadership from the CFO, who was also the ES project business sponsor, the vision for the new system took shape.

The ES implementation process at the Health Board can be divided into four phases: preparation, design, implementation, and realization. The focus of the preparation phase was on developing a vision for the new system and starting the process for putting together core implementation teams. During the design phase, technology and configuration issues took center stage. Implementation teams were further defined through processes of organizational recruitment, training, and implementation partnership. The implementation phase focused on configuring the new ES using its design blueprint. The realization phase, which started when the system went live, focused on operationally stabilizing the new system to support organizational change.

During the realization phase, two upgrades were implemented and a post-implementation review concluded that the new system objectives had been realized. However, it was only three years after go-live that benefits of implementing the system became visible across the different functions of the organization to trigger a start to phase II.

The Health Board case data show that all 15 decisions were considered during the two early phases of preparation and design. However, several of these decisions were reconsidered again. These decisions included: the IT infrastructure (D07), go-live (D11), personnel training (D13), reporting needs (D14), and maintenance (D15) decisions. Furthermore, cost was the driving force behind many of these decisions.

Figure 5-1 plots each one of the 15 ES decisions across four implementation phases and captures the sequence of ES decisions across time. Figure 5-1 also shows the decisions

that had been reconsidered more than once. A brief description of the implementation process during each phase is provided next.

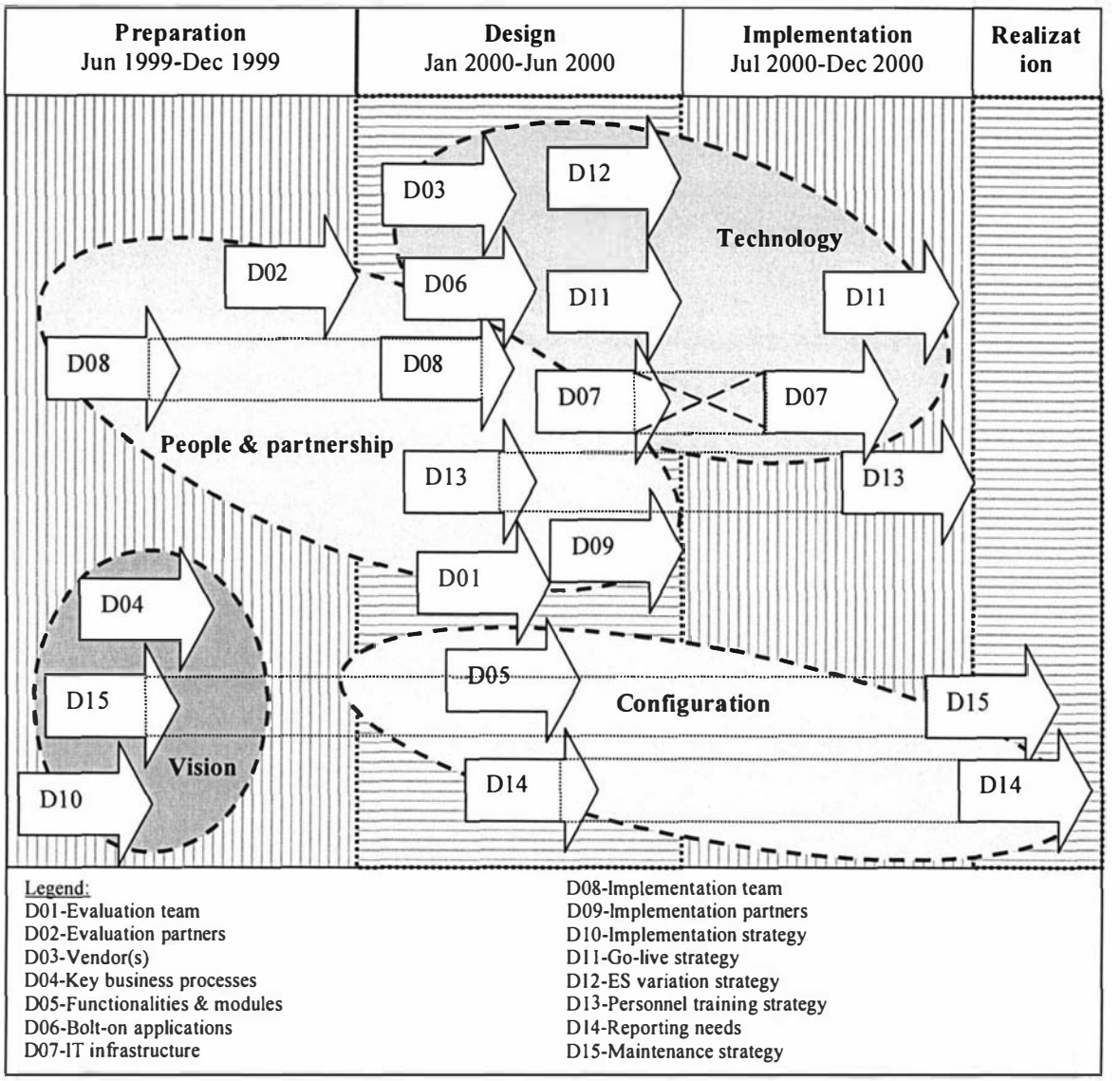

Figure 5-1: Strategic ES decisions across four implementation phases

The preparation phase

The preparation phase took six months—from mid-1999 until the end of 1999—during which 5 of the 15 ES decisions were addressed. The focus of those decisions was on both setting the vision for the new implementation and the formation of the core implementation team.

Earlier or vision focus decisions included: key business processes (D04), implementation strategy (D10), and maintenance strategy (D15).

The SCO review identified the end-to-end supply chain as a key objective to implementing the new system. Using these recommendations, and with a view to enable easy implementation of future system upgrades, the Health Board aimed for a minimally-customized or 'vanilla' implementation that was driven by a BPR initiative.

Adherence to the implementation strategy continued through the length of the ES project. With no compromises made on the standardization features of the new system, all suggestions to maintain legacy applications were rejected. From the beginning, senior management made it clear that every bit of information had to go through the new system. The Redesign Manager described the Health Board ES implementation approach as follow:

> We used the supply chain optimization review to identify what bad habits are. The only way we were going to get rid of those bad habits was to put some quality people in place, go through an upgrade, discipline the processes with minimal configuration, and say 'that's the system and that's how you would use it. I'm sorry if that makes you unhappy, but no more argument.'

People and partnership decisions during the preparation phase included those of the evaluation partner (D02) and implementation teams (D08).

Implementation team decisions (D08) were concerted as part of the organizational change program. New staff were recruited with a vision to participate in the new implementation. Both supply chain and system implementation experience were key to most of these appointments. Two key appointments during the preparation phase were the appointments of the Redesign Manager and Group Accounting Manager. The Redesign Manager later became the ES Project Director. The Group Accounting Manager managed the implementation of the core financials modules.

As an extension of ConsultCo's previous involvement in the SCO review, the consultancy firm was appointed as the evaluation partner (D02) to help the Health Board in the writing of the system's business case.

The design phase

The design phase lasted approximately six months—from January 2000 until June 2000—during which 10 of the 15 ES decisions were addressed. The focus of these

decisions was three-fold: choice of technology, system configuration, and people and partnership.

Technology focus decisions included choices of the vendor (D03), IT infrastructure (D07), bolt-on applications (D06), go-live strategy (D11), and ES variation strategy (D12). Configuration decisions were these of software functionalities (D05) and reporting needs (D14). The evaluation team (D01), evaluation partner (D02), and personnel training (D13) were these decisions that focused on the building and supporting of the multi-layer implementation team for the ES project. The recruitment process for the implementation team member (D08) continued until most roles were filled by March 2000.

As part of the preparation for the system's business case, the choice of the ES vendor (D03) was considered. The Health Board already had an older implementation of the financial modules of Oracle 10.7 enterprise applications. However, that version was highly customized to the individual environments of the Health Board business units and was going to be de-supported by Oracle at the end of 2000. Therefore, a new implementation was considered both necessary and critical.

Because that implementation was not the first implementation at the Health Board, no formal evaluation was needed. In partnership with ConsultCo, the Health Board compared different vendors' alternatives and came to the conclusion that the cost of change to a non-Oracle ES was prohibitive. However, the Health Board team used the investigation process of alternative vendors as a negotiation strategy towards an affordable solution for a package that included upgrading, financials and a new implementation of fixed assets and supply chain purchasing. Oracle confirmed having offered the Health Board a good deal, yet the Oracle Accounts Manager noted that it was an easy sale for Oracle at that time.

Guided by a clear vision to a 'vanilla' implementation that needed to be achievable within the allocated time and budget, the Health Board did not consider any bolt-on applications (D06) other than a reporting tool.

The focus of the IT infrastructure decision (D07) was the choice of the operating system platform. Two alternatives were considered, the thick client alternative of Windows NT and the thin client alternative using Unix. It was agreed that the thin client alternative

would be more stable under the not-so-well-tested environment of Oracle 11i. However, there was a big price difference that favored Windows NT. Although the ES vendor had recommended a thin client implementation, specifications for Oracle 11i had clearly indicated that the two options were viable.

Guided by a favorable price and an alignment with the organizational IT strategy for standardization, the Windows NT platform was chosen. However, having done a thorough evaluation before making that decision, the Health Board team was prompted to include a special condition in their contract with the hardware and operating system vendor. That condition gave the Health Board the power to terminate the contract if the system's performance proved inadequate.

These fears materialized during implementation and resulted in the cancellation of these contracts. Health Board informants agreed that this was the only major change during implementation. The implications of not resolving the IT infrastructure decision in a timely manner would have resulted in a failed implementation. Because the decision was highly critical, it was the only decision that needed to go to the Board for approval.

All informants agreed that the Health Board had no alternative in considering both the go-live (D11) and ES variation (D12) decisions. Because business operations are similar across divisions, they do not warrant considerations for different types of implementations. Also, business operations are tightly coupled to suggest an incremental implementation during go-live as parallel implementation would be too expensive. However, critical system performance problems during the go-live had resulted in a minor change to the initial plan.

The go-live date for the fixed assets module was delayed three weeks to overcome the low system performance caused by the heavy data entry. Also, the implementation across the multiple locations of the Health Board was staggered through a delay in sending users their login passwords.

The implementation partner decision (D09) followed a formal tender process that involved a formal invitation-to-tender to several IT consultancy firms. Responses went through a structured two-stage evaluation process, with prices only considered during the later stage. The two key critical criteria that made the final choice were previous working experience with the Health Board, and the depth and wealth of ES

implementation experience. As a result, ConsultCo, the big-five management consultancy firm, who had earlier reviewed business operations and helped develop the new system's business case, won the tender.

Choosing the software functionalities of the new system (D05) was a collaborative effort between the Health Board team and ConsultCo. Extensive preparation for the Health Board staff took place to enable active participation in the decision-making process (D13). New Health Board employees underwent the Oracle 10.7 training that started in March 2000. Although there was an agreement that that version of the software was going to be obsolete by year-end, the focus of training was to understand how both business and software functioned and the effect of changes in one on the other.

Reporting needs (D14) for the Health Board were guided by the 'vanilla' implementation strategy. All reports were first consolidated and prioritized within each function, and were second consolidated by core module champions.

The implementation phase

Choosing a course of action for each of the 15 decisions had been finalized prior to the start of implementation. However, several decisions were reconsidered during implementation. Those were the IT infrastructure (D07), go-live (D11), personnel training (D13), and reporting needs (D14) decisions. The need to revisit each of these decisions was in response to changing implementation conditions. Except for the IT infrastructure decision that involved a strategic change, all decisions addressed tactical changes in implementation. However, the overall aim for all changes was to achieve system implementation as planned, in time, and within-budget.

The IT infrastructure decision (D07) was described as the one decision that would have made implementation a failure had it not been addressed quickly and effectively. Other changes prior to implementation go-live included outsourcing user training (D13), validating ES reports (D14), and a staggered process for go-live (D11).

The realization phase

The justification for implementing the newly released version of Oracle 11i instead of Oracle 11 was to avoid creating a need for an upgrade soon after going live.

Nonetheless, such an upgrade was undertaken soon after. Critical problems of system performance were attributed to the newly released software. To overcome these problems, a decision was made to start a new system upgrade (D15) within three months of going live. The update took approximately six months to complete. As a result, the post-implementation review was delayed and could only be released post the go-live of new system update.

Another dimension to the maintenance strategy (D15) decision was phase II implementation, which was planned for 2000-2001. Problems with system go-live, the new system update plus the major financial deficit meant the Health Board suffered a delay to phase II implementation. Although business benefits materialized as planned, it took approximately three years for benefits to be noticed by the different functions of the organization, thus warranting the start of phase II. By June 2003, phase II was still being deliberated upon, with a new expected start time of 2004.

This section provided a brief description of the SDM process during the four phases: preparation, design, implementation, and realization. Figure 5-2 draws a simple PERT chart of the 15 decisions and shows decision dependencies. These dependencies help to construct the ES implementation story as a series of the 15 decision stories, the details of which are presented in section 5.6 .

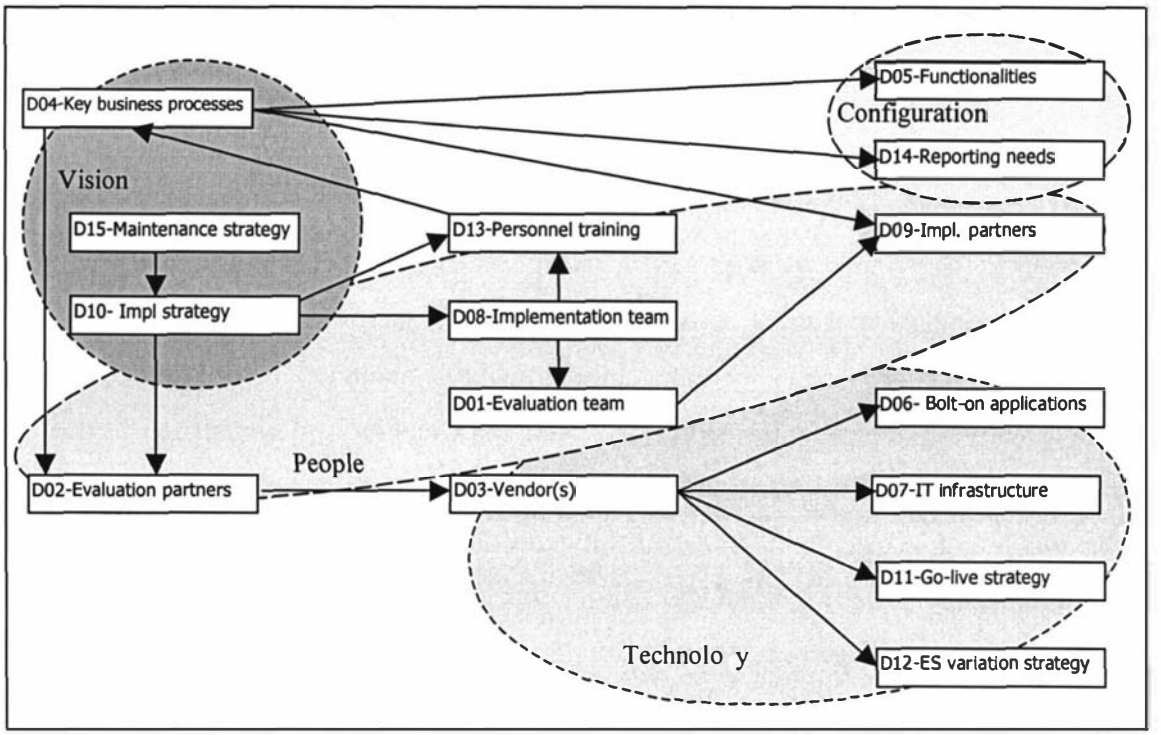

Figure 5-2: Dependencies between ES implementation decisions

Before presenting a detailed account of the decision process for each of the 15 strategic implementation decisions, the next section introduces the key informants in this case.

5.5 Key Informants

Empirical data from research interviews provided the basis for constructing the 15 strategic decision stories. A descriptive account of each decision mainly utilized informants' quotes to both construct and validate those stories. A brief introduction to the key informants in this case is therefore needed to provide the reader with a background to the important actors in this case. This section fulfills this need.

Using the criteria for informant selection discussed in the methodology chapter, four key informants were identified for this case. Table 5-6 lists informants' organizational job descriptions and their roles in the ES project.

Two other potential informants that could not be interviewed for this study included the IT General Manager and the ConsultCo lead consultant.

The IT General Manager was contacted several times but apologized because of heavy work commitments. She had left the Health Board to a different organization by the

time data collection started and was busy settling in her new job. She was contacted again to review the final draft of this case study for the purpose of validating the findings. She initially agreed to review a condensed version of the case. Unfortunately, she could not return her feedback within three months of when the report was sent to her.

The ConsultCo lead consultant or the external project manager for the Health Board implementation was based in Australia at the time implementation took place and was flown to NZ with the whole ConsultCo team. He left ConsultCo soon after the Health Board implementation went live. All efforts to get his contact details when data collection took place were unsuccessful. An earlier interview with one of ConsultCo's partners—who was also a Project Director for this ES project—covered issues particular to the ConsultCo approach in ES implementation which shed some light on ConsultCo's management of the Health Board implementation.

Table 5-6: Key informants

Job description	Role in ES implementation
CFO	The business sponsor of the ES project and the leader of the change program at the Health Board
Redesign Manager	The ES Project Director (or the internal project manager).
Group Accounting Manager	The internal project manager for the financials core module
Oracle Accounts Manager	The ES vendor representative on the project.

The CFO, Redesign Manager, Group Accounting Manager, and the Oracle Accounts Manager have been interviewed. A brief introduction to the background of each of those informants is provided next.

CFO

The CFO had a background of working in big organizations. He had previously managed the change program for a large SAP implementation in a supply chain production environment. Soon after joining the Health Board in 1998, he realized that there was no strategic framework for managing organizational business processes. As a result, he initiated an organizational supply chain review. The review was carried out by ConsultCo to identify supply chain problems and provide recommendations for defining a new strategic vision for the organization. The CFO later became both the organizational champion and the sponsor of the ES project. His backing was evident in

both setting up the support structure for ES implementation and in stepping in to solve problems along the way (refer to the IT infrastructure decision (D07)).

Group Accounting Manager

The Group Accounting Manager was employed with the intent that she would help operationalizing the recommendations of the SCO review. Having had a strong financial accounting background, she became involved in both the organizational restructuring of the accounting function and the later recruitment of accounting team leaders. As the internal project manager of the financial modules, she, as well as accounting new recruits went through a comprehensive Oracle training course during the preparation phase of the ES project. Throughout implementation, she maintained a leading role as the financial modules champion and also served as secretary on the ES steering committee. The Group Accounting Manager was also a member of the Oracle Application User Group.

Redesign Manager

The Redesign Manager was employed to lead the operationalization of the SCO review through both a reengineering exercise and the ES implementation. Appointed as the ES Project Director, he was the hub for coordinating the different stakeholders involved (refer to Figure 5-3, ES project structure). He had been delegated authority to approve implementation change requests up to a certain value. Above that, requests would be moved on to the steering committee for authorization.

Oracle Accounts Manager

The Oracle Accounts Manager had 20 years sales experience before working for Oracle. That experience included a variety of roles such as salesman, chief salesman, marketing, sales management, regional management, and CEO. As is the norm for sales operations, the emphasis during the sale process was always to present the 'positives' and 'the half-full glass not the half-empty.' Getting involved during the process of writing the system's business case, he was aware that Oracle had a strong cost advantage over rival vendors; hence the sale was not a difficult process. Having a strong belief that the customer always comes first, he worked avidly with the Health Board team to solve the

post-implementation problems associated with the new release of Oracle 11i (refer to the maintenance strategy [D15] decision).

5.6 Strategic ES implementation decisions

This section provides a detailed account of the decision process for each of the 15 strategic decisions in the implementation of the Oracle 11i ES application at the Health Board. Empirical data from research interviews provided the basis for constructing these decision stories. Other sources of information included observation, organization documents, and industry publications.

Decision stories will be presented in the sequence they were addressed in this case. The sequence across time and the dependencies between decisions were elicited in the analysis of case study data. Data displays that captured decision-making over four phases of implementation were revised several times through triangulating the evidence and validating displays with the key informants of this case (refer to Figure 5-1 and Figure 5-2).

5.6.1 Maintenance strategy (D15)

Informants' accounts in this case suggested different perspectives of the ES maintenance strategy. In his own words, the Redesign Manager described maintenance decisions as multi-dimensional in that "it's a combination of different things, there's maintenance for software, ... there's hardware, and so on."

The first perspective on the maintenance strategy refers to plans for the next implementation phase or what informants refer to as phase II. Phase I is the ES implementation studied retrospectively in this case.

The system's business case had evaluated two alternative phasing approaches prior to implementations start. The first was for the payroll and human resources modules to be packaged with the financials, procurement, and fixed assets modules during 2000-2001. The second alternative was to delay the implementation of payroll and the human resources to the following year 2001-2002.

The system's business case concluded that a two-phase implementation was preferred. The phasing decision was an organization-wide decision that was carefully considered,

taking into account the limits of capital expenditure allocations for the Health Board. Packaging the two phases into one was difficult, costly, and high-risk. The board agreed with this recommendation and authorized the start of phase I in July 2000. In the following, the Redesign Manager confirms that cost considerations were of great influence: "At the time when we wrote the business case, the business couldn't afford to deal with them all at once. There wasn't enough money. So, we split it into two phases."

Phase II implementation did not start as planned for two reasons. The first is the length of time needed to stabilize the ES to be fully operational. During the stabilization phase, an ES service pack upgrade was undertaken. The upgrade process took approximately eight months and ended with a post-implementation review in September 2001. Still, the new system needed further time to get bedded in the organization. The CFO explains that it took approximately three years after go-live that the Health Board staff started realizing the benefits of the new system and were ready to move on to phase II:

> It's only in the last 12 months that the organization now sees HRIS [human resources information system] as one of the highest needs...why? Because with the change in structure we put in place this time last year, executives now see that the quality of data in the organization around people needs improving, to manage our most important and largest asset—staff.

The second cause of delay in phase II was the financial deficit the Health Board had suffered during the 2000-2001 financial year. A huge building project and urgent patient needs took precedence over IT investment issues.

At the time of data collection, a revised system business case for phase II was to start late in 2002, with a prospective implementation start in 2003. At the time when this case report was validated, these deadlines stretched even further—for another year. In the following, the Redesign Manager explained the reasons behind the delays in phase II:

> The plan was always once you'd finished the upgrade in 2001, we would have started phase II. So, we were lined up to write a business case to go to the Board in June 2001, which we couldn't do because: (1) no more money, and (2) the quality of the software ... The quality of the software had pushed us into a work environment where we were so busy we had to get the upgrade completed. The combination of the two meant that we pushed out phase II. ...
>
> Now as we sit here today, the plan was to start phase II in July this year (2002). ... We've now been told that there's even less money so don't even bother. ... We are saying the consequences of us not doing phase II is we're losing sustainable savings. An organization of 8,500 employees and

> doesn't have an HR system, that's negligent. ...
>
> We're going through a whole process of refocusing again because we've got a new Board. [We're] refocusing the new Board on what the consequences are of not doing phase II and we'll go through a whole new marketing process again to get them to understand why. ... There are lots of committees we go through. So, we're in the process of having an IT strategic plan confirmed and that itself includes spending money on phase II.

A second perspective to the maintenance strategy refers to future system upgrades. Most informants confirmed that a 'vanilla' implementation strategy was key to achieving up-to-date, less costly, and easier future system upgrades as well as facilitating future collaboration with other district health boards. In the following, the Redesign Manager expressed the Health Board's commitment to the 'vanilla' approach:

> In support of a decent maintenance strategy, we said that one way you can minimize costs would be to move through upgrades if your software is unmodified. ... We strategically again said, we are not in the business of developing software. When we implement Oracle, we were implementing with minimum modifications and we will configure it as such that it's in a multi-organization environment because one day there might be a need to bring on more organizations. ...Our upgrade strategy is that when we're ready, we will move to the next level, but we purposely didn't modify software because strategically, we will always align ourselves with the latest versions.

Surprisingly and shortly after the Oracle 11i go-live, the Health Board had to go through an upgrade process to solve some of the problems associated with the newly released software. Despite a strict allegiance to the 'vanilla' approach, the upgrade process was not easy. The Health Board was not content with Oracle's marketing strategy of pushing the product into the market when it was not bug free. The many similar examples discussed in the online forum of the Oracle Applications User Group (OAUG) at the time supported their claim (Anonymous, 2000; Songini, 2000). No financial compensation for contemplating the quick upgrade was offered to the Health Board. However, in an attempt to repair the relationship, discounts on future purchases were proposed.

Both the Group Accounting Manager and the Redesign Manager discussed how the upgrade decision was made (the decision to move to a higher release of the Oracle 11i software, via the application of maintenance and other patch sets):

> I guess we had probably never envisaged that we would have had to apply maintenance patches to move to a higher release version, but we had so many bugs that just simply weren't going away. And because we were on such an early release version of [Oracle] 11i, it was very buggy. ... A lot of fairly fundamental functionality things didn't work or were slow. ... We had ConsultCo help us ... 'do we patch up?' ... or 'do we look at upgrading to [Oracle] 11.5.3?' which was a bigger option? We all sat down and had a think at the time. It was believed that going to [Oracle] 11.5.3 ... was much more stable. ... However when we upgraded it ... we found that there were a lot of problems with it and took us about 2-3 months to actually settle down enough to say we're prepared to go-live on this. It took a lot more time than we thought to do it. Fundamental things that were working before didn't work. (Group Accounting Manager)

> After we went live we had about six months worth of patching. We had to stabilize things and eventually we got to the point when we said 'no we're not happy with that.' To resolve all the bugs, we had the recommendation that we do another mini upgrade to Oracle 11.5.3 and that was started in May 2001 and finished in August. (Redesign Manager)

5.6.2 Implementation strategy (D10)

The two key objectives of the change program were standardization and cost cutting. Existing systems could not support the achievement of these goals, mainly because the earlier Oracle 10.7 implementation was highly customized. As a result, the target for the new system was clear: a 'vanilla' implementation with minimum customization.

The advancement in enterprise software had reached a stage of maturity to support a 'vanilla' implementation that is both standard and rich. Comments by the Oracle Accounts Manager suggested that:

> Most of the applications from the big providers of ERP type software are rich enough so that in most cases, you should be able to adapt your business around the software. Usually, you don't have to change your processes too much. In the old days, the software wasn't very rich and you just couldn't run your business on it. Therefore, we had to customize it [the software].

The new ES was an important tool to enable business transformation; therefore, the implementation strategy had a clear BPR focus. Davenport (2000) calls this type of strategy the 'quick advantage' when implementation takes a considerably a short period of time—approximately 6-8 months in this case. In the following, the Group Accounting Manager discussed this relationship between ES implementation and business change program:

> We decided how we wanted the business process prior to implementing it. However, we implemented most of the business processes after because we had to have the system in place to do it. So, we couldn't actually alter most of our business processes before and then we had to go-live with both the new system and new business processes.

All circumstances suggest that the Health Board was locked into a 'vanilla' approach. The go-live date had coincided with a change in the chart of accounts for the newly structured organization and the new ES was essential to support this transition. The Health Board was working with both a tight budget and a short time-to-implement. Plus, management needed to proof that ES implementation was achievable within these tight constraints. The CFO explained:

> We were very keen to meet our obligations to the Board that we were going to go-live on a certain date. This organization has a record of not delivering what it says it's going to deliver, either on time or on budget. I was quite keen that we did just that.

Meeting implementation deadlines in a short-time span meant that organizational change materialized at a very high pace, which was uncomfortable to some. This effect could not be avoided knowing the circumstances—a BPR focus and a tight timeframe. The Redesign Manager recalled the problem with organizational change in the following.

> We used the supply chain optimization review to identify what bad habits are. The only way we were going to get rid of those bad habits was to put some quality people in place, go through an upgrade, discipline the processes with minimal configuration, and say 'that's the system and that's how you would use it. I'm sorry if that makes you unhappy, but no more argument.'

5.6.3 Vendor (D03)

As part of the preparation for the system's business case, the choice of the ES vendor was considered. The Health Board already had an older implementation of the financial modules of Oracle 10.7 enterprise applications. However, that version was highly customized to the individual environments of the Health Board business units, plus it was going to be de-supported by Oracle at the end of 2000. A new implementation was therefore considered both necessary and critical. And because the ES implementation considered was not a first implementation at the Health Board, no formal evaluation was needed.

By definition, the new implementation can be considered a phase II implementation. However, this implementation does not form an extension to the previous implementation and stands on its own as an example that provides interesting insights into the decision process of ES implementation. This implementation was initiated by a strategic BPR initiative, was managed by new leadership, and was accompanied by an organizational restructure.

Two main alternatives were initially considered. The first was to re-implement using a newer version of Oracle applications and the second was to implement a different vendor's product. Both the Redesign Manager and the ConsultCo team worked closely to compare several vendors' prices and came to the conclusion that shifting to a different vendor was not an option for the Health Board. The cost of change was prohibitive. In the following, both the Group Accounting Manager and the CFO commented on the software selection process:

> An Oracle implementation was going to be cheaper than putting in a brand new system, which people had no knowledge of whatsoever. ... We did...a rough evaluation just to say 'well okay, we do believe Oracle's the best way, but what would it cost if we put it in one of the other big ERP ones?' Just really rough ballpark stuff. We had ConsultCo help us get that information. (Group Accounting Manager)

> We had Oracle, and we knew a change from Oracle could be considered. We issued an RFI to alternative providers and asked for indicative numbers. But numbers were so quite different. We took the call. The cost to change was too prohibitive. ... So our decision was to remain with Oracle but to upgrade to the latest version of their software. (CFO)

With knowledge of the Oracle pricing structure and alternative vendors' offerings in the marketplace, the Health Board was in a better position to negotiate a package that included upgrading financials and a new implementation of both supply chain purchasing and fixed assets. Oracle also realized that they could close the deal to their favor if they could convince the Health Board that shifting to a different vendor would incur a major increase in cost. The negotiation process between the Health Board and Oracle ended in obtaining a good deal for both parties. The contract with Oracle was finalized before the new system's business case went to the board for authorization. In the following, the Oracle Accounts Manager confirmed that the sale process went very smoothly.

> I honestly believe that I never really made a sale in there. I honestly believe they [the Health Board] came to a decision, which was compelling. I never saw it as a big victory in terms of selling.

The decision to stay with Oracle was also in alignment with the strategic direction for the Health Board to achieve a standard platform for all regional district boards (DHBs). One DHB in the same region had made their choice for an Oracle ES by that time. The other DHB committed to an Oracle ES at a later stage. The Group Accounting Manager emphasized this strategic consideration in final system choice:

> Return to the business is an important one, strategy and alignment with other hospitals is also a big consideration. ... There was also clearly a trend from other DHBs ... particularly the Health Board-B. They had gone Oracle anyway, so there were really no drivers to go for any other software.

5.6.4 Evaluation partner (D02)

ConsultCo, the consulting firm who worked with the Health Board on the SCO review was appointed to help with the writing the new ES business case. This appointment did not involve the same formalities of the SCO review and implementation partnerships bids. ConsultCo's earlier involvement in the SCO review made them a favorable candidate. They had developed a lot of in-depth knowledge about the business and could therefore use that to their advantage to become the evaluation partner.

The Redesign Manager explained that ConsultCo's involvement as evaluation partners was mainly because of both, their understanding of business operations and their professional capability to use that understanding to develop the requirements for the new system.

> The focus in writing the business case ... was that we needed to go and do some more work back in the business and understand some of the processes which were not only supply chain. ... We went to the market again—to a similar bunch of external partners—saying we want people to come and help us with the business case. ... ConsultCo won because the pitch they gave us suited what we needed. When ConsultCo completed their work [SCO review], they knew at that point where all the gaps were from a supply chain point of view, but they didn't necessarily know where the gaps were in terms of our software, that wasn't part of the exercise

5.6.5 Bolt-on applications (D06)

The previous 1998 implementation of Oracle financials was heavily modified. As a result, many databases existed. One key strategic decision (D10) for this ES implementation project at the Health Board was to cut modifications to a minimum and keep implementation as 'vanilla' as possible.

Guided by this vision of a 'vanilla' implementation that needed to be achievable within the allocated time and budget, the Health Board did not consider any bolt-on applications (D06) other than the reporting tool. Because bolt-on applications would add to both the cost and the complexity of the project, they were discarded. The Redesign Manager and the Group Accounting Manager discussed the deliberations underlying this decision in the following:

> Bolt-on applications were one of the problems we'd had in the past. We'd had too many databases all around. ... The implementation strategy for ERP was: Get rid of all the databases and put all the processes into our ERP system. Those which weren't quite the same as how Oracle functioned, we'd change those processes and then set up the new way to do things. So bolt-on applications was a 'no no.' (Redesign Manager)

> From the ConsultCo review [SCO review] and from the strategy, which was deemed to be 'vanilla,' as much as possible, it is better in the future for upgrading as we'd had a very modified system in the past. ... It was a key decision that we'd have to have a really good reason to keep any modifications ... keeping things as simple as possible, as cost effective as possible...The strategy was that Oracle would be the core financial module; everything basically would have to run from that. ... If there was an absolute desperate business reason to have something outside, then it had to interface in at a certain point but not overlap any of the functions of Oracle. (Group Accounting Manager)

The guideline to the new implementation was to move all databases into the ES. On a few occasions, that was not possible because the ES lacked the functionality. Two options were perused: to discard the standalone application or to interface it with Oracle. The focus was that no duplication would be allowed. In the following, the Group Accounting Manager discussed how these choices were made:

> That's not to say that there weren't the odd things that we had to look at. Basically it was about looking at all the databases and spreadsheets and everything that people kept outside the system, and whether we could integrate them or not. If not, was it really important to do it? If so ... just leave what they were doing anyway or interface it in some way. ... One application that could not

be integrated with the new ES was the maintenance database of the clinical engineering department. A choice was made to interface the database with information from the Oracle system. However, this solution does not present a bolt-on application example because the data is exported to the system on a monthly basis [a batch update process].

The only bolt-on application implemented, although not fully considered a bolt-on application because it is an Oracle product, was the Discoverer reporting application. Reporting applications are the simplest examples of bolt-on applications. Discoverer was also part of the early implementation of Oracle 10.7. Discoverer's main function is to pull data out of the ES system in professionally presented reports.

5.6.6 IT infrastructure (D07)

This operating system (OS) and hardware platform decision was thoroughly considered by the Health Board and was made in alignment with its strategic IT policy. Nevertheless, a major change took place a few weeks prior to ES go-live. Not resolving IT infrastructure implications in a timely manner would have resulted in a failed implementation. Because the decision was highly critical, it was the only decision that needed to go to the board for approval during implementation.

One of the main issues that affected the choice of both the OS and the hardware platform was the relationship between the release version of the ES application and the hardware platform. The Health Board had chosen to implement the new release of Oracle 11i; yet, experience in implementing different combinations of OS and hardware platforms with the new release was still immature. In the following, the Redesign Manager explained the implication this decision had on ES implementation:

> For us, one of the biggest things in this particular implementation was the relationship of the application to an operating system. That triggered a whole lot of things for us. What we did on the project might have been different to some other ERP applications because this issue looked like it was going to have an impact on us being able to deliver the whole project on time. ...
>
> That was a major change and that would have been our biggest change. ... It had a major impact on the project. So ... [it] went up through to the steering committee, even to the Board saying this is a change. ... Even though we had used all the expertise from Oracle, all the expertise from the IT Vendor in this case, plus ConsultCo's collective expertise, so-called around the world, the decision ended up in hindsight not the right one. But at least we made a decision.

Theoretically, two main alternative platforms were suggested by Oracle as being equally valid. These were the thick client alternative of Windows NT on IBM hardware and the thin client alternative of Unix on Solaris hardware. In the preparation for a formal RFP, the Health Board had thoroughly explored the two alternatives in consultation with its internal and external stakeholders. Because no experience of implementing Oracle 11i on the NT platform in an organization as large as the Health Board existed, it was understood that the thin client would be a more stable alternative. However, a big price difference still favored Windows NT.

Guided by a favorable price and in alignment with the organizational IT strategy for standardization, the Windows NT platform was chosen. As a precaution, having done a thorough evaluation, the Health Board drafted a special warranty clause in its contract with its OS and hardware vendor. The clause enabled the Health Board to terminate the contract if performance proofed inadequate.

The implementation later proved that these precautions were valid. Pilot testing showed that the performance of ES applications on users PCs was unacceptable. The hardware vendor was notified to address the problem within the short time specified in contract documents. When the vendor faltered, an exit clause of the contract was exercised and a move to a Unix platform was soon actioned. In the following, the Redesign Manager answers the two questions of how the initial decision was made and why change was inevitable:

Q-How the initial decision was made and how it was reviewed later?

> We gave the opportunity to a number of hardware suppliers based on our statistics [that] we'd collected through the business case exercise. ... ConsultCo were helping us write the business case. Also was Oracle. ... We had already collected all of that information informally so we already had a view on what was possible and what wasn't.
>
> By the time it got to formally go out for RFP for the hardware, we knew what we wanted and how we would evaluate it. ... We wanted to make sure we had the right guarantees. So contract negotiations with those hardware vendors was very much written into warranty—strong focus on warranty provisions. ... We again ended choosing objectively a hardware solution, which was based on the NT platform. ...
>
> Then it was up to the hardware vendor to guarantee that the Oracle software would work on their hardware. That was a large part of the negotiations because we knew we were going into a risky

> environment and that was the only way that we could seal it because we didn't have a relationships with a prime vendor... We had to make very sure each one of the individual contracts we signed had good warranty clauses in them...
>
> I suppose we were able to recover from it because of various risk mitigation strategies we had in place ... after waiting for the IT Vendor to exercise an alternative, which ... they couldn't exercise it in time, we said goodbye to the IT Vendor and ended up with SUN supplied by ConsultCo.

Q-Why did the Health Board choose Windows NT and why change was unavoidable?

> Part of our strategy was preferably to go down an NT operating system route. That's why we went down the hardware route that we did because it was an NT operating system...[however], we had to make very sure each one of the individual contracts we signed had good warranty clauses in them. When we discovered [the problems with] 11i ... we moved back to a Unix environment, which in a way determined the hardware.

Although the initial IT infrastructure decision was made at the PM level where the Redesign Manager, IT, and ConsultCo were key decision-makers, the CFO, as he explained below, had to step in when performance deteriorated and make the hard call for change in order to rescue the project.

> I didn't get involved in those decisions at all [IT infrastructure]. That was driven out of the IS function working with the consultants. That's where we had major problems all around—around the hardware and the database. A decision had been taken to go down that path. As we got into the project, there were problems. This required a decision to be taken that we were going to stop there and then switch out of NT into the Unix environment. Some people didn't like that at all. There were risks around it, but there you go. ... The easier decision was we could have stopped the project rather than go live. That would have cost us dearly.

There are two different explanations to the software performance problem that caused a major change in implementing the IT architecture decision. The first is provided by the Health Board, which attributed performance problems to the newly released Oracle 11i. The second is provided by the vendor, which attributed the problem to a combination or unrealistic expectations, limited vendor's participation, and an immature implementation experience. A detailed explanation of these two views is provided next.

The Health Board based their conclusion that the Oracle 11i had not been thoroughly tested within an NT environment not only on their experience but also on the experience of many other users of Oracle 11i at the time. The hot discussion in the online forum of

the Oracle application user group (OAUG) had affirmed this explanation that Oracle 11i was still not ready to go to the market[16].

The ES vendor Oracle believed that the IT infrastructure problem was exaggerated for three reasons. First, neither the vendor nor any of its representatives were actively involved in the implementation. Therefore, critical issues didn't come to their attention until a problem became significant and needed immediate action.

Second, although the implications of implementing a new release had not been clearly explained by Oracle in advance, the Health Board should have had realistic expectations when they chose the new 11i release. One fact most computer professionals are aware of is that new software releases are never bug free until they are validated by users. Therefore, problems inherit in the new software release could have complicated the diagnosis of performance problems.

Third, the ConsultCo implementation team did not have prior experience in implementing the Oracle 11i applications on an NT platform and had refused several suggestions to add an Oracle person to complement their team. The Oracle Accounts Manager best summarizes those three issues in the following:

> IT were the people that were saying that you must use an NT system in the first place because 'that's our standard.' ... They were more worried about the fact that they were trying to have an NT Microsoft type strategy. ... We most assuredly suggested to them and recommended to them many times that they should go down a Unix path and they didn't listen to us there. ... We [Oracle] concluded that [ConsultCo] had little experience with NT—very little experience with NT and with Oracle. Even less, [they] certainly had no experience for putting 11i onto it. They had no experience in putting 11i into a SUN box, which is why I always felt uncomfortable that they weren't taking Oracle people [as sub contractors on to the project].

5.6.7 Go-live strategy (D11)

The chosen approach for the go-live strategy was the 'big-bang' or implement all modules at the same time. Running the old and the new system in parallel was not an option. The price was too high with a lack of resources to support it. The Group Accounting Manager, the Redesign Manager, and the CFO explained that all alternative go-live approaches were both infeasible and inappropriate:

[16] Announcements by the OAUG (Anonymous, 2000; Songini, 2000) and a report by Gartner Group (Anonymous, 2001) affirmed those problems with the new release of the Oracle software package, 11i.

> There really wasn't any other option. You literally switch off the old way, upgrade your data at that point, and then you go-live with your fresh data. We didn't have the resources to run accounts payable in parallel. It wasn't practical for our particular implementation plus we actually had a year-end compounded on it. (Group Accounting Manager)

> The focus was on supply chain. Inherently supply chain transactions affect accounting entries. We said that the majority of supply chain and financials—all one shot, one 'big-bang'. (Redesign Manager)

> This wasn't an option because we had conflicting with us the formation of a DHB. We had to do statutory accounts at the end of December that would close out accounts. ... So it was important that we had all the organization at the same point, otherwise data integrity would be a major issue. (CFO)

All systems had a three-week downtime period for data conversion and upgrade in preparation for go-live. The process took one more week than the two-week it was planned for, mainly because of performance problems. Specifically, the demand on the hardware was more than expected and new hardware was requested. In response, both the fixed assets and the Discoverer reporting application were phased a few weeks later. The phasing was needed to ensure that the two core modules of financials and procurement were in place and functioning in order to produce the end-of-year financial reports that were due in a month's time. In the following, the Group Accounting Manager recalled the go-live implementation experience citing the two problems of data migration and hardware performance:

> There was some phasing in fixed assets, because we couldn't convert all the data in the downtime period, which was basically taking the live system off line. ... They [fixed assets entries] were loading up the whole register [and it] was actually impacting on everybody else and their conversion processes. We actually couldn't go-live on that until a little bit later. ... We deferred Discoverer a little bit as well. ... Discoverer took a lot of memory and it was deemed let's leave this for a few weeks and just make sure that the purchasing system, all the critical ones [are in place]. If you can't purchase, it's really a major issue. ... We had a few hardware issues with the project and the specifications that the vendors gave us. Because 11i was new to the market, it was quite under specified.

The Redesign Manager further suggested that data migration was a common problem to many Oracle 11i implementations. He recalled:

> The actual migration of the data took a huge proportion of that time. So the migration process was a really lengthy process. That was one of the major stumbling blocks for a lot of users going from 10.7 to 11i.

On a micro level, however, the actual implementation go-live across the seven locations of the Health Board business units was staggered slightly. Theoretically, the system went live at one point in time but users' access to the system was staggered over a period of two days. The main purpose of this short delay was to ease the load, in terms of both system performance and helpdesk support. The delay was managed through emails that included the required access passwords and instructions for logging into the system. Email messages were sent in batches and the plan worked well with no major problems reported. The Group Accounting Manager describes the go-live rollout process to all users as follows:

> We staggered slightly the start times of the various modules, simply to check the load on the system. ... It was a very minor staggered start ... so that we could ... get ourselves a bit of a breather rather than have 60 people screaming at once if something went wrong

5.6.8 ES variation strategy (D12)

A Similar implementation across the seven business units of the Health Board was adopted. This approach was suitable because it satisfied the standardization goal of the change program. The CFO explained that "the general ledger is not structured with separate companies.... It's just one organization. So it's driven by the structure of the general ledger at the time."

5.6.9 Implementation team (D08)

Implementation team decisions (D08), which included the formation of the ES steering committee, ES PM team, and applications team were concerted as part of the organizational change program (refer to Figure 5-3: ES project structure). New staff were recruited with a vision to participate in the new implementation. Both supply chain and system implementation experience were key to most of these appointments. The CFO explained that the recruitment process was a concerted plan to "get the right people in place:"

> In going to the market place, we went trying to recruit people with supply chain knowledge and experience. ... So it was all part of the bigger plan, 'get the right people in place before you go to the next step.'

The decision process involving the formation of each of the three teams—ES steering committee, ES PM team, and applications team—is discussed next.

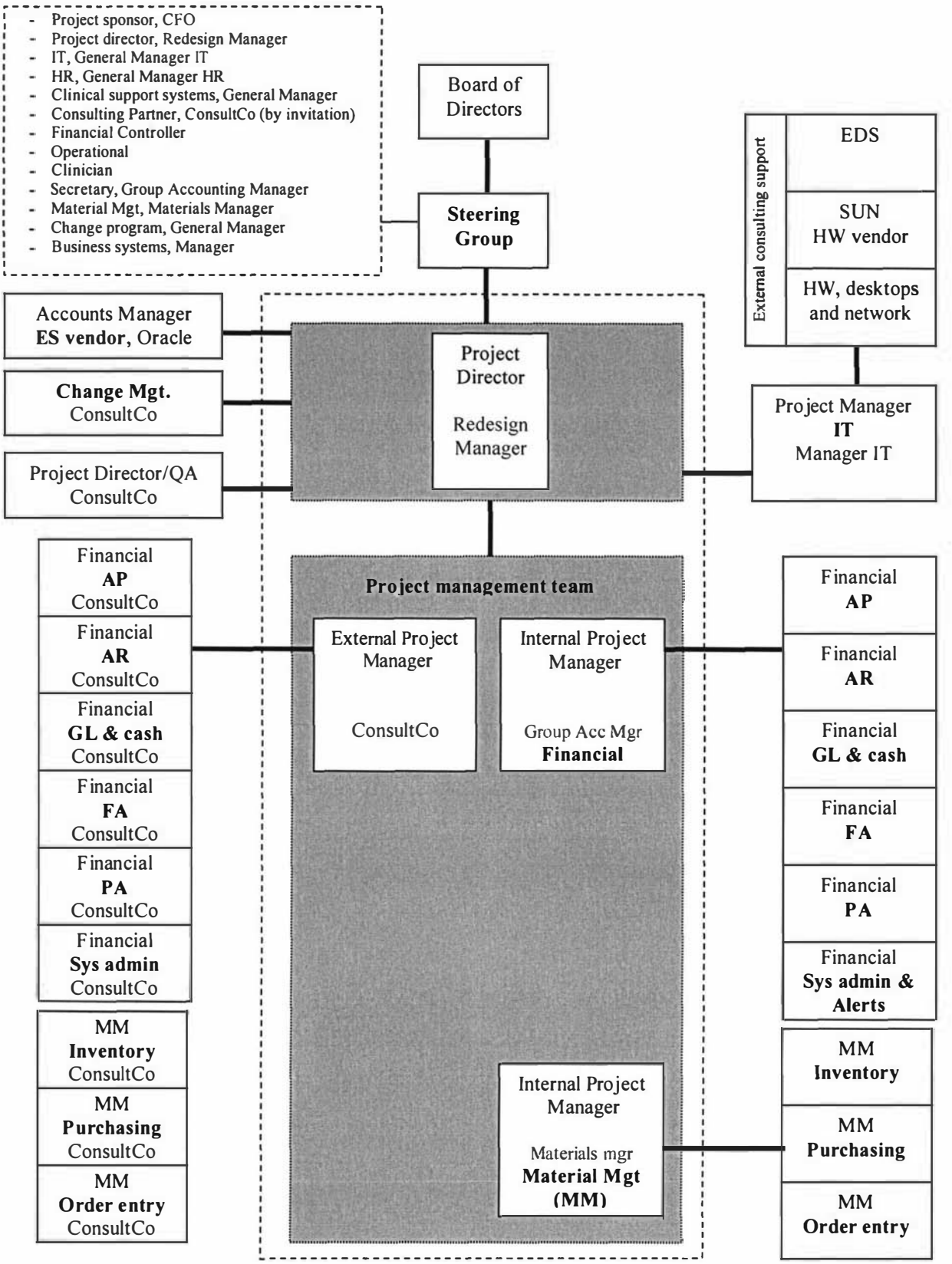

Figure 5-3: ES project structure

Steering committee

Both the Redesign Manager (also the ES Project Director) and the CFO (also the ES project sponsor) influenced the composition of the steering committee. Criteria for membership in the committee included a combination of both skills and authority. The committee needed to be representative of the organization to gain input on the critical issues facing the project. It also needed to include the people who had the authority to sign-off on these decisions. In the following, the Redesign Manager explained how and why committee members were selected:

> We had representation from the business, from IT, from senior Health Board people, from our implementation partner, and there were people put on the steering committee in understanding of their skills.... When you look at the objectives of the business case 'to act as catalysts for change' ... the steering committee were people who in regard to the organization would say 'I was on the steering committee, sign it off.' ... I was happy we weren't going just to have any Tom, Dick, and Harry on the steering committee. So we made sure the steering committee was properly representative of the organization. ... Sponsorship [was important] as well. Again, the sponsor was from within the finance area, being the one who was ultimately going to be the person who pushed through the savings through the organization saying that from a financial aspect 'these need to happen, we'll put the tools in place, and then we'll measure.' ... The sponsor in his own right was someone who had previous experience in systems implementation and a finance background, and also knew enough about the business. [He] was senior enough in the business to be able to stand up to the rest of the senior management team as a sponsor.

Project management team

Membership to the PM team was defined around mid-1999. Team members were carefully selected. Two key appointments during the preparation phase were the appointments of the Redesign Manager and Group Accounting Managers. The Redesign Manager had a background in system implementation and supply chain management. He later became the ES Project Director. The Group Accounting Manager who later became the financials module champion was an exception. She had strong financial skills but implementation was a strong learning curve for her. The testimony of her bosses and her reported heavy involvement in the implementation process proved her more than capable with all the roles she juggled to fulfill.

The PM team had a two-level structure as shown in Figure 5-3. The first level (or the leadership level) was composed of the ES Project Director. The ES Project Director role

in the project was a default of him being the Redesign Manager. The second level included two Health Board internal project managers, Group Accounting Manager and Material manager, and an external project manager from the implementation partner, ConsultCo. The representation of both ConsultCo and the Health Board on the PM group shows a joint leadership between the two.

Applications team

Similar to the membership of the PM team, the implementation of the change program had guided the selection of applications team members. The SCO review had identified a need for an organizational restructure. New positions were designed and advertised to recruit new personnel. Existing staff were invited to re-apply for the new jobs. Those people who were not suitable for the new roles were assisted through a redundancy process. New role descriptions had indicated that systems experience was an essential criterion for all new recruits. This was a criterion that many existing personnel lacked, the Group Accounting Manager explained:

> Criteria for team selection were a 'module champion'; some companies call them 'super users.' Somebody who developed expertise in that area, made sure that they knew the system really well, understood why it was set up ... somebody who was a really good strong person on the system as well, which we didn't have before. ... They were also viewed as being people who would be on the project once we got ahead so they were always hired with that in view that a systems implementation was coming up. A lot of the people we hired had some systems implementation in their background. ... A lot of the new staff had come from big organizations with some very good strong best-practice things. ... We were quite clear that we didn't want a third party person to run the whole thing. We wanted people to have the knowledge and expertise. So this is how we felt it was best run and the [Redesign Manager] basically got approval from CFO on that.

The recruitment process started in November 1999 and it was not until March 2000 that most positions were filled. Both the Redesign Manager and the Group Accounting Manager champion played an influential role in the selection of new candidates. All new recruits went to Oracle 10.7 training to learn how the ES functions. Each team leader became a module champion during the implementation later and was either full-time or part-time delegated to the project. The following are the Redesign Manager comments on the decision process for forming the ES applications team:

> We argue that we recruited specific people into our project team and at the Health Board with a view to flushing out all our bad habits. We used the supply chain optimization review to identify

what bad habits are. The only way we were going to get rid of those bad habits was to put some quality people in place, go through an upgrade, discipline the processes with minimal configuration, and say 'that's the system and that's how you would use it.' I'm sorry if that makes you unhappy, but no more argument. ...

We made those decisions on the basis of previous experience in implementation that said 'for an organization like us that is going through a major process redesign initiative, not having the initial skills required in this organization to drive those initiatives through, we would need to recruit some new people'... as opposed to saying 'our project team should just be a bunch of outside people.' ...

The whole purpose of the project team being structured the way it was, was to transfer knowledge about the product from ConsultCo. Also, people having the knowledge and skills around running functional departments were back into the line function and made sure that that system carried on ticking the way it was always planned. ...

Those are the decisions around why the project team was structured like it was. So we had a main project team structure mirrored by functional experts from ConsultCo.

The objective of gaining ownership of the ES implementation was the driving force behind getting operational people involved. The transfer of knowledge from the consultant to implementation team member was a critical issue and was enabled through the recruitment of project team members with a combination of business and systems skills, training the team to understand the ES functionality, and actively involving team members in the implementation process.

5.6.10 Personnel training strategy (D13)

Two phases of training are reported in this case. The first phase is training new recruits on the Oracle 10.7 financial applications. The training decision was influenced by the recommendations of the SCO review, which highlighted personnel skills as an important component of the new change program at the Health Board. The training, delivered by Oracle started in March 2000, shortly after operational team leaders joined the organization. The purpose of the training was to enable new recruits, who became module champions on the ES project to understand the software well enough to be able to make informed decisions later. In the following, the Group Accounting Manager recalled the importance of this early training phase in building employee competency to deal with both business and software implications:

> We started on a quite a comprehensive training program to get them [module champions] trained, because a lot of them never had Oracle experience. ... We used Oracle to deliver their standard training program and we did concentrate on what was the 'vanilla' functionality. ... We went on the [Oracle] 10.7 one so that they could relate to the system we had in at the time and then try and identify the modifications we had in place. ... They also got a feel for what other functionality there was available and how it could be used better ... and start[ed] to question business processes in place and look[ed] at best-practice. ... So really their focus actually in their first few months was understanding Oracle as much as they could while sort of trying to also hit the ground running in their new roles.

The second training phase was the training of users in preparation for the go-live date. The initial plan was for module champions to provide user training in their functional divisions. However, this was not possible because team leaders maintained a heavy work schedule throughout the project. This necessitated seeking outside training expertise to deliver the required training before go-live. Module champions sat through these training sessions to be prepared to deliver any balance training after the go-live, which they eventually did. Both the Group Accounting Manager and the Redesign Manager described the decision process for end-users training in the following:

> We had originally intended for the module champions to train the end-users because they understand the business processes as well as the system. However, because of some of the technical issues we had on the project, people were just working very long hours. With the time constraints ... we got a third party to write the training manuals and actually run the courses here. (Group Accounting Manager)

> Train-the-trainer was the plan. But because of all of the problems in the software and moving implementation date, we had to bring extra resource to do that. So while we did train-the-trainer, all of that training was physically done by the 'so-called' expert while the module champions, who were going to be the trainers in the end attended. They sat in on all of those courses, but the actual professional training was done by external folks. ... We subcontracted some specialist training skills. There were Oracle certified people. ... Then, at a point in time any balance training that had to be given, we used the same training material that was given by one of the module champions. (Redesign Manager)

Training for the Discoverer reporting application was repeated post the go-live date because the implementation of Discoverer was delayed. The main focus upon go-live was stabilizing the critical applications of financials and purchasing. Discoverer was next on the list. Discoverer also required a higher hardware configuration than it was planned for; therefore a time lag for the hardware upgrade to be purchased and installed

was needed. The Group Accounting Manager described this delay as one of the trade-offs to system go-live:

> We reran the Discoverer training again later because it was so busy. Pretty much everybody forgot how to use it. Discoverer is a reporting package. It wasn't critical to them to know right then

One important issue that was associated with training was users' resistance. In a quick implementation approach, focus on technical issues dominated with less attention to facilitating organizational change. Furthermore, this project was the first project across the organization when people were required to do things in a consistent way. This materialized after go-live when some users developed workarounds to avoid using the system. Knowing that in a large organization, it is difficult to please everyone, the Health Board persisted in enforcing the use the new ES application to enable organizational change, the CFO explained:

> We identified the software issues, but what we didn't really identify was the change issues. Once we put the new software in place there was a lot of the organization trying to develop work-arounds and things like that, and not wanting change. ... This organization is large, there's a lot of history around G Hospital, N Hospital, A Hospital, and S Hospital; history sits in each of those hospitals. Those organizations were struggling to accept that there is one organization only and you need to do things on a very consistent basis. So this project had a problem around training.

What is also noted in this case is the high emphasis on the early phase of training as an important component to up-skilling new recruits in preparation for the implementation of the new ES.

5.6.11 Key business processes (D04)

Key business processes were identified as part of the deliverables of both the SCO review and the system's business case. The findings suggest that the definition of key business process was an incremental process and that these processes were defined at a higher level of abstraction first and were gradually refined to the level they were operationalized.

On a high-level, the identification of key business processes were guided by the new strategic direction for the Health Board that needed to be aligned with the four principles of 'standardization, consolidation, integration, and collaboration.' Senior management had a high stake in the way key business processes took shape. For

example, the CFO played a key role in implementing organizational change to ensure that the capital expenditure processes were more rigorous. The change program had pushed for a centralization of the organization with the overarching principle of controlling expenditure. Centralization provided one way of looking at the big picture that was lacking earlier. The Group Accounting Manager described business processes before the start of the change program as follows:

> A lot of the processes that were in place had just been built on over time and nobody had really just looked at the big picture and said 'well, how should we do this?' and 'why do we have five databases doing this?.'

A review of key business process definitions was conducted upon the recruitment of new operational team leaders. The training they received for the ES project included brainstorming sessions that focused on validating earlier key business process definitions. Some of process decisions were driven by business policy requirements; deliberation in these sessions were described by the Group Accounting Manager in the following:

> There are some specific policy-type things that are unique to us. ... Within the financials, we have very rigid capital expenditure processes. ... We can't change the business process. This is what's required for the Health Board. 'How can we utilize the module to the best effect so that we can streamline?

Both Health Board applications team leaders and ConsultCo further reviewed these definitions before project start. The Group Accounting Manager described the review process in the following:

> As part of this document [ERP system's business case], we had a bit of a brainstorming session with the module champions and we wrote up visions for each of the modules. A view of 'what would we like to ideally see with this module' and 'what's the key business processes, the key ways we see it should operate?' ... When ConsultCo came on board at the very beginning, we also had workshops about the modules themselves, best-practice, and brainstorming sessions.

The post-implementation review, which included an evaluation of these KPBs provided positive results[17]. All initial ES project objectives (refer to Table 5-2) that were documented in the system's business case had received either 'achieved' or 'substantially achieved' scores.

[17] Source: The Health Board Systems Upgrade Project: Phase I (30 September 2001).

5.6.12 Functionalities and modules (D05)

Choosing the software functionalities of the new system (D05) was a collaborative effort between Health Board team and ConsultCo. Extensive preparation for Health Board staff took place to enable their active participation in the decision-making process. The focus of training was on understanding how both business and software functioned and the effect of changes in one on the other. The Redesign Manager and the Group Accounting Manager talked about those early preparations in the following:

> We recruited people. We had to train them. We then started writing the business case. We involved the people we had trained. They went into the project. When they finished, they went into the live function again. (Redesign Manager)

> Basically, we did use the module champions to look at functionalities and modules by virtue of them looking at Oracle and its capabilities, then looking at what was currently done, and getting input from the users if necessary. (Group Accounting Manager)

Having undergone thorough software training and the brain storming sessions to clarify key business processes, module champions took responsibility for choosing the modules and the specific functionalities of the ES software, each in their area of operations. They consulted the users when necessary and received guidance from the PM team.

The PM team had a high-level view of the whole project to ensure that choices made were within the objectives of the ES project and that the effects of choices made for one function did not have a negative effect on other functions. The Redesign Manager and the Group Accounting Manager described the decision process as follows:

> We did that during the course of writing the business case and so forth. 'What does the business need? What are all the problems? Where are all the gaps? Well to do that we need the following modules.' ... We worked through using ConsultCo's part of writing the business case. ... They [ConsultCo] helped structure that. We got to all the right answers with their knowledge of the way the software functioned. We were able to cut to the chase quite quickly. ... It also helped that we'd already trained our staff on Oracle prior to all this happening. (Redesign Manager)

> They [module champions] were looking at it more from a one module point of view ... with me looking at the overall thing and saying 'hey no, this is against our principles.' (Group Accounting Manager)

5.6.13 Reporting needs (D14)

Reporting needs were first identified during the operational team leaders first training phase. Because implementation had a limited scope, the approach was to list, then prioritize legacy system reports. Each operational team leader was responsible for the reports in their functional area. A short-listing followed to keep only these critical and postpone the 'nice-to have' reports to a post go-live stage. The Group Accounting Manager reported the involvement of module champions, end-users, ConsultCo consultants, and the PM team in these decisions:

> Because it was a limited implementation, we didn't say 'okay folks what reports do you want?' We said 'this is what you've had in the past; this is what we think you need.' ... Every module champion, as part of their review of the system also had to identify critical reports or reports that are currently available. ... We had end-users involved...with the module champions for really important reports. The module champions would have a look, either themselves or with ConsultCo and say well this is already set up and it's 99% there.

In preparation for system go-live, operational team leaders—also module champions—reconsidered the list of reports, consulting users when necessary. The Group Accounting Manager took the responsibility for coordinating all the reports, particularly those implemented with the Discoverer application. In approaching the go-live date, she and the ConsultCo report-writer developed another short list. Some reports were excluded to ensure that critical reports would be ready at the approaching go-live date. In the following, the Group Accounting Manager described how these priorities were considered:

> I actually looked after all the coordination of all the Discoverer report development. So, I was the one who said 'hey we're running out of time here, drop this report as it's not as important as another one.' So...I was reviewing the overall priorities. ... I was the one who had the sheet with all the reports and ConsultCo would update where they were at with me. When they started to run out of time, we'd reprioritize them. So I was the overall person on the reporting one

After the go-live, further reports had to be re-written and others reengineered, mainly because of performance problems. The service of a third party report-writer was outsourced to do the job.

5.6.14 Evaluation team (D01)

The initial definition of the evaluation team in this study is the team that is formed to explore, investigate, and evaluate different vendors' offerings for the purpose of selecting an ES vendor. The Health Board already had an Oracle ES implementation in place. Continuation with the same vendor did not need to be formally justified, as is the norm for new implementations. For that reason, no formal evaluation of vendors' offerings was conducted. However, a formal, lengthy, and structured evaluation process took place for the selection of the implementation partner (D09). Therefore, and for this particular case, the definition of the evaluation team is adjusted to: the team formed to evaluate and select the implementation partner. The composition of the Health Board evaluation team is included in Table 5-7.

Table 5-7: Evaluation team

Job role	**ES project role** (if applicable)
IS general manager	- Steering committee
Materials manager	- Steering committee
IS business systems manager	- Steering committee - Project Manager-IT
Group Accounting Manager	- Steering committee-secretary - Internal project manager-financials
Inventory manager–corporate	- Internal project manager-materials management
Redesign Manager–corporate	- Steering committee - Project director
Financial controller–corporate	- Steering committee
Finance manager–hospital	
Payroll manager	

Note. From case study documents (The Health Board: ERP System Business Case, June 2000, p. 36-37)

The selection of evaluation team members was a process considered by both the CFO (who was also the ES project sponsor) and the manager of the redesign project (who became the ES Project Director). The aim was to include a representative sample from key functions in the organization. These included representatives from accounting, finance, supply chain, human resources, and IS.

Having identified team members in consultation with the CFO, the Redesign Manager negotiated their involvement with their senior managers. The Group Accounting

Manager described the decision process for the selection of evaluation team members as follows:

> In terms of the evaluation team for the third party consulting partner, the Redesign Manager basically decided who was appropriate to be on the evaluation team. It's just basically getting a sufficient representative sample of people that will be affected. ... The impact on IS is obviously quite important. They can't go ahead and do anything that conflicts with any IS strategy. So IS was important to be involved. On the Finance side, the Redesign Manager and myself were involved. The IS general manager wanted Project Manager-IT to be added to the team. Overall, the main person [Redesign Manager] will pick a core sample, then check with the CFO to see if there were anybody else who missed out and check with IS general manager whether there's anybody else she views as important to be involved. Just making sure you've got a good sample of people, but not too big because it's very difficult to get people to the meetings.

5.6.15 Implementation partner (D09)

Again ConsultCo's previous involvement in both the SCO review and the ES business case was behind winning the implementation partnership bid. The Health Board wanted the implementation partner to have an ownership of the business case, the CFO explained: "When we went to the market place, we looked for an implementation partner who would actually help us put the business case together; they had to own the business case like we did."

The Health Board case demonstrates an emphasis on the process of the selection of implementation partner as opposed to choosing the vendor. The Health Board followed a structured tender process similar to that of a large capital expenditure, which is common practice in public organizations.

The tender process involved formal invitations to several IT consultancy firms. Responses went through a structured two-stage evaluation process. Price was not considered during the first round of evaluation to ensure that cost had a minimal effect on evaluation team's judgment. Instead, evaluation focused on two critical criteria to screen implementation partners. Those were previous working experience with the Health Board and the depth and wealth of ES implementation experience. As a result, ConsultCo was the favorable candidate that won the tender. The Redesign Manager listed the evaluation criteria as follows:

> We listed a whole lot of criteria as to how we were going to evaluate being price, quality, makeup of project team, details on that project, number of labor hours, unit price, and so on. ... One of the criteria was continuity for the organization. ... We compared dollars and skills and depth and everything else as part of our criteria to eventually come to a conclusion, objectively, with the point scoring system.

The Group Accounting Manager, who was a member of the evaluation committee as well as being involved in writing tender documents, noted that another important criteria was the project structure. Because a joint PM structure (between the Health Board and the implementation partner) would enable Health Board staff to develop ownership of the new implementation, the RFP was issued on that basis:

> To ensure that we left the knowledge with the people in the business rather than just having a bunch of consultants come in, run the whole thing, put it in, walk away, and nobody knows what was done and why. ... We wanted to have a heavy component of our own staff and heavy involvement. ... We felt we had people who had most of the skills to do that. We didn't want ConsultCo to come in and take total ownership. ... It was a joint project management arrangement. ... We had joint responsibilities. ... We didn't want it run completely by outside consultants like a lot of things have been here in the past because the consultants walk away with all the knowledge

The Health Board made this important criterion very clear in the tender invitation. The Group Accounting Manager added:

> We tendered on that basis. We actually put into the tender document our project structure roles. This was our structure and we wanted people from ConsultCo to team with these people.

Although the ES vendor, Oracle was keen to get involved as an implementation partners, they lost the bid for several reasons. First, the Health Board was not happy with the heavy customization of its existing Oracle 10.7 financial applications, for which Oracle was the implementation partner.

Second, ConsultCo was an Oracle preferred partner. As a result, they were on similar grounds with Oracle in terms of their technical ability. However, because of the depth and breadth of their management consultancy experience, ConsultCo had a competitive advantage over Oracle.

Third, the Health Board was still negotiating software license pricing. Therefore, they did not want to show an early commitment to Oracle that would undermine their negotiation power.

The Redesign Manager elaborated on the tender evaluation experience, particularly focusing on the comparison between Oracle and ConsultCo, as follows:

> We chose ConsultCo for various reasons, depth of skill, functional expertise, reputable company—all of those things ... by virtue of us going into this project, which was a process redesign project, we weren't only looking for functional expertise, we were looking for a redesign expertise at the same time, and we didn't see that coming through from Oracle consulting. ... We were also looking for people to bring to the party general business knowledge and process redesign. So everything we did, we had a redesign hat on, and we perhaps didn't see that coming through the Oracle expertise. They didn't have enough depth in their consulting. ... The process was delicate in terms of Oracle because in negotiating a price with them as a software supplier ... we'd always said 'you need to be aware that we're looking at other options.'

6. Chapter Six: Case Study Analysis

6.1 Introduction

This study has used a two-case-study research approach to investigate the decision process pertaining to 15 strategic ES implementation decisions. The preceding two chapters provided the descriptions of both the case study background and ES decision-making to answer the second and third research questions of this study:

- How are strategic ES decisions made?
- How are those decisions implemented?

This chapter compares the findings from the two case studies to answer the fourth question of this study:

- How does the ES decision process contribute to implementation outcomes?

This chapter is structured as follows:

First, the two ES implementation case studies are briefly compared highlighting both their organizational and ES project backgrounds.

Second, the analysis of the ES decision process is provided. The decision process for each of the 15 ES implementation decisions in each case is compared with the five a priori models in the literature—rational, muddling through, mixed scanning, garbage-can, and political—to indicate the model that better explains implementation decision-making. The events leading up to each decision as well as decision execution are discussed with explanations of the dependencies between decisions and the consequences of taking a particular decision-making approach.

Third, a cross-case comparison of the two implementations is provided. The two cases are analyzed for the similarities and differences along the two categories of decision-making pattern and decision-making focus. Explanations for the impact of these categories on implementation outcomes are discussed. In particular, the focus of implementation outcomes is two-fold: meeting ES project deadlines and the lessening of implementation impact.

Fourth, a brief overview of the application of the alternate templates strategy in both within and cross-case comparison is provided.

Fifth, a summary of the cross-case comparison is provided with a foreword to the conclusions chapter.

6.2 Background comparison of two cases

Two ES implementations in two organizations with the pseudo names of Health Board and DistCo were studied. The two organizations varied widely on features such as organizational type, organizational size, industry, and ES vendor. Both organizations, however, implemented an ES application from a top-five ERP vendor[18], had well defined objectives at the start of the implementation process, and worked with similar budgets.

The two implementations varied in: implementation outcomes, the sequence of the BPR exercises both organizations went through, and their use of a third-party consultancy advice. Refer to Table 6-1 for a comparison of organizational profiles, Table 6-2 for a comparison of the ES project summaries, and Table 6-3 for a summary of the similarities and differences between the two cases.

The DistCo implementation was preceded by a lengthy exploratory phase. DistCo's senior management managed the exploratory investigation for the new system with minimal third-party advice. Implementation started after a thorough evaluation of invited bids, the selection of the vendor, and contract negotiations.

Implementation progressed slowly with a significant change in implementation strategy from a minimally-customized to a highly-customized approach. The announcement of detailed cost estimates showed that total cost was, to the shock of everyone, twice the initial budget. To bring costs down, key business processes were re-assessed, and a revised set of system specifications was prepared. The re-assessment process drew management's attention to the value of reengineering business processes and triggered a BPR exercise causing significant delays to the project plan.

[18] The top five ERP vendors are SAP, Oracle, PeopleSoft, J. D. Edwards and Baan.

Similar to the Health Board case, the chosen IT platform for DistCo caused a major performance problem. Resolving the problem contributed to further go-live delays. Because of those delays, a significant number of the implementation partner's consultants working on the DistCo implementation left their jobs by the end of the first year, causing a big loss of business knowledge. The loss of business knowledge had the effect of causing further delays. The implementation was finally completed with a one-year delay and a moderate increase in budget.

Formal preparations for the Health Board implementation included the formulation of a new strategic direction for the organization that focused on supply chain integration. The SCO review prepared by the consulting partner, ConsultCo, included both a blueprint for a new organizational design and recommendations for an ES implementation to support it.

Having a clear vision, strong leadership, and a detailed plan, the Health Board implementation was completed on time and within-budget despite one critical problem in the system's performance. Contingency plans to deal with this problem enabled addressing the problem urgently through a major change in system architecture. An alternative course of action was considered, approved, and implemented only two months before going live.

Table 6-1: Organizational profiles

Categories	DistCo	Health Board
Business	The distribution of magazines and newspapers. The business also manages specialized magazine subscriptions.	The provision of public hospital and health services.
Type of organization	A business (for profit) organization	Non-profit organization
Ownership	A wholly owned subsidiary of a NZ newspaper publisher	Public organization
Business units	Main Retail (allocation and physical distribution of publications for publishers—mainly magazines), Gossip (airfreight delivery of magazines), and Planet Solutions (specialized subscriptions).	Four specialist teaching hospitals, community health services, mental health services, and clinical support services.
Mission statement (1999-2000)	"DistCo is at the heart of the most vibrant, energetic, competitive, and successful magazine market in the world. We strive to have the best understanding of magazines and the magazine market and provide our clients with the most effective marketing and distribution services."[19]	"The Health Board will provide New Zealand's finest comprehensive health service through excellence and innovation in patient care, education, research, and technology."[20]
Customers	Three main groups: publishers, retail outlets, and readers	Patients (two million patient contacts annually)
Reach	National (within NZ)	Regional (within NZ)
Organization size	300 employees NZ$200 million (approximately)	8,500 employees NZ$600 million budget for the year 2000/2001

[19] Source: The back of a DistCo business card.
[20] Source: The Health Board Annual Report (1999-2000).

Table 6-2: ES project summaries

Profile	DistCo	Health Board
ES product name & version	J. D. Edwards XE	Oracle 11i
ES core modules	Distribution and financials (new implementation)	Financials (upgrade), fixed assets, and procurement (new implementation)
Number of users	Eighty users	8,500 users including 120 power users
Cost of implementation in dollars	Approximately NZ$3 million that included NZ$700,000 in hardware, NZ$500,000 in software, and NZ$1,800,000 in implementation costs (both internal business costs and consultancy work).	Approximately NZ$2.3 million that included NZ$1.7 million for hardware, software, consultancy, and internal costs; plus NZ$650,000 for operational costs, including backfill and change management.
Number of locations	Two locations, the company's head office in The North Island and a small warehouse in the South Island.	One instance implementation on multiple sites (seven business units on two geographically distributed sites).
Implementation management/consultancy	Direct implementation with J. D. Edwards.	3rd party implementer: ConsultCo, a big-five consultancy firm.
Go-live	July 2002	December 2000
Post-implementation or phase II plan	Plans for phase II were unclear. Software functionalities supporting the subscription management division, 'Planet Solutions,' would be implemented as part of phase II, pending system business case approval.	Implementation for the two core modules of human resources and payroll were planned to start by mid-2001. However, this was not possible due to both the need to stabilize existing implementation and the lack of funding. The phase II implementation is expected to take place sometime in 2004.

Table 6-3: Similarities and differences between case studies

	DistCo	Health Board
Similarities		
Implementation objectives	- To resolve a devolved IS environment with a focus on supporting the key business process of allocations. - To develop the capability for analyzing DistCo historic data in an attempt to create a competitive advantage over rivals.	- To resolve a devolved IS environment with a focus on supply chain optimization. - To upgrade the existing version of the ES software, which was going to be de-supported by the vendor by the end of 2000.
Employee ownership of ES implementation	Employees' ownership of ES implementation was an important consideration. However, employees were not actively involved until the start of the ES project. Many struggled because of the minimal IT skills they had when implementation started. As implementation slowly progressed, their involvement gradually increased to the level that team leaders took responsibly for delivering system training to end-users during the six months before go-live.	Employees' ownership of ES implementation was an important consideration. Employees were actively involved in the implementation process with a view to taking responsibly for the system once it went live and was operational. An organizational restructure, early training, and active involvement during implementation were the key strategies the Health Board adopted to achieve its goal for the short timeframe—six months—of the ES project.
IT platform	System performance problems that were related to the new IT platform supporting ES application were detected during system testing. Such a problem was not predictable despite the thorough review and evaluation process that proceeded architectural choice. A review of the IT architecture was conducted and an alternative solution was implemented causing a long delay to the project.	System performance problems that were related to the new IT platform supporting ES application were detected during system testing. The contingency plans, written into contract documents, enabled addressing the problem urgently when it arose. A major change in the system architecture was deliberated, approved, and implemented during the two months before go-live.
Differences		
Implementation strategy	A heavy customized implementation with the business process reengineering (BPR) exercise taking place during implementation.	A low customized implementation that was preceded by a BPR exercise.
Implementation outcomes	Implementation was completed with a one-year delay and a moderate budget increase. User resistance softened with the continuous training sessions users received in preparation for the delayed system go-live.	Implementation was completed within-budget and on time. However, a high level of user resistance was reported.
Employees' training	Training was an incremental process during implementation. Early experience suggested that many employees had modest IT skills, therefore, basic Windows training was provided. Training continued and was an on-going process that was mainly managed by team leaders.	New recruits received extensive training on the existing ES application prior to implementation start. During implementation, training that was initially assigned to module champions, was outsourced to enable meeting go-live deadlines. Module champions delivered further training after go-live.

6.3 Strategic ES implementation decisions: A cross-case comparison

This section provides the analysis of the ES decision-making process. The decision process for each of the 15 ES decisions in each case is compared with the five a priori models in the literature—rational, muddling through, mixed scanning, garbage-can, and political—to indicate the model that better explains implementation events.

The events leading up to each decision as well as decision implementation are also discussed. An attempt to explain the consequences of the decision-making approach on implementation outcomes is further pursued. Table 6-4 summarizes those findings that are discussed in detail next. A more detailed summary mapping the decision-making characteristics for each decision to an a priori SDM model is included in Appendix E and Appendix F, for the DistCo and the Health Board cases respectively.

Table 6-4: Fifteen strategic ES decisions examined using five conceptual lenses

ES decisions	Five conceptual lenses				
	Rational	**Muddling through**	**Mixed scanning**	**Garbage-can**	**Political**
D01-Evaluation team	DistCo Health Board				
D02-Evaluation partners	Health Board	DistCo			Health Board
D03-Vendor	Health Board		DistCo		
D04-Key business processes			DistCo Health Board		
D05-Functionalities & modules	Health Board	DistCo			
D06-Bolt-on applications	DistCo Health Board				
D07-IT infrastructure	Health Board	DistCo			Health Board
D08-Implementation team[21] (Applications team)	DistCo Health Board				Health Board
D09-Implementation partners	Health Board		DistCo		Health Board
D10-Implementation strategy	Health Board	DistCo			
D11-Go-live strategy	DistCo Health Board		DistCo Health Board		
D12-ES variation strategy	DistCo Health Board				
D13-Personnel training	DistCo		Health Board		
D14-Reporting needs		DistCo	Health Board		
D15-Maintenance strategy	Health Board	DistCo			Health Board

[21] The implementation team (D08) decision was analyzed at three levels: on the steering committee, the PM team, and the applications team. To facilitate a parsimonious comparison of the 15 decisions, the focus of the implementation team decision here is on the applications team. Further analyses of decisions relating to the steering committee and the PM team are included in section 6.3.8

6.3.1 Evaluation team (D01)

The initial definition of the evaluation team in this study described the team that is formed to explore, investigate, and evaluate different vendors' offerings for the purpose of selecting an ES vendor. Therefore, the evaluation team in the ES project holds a collective responsibility for making critical decisions during the early phases of the ES project. Because an ES is applied for the whole enterprise, the evaluation team often needs to be representative of the whole organization.

The above definition still applies for the DistCo case. However, because of circumstances that are particular to the Health Board case, the definition of the evaluation team was adjusted in this instance to mean: the team formed to evaluate and select the implementation partner (D09). The Health Board was running an older implementation of Oracle financials, which did not necessitate both a formal and thorough process of vendor selection that needed an evaluation team. However, a formal, lengthy, and structured evaluation process took place for the selection of the implementation partner.

In the two cases, many members of the evaluation team later became part of the implementation team. As a result, the evaluation team not only had a stake in vendor or implementation partner selection, but also in other implementation decisions.

In both cases, senior management took responsibility for team selection. This process included the ES internal project manager drawing up a list of people, which was then discussed with the ES sponsor. Managers from the business were sometimes consulted but the final decision on team composition rested with these two parties.

The evaluation team decision was described as a straightforward decision that had the purpose of getting a representative sample of people from the business. The decision process included less formal but conventional procedures for team formation in the two organizations studied. Confined to deliberation between two senior managers, the process had limited extensive analysis. Nonetheless, the process, as discussed by informants, was typical of a *rational* approach that is a common practice for team formation in organizations.

In terms of the evaluation team for the third-party consulting partner, the Redesign Manager basically decided who was appropriate to be on the evaluation team. It's just basically getting a sufficient representative sample of people that will be affected. ... The impact on IS is obviously quite important. They can't go ahead and do anything that conflicts with any IS strategy. So IS was important to be involved. On the finance side, the Redesign Manager and myself were involved. The IS general manager wanted the Project Manager-IT to be added to the team. Overall, the main person [Redesign Manager] will pick a core sample, then check with the CFO to see if there were anybody else who missed out and check with IS general manager whether there's anybody else she views as important to be involved. Just making sure you've got a good sample of people, but not too big because it's very difficult to get people to the meetings. (Group Accounting Manager, Health Board)

The decision was quite a straightforward decision ... as to who should be involved. (MD, DistCo)

It was just cherry picking people from the business ... key people within the organization who had knowledge of the business, who would be particularly critical or evaluate strongly... who would ask good questions, who were looking for specific things out of the new system, and who were the most critical of our current system. (FC, DistCo)

6.3.2 Evaluation partner (D02)

The evaluation partner(s) is defined as the party, usually external to the organization planning an ES implementation that provides advice and guidance to select an ES application. The services of an evaluation partner can include some or all of the following activities that facilitate the selection of the ES vendor: information gathering, advice, comparative analysis, and project management.

For many organizations, the vendor selection process is unfamiliar; the process commits the organization to a considerable investment of organizational resources, it requires heavy involvement of business managers, and its outcome has significant implications on the business. An experienced evaluation partner can help the organization in both drawing a roadmap to the vendor selection process and working out the details required for the process to move smoothly.

The appointment of ConsultCo as the evaluation partner in the Health Board case did not involve the same formalities of both the supply chain and implementation partnership bids. Earlier involvement with the Health Board gave ConsultCo a lot of in-depth knowledge about the business that they used to their advantage to become the

evaluation partner. Furthermore, ConsultCo's professional capability and their extensive experience in ES implementation were beyond dispute.

As a result, a mixture of *rational* and *political* decision processes can be inferred from case details. The process was *rational* in that ConsultCo both had the capabilities and demonstrated they could fulfill implementation requirements. Their earlier involvement, however, suggests that previous involvement might have opened doors wider, especially when events were moving or needed to move quickly.

> The focus in writing the business case ... was that we needed to go and do some more work back in the business and understand some of the processes which were not only supply chain. ... We went to the market again—to a similar bunch of external partners—saying we want people to come and help us with the business case. ... ConsultCo won because the pitch they gave us suited what we needed. When ConsultCo completed their work [SCO review], they knew at that point where all the gaps were from a supply chain point of view, but they didn't necessarily know where the gaps were in terms of our software. That wasn't part of the exercise. (Redesign Manager, Health Board)

The DistCo case shows a long exploratory phase for scanning the ES application market. The standard definition of the implementation partner does not quite fit the two types of partnerships DistCo made to facilitate the vendor's selection.

The first partnership with DistCo Australia was initiated by the parent organization NZNP to consolidate both companies' resources for the selection of the software application. Knowing that the type of business DistCos is in is unique meant that software applications that fulfilled business needs were not going to be standard market offerings. Both companies, therefore, needed to scan the market for the application that provided the best, but not the perfect match.

The second partnership DistCo formed was informal. The partnership was formed to facilitate getting advice that the FC sought from a former colleague to validate the system's business case assumptions before formally starting the RFP stage.

> None of us had written one [an RFP] of that magnitude before so we wanted to make sure we'd done a reasonable job. (FC, DistCo)

The decision process for selecting evaluation partners followed a *muddling through* approach. Small incremental decisions were made to push the exploratory phase forward, during which the process stalled because of the sale of DistCo Australia.

Because no expertise in the marketplace was available in DistCo's core industry, senior management believed that they needed to develop the capabilities for selecting the ES application themselves. And while cost might have been the deterrent factor behind seeking professional help, the result was that DistCo *muddled through* the investigation, relying on their relationships with business contacts, and did not enter into an agreement with a key partner.

> The company [DistCo] is well connected to other distributors worldwide, so we knew that there weren't people in our business who actually had a robust solution that would suit our market, so there was no point in engaging consultants in our view. We felt that if we couldn't as a team evaluate whether a solution was robust enough, then we weren't doing our jobs. (MD, DistCo)

6.3.3 Vendor (D03)

The ES vendor is the vendor of ES applications the organization chooses to implement. Once implemented, those ES applications become the base platform for other systems within the organization.

The two cases in this study differ on the vendor selection process. For the Health Board case, no thorough, lengthy, and formal evaluations of vendors offering were conducted. The organization, which already had an old version of the Oracle financials, did not need to formally justify a continuation with the same ES application.

The DistCo case provides a classic example of the vendor selection process for an organization that is starting an ES implementation project. The vendor selection process was thorough, lengthy, and included a mixture of both formal and informal processes during the three stages of the RFI, the RFP, and contract negotiations.

For the Health Board, the decision process for confirming a continuation with the same vendor followed a *rational* approach. Guided by ConsultCo, a systematic evaluation of several 1st tier ES vendors was conducted as part of an RFI investigation. The evaluation process showed that cost considerations favored Oracle applications by a very big margin. The continuation-with-Oracle decision could therefore be made in a

relatively short period of time. The decision was made with minimum formalities, at the PM level, and in consultation with both the ES sponsor and the experienced evaluation consultant partner.

> It [an Oracle implementation] was going to be cheaper than putting in a brand new system, which people had no knowledge of whatsoever. ... We did ... a rough evaluation just to say 'well okay, we do believe Oracle's the best way but what would it cost if we put it in one of the other big ERP ones?' (Group Accounting Manager, Health Board)

> We had Oracle, and we knew a change from Oracle could be considered. We sought prices from other system providers such as SAP but the cost of change was prohibitive. (CFO, Health Board)

The decision to stay with Oracle was also in alignment with the strategic direction for the Ministry of Health to achieve a standard platform for all regional district health boards. One of the two other district health boards in the same region had already committed to the Oracle enterprise applications by that time.

> Return to the business is an important one, strategy and alignment with other hospitals is also a big one. ... There was also clearly a trend from other DHBs ... particularly the Health Board-B. They had gone Oracle anyway, so there were really no drivers to go for any other software. (Group Accounting Manager, Health Board)

For DistCo, the decision process for vendor selection followed a *mixed scanning* approach. While DistCo hesitated about formally engaging an evaluation partner, as discussed in the evaluation partner (D02) section above, senior management always had a clear vision as to what they wanted to achieve: an ES application that supported the unique business process of DistCo and an ES vendor that demonstrated a commitment to that vision.

Vendor selection was a three-step process consisting of the RFI, the RFP, and the contract negotiations stages. The process was noticeably long, partly because DistCo was under no urgent need to go-live by a certain date. The strategic review of business operations in early 1998 had considered Y2K preparations and recommended that existing systems be upgraded before the start of a new implementation.

Considering the three steps of the RFI, the RFP, and contract negotiations, it is clear that senior management had a high level of influence in the process, particularly during the RFI and contract negotiations stages. While middle management were formally

consulted during the RFP stage, senior management still retained the leadership role of inviting vendors and setting out the selection criteria.

Five factors that influenced the screening of ES vendors during the RFP stage were identified from interview data. Those included: (1) the long-term viability of the vendor, (2) the flexibility of the IT architecture the ES application supported, (3) implementation methodology, (4) software functionality, and (5) the competence of the vendor's sales people.

The RFP stage ended with two competing ES vendors, Intentia, and J. D. Edwards. The final choice was made during the contract negotiations stage and was facilitated by the referrals to clients' sites. Referrals suggested that the focus of J. D. Edwards's implementations were business oriented, while Intentia's implementations were more technology focused. Intentia clients were described to be "very much IT department driven as far as the decisions about solutions." (FC, DistCo)

DistCo's senior management had always regarded the vendor selection decision as one that would have long standing implications in the future. The process involved high-levels of analysis during the three stages of RFI, RFP, and contract negotiations. Decision-making applied a combination of both high-order decisions and incremental decisions that prepared for high-order ones, which is typical of a *mixed scanning* approach (Etzioni, 1986).

6.3.4 Key business processes (D04)

Key business processes are the core processes the new ES needs to support. Organizations need to identify key processes in order to bridge the gap between software functionalities (or what the software can do) and business processes (how the business operates). Often the identification of key processes becomes part of a BPR exercise, the purpose of which is to evaluate business operations and suggest improvements.

When the BPR exercise precedes the start of ES implementation, one of its outcomes would be the identification of future system boundaries. The other alternative is for the BPR exercise to be performed during implementation. Hence, system boundaries get defined within an iterative process of business process evaluation. And because an ES is

designed for integrating all organizational functions, the change in one function is likely to affect all others, making the identification of key business processes a complex process that requires the input of many functional managers.

For the Health Board, the decision process for defining key processes followed a *mixed scanning* approach. Key processes were defined during the preparation phase of the ES implementation project and were later refined as part of writing the system's business case. The choice of key processes was guided by the new strategic direction for the Health Board and its vision to achieve the four principles of "standardization, consolidation, integration, and collaboration" towards optimizing the organizational supply chain. With awareness of the rolling-effect of change between functions, integration was adopted with a commitment to a standard ES implementation across all functions.

The definition of key business processes was an incremental process that had its roots in the recommendations of the supply chain review. The review provided the high-level guidelines the Health Board team applied in evaluating business process details. With guidance from the Redesign Manager and the consulting partner, new recruits underwent several Oracle training sessions to understand the limitations of existing ES software and its application to organizational business processes. This made it possible for key processes to be first defined at a higher level of abstraction. Processes were gradually refined to the level where they could be operationalized.

Similar to the Health Board case, the decision process for the identification of key business processes for the DistCo case followed a *mixed scanning* approach, however the formal process of examining these processes only started midway through the design phase.

During the preparation phase, the process was informal and implicit. Most of DistCo's staff had been with the company for a long time, making it clear to everyone that both allocations and logistics were key to DistCo's operations. A strategic planning exercise three years prior had formally confirmed that.

> DistCo had been through some strategic planning some three years prior and we knew exactly what our core competencies were. Therefore, we needed to focus on the things that we really needed to be good at as a business to succeed. Allocations was the fundamental business process

amongst those eight objectives and that was the only pure business process that was among those objectives. So, it was absolutely clear. (MD, DistCo)

When implementation started and detailed system specifications were released, the cost was too high. To bring the cost down, system specifications were revised considering the definitions and scope of key processes. Thorough examination of business operations pre-empted an iterative process of business improvements that continued until system boundaries were redefined within an acceptable cost estimate. Hence, the decision process was another classic example of a *mixed scanning* approach.

Both cases were similar in that a high-level recognition of key business processes was known at the outset of the ES implementation. The difference for the Health Board is that key business process details were operationalized early as part of the systematic training of new recruits. For the DistCo case, no details were produced until the high-cost estimate necessitated a review of configuration decisions (D05). At the completion of the review, final system specifications changed to include only the essential-to-have. All the nice-to-have functionalities were postponed to a phase II implementation.

6.3.5 Functionalities and modules (D05)

Because ES applications are sold as a package that includes all functionalities, decisions regarding functionalities and modules are those decisions that involve the choice of what functionalities to implement and how modules are to be configured.

For the Health Board case, the decision process for selecting system functionalities and modules followed a *rational* approach. The ES PM team at the Health Board had a clear vision as to what the new system needed to do and they developed a detailed plan to achieve the project's objectives with an emphasis on personnel training.

Configuration decisions were a shared responsibility between the ES PM team and module champions. Newly recruited module champions underwent system training to empower them to make informed decisions. They consulted the users when necessary and always considered cross-functional effects to avoid negative conflicts. The PM team continued to oversee configuration decisions to ensure that decisions made for one function did not have negative effects on others.

> We did that during the course of writing the business case. [We asked:] 'What does the business need? What are all the problems? Where are all the gaps?' To do that we need the following modules. ... We worked through using ConsultCo's part of writing the business case. ... They [ConsultCo] helped structure that. We got to all the right answers with their knowledge of the way the software functioned. We were able to cut to the chase quite quickly. ... It also helped that we'd already trained our staff on Oracle prior to this happening. (Redesign Manager, Health Board)

Rational configuration decisions were made within the timeframe for an ES implementation that satisfied an on-time and within-budget completion. The decision process was formally planned as part of ES project activities and was enabled through preparatory training sessions. The process did not involve high-levels of analysis, partly because there was a strict commitment to a low-customized implementation that guided configuration decisions.

For the DistCo case, the decision process for software configurations followed a *muddling through* approach. Because no industry standards existed for the type of ES applications the business needed, the process of deciding on functionalities and how to customize the software was managed through an iterative trial-and-error approach.

DistCo had a clear vision of what key processes the new system needed to handle but because no best-practice ES application existed for this type of business, it was difficult to define system specifications. An initial expectation that a non-customized solution would be appropriate proved to be unrealistic. That expectation changed after the development of the first system prototype because the detailed cost estimate exceeded the initial budget. A review of system functionalities was conducted to bring the price down. The examination of business process details required a review of earlier assumptions, triggering a business process redesign exercise. As a result, functionalities could not be clearly redefined until a detailed definition of DistCo's business processes was completed.

Bridging the gap between business functionalities and software applications was an ongoing process that started during the RFI stage, was carried through the RFP stage, but was only operationalized during implementation.

> When we [DistCo] were part of the implementation team, we documented the processes that the business carried. We sat around in our little groups and ... mapped out exactly what needed to

> happen ... so that the consultants could get a feel of what the requirements would be for the modifications. (Team Leader, DistCo)
>
> We [J. D. Edwards] came up with the initial pricing; it was an extremely big price. DistCo couldn't afford that so we decided to go through a process of trying to cut out functionality as much as we could. ... [The] original modifications for allocations were written on the basis of their [DistCo] understanding what the business was. ... They [later] expressed an interest in going through and improving their existing processes—process redesign. (Project Manager-JDE, DistCo)

Different parties came into the decision process for system configurations. During the early stages, DistCo's FC, the parent company NZNP, DistCo Australia, and ES vendors played a dominant role. During implementation, J. D. Edwards and DistCo's team leaders took responsibility for operationalizing configuration details. By the time configuration had started, DistCo Australia was no longer part of the NZNP group. However, they continued to have a stake in configuration decisions because they shared customization costs with DistCo through a special agreement with J. D. Edwards.

The configuration took a considerable period of time during which the DistCo PM team had an overseeing role, however, they did not maintain the same level of control as the Health Board PM team. Halfway through implementation, DistCo's FC was promoted to the MD position, lessening her involvement even further. Furthermore, several J. D. Edwards consultants left the project six months prior to go-live, resulting in a big loss of business knowledge to the ES project.

DistCo achieved an ES that fulfilled most of DistCo's application requirements. However, the implementation process took considerably longer than expected and functionality was noticeably cut back to keep costs within budget.

6.3.6 Bolt-on applications (D06)

The ES application suite comes as a collection of software modules that are designed to integrate with one anther. Bolt-on applications are those applications that are sold by a vendor other than the ES vendor and can be integrated with the base ES suite. But because of the integrated nature of the ES application, the complexity of ES implementations often increases with more bolt-on integration. Even though, the evolution of ES applications is increasingly enabling this type of integration because it builds more flexibility into the ES offering. The decision process considering bolt-on

applications in this study focuses on consideration for including one or more of these applications to complement the ES suite.

More often than not, bolt-on applications provide specialized functionalities that are not available as part of the ES suite or they provide similar functionalities better. One common example is the report-writer that is bolted onto the ES application suite. Because most ES applications offer few and non-business specific alternatives for presenting business reports, a bolt-on application fulfills this need through extracting ES application data into different types of customized report formats.

For the Health Board, the decision process considering bolt-on applications followed a *rational* approach. One key strategic decision involved both keeping modifications to a minimum and keeping implementation as 'vanilla' as possible. Guided by a low customization implementation strategy, no bolt-on application was considered. Although implementation included the report-writer, Discoverer, it cannot be not fully considered a bolt-on application because it is an Oracle product.

During the early phases of the ES project, the decision to veto the bolt-on application was *rationally* made by senior management through a consultation process between the ES sponsor (CFO), the ES Project Director (Redesign Manager), and the consulting partner (ConsultCo). Minimizing bolt-on applications was one means of achieving an on-time and within-budget implementation, therefore suggesting a short-future horizon to this decision.

> From the SCO review and from the strategy, which was deemed to be as 'vanilla' as possible, it was a key decision that we'd have to have a really good reason to keep any modifications. ... [We aimed for] keeping things as simple as possible, as cost effective as possible. ... The strategy was that Oracle would be the core financial module; everything basically would have to run from that. ... If there was an absolute desperate business reason to have something outside, then it had to interface in at a certain point but not overlap any of the functions of Oracle. (Group Accounting Manager, Health Board)

Similar to the Health Board case, the decision process considering bolt-on applications for DistCo followed a *rational* top-down approach. To minimize costs and implementation complexity, it was "never planned to take the ERP system past where the current magazine distribution system goes" (MD, DistCo). Therefore, bolt-on

applications, apart from the report-writer and invoicing applications that were already in-use prior to go-live, were not considered.

> That was the way it worked. We [senior management] didn't go to them saying 'We don't know what to do? What do you think?' We'd go to them and say 'This is what we believe. What do you think?' (MD, DistCo)

This decision was made during the preparation phase of the ES project. In making the decision, the ES PM team investigated alternatives and consulted with both the ES steering committee and operational managers. Consultation with the business was informal and focused on the day-to-day practicality of system use. Because the initial strategy aimed for a 'vanilla' implementation, bolt-on applications did not get a thorough analysis. Serious considerations for bolt-on applications were to take place as part of Phase II. Despite limiting bolt-on applications, the DistCo implementation still took a considerable period of time to customize the base ES software to the unique nature of business operations.

6.3.7 IT infrastructure (D07)

For the Health Board case, the decision process for the IT infrastructure showed a combination of *rational* and *political* approaches. The operating system supporting the new ES environment of Oracle 11i was thoroughly considered. Guided by advice from the implementation consultancy partner and hardware vendors, and in consultation with the IS function, the initial choice of the IT platform was made.

Windows NT was favored both for its significant price difference and for being the Health Board's standard software platform at the time. However, that environment was not tested with the new software release of Oracle 11i. To mitigate this risk, an exit-condition in the contract with the hardware and operating system vendor was written. During implementation and when system performance deteriorated, these conditions were exercised and a change to a Unix environment was adopted. This major change in the IT platform, which took place during the two months prior to go-live, was considered a high-risk. Still, no change would have had a greater impact than implementation not being completed, resulting in project failure.

While the initial decision was *rational*—made in consultation with key organizational stakeholders, particularly IS—the later change showed a *political* approach. To enable

change to take place quickly, the CFO, realizing that the project was under a big threat to fall apart because of the slow performance of hardware, had to take control and push for the change to be authorized at the board level. Following normal organizational channels would have taken long enough for costs to increase and to cause a halt to implementation.

> This issue looked like it was going to have an impact on us being able to deliver the whole project on time. ... That was a major change and that would have been our biggest change. ... It had a major impact on the project so ... [it] went up through to the steering committee, even to the Board saying this is a change. ... Even though we had used all the expertise from Oracle, all the expertise from the IT Vendor in this case, plus ConsultCo's collective expertise, so-called around the world, the decision ended up in hindsight not the right one. But at least we made a decision. (Redesign Manager, Health Board)

This IT platform decision was considered twice, once during the initial phase of the project and next after system testing in the approach to system go-live. Prior to implementation start, the decision underwent a thorough analysis where concerns about system performance were noted and documented. While the initial objective had a long-term perspective of organizational standardization, the future horizon to this decision later shifted to focus on project completion.

For the DistCo case, the decision process for the IT infrastructure supporting ES applications showed a *muddling through* decision-making approach. The decision process was a 'challenging,' 'huge,' and 'difficult' task for the ES PM team. One informant best described it as 'a process of discovery.'

The DistCo PM team forwarded the high-level requirements that J. D. Edwards International had suggested to three hardware vendors in NZ and received three extremely disparate proposals. A meeting with vendors followed to clarify those ambiguities but no explanations were provided. Because of the high pace of change in the IT marketplace, a comparison of alternative solutions was not an easy task, especially because the implementation partner, J. D. Edwards, declined to participate.

With no prior experience, the DistCo PM team took full responsibility to explore alternative solutions. Mainly relying on the proposals they had received, they developed an invitation to tender. The outcome of the tenders' evaluation was to implement the Windows 2000 server environment. The testing of the Windows 2000 environment

during implementation showed an unacceptable system performance. The IT platform decision had to be reevaluated and a more expensive change to the Citrix platform was adopted.

> The hardware stuff was very difficult. It was an area that I knew very little about. ... It was a huge task at the time. ... I learnt a lot in the process. (FC, DistCo)

The objective guiding the selection of the IT platform for DistCo was that it be a fit-for-purpose platform. Client PCs had recently been upgraded to the Windows 2000 environment and the choice was made to align the ES platform with the existing architecture. Analysis was thorough, but the lack of expertise was evident in the dilemma encountered when analyzing hardware vendors' bids, especially with no input from the implementation partner. The ES PM team took full responsibility in making both the initial choice of the IT platform and addressing the later change when required.

It is interesting to note that the two cases, although taking two different paths in the way they addressed the choice of the IT architecture, came to the same outcome. The initial choice was justified because it conformed to the organizational IT standards. Nonetheless, that platform did not fully support the new ES and needed to be changed to overcome major performance problems. The difference between the two cases is that the Health Board had identified the risk and took precautions to address it if the situation arose. This made it possible to address the change quickly using the *political* power of the CFO. DistCo continued to stumble through the process, but they made it through taking considerably more time than expected.

6.3.8 Implementation team (D08)

The three main organizational teams formed to facilitate ES implementation are the steering committee, the PM team, and the applications team. The decision process for each is discussed next.

Steering committee

In the case of the Health Board, the steering committee not only needed to be representative of the different organizational stakeholders, but also had to include members that had the authority to action decisions in a timely manner. For this implementation, most decisions were deliberated and made at the PM level. When not

resolved, as was the case for the IT platform decision, further deliberations were taken to the steering committee and finally to the board to authorize change.

> We had representation from the business, from IT, from senior Health Board people, from our implementation partner, and there were people put on the steering committee in understanding of their skills. ... When you look at the objectives of the business case 'to act as catalysts for change' ... the steering committee were people who in regard to the organization would say 'I was on the steering committee, sign it off.' ... I was happy we weren't going just to have any Tom, Dick, and Harry on the steering committee. (Redesign Manager, Health Board)

The decision process for the selection of steering committee members in the Health Board case showed a *rational* approach. The selection of members by the CFO and the Redesign Manager was done through a detailed evaluation of employees experience and influence to enable addressing problems quickly, and to maintain continuous progress once the project started. Within the *political* dimension, the decisions the steering committee were engaged in later were likely to involve a political approach.

Similar to the Health Board case, the DistCo case also showed a *rational* approach to selecting steering committee members. In consultation with the MD, the FC selected the steering committee members. The main role of the steering committee involved managing communications and relationship issues and keeping stakeholders formally informed, particularly the MD and the parent company NZNP.

Many decisions, especially those that had a high-cost impact were evaluated at the steering committee level (i.e. the decision to cut modifications and bring the overall cost down). Evaluation results were further tested with business operations before a final decision was made.

> The steering committee has very much been about simply keeping NZNP briefed. (FC, DistCo)

> We wanted people that were both within our organization and outside to give it a level of independence. (IT Manager, DistCo)

Project management team

In the case of the Health Board, PM team formation decisions displayed a *rational* approach. The core of the PM team was put together at the start of the SCO review. Key members were recruited because of their prior experience in similar implementation projects. During implementation, the Health Board PM team was complemented with

experienced ConsultCo members. Having specialized skills and in partnership with ConsultCo, the PM team took a leadership role to deal with problems and achieve an on-time and within-budget implementation.

The formation of the DistCo PM team was a combination of *rational* and *muddling through* decision processes that were influenced by senior management, particularly the MD and the FC. Team formation was informal. The FC fell into the PM role because of her active involvement during ES acquisition. During the acquisition phase, a retired DistCo employee joined the project in the role of a Business Consultant. The IT Manager who joined DistCo during the RFP stage provided the team with the complementary technical experience. During implementation, when the Business Consultant took a more active role in configuring the allocations module, more and more of his time shifted to allocations that became his responsibility.

Applications team

Applications team formation for the Health Board case was a blend of the *rational* and *political* decision processes. The SCO review identified a need for an organizational restructure and rationally guided the selection of implementation team members. Those new positions were advertised. While those positions were open to existing employees, they did not qualify and a significant number of implementation team members included new recruits. New recruits received ES applications training soon after they joined the Health Board to enable their active participation in the later implementation.

Although the decision process for the DistCo applications team formation was informal involving 'cherry picking' people from the business, the process took a *rational* approach. Because DistCo's business is unique, no best-practice software application was available. The knowledge of the business was therefore a key criterion in selecting the implementation team. Applications team members were expected to apply their business knowledge to facilitate the configuration of the new ES application by J. D. Edwards.

DistCo's applications team members included people who were highly experienced in business operations, however their IT skills were not advanced enough to grasp the interdependent relationship between IS and business. Because no training was provided

prior to implementation start, many struggled during the process but they learned a lot and their IT skills developed considerably.

> [The applications team included] key people within the business—in each section. (Business Consultant, DistCo)

> [The applications team included] people with perhaps a more hands-on approach. (Team Leader, DistCo)

> The selection of the project team was really a case of identifying who were the best resources in each area of the business that we needed to provide and bring to the project a level of understanding as to how the business operated in order to model and prototype the One World solution. So it was a bit of a no brainer in that sense. (IT Manager, DistCo)

> We populated the project team with people who do most of the actual day-to-day operations. All the team leaders were in those areas, which was good; they had good knowledge. (FC, DistCo)

6.3.9 Implementation partner (D09)

For the Health Board case, the decision process was formal following common governmental biding procedures. The ES PM team within the organization developed the selection criteria that were written into bid-documents. A closed invitation was issued to a select-list. The evaluation of those bids was a two-step process that first considered bids anonymously, comparing all criteria except cost; prices were ignored to ensure that cost did not affect evaluation results at that point. Cost was considered as part of the second step, which ended with a collective decision favoring the highest score.

The decision process was *rational* following common and well-practiced organizational procedures. The process involved a lot of both analysis in the preparation of bids as well as analysis of bids that were received later. Because of the extensive analyses and the amount of investment involved, this decision had a high level of significance.

The *political* dimension of the decision process can be inferred from the observation that prior involvement of the implementation partner with the Health Board had a high level of influence on the decision's outcome. The ES PM team is believed to have influenced the selection of the implementation partner through both setting the selection criteria and being part of the evaluation team. The selected partner was that same

consulting company that had developed the SCO review and helped in putting together the system's business case.

> We looked for an implementation partner who would actually help us put the business case together; they had to own the business case like we did. (CFO, Health Board)

> To ensure that we left the knowledge with the people in the business rather than just having a bunch of consultants come in, run the whole thing, put it in, walk away, and nobody knows what was done and why. ... We wanted to have a heavy component of our own staff and heavy involvement. ... We had joint responsibilities ... we didn't want it run completely by outside consultants like a lot of things have been here in the past because the consultants walk away with all the knowledge. (Group Accounting Manager, Health Board)

> We listed a whole lot of criteria as to how we were going to evaluate being price, quality, makeup of project team, details on that project, number of labor hours, unit price, and so on. ... One of the criteria was continuity for the organization. ... We compared dollars and skills and depth and everything else as part of our criteria to eventually come to a conclusion, objectively, with the point scoring system. (Redesign Manager, Health Board)

In the case of DistCo, the decision process for the selection of implementation partners followed a *mixed scanning* approach. The process was both informal and incremental. The importance of DistCo taking ownership of their system implementation caused them hesitation to commit to one particular implementation approach during the acquisition process (i.e. the vendor-implementer vs. the third-party implementation partner approach).

It was not until reference checking during contract negotiations had suggested a preference for the vendors-implementer approach that a commitment to J. D. Edwards for the provision of both software and implementation services was made. Because DistCo's business is unique, software configuration was the first for J. D. Edwards in this type of industry. DistCo believed that the strong and close relationship J. D. Edwards and their NZ implementation team enjoyed would be key to resolving any future conflicts if they arose.

> We left that as a question to be solved once we chose who would be our vendor or software vendor. ... [In reference checking, there] was a very strong feeling [that] 'Make the vendor implement it themselves. Don't get involved with a third-party.' (FC, DistCo)

> That was quite critical. We didn't see the need [to use the services of an implementation partner, other than J. D. Edwards], given the way we wanted to operate. (Business Consultant, DistCo)

6.3.10 Implementation strategy (D10)

The implementation strategy decision is identified as the most significant of the 15 decisions studied (refer to section 1.6.2). The outcome of this decision usually drives the choices made for many of the other 14 decisions.

In the case of Health Board, the decision process was highly *rational*. The ES implementation strategy was part of an organization-wide BPR initiative that emphasized minimum customization (i.e. 'vanilla'). This type of strategy is called the "quick advantage" because ES implementation has a clear business focus and takes a very short period of time, approximately six to eight months in this case (Davenport, 2000).

The objective of the ES implementation strategy for the Health Board was to enable the integration of the organizational supply chain. The older implementation of Oracle 10.7 financial applications could not fully support integration, mainly because the system was highly customized. With help from an experienced management consultancy partner, a thorough SCO study produced recommendations that provided a long-term view. The 'vanilla' approach was adopted as one of those recommendations. Throughout ES implementation, the Health Board maintained a strong commitment to this 'vanilla' approach.

> We used the supply chain optimization review to identify what bad habits are. The only way we were going to get rid of those bad habits was to put some quality people in place, go through an upgrade, discipline the processes with minimal configuration, and say 'that's the system and that's how you would use it. I'm sorry if that makes you unhappy, but no more argument.' (Redesign Manager, Health Board)

> We decided how we wanted the business process prior to implementing it. However, we implemented most of the business processes after because we had to have the system in place to do it. So, we couldn't actually alter most of our business processes before and then we had to go-live with both the new system and new business processes. (Group Accounting Manager, Health Board)

In the case of DistCo, the decision process on implementation strategy was incremental following a *muddling through* approach. DistCo started ES implementation with a view that minimum customization was needed. The actual implementation proved the contrary; a gradual shift to a highly customized system that coincided with a BPR

exercise took place. This type of highly customized implementation strategy that maintains an emphasis on key business process improvement is called the "long term competitiveness" approach (Davenport, 2000). Often implementation takes place over a very long period of time, during which key business processes are reevaluated more than once.

DistCo's earlier assumptions about the possibility of minimal software customization were unrealistic. Those assumptions needed to be reevaluated when the ES project cost proved to be too high. Cost cutting exercises provided a better understanding of the interdependencies between business processes and software operations. That understanding triggered a BPR initiative to improve processes at the same time customization decisions were considered.

The PM team maintained a leadership role throughout the process. However, because of the BPR initiative, a lot of smaller decisions needed to take place at the applications team level. The process experienced recurrent delays because most of DistCo's applications team lacked sophisticated IT skills to enable the translation of business process needs into configuration decisions. Due to the iterative nature of the process, the level of analysis was high, and the perspective towards the future expanded beyond the go-live target.

> It wasn't until really over a period of months and months where we understood the product better and they understood our business better that we could actually start to see how we were going to mesh the modifications into the core product. ... [By then,] we actually understood more about the product. We said 'well, okay here's an opportunity for us to reengineer our business.' (IT Manager, DistCo)

> Our premise has been as 'vanilla' as possible but we knew that that was never going to be completely the case and we have reengineered processes where possible. That's definitely been [our] goal. (FC, DistCo)

> It is so hugely modified. Of all the implementations we have in NZ it is probably coming close to being one of the most heavily modified. ... They already had an existing system in place and they wanted to improve on that when they went to the new system and they had to do it in the context of how software worked. (Project Manager-JDE, DistCo)

6.3.11 Go-live strategy (D11)

The Health Board implementation demonstrates a *rational* decision approach to the go-live strategy. In cooperation with the consultancy firm, ConsultCo, the ES PM team opted for a 'big-bang' go-live plan as documented in the system's business case. Running the old and new systems in parallel was not an option; the price was too high and the Health Board had no resources to support it.

> There really wasn't any other option. You literally switch off the old way, upgrade your data at that point, and then you go-live with your fresh data. We didn't have the resources to run accounts payable in parallel. It wasn't practical for our particular implementation plus we actually had a year-end compounded on it. (Group Accounting Manager, Health Board)

The 'big-bang' approach was implemented with a few minor adjustments. Considering the extent of those adjustments, a *mixed scanning* approach can be inferred in the implementation of the go-live decision. Changes included both a few weeks delay of the fixed assets and the Discoverer reporting applications and a staggered users' access. Those changes were implemented to both boost system performance during data migration and ease the load on helpdesk personnel.

> There was some phasing in fixed assets, because we couldn't convert all the data in the downtime period, which was basically taking the live system off line. ... They [fixed assets entries] were loading up the whole register [and it] was actually impacting on everybody else and their conversion processes. We actually couldn't go-live on that until a little bit later. ... We deferred Discoverer a little bit as well. ... Discoverer took a lot of memory and it was deemed let's leave this for a few weeks and just make sure that the purchasing system, all the critical ones are in place. (Group Accounting Manager, Health Board)

> We staggered slightly the start times of the various modules simply to check the load on the system. ... It was a very minor staggered start...so that we could ... get ourselves a bit of a breather rather than have 60 people screaming at once if something went wrong. (Group Accounting Manager, Health Board)

The DistCo implementation also demonstrates a combination of *rational* and *mixed scanning* decision approaches to the go-live strategy. Because the business is contingent on different sections that were not easy to separate, the 'big-bang' approach was adopted. That approach was also cost effective.

Still, the go-live strategy was reconsidered at three points in time during implementation. Those were: (1) at the end of the system configuration phase—because that phase took a very long period of time (four to six months), a partial go-live strategy was considered but was rejected; (2) when the project approached the planned go-live date—a parallel implementation alternative was considered but was discarded; and (3) when approaching the actual go-live—as a contingency measure, a decision was made for one legacy application (News Media) to run in parallel for a few weeks.

The PM team considered the go-live decision jointly with the implementation partner, J. D. Edwards. Because the main objective of those considerations was to make the transition to an operational system, the target was always the go-live date. However, because of accumulated delays, the horizon to this decision was stretched considerably.

> The kick is from the point of view of IT people. They have their requirements in this area because there's a lot of conversion required from the old system. (Business Consultant, DistCo)

> It was something that was pretty obvious; there wasn't really an alternative strategy. The thing with the business is that because their financials and distribution were so integrated [that] it wasn't possible to separate them from a functional basis. ... So it was a bit of a no brainer. (Project Manager-JDE, DistCo)

> It was more important for the business to get it right than to do it quickly. People rely on distributors and in a way you need to be more like a bank. (MD, DistCo)

6.3.12 ES variation strategy (D12)

The decision process for the ES variation strategy in the Health Board implementation followed a *rational* approach. A similar implementation across the seven business units of the Health Board was suitable because it satisfied the standardization goal of the change program.

> The general ledger is not structured with separate companies. ... It's just one organization. So it's driven by the structure of the general ledger at the time (CFO, Health Board).

The decision process for the DistCo case was similar to following a *rational* approach. The PM team had made the decision early in the life of the ES project. The ES project focused on the implementation at the head office, where all data input is managed; the regional office gets access privileges only. There was no need for considering

alternative implementations between the two locations because there was no business need to justify different types of implementations.

> The main implementation is here [head office]. ... What's here is replicated there [regional office]. (Business Consultant, DistCo)

> The business process in the south island [regional office] works exactly the same as it does in here [head office]. There's nothing any different about what they're getting compared to what we've got. It is exactly the same process, just different location. (Team Leader, DistCo)

> It's similar to what happens in here [head office]. So it's only a very small part of the process that actually happens down there [regional office]. A lot of the work is actually done for them here anyway. (Project Manager-JDE, DistCo)

> They're simply an extension of our warehouse here [head office] in the way they operate. All other processes are centralized here [head office]. (FC, DistCo)

6.3.13 Personnel training strategy (D13)

Personnel training was key to the management of the ES implementation at the Health Board. The training strategy had clear objectives, the most important of which was to prepare the Health Board team to take full responsibility of the new ES after go-live. The plan that operationalized this strategy was carefully prepared before the start of the ES project and was revised when needed. Hence, the decision process regarding training decisions for the Health Board case followed a *mixed scanning* approach.

In March 2000, shortly after operational team leaders started their new jobs, the first phase of training that focused on the Oracle ES applications started. The purpose of the first phase was for new recruits to understand the software well enough to be able later to make informed decisions. The second phase of training was the training of users in preparation for the go-live date. The initial plan was for module champions to provide user training in their functional divisions. However, due to a busy implementation schedule, end-user training was outsourced.

The Health Board used training as both a knowledge transfer and a change management strategy at different times before, during and after go-live. The PM team was central to all training decisions, conducting analysis as the situation changed with a strong focus on meeting project deadlines.

> We started a quite comprehensive training program to get them [module champions] trained, because a lot of them never had Oracle experience. ... They also got a feel for what other functionality was available and how it could be used better ... and start[ed] to question business processes in place and look[ed] at best-practice...So really their focus actually in their first few months was understanding Oracle as much as they could while sort of trying to also hit the ground running in their new roles. (Group Accounting Manager, Health Board)

> Train-the-trainer was the plan, but because of all of the problems in the software and moving implementation date, we had to bring extra resource to do that. (Redesign Manager, Health Board)

> We reran the Discoverer training again later because it was so busy. Pretty much everybody forgot how to use it. Discoverer is a reporting package. It wasn't critical to them to know right then. (Group Accounting Manager, Health Board)

Since the early phases of the ES project, DistCo had made a commitment to the train-the-trainer approach. The decision process associated with training decisions followed a *rational* approach that was influenced by senior management and endorsed by the implementation partner, J. D. Edwards. The strategy suited DistCo well; particularly because it was difficult to find trainers who could understand DistCo's unique processes better than DistCo's employees. It was also less costly to train internal people than to bring in external consultants.

This train-the-trainer strategy was effective in utilizing the business knowledge employees had gained over long years of working with the company. In approaching the go-live, the training strategy became more appropriate in keeping everyone, both team members and end-users, motivated and in touch with implementation progress.

> Some of the allocations processes are very detailed and you have to understand the business to understand why things are done. So it would be pointless trying to bring somebody in from outside as a specialist trainer without specialist business knowledge. ... We just felt that we'd rather take people's specialist business knowledge and give them training skills because they were to be an ongoing resource for the business ... when the system went live. ... There was a focus on enabling people internally to act as trainers in the key processes so that they could then answer questions once they'd gone live and provide solutions. We weren't dependent on the consultants. (MD, DistCo)

> In a place like DistCo generally that's not appropriate because so much of their systems were modified. There are a few little parts of their system where they could potentially take that 'vanilla' end-user training. (Project Manager-JDE, DistCo)

It was price that drove that. (FC, DistCo)

6.3.14 Reporting needs (D14)

In the case of the Health Board, the decision process for the identification of ES reports followed the *mixed scanning* approach. Reporting needs were guided by a 'vanilla' implementation approach that minimized both the cost and time of implementation. At the start of the ES project, reporting needs were prioritized. While operational team leaders were responsible for ranking the reports in their functional areas, the PM team had the overarching responsibility for both the coordination and prioritization of all reports. The reports considered at the start of the project were reevaluated several times before go-live, to check both their relevancy and urgency. After go-live, a third-party report-writer was approached to re-write or reengineer some of the reports that caused low system performance.

This start-stop is typical of *mixed scanning* approach. In concert with other implementation activities, decision-making was a recurrent process of report prioritization that continued until system go-live.

> Because it was a limited implementation, we didn't say 'okay folks what reports do you want'? We said 'this is what you've had in the past; this is what we think you need.' ... Every module champion, as part of their review of the system also had to identify critical reports...I was the one who said 'hey we're running out of time here, drop this report as it's not as important as another one.' So ... I was sort of the overarching. ... I would have a look at the overall priorities. (Group Accounting Manager, Health Board)

In the case of DistCo, the decision process to identify ES application reports followed the *muddling through* approach. Reporting needs were decided through a process of documenting existing systems and evaluating legacy systems reports. Both the PM team and the applications team were involved, however final decisions often rested with senior management.

When system specifications (D05) were reviewed to bring the ES project costs down, all reports were also reevaluated and prioritized—the quicker a report was needed after go-live, the higher it scored. From that point forward, and with only a few exceptions, all new reports were postponed to the post go-live or the realization phase.

> We documented all the reports that we used in the system. ... We evaluated them to see if we still needed them or if we didn't and how that they would best fit. (FC, DistCo)

> We approached all the different areas, asked them for all the reports that they used. They had a look at what they were trying to get out of them and then had a look at J. D. Edwards OneWorld and how we were going to produce the same documentation. ... These decisions were made at a higher level. (Team Leader, DistCo)

> The understanding is that we'll get exactly the same reports that we currently get. (Operations Manager, DistCo)

6.3.15 Maintenance strategy (D15)

The maintenance strategy is concerned with what is going to happen after the ES is live and operational. The focus on the maintenance strategy in this study is two-fold, one is concerned with system upgrades and the other is the extension to existing system. Extension can either be a phase II implementation, where new ES modules are added or it can be the implementation of specialized 3rd party or bolt-on functionalities.

The Health Board system business case had recommended dividing the implementation into two phases: phase I (financials, purchasing, and fixed assets) and phase II (human resources and payroll). Packaging the two phases into one was seen as a difficult, costly, and high-risk alternative. The decision can therefore be perceived as *rational.*

> At the time when we wrote the business case, the business couldn't afford to deal with them all at once. There was not enough money so we split it into two phases. ... The plan was always that once we'd finished the upgrade, we would start phase II. So, we were lined up to write a business case to go to the Board in June 2001, which we couldn't. (Redesign Manager, Health Board)

After the go-live of phase I, the new system had to go through a stabilization phase to be fully operational. During that phase, a new service pack upgrade was undertaken. While the Health Board had not planned for such a quick upgrade, they had been convinced by Oracle to go through with it. The new upgrade promised to fix the problems of the new release of Oracle 11i, which had just been implemented.

The upgrade process took approximately eight months and ended with a post-implementation review that confirmed the achievement of phase I objectives. The upgrade decision process had therefore been *rational.* The decision was made in

response to an existing problem and problem evaluation that had recommended the upgrade as the best solution.

Even when the upgrade was complete, the new system still needed further time to get bedded into the organization. It was not until three years after go-live that people had started realizing the benefits of the new system and were ready for phase II to proceed. This, plus a huge financial deficit the Health Board had suffered during those years, had delayed the start of phase II. Approximately three years post go-live, a business case is being considered for phase II to proceed.

While the initial decision about phasing ES implementation was *rational*, the *political* approach is evident in the delay of phase II. The impact of an ES implementation on the Health Board took longer to be absorbed and delayed the start of phase II implementation.

> We couldn't do because: (1) No more money, (2) The quality of the software ... had pushed us into a work environment where we were so busy we had to get the upgrade completed. So the combination of the two meant that we pushed out phase II. (Redesign Manager, Health Board)

> It's only in the last 12 months that the organization now sees HRIS [human resources information system] as one of the highest needs. ... Why? Because ... executives now see that the quality of data in the organization around people needs improving, to manage our most important and largest asset—staff. (CFO, Health Board)

The DistCo system business case did not consider a strategy for phase II. Phase I needed to be bedded in before a strategy for the next phase could be defined. Decisions for phase II were considered 'business decisions'; they needed both a return on investment justification and approval by the NZNP board to proceed. Phase II plans therefore remained on hold waiting for implementation go-live as first priority.

DistCo also had no clear plans for the upgrades. By the time DistCo Australia started its J. D. Edwards implementation, DistCo had already accomplished some extensive development work. To take advantage of their progress and to cut project costs, DistCo entered into an agreement with DistCo Australia and sold its ES development work to the latter company. As a result, DistCo upgrade decisions were coupled to the software upgrades DistCo Australia were using.

Whether this cooperative relationship between DistCo and DistCo Australia was going to continue was not clear because the implementation at DistCo Australia is shifting along a different route. Furthermore, because the new ES was heavily modified, DistCo was warned that upgrading would not be an easy job.

The decision process for the maintenance strategy had followed a *muddling through* approach with analysis conducted as the situation developed. DistCo's senior management and its parent company NZNP were the main influential decision-makers.

> Because we have shared some of our development work with the DistCo implementation in Australia, we're currently working in parallel to make sure that we stay with the same version at all times so we can pass objects between ourselves without any difficulty. (FC, DistCo)

> At this stage I couldn't say that I've got any particular needs identified. (Business Consultant, DistCo)

> Because the software is so heavily modified it's going to be a major issue remerging the modifications with the new release. There's been no discussion about when they might upgrade to a new release. (Project Manager-JDE, DistCo)

6.4 Pattern and focus of strategic ES decision-making: A cross-case comparison

This section provides a cross-case comparison of the two ES implementations. The two cases are analyzed for the similarities and differences along the two categories of decision-making pattern and decision-making focus. Explanations for the impact of these categories on implementation outcomes are also discussed.

6.4.1 Pattern of the ES decision process

The analysis of the decision process pertaining to the 15 key ES implementation decisions has revealed that the ES decision-making reflected only four out of the five a priori models applied in this study. Although previous literature (Sabherwal and King, 1995) suggested that the *garbage-can* decision approach would be common in inter-organizational IT systems, this was not the case here. The *garbage-can* decision approach was not detected. Table 6-5 provides a summary of the five decision processes observed in the two case studies.

Table 6-5: ES Decision-making: A cross-case summary

A priori decision models	DistCo (of 15 ES decisions)	Health Board (of 15 ES decisions)	Total (of 30 ES decisions)
Rational	5	6	11
Mixed scanning	3	3	6
Muddling through	6	0	6
Rational-Political	0	5	5
Rational-Mixed scanning	1	1	2

The absence of the *garbage-can* decision approach can be explained in the following way. First, the strategic nature of ES applications requires key decisions to undergo some type of decision evaluation before decisions are made or implemented. Second, an ES implementation is very different from the traditional IS implementation (Howcroft and Light, 2002; Sawyer, 2001), therefore a match of existing solutions to emergent implementation problems, which is the premise of the *garbage-can* model, could not be made. The third explanation is that IT implementations studied in the Sabherwal and King (1995) study are what are defined as bolt-on applications in this study. Because implementations of bolt-on applications were limited in the two cases studied, a validation of that proposition could not be established. Hence suggesting further investigation of the ES decision process during a post-implementation or the realization phase.

Another observation was that a combination of decision-making approaches was observed in seven of a total of 30 decisions. All those combinations had included the *rational* model plus either of the *muddling through*, the *mixed scanning* or the *political* model. This confirmed assumptions earlier studies had made about the dominance of the *rational* approach in both strategic decision-making (Bourgeois and Eisenhardt, 1988; Pinfield, 1986) and strategic IT decision-making (Franz and Robey, 1984; Ranganathan and Sethi, 2000; Ranganathan and Sethi, 2002).

The combination approach also confirms that for some strategic decisions, the decision process does change during implementation. In the case of the Health Board, for example, there was a great emphasis on project completion. While the *rational* approach

prevailed during the early phases of the ES project, other approaches became more dominant later, either to speed actions or to lessen implementation impacts. Certainly ES implementation is a dynamic process. As a result, "successful organizations modify goals, plans, and execution," both to respond to changing situations or to modify unrealistic goals and plans (Markus and Tanis, 2000, p. 198)

The impact of the decision approach on implementation outcomes was noted to have an influence on meeting or stretching project deadlines. Decisions that are associated with a *muddling through* approach often took longer and pushed implementations deadlines more than once. Delays in ES implementation bring major consequences, such as overspending, loss of implementation knowledge that results from either consultants or staff turnover, and loss of personnel commitment and motivation. All those are reported to have a negative effect on implementation success (Markus and Tanis, 2000).

In contrast to *muddling through* decisions are decisions that were associated with the *mixed scanning* approach. In a *mixed scanning* approach, the problem needing a decision was too complex to be dealt within one decision. But because the objective for making the decision was clear since the early deliberations, an interim solution was often enough to move implementation one step forward. A few more steps that were tailored to changing implementation situations kept the process rolling.

The *political* approach had the ability to deal with rapid changes, especially when a deadline was critical. Those changes would have otherwise failed to materialize if they had gone through normal organizational channels.

A comparison between common ES implementation problems (Markus et al., 2000a) with those observed in the two cases studied, the DistCo case study demonstrates far more problems than the Health Board case study. An outcome of many problems is that some problems of earlier phases remain unresolved and come to the surface only in later phases. Using the Markus et al. (2000a) framework, Table 6-6 compares ES implementation problems in the two case studies.

The analysis of decision process pattern for both the DistCo and the Health Board case is provided next.

Table 6-6: Common ES implementation problems: A cross-case comparison

Common ES implementation problems (Markus et al., 2000a)	DistCo	Health Board
Software modifications	Software modifications decisions were made early in the project when DistCo did not understand the software thoroughly and the implementation vendor did not understand the business well. The difficulty of getting modifications to work well together was the cause of a significant delay.	ES software modifications were kept to a minimum, thus lessening the impact of such a problem.
ES product and implementation consultants	The implementation vendor declined to take responsibility for coordinating IT infrastructure activities. The project team came to a decision but had to revise it later because of performance problems. The implementation vendor lost a few key personnel midway through implementation.	The implementation consultant participated in the decision-making process for coordinating IT infrastructure activities. Even when the decision had to be revised later because of performance problems, alternatives were already explored and documented. Exit clauses in IT platform contracts also made a quick change possible. The implementation consultant had the capacity and did replace key personnel during implementation when personal circumstance necessitated taking a leave.
Approaching ERP implementations from an excessively functional perspective	DistCo had to re-write the ES requirement specifications to adhere to budget limits. In the process, they started exploring and later implemented business process change. Thus, the process was iterative causing further delays to the ES project.	Even though the Health Board had previous experience with ES financials, although a negative one, the project team still went through aggressive ES training early. That helped to create a clear understanding of the dependencies between functions early in the project.
Inadequate testing	To cut costs, the inexperienced DistCo project team took responsibility for final testing. As a result, problems were left unresolved until later when the implementation vendor regained control to draw an end to a lengthy testing phase.	The implementation consultant presence during implementation remained constant until go-live. Support and quality control of key tasks were always maintained. Therefore, the testing problem did not materialize.
Data quality problems	The IT function took responsibility for re-organizing the data on top of the day-to-day support they needed to provide. Resources were stretched, thus both affecting the quality of the outcomes and further extending the project.	No such problems were reported.
Company-specific problems	The confusion over the suitability of a 'vanilla' approach to the unique nature of the DistCo business was one major problem that had a roll-over effect on most ES implementation decisions. A shift from a 'vanilla' approach to a high customization approach took place during implementation.	Organization inefficiencies were well addressed prior to implementation start. ES implementation was one component of a bigger plan to overcome those problems.

6.4.1.1 DistCo case

Except for three decisions that showed a strong *mixed scanning* approach, the comparison of the ES decision process with the five a priori decision-making models in the literature showed that decisions followed the *rational,* the *muddling through* or a combination of the two approaches (refer to Table 6-7). A brief summary relating SDM characteristics for each of the 15 decisions to those a priori models is included in Appendix E.

Table 6-7: The ES decision-making process: DistCo

ES decisions	DistCo
D02-Evaluation partners	
D05-Functionalities & modules	
D07-IT infrastructure	Muddling through
D10-Implementation strategy	
D14-Reporting needs	
D15-Maintenance strategy	
D01-Evaluation team	
D06-Bolt-on applications	
D08-Implementation team (Applications team)	Rational
D12-ES variation strategy	
D13-Personnel training	
D03-Vendor	
D04-Key business processes	Mixed scanning
D09-Implementation partners	
D11-Go-live strategy	Rational-Mixed scanning

The *muddling through* approach is typical when a decision is made incrementally and, during the process, the goal of implementing the decision changes. Surprisingly for DistCo, change was sometimes divergent. One dramatic change was that of the implementation strategy (D10). It is unclear how, with a thorough understanding of their unique type of business and the meticulous investigation process during system acquisition, that DistCo had projected a 'vanilla' implementation. It was only when

configuration decisions were reconsidered that an incremental change to the highly customized implementation started to develop. Most of the *muddling through* decisions in this case were affected by this critical turnaround in the implementation strategy.

An explanation of the *muddling through* or the incremental decision-making approach in this case arises from the premise that because "complex problems cannot be completely analyzed ... strategies for skillful incompleteness" are required (Lindblom, 1979, p. 524). On the basis of this argument, incremental decision-making is neither negative nor ineffective. On the contrary, resolving complex problems incrementally is a better approach than the stand still of the analysis-paralysis situation.

DistCo faced a complex problem of a first-time implementation of an integrated system. Constrained by a unique business model, limited resources, and an obligation to conform to organization-wide policies, DistCo sailed through implementation with poise. Skillfulness in the decision process was demonstrated through employing a variety of strategies in a trial-and-error sequence to clarify objectives and move implementation forward. Each of the decisions associated with a *muddling through* approach serves as an example of the use of those tactics. One draw back to incrementalism is its lengthiness. Nevertheless, "a fast moving sequence of small changes can more speedily accomplish a drastic alteration of the status quo than can ... infrequent ... change" (Lindblom, 1979, p. 520).

In summary, the ES implementation process was delayed and the go-live date shifted more than once. Change that was incremental facilitated organizational learning and allowed sufficient time to validate ES configurations. This was critical for a first implementation of the ES product in this type of business. As a result, success was associated with overcoming obstacles and resolving problems instead of a traditional focus on go-live results.

6.4.1.2 Health Board case

The comparison of the ES decision process pertaining to the 15 decisions with the five a priori decision-making models in the literature shows that the *rational* approach prevails. Except for two decisions that showed a strong *mixed scanning* approach, the decision process for other decisions followed either a *rational*, or a combination of *rational* plus the *mixed scanning* or the *political* approaches (refer to Table 6-8). A brief

summary relating SDM characteristics for each of the 15 decisions to those a priori models is included in Appendix F.

Table 6-8: The ES decision-making process: Health Board

ES decisions	A priori decision models
D01-Evaluation team	Rational
D03-Vendor	
D05-Functionalities & modules	
D06-Bolt-on applications	
D10-Implementation strategy	
D12-ES variation strategy	
D02-Evaluation partners	Rational-Political
D07-IT infrastructure	
D08-Implementation team (Applications team)	
D09-Implementation partners	
D15-Maintenance strategy	
D04-Key business processes	Mixed scanning
D13-Personnel training	
D14-Reporting needs	
D11-Go-live strategy	Rational-Mixed scanning

A *rational* decision process included a study of a problem that was followed by an evaluation of a few alternatives and the selection of a course of action that fulfilled a clear objective for the Health Board. The decision process for each of the six *rational* decisions had been relatively quick. Decisions were well justified according to clear objectives. No further consideration for any of the six decisions was needed during implementation.

A *rational-political* decision process displayed both elements of rationality and politics. Five *rational-political* decisions are observed in this case. Two of these, the IT infrastructure (D07) and maintenance strategy (D15) decisions, the initial decision was made rationally but the review of the decision later demonstrated a political dimension

in the process. The political influence in this case had helped to resolve problems quickly.

A *rational-mixed scanning* decision process was observed when the initial decision was made rationality; however, its execution had required several tactical changes in response to implementation demands. This approach is also known as "rational planning with adaptive execution" (Bourgeois and Eisenhardt, 1987, p. 830). The two *rational-mixed scanning* decisions in this case included the go-live strategy (D11) and reporting needs (D14).

Examples of a *mixed scanning* decision process were those of key business processes (D04) and personnel training (D13). It's main feature was that the decision was made incrementally, however, its purpose remained clear and did not change until the goal was fulfilled.

Evidence in the literature suggests a strong association between quick and successful decisions (Bourgeois and Eisenhardt, 1987; Eisenhardt, 1989b; Hayashi, 2001; Roberto, 2000). This relationship was better explained by Eisenhardt (1989b) who hypothesized that quickness speeds up the learning process, thus "executives learn by making decisions" (p. 560). Decision success is often defined to encompass the two dimensions of efficiency, which includes both cost and time, and effectiveness that includes meeting preset objectives.

Several tactics are suggested in the literature to enable quick decision-making (Eisenhardt, 1989b; Hayashi, 2001; Roberto, 2000). Those include: (1) developing a clear vision and translating it into operational criteria, (2) developing and eliminating alternatives simultaneously, (3) developing a contingency plan (i.e. multiple scenarios), (4) using experienced counselors, (5) using real-time (as opposed to planning information), and (6) integrating decisions.

The Health Board case demonstrates the use of many of those tactics. The ES implementation process was preceded by the development and operationalization of the organization vision. Several alternatives were thoroughly explored and those eliminated were put into contingency plans for risk mitigation. Plans provided a fallback position that facilitated a quick action when several decisions were reconsidered. The partnership with the management consultancy firm provided both the depth and wealth of

experience that covered not only the technicality of ES implementation but also change management and organizational re-design. The ES implementation team structure mirrored module champions with implementation consultants to ensure balanced and timely feedback. Finally, ES decisions were well integrated into the organizational change program and hence progressed from a focus on vision to people and partnerships then to technology, and later to configuration (this is discussed in more detail in section 6.4.2).

What is of interest in this case is that political decision-making facilitated a quick and effective decision-making. While there is evidence in the literature that indicates that politics slows the decision process (Bourgeois and Eisenhardt, 1987) or renders ineffective decisions (Dean and Sharfman, 1996), this was the contrary in the Health Board case. The explanation for that could be that politics was often associated with rationality. And since rationality enabled an objective evaluation of alternatives, political decision-making was exercised to facilitate actions that were founded on prior analysis. Furthermore, powerful decision-makers, similar to those reported in the Health Board case, are able to use less sophisticated assessment and still make decisions (Nutt, 2000).

In summary, facilitating an on-time implementation was critical for the Health Board. End-of-year reports had to be prepared using the new ES shortly after go-live. Furthermore, working with a tight budget, contingency spending was difficult to secure if delays were to accumulate. As a result, most decisions needed to be made and implemented in a timely manner. As discussed before, ES decision-making was one means to achieve implementation targets.

6.4.1.3 Summary

The comparison of ES decision-making between the two cases essentially reveals that there are both similarities and differences (refer to Table 6-9). What stands out in comparing the two implementations is that one particular decision-making approach stands out for each of the two implementations: the *political* for the Health Board and the *muddling through* for DistCo. This difference can perhaps describe the nature of the two implementations.

Table 6-9: The ES decision-making process: A cross-case comparison

ES decisions	DistCo	Health Board
D01-Evaluation team	Rational	
D04-Key business processes	Mixed scanning	
D06-Bolt-on applications	Rational	
D11-Go-live strategy	Rational-Mixed scanning	
D12-ES variation strategy	Rational	
D02-Evaluation partners	Muddling through	Rational-Political
D03-Vendor	Mixed scanning	Rational
D05-Functionalities & modules	Muddling through	Rational
D07-IT infrastructure	Muddling through	Rational-Political
D08-Implementation team (Applications team)	Rational	Rational-Political
D09-Implementation partners	Mixed scanning	Rational-Political
D10-Implementation strategy	Muddling through	Rational
D13-Personnel training	Rational	Mixed scanning
D14-Reporting needs	Muddling through	Mixed scanning
D15-Maintenance strategy	Muddling through	Rational-Political

The Health Board implementation was thoroughly planned with the consulting partner involved during all phases. But even though the planning process was highly rational, implementation included many challenging problems. Knowing that any delay would jeopardize the success of the project, problems were resolved quickly with the strong leadership of key organizational stakeholders.

The DistCo implementation was challenging for all parties involved. Whether or not the seeking of consulting expertise, either during preparation or for implementation, could have changed the outcome, is unknown. But because of the unique type of business and the amount of customization involved, *muddling through* might have been the only alternative. ES implementation was certainly learning through a process of discovery.

6.4.2 Focus of the ES decision process

This study conceptualizes the implementation process as a collection of 15 strategic ES decisions. Those decisions, as defined earlier in chapter one, can be categorized into four clusters that capture decision emphasis. Those clusters are vision, people and partnership, technology, and configuration. Table 6-10 shows the four categories and the specific decisions they encompass.

Table 6-10: Focus of strategic ES decisions

Focus	#	ES decisions
Vision	D-04	Decide on key business processes
	D-10	Decide on implementation strategy
	D-15	Decide on maintenance strategy
People and partnership	D-01	Decide on evaluation team
	D-02	Decide on evaluation partners
	D-08	Decide on implementation team
	D-09	Decide on implementation partners
	D-13	Decide on personnel training strategy
Technology	D-03	Decide on vendor
	D-06	Decide on bolt-on applications
	D-07	Decide on IT infrastructure
	D-11	Decide on go-live strategy
	D-12	Decide on ES variation strategy
Configuration	D-05	Decide on functionalities and modules
	D-14	Decide on reporting needs

6.4.2.1 DistCo case

At DistCo, the analysis of ES decision stories to indicate decision-making focus during the four phases of preparation, design, implementation, and realization is summarized in the following paragraphs.

The preparation phase included three stages: RFI, RFP, and contract negotiations. The focus of the preparation phase was on organizing implementation teams and choosing the appropriate technology.

The three main activities of the design phase included defining system specifications, training users, and developing a prototype for the new system. During the design phase, both technology and configuration issues took center stage.

The implementation phase still focused on configuring the ES using its design blueprint. One major technology decision, the IT infrastructure (D07), was reviewed during that phase.

The realization phase started when the system went live and focused on stabilizing the new system to run smoothly. Developing a vision for the new system was an incremental process throughout the four phases. Figure 6-1 highlights the four focus areas across the four phases for DistCo (refer to Figure 4-2 for detail of decision clusters).

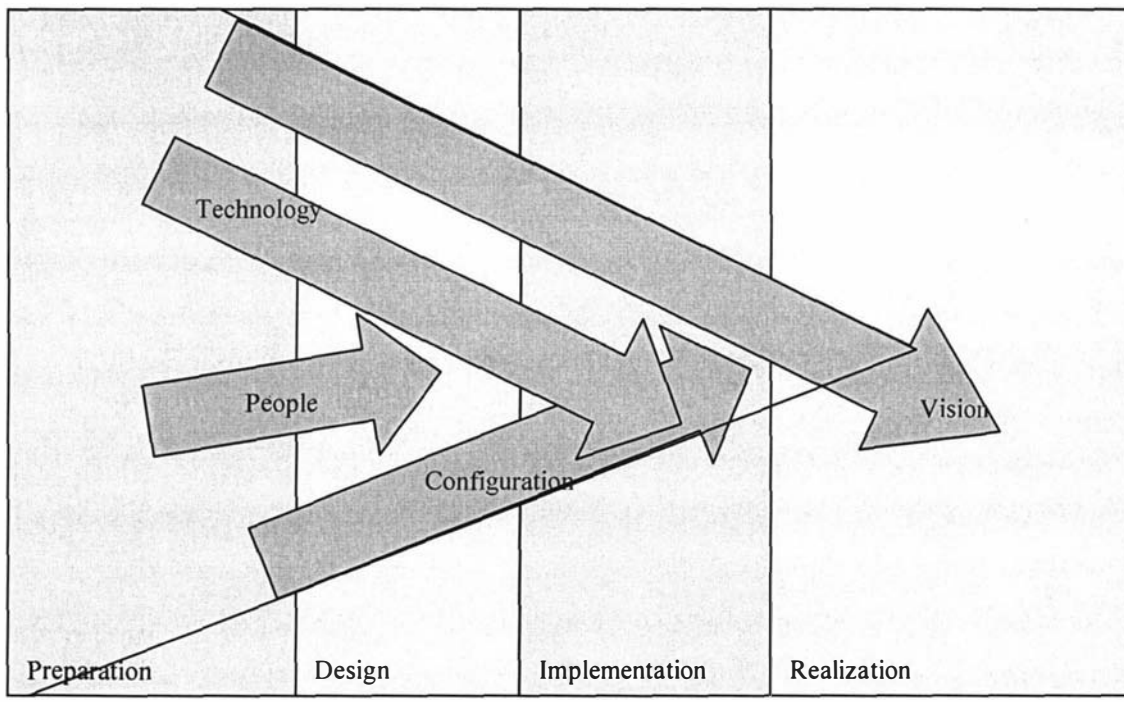

Figure 6-1: ES implementation focus across four phases: DistCo

6.4.2.2 Health Board case

At the Health Board, the analysis of ES decision stories during the four implementation phases indicated both similarities and differences in decision-making focus to that of the DistCo case. Figure 6-2 highlights the four focus areas across the four phases for the Health Board.

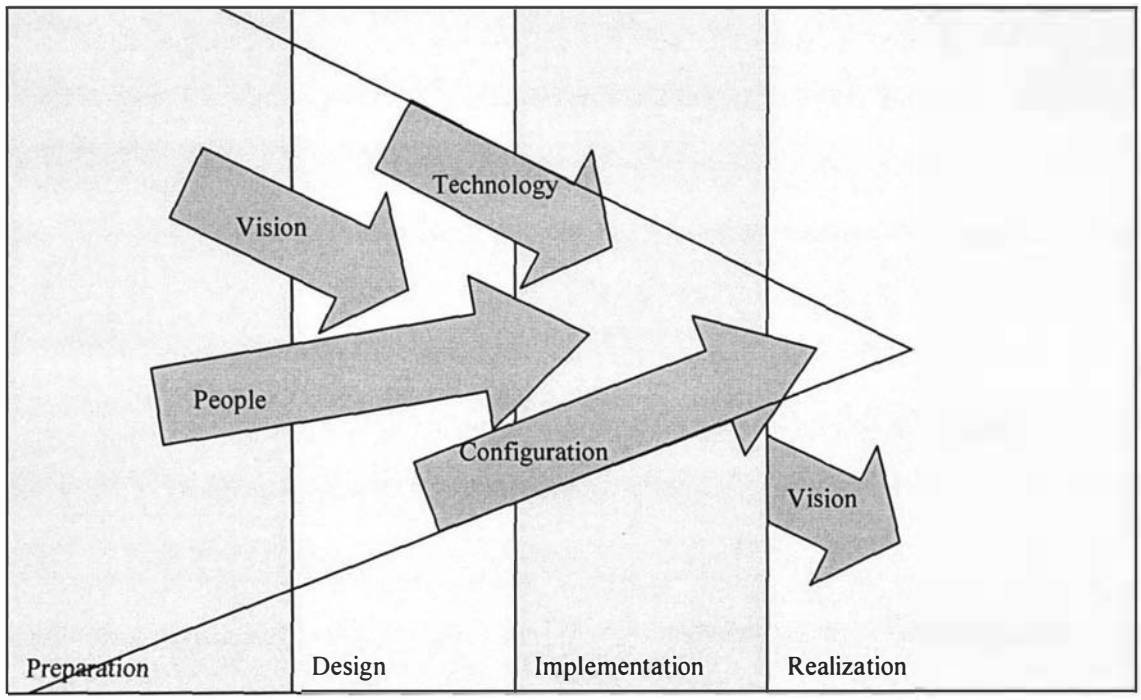

Figure 6-2: ES implementation focus across four phases: Health Board

The focus of the preparation phase was on developing a vision for the new system and starting the process for putting together core implementation teams.

During the design phase, technology and configuration issues took center stage. Implementation teams were further defined through processes of organizational recruitment, training, and implementation partnership.

The implementation phase focused on configuring the new ES using its design blueprint. The realization phase, which started when the system went live, focused on operationally stabilizing the new system to support organizational change.

During the *realization* phase, two upgrades were implemented and a post-implementation review concluded that the system objectives had been realized. However, it was only three years after go-live that benefits of implementing the system became visible across the different functions of the organization to trigger a start to phase II.

6.4.2.3 Summary

ES decision-making in the DistCo case started with a focus on technology where the ES acquisition process dominated the preparation phase. People and partnership decisions

were made around the vendor selection process. Configuration decisions followed with a similar emphasis on technology. Because implementation vision was developing incrementally during the process, a major revision in ES configuration needed to take place when business assumptions were scrutinized. This had a roller coaster effect on technology decisions and was the start of several iterations of technology and configuration decision-making in the lead up to go-live.

It is noted that although early deliberations had definitely included vision-focus decisions, the level of detail to these decisions was not enough. Vision-focus decisions form the basis for the detailed decisions that are made later in the life of the project. The iterative considerations of vision, configuration, and technology had built major delays into the project. The benefit however, was that delay allowed for change to be introduced gracefully. Incremental change was probably important in an organization where many employees have both a long history of working for the company and outdated IT skills. The process was a huge learning experience for all.

ES decision-making in the Health Board case showed a progressional change in focus from vision to people, then to technology and finally to configuration. ES implementation had therefore started with a clear focus on enabling organizational change. Both an organizational restructuring and the ES implementation were the stepping stones to the realization of this change. People and partnership decisions were dealt with first before moving to technology. This ensured that the necessary expertise from both internal people and the consultancy partner was available to make informed technology decisions. Finally, a framework for the ES technology was identified to provide the basis for configuration decisions.

It is clear that ES decision-making had progressed from high-level or significant strategic decisions to those that are low-level where the implementation strategy is operationalized. This made it possible for implementation to finish in time and within-budget despite the relatively short six-month duration.

It can be concluded that the Health Board case provided an example of an ideal implementation where systematic preparation had enabled ES implementation to progress making high-level decisions early in the implementation lifecycle and moving to low-level decisions later. While high-level decisions are more significant in the way

they draw the implementation roadmap, low-level decisions are those that operationalize the ES plan and make go-live possible.

The next section gives an overview of the analysis strategy applied in this study before concluding with chapter summary.

6.5 The analysis strategy: An overview

The main analytical strategy applied in this study is a combination of explanation building and the development of case study chronologies. Explanation building was applied using the alternate templates approach (Langley, 1999). In this approach, the "analyst proposes several alternative interpretations of the same events based on different but internally coherent sets of a priori theoretical premises" (p. 698). This section explains the application of the alternate templates approach in this study and justifies changes in the way it was implemented.

Using the alternate templates approach (Langley, 1999), each of the 15 ES decisions was compared with five a priori models in the literature—*rational, muddling through, mixed scanning, garbage-can,* and *political*—to indicate the model that better explained the decision process.

This strategy for theorizing from process data provides opportunities for exploring the decision process by means of using several lenses instead of only one. Although it was possible in this study to adopt the strategy as-is, especially that several occasions existed when two or more SDM models could be applied to one particular decision, the study took a slightly different approach. There are two reasons for that. The first is to maintain parsimony and the second is to avoid the confusion that would arise from the information overload when each of the 15 decisions is explored by means of different lenses (i.e. different SDM models). The approach this study adopts stipulates that either one or a combination of two SDM models is enough to explain the decision process for any one decision.

The drawback in the adopted approach limited the alternative interpretations that existed in the rich case study data. These interpretations may be visible to the reader of the analyses results in this chapter. For example, several decisions are open to two or even three interpretations (i.e. one decision can either be explained using a *rational, mixed*

scanning or a *political* model). However, weighing the advantages and disadvantage of the two approaches—the reporting of one or several plausible interpretations for a particular decision, this study chose to report the findings using the lens that better explained the ES decision process.

Reporting using one plausible lens is a legible approach here because study findings achieved comparable outcomes to these reported in studies of strategic implementation decisions (Allison, 1969; Pinfield, 1986) and IT diffusion decisions (Baskerville and Pries-Heje, 2001), which use alternate lenses.

If ES implementation is conceptualized as one grand decision, then it would be more appropriate to subject this decision to several interpretations. In this study, however, this grand decision is conceptualized as a collection of smaller decisions, which necessitated adjusting the analysis approach.

For example, if the ES decision process for any of the two cases studied here is considered as one grand decision, it becomes apparent that several interpretations of the findings are possible. As a result, several SDM models could be used to interpret the case. Consequently, the end product of the analysis is similar even though the underlying analysis approach was not exactly the same.

Figure 6-3 illustrates the within-case and cross-case comparison strategy adopted in this study. In summary, the analysis strategy included the following four steps:

(1) Each of the 15 decisions in one case was compared to the five a priori SDM models in the literature for similarities and differences in the decision-making approach. Either one or a combination of two SDM models that best captured decision-making was chosen.

(2) For each case, the 15 decisions were compared together to validate initial analyses results, to provide an understanding of the case as a whole, and to develop a case chronology.

(3) ES decisions from the first case were compared with their counterparts in the second case (i.e. D01 in the first case with D01 in the second case) for similarities and differences in the decision-making approach. This provided further validation to the findings.

(4) The two case study chronologies were compared to explore similarities and differences of the relationship between the ES decisions process, ES decision focus, and the implementation process.

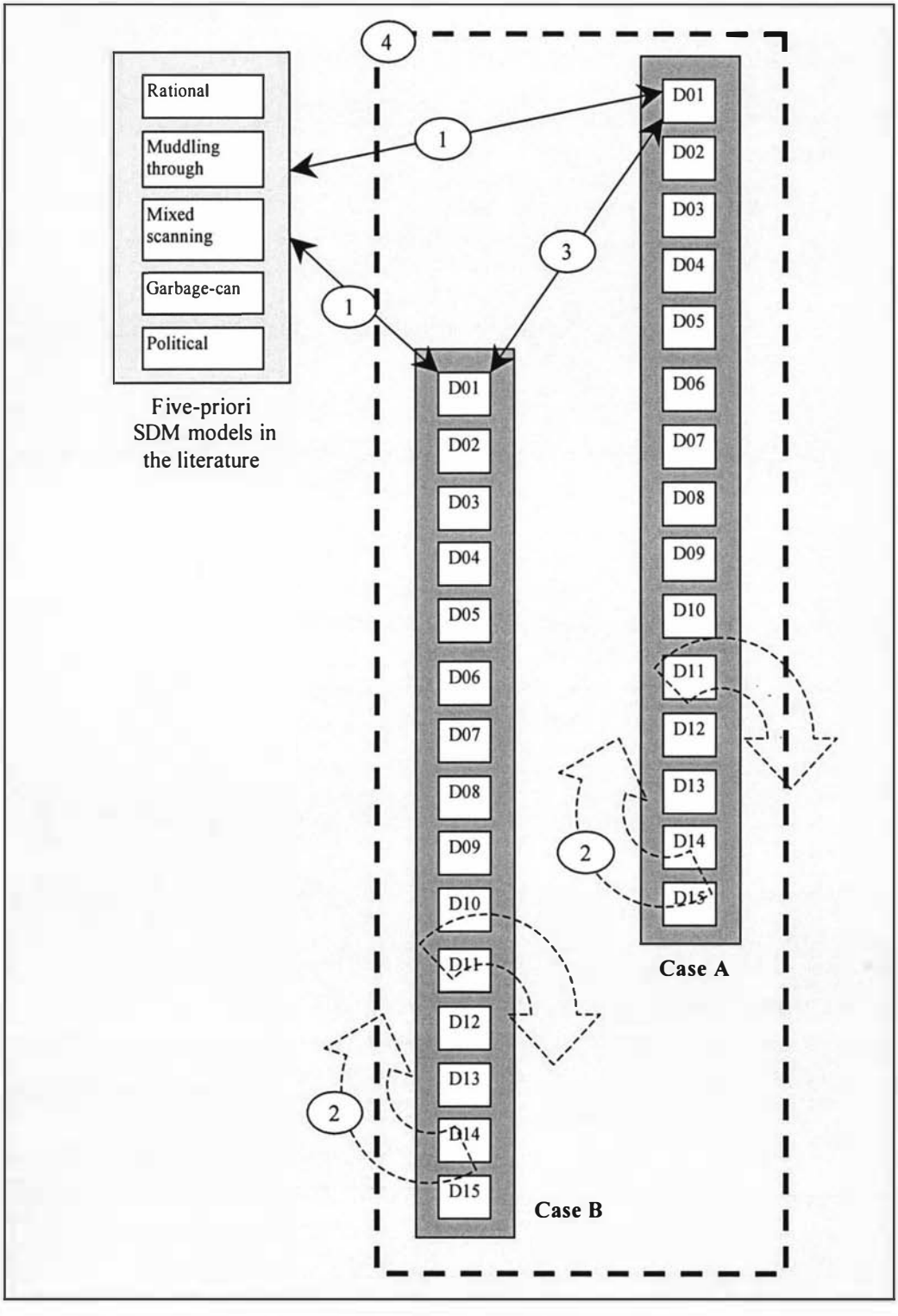

Figure 6-3: Analyses: within and cross-case comparison

Legend:
Within-case analysis: steps 1 and 2
Cross-case analysis: steps 3 and 4

6.6 Summary

While the preceding chapters provided a description for the decision-making and execution of strategic ES decisions, this section attempts to explain the impact of the ES decision process on implementation outcomes.

The comparison of the ES decision process for each of the 15 ES decisions with the five a priori models in the literature—*rational*, *muddling through, mixed scanning, garbage-can,* and *political*—indicated the model that better explained decision-making during ES implementation (refer to Figure 6-3).

A cross-case comparison of the two different implementations was lastly provided. The two cases were analyzed for the similarities and differences along the two categories of decision-making pattern and decision-making focus. Explanations for the impact of these categories on implementation outcomes were discussed.

The next chapter concludes this study, summarizing both its contributions and limitations and providing suggestions for future research.

7. Chapter Seven: Conclusions

7.1 Overview

The overall aim of this study was to provide an understanding of the complex process of ES implementation through focusing on the decision process pertaining to 15 strategic implementation decisions. Using qualitative data from two case studies of ES implementation in NZ, understanding was achieved in:

- Providing a detailed description of the ES implementation process that is conceptualized as a set of 15 ES implementation decisions.
- Providing a detailed description of the decision process pertaining to each of the 15 ES decisions.
- Comparing these ES decision processes with five a priori decision-making models in the literature using both pattern matching and explanation building to show similarities and differences in the decision approach.
- Tracing the implementation of ES decisions during the four phases of preparation, design, implementation, and realization to reveal change, if any, in the decision-making approach over time.
- Exploring and then explaining the relationship between the ES decision process and implementation outcomes. In particular, focusing on the two implementation outcomes of meeting or stretching implementation deadlines and organizational learning.
- Exploring and then explaining the relationship between the focus of ES decision processes and implementation outcomes.

Qualitative data pertaining to the decision process for 15 strategic ES decisions were gathered retrospectively from two NZ organizations that had implemented an ES. The two case studies were used to inductively develop a model of the ES implementation process that has both a theoretical and a practical perspective.

The next section briefly summarizes the development of the ES implementation process model in this study. Next, the study's five key findings are highlighted. Study implications are later discussed and study limitations are identified. Finally, future research is proposed.

7.2 A process model of ES implementation

This study argued that understanding the complexity of the ES implementation process requires the understanding of the decision-making process involved. This argument was strengthened when a review of the implementation literature for strategic IT applications highlighted a lack of research that focuses on the decision-making process, a problem that also applied to ES implementation (Ranganathan and Sethi, 2000; Sabherwal and King, 1992).

The ES implementation process model reported in this study was developed through answering the four main research questions, a brief summary of which is provided here.

The *first* research question 'what are the strategic ES implementation decisions?' provided a focus for research investigation in this study. Answering this question started with a definition of strategic ES implementation decisions. Applying this definition, 15 key implementation decisions were identified through a review of the academic and practice publications (refer to Table 1-3). These decisions were validated in discussions with expert ES stakeholders in both academia and industry, through exploratory ES case studies (Hossain and Shakir, 2001; Shakir, 2000; Shakir and Hossain, 2002), and through the exploratory investigation of key issues on ERP implementations in NZ (Shakir, 2003).

Answering the *second* and *third* research questions, 'how are strategic ES decisions made? and how are they implemented?', provided the description of both the ES implementation process and the decision processes involved. Two case studies were conducted and are reported in chapters four and five. Qualitative data about the decision process for the 15 implementation decisions were gathered retrospectively and a four-phase process model was inductively developed. For each phase of the model, key activities about the decision process were described.

Each case study reported a background of both the organization and IT implementation, a chronology of main ES implementation events, and the ES implementation story. The implementation chronology was presented along the four implementation phases of (1) preparation, (2) design, (3) implementation, and (4) realization. The implementation story was constructed and then told through the accounts of the 15 decision processes studied.

Telling the implementation story, understanding is achieved through learning about both the decision-makers involved and key organizational and implementation events, challenges, and problems.

Answering the *fourth* research question, 'how does the ES decision process contribute to implementation outcomes?', explained the implementation story. Explanation was realized both through the application of the five conceptual decision-making lenses to the 15 implementation decisions and through an observation about the change in decision-making focus over time.

The five key findings that are reported in chapter six are briefly summarized next.

7.3 Key findings

Analyses results showed that ES decision processes were similar to four of the five a priori decision-making models in the literature, the *rational, muddling through, mixed scanning,* and *political.* Four key findings are noted from interpreting these results for the cases studied.

In agreement with the strategic decision-making literature, the first finding points in the direction that strategic decision processes are mostly rational. The two implementations shared a combination of rational and mixed scanning—that is a variation of the rational model—approaches in two thirds of their decision processes. In the Health Board implementation, the remaining third of decision processes were political, while one third were muddling through in the DistCo implementation.

The second key finding of this study was observed through considering the relationship between the decision-making approach and implementation progress. When the implementation deadline was a high priority, as was the case for the Health Board implementation, the decision process showed a *political* dimension that accommodated urgency. Alternatively, when urgency was not an issue, as was the case for the DistCo implementation, the approach did not change. This indicated a relationship between the decision-making approach and meeting implementation deadlines.

The third key finding of this study is related to the adaptability of the decision approach in response to implementation challenges. The Health Board implementation

demonstrated a high level of adaptability that was clear when implementation decisions were reevaluated. Often the evaluation process signaled a change in the decision-making approach. Again adaptability positively contributed to implementation progress.

The fourth key finding relates to organizational learning. An incremental decision-making approach, similar to that observed in the DistCo implementation, facilitates organizational learning. Because of DistCo's unique type of business, ES configurations were not standard. As a result, developing organizational knowledge both about formalizing business processes and the ES software was critical for implementation success. Success in this case had a different meaning to that of the Health Board implementation, which was overcoming obstacles and solving problems.

The fifth key finding was reported from analyses that considered the change in decision-making focus over time. The grouping of ES implementation decisions according to decision-making focus resulted in four clusters. These are: vision, people and partnerships, technology, and software configurations. When the 15 ES decisions were plotted across four implementation phases, a progression in implementation focus from vision to people and partnerships, then to technology, and finally to software configurations was noted, particularly in the Health Board case. This change in implementation focus helped to concentrate efforts on developing a high-level plan first before progressing towards operationalizing this plan during implementation.

The DistCo implementation demonstrated a similar progression except that it maintained a focus on vision throughout the whole implementation. Consequently, the high-level plan for this implementation was never finalized; this hindered its operationalization and resulted in a considerable implementation delay.

7.4 Contribution

This is the first attempt, to the author's knowledge, (1) to identify 15 strategic ES implementation decisions, (2) to explore the ES decision process during the implementation cycle consisting of four phases of preparation, design, implementation, and realization, (3) to construct the ES implementation story from the decision processes involved, (4) to explain the ES decision process using five a priori decision-making models in the literature, and (5) to investigate the influence of ES decision-making on implementation outcomes. Accordingly, it is believed that study findings can

be extremely valuable for both IS researchers and IS practitioners. The next section elaborates on this.

7.5 Study implications

This study of the strategic decision process in ES projects not only adds to our knowledge about strategic decision-making in organizations, but also advances our understanding of both the IT and ES implementation processes. The study provided several significant contributions to both academics and practitioners. The main contribution of this research lies in providing a better understanding of the complex process of ES implementation through the understanding of the decision process for key or strategic implementation decisions.

The implications drawn from this study's findings for both IS theory and IS practice are discussed in detail next.

7.5.1 Implications for theory

It was previously argued in this study that the process approach was preferred for the study of complex implementation problems, which ES implementation is one. This study applied five conceptual decision-making lenses to investigate the decision-making process of ES implementation. This approach, which is a popular approach in the strategic management literature, provided the theoretical parsimony to investigate a complex set of IT management decisions and hence the ability to consider multiple interpretations to an important IT implementation problem. The different theoretical interpretations enabled by the use of the five lenses also provided a rich insight into the implementation processes studied.

Although prior work in the area of ES implementation has addressed the process of ES implementation and its relationships to critical success factors (e.g., Akkermans and Helden, 2002; Bingi et al., 1999; Brown and Vessey, 1999; Holland and Light, 1999; Parr et al., 1999; Shanks et al., 2000; Somers and Nelson, 2001), the operationalization of those factors received little attention (Esteves and Pastor, 2001). In particular, no previous study had explored the relationship between the ES decision-making process and the implementation process.

It was also argued in this study that the focus of strategic information system research literature is more about strategy formulation or 'what to do' rather than 'how to do it,' which is the implementation of strategy through strategic IT decisions. As a result, there is an abundance of normative IT frameworks, tools, and guidelines while little is known of what happens at the micro-level, where IT plans are translated into a set of appropriate IT decisions (Ranganathan and Sethi, 2002). This research attempted to address this gap by investigating the process by which strategic ES decisions are made, how the focus of these decisions changes during the different implementation phases, and how these decisions interconnect to fulfill the ES implementation strategy. This suggests that the decision process can be used as a lens to understand ES or IT implementation through looking at the interwoven set of implementation decisions.

This research also addressed the post-acquisition dimension of ES implementation. One previous study of the ES acquisition process (Verville, 2000) has suggested the link between acquisition processes and implementation processes as a fruitful area for further study. In particular, this study had explored the cause-and-effect relationship between the actions of the acquisition process on the implementation process.

In summary, the contributions to research include the following:

(1) The identification of strategic ES implementation decisions.

(2) The description of the decision process pertinent to these strategic ES decisions.

(3) The investigation of the relationship between the ES decision process and the ES implementation process.

(4) The investigation of the relationship between the decision-making focus and the ES implementation process.

(5) The inductive development of a four-phase model of ES implementation that conceptualizes the process as an interdependent cluster of strategic decisions.

(6) The application of the five conceptual decision-making lenses to explain the implementation decision processes and their impact on implementation outcomes, focusing on their effects on on-time completion and organizational learning.

Another contribution of this study was the development of a framework for case study selection. This is a valuable tool for case researchers who are bewildered by the choices they need to make when conducting case research. This tool provides a systematic way of defining the case selection strategy following the clarification of research aims and objectives.

7.5.2 Implications for practice

For the IT and management practitioners, the benefits of this study include the following:

(1) Documenting and reporting the ES implementation experience for the two organizations participating in this study.

(2) Understanding how key ES implementation decisions are made, who gets involved, when, and why, taking into account the different viewpoints of several ES implementation stakeholders.

(3) Understanding the influence of both the decision approach and decision-making focus on implementation outcomes.

The practical ES implementation lessons that are learned from the two case studies include the following:

(1) Early preparations, contingency planning, and risk mitigation procedures are of high importance.

(2) Independent professional advice during the early phases of the ES project is useful to provide realistic expectations considering both the complexity and the limited resources. ES vendors tend to overemphasize implementation benefits through focusing on rewards rather than problems.

(3) Careful attention to the wording and inclusion of out-clauses in contracts can save the project, especially when later circumstances require an urgent and costly change.

(4) It is important to question the ES vendors' promise of a 'vanilla implementation' because for some types of business, 'vanilla' may not be an option.

(5) The training of staff during the preparation phase helps to clarify the expectations of what the new ES can deliver. It also arms staff with new concepts and a new vocabulary to use in communicating to technical consultants. Waiting until the official start of the ES project to involve staff can be inefficient because a lot of early design decisions have already been made.

(6) The benefit of involving professionally trained consultants to perform final system testing was emphasized to break the cycle of testing and re-testing that often precedes ES go-live.

7.6 Limitations

This research is limited by both the small number of cases—two case studies—and the retrospective nature of the data collected. Explanations of research design trade-offs pertaining to these two limitations and the implication on study findings are discussed.

The first limitation is the generalizability of study findings. Generalizability had been sacrificed to gain some depth to the accounts of the two cases. Two practical considerations had further contributed to limiting the number of cases. These included:

(1) Unwilling participant organizations. Many key ES stakeholders the researcher contacted expressed interest in this research. However, securing organizational acceptance was a difficult task. This research experience suggests that at least one of the senior managers in the case study organization needs to have not only interest in the research project, but also needs to have the authority to facilitate entry to the organization. For the two cases in this study, the person acting in this role also had a significant involvement in the ES implementation process. In order to gain entry to the organizations studied, the researcher relied on 14 contacts she initiated with key ES consultants and vendors, who in turn had referred her on to the two case study organizations (Shakir, 2003).

(2) Limited resources available to the researcher. No funding for direct research cost, such as data collection, travel, transcribing interviews, etc. was available. To offset some of these expenses, the researcher, was successful in wining two small Technology NZ consultancy grants.

The second limitation stems from the retrospective nature of the data collected. A longitudinal study that applies the participant observation approach in collecting data would have clearly deepened the analysis (Orlikowski, 1996). This was not possible in this study.

The researcher contacted several organizations that were in the process of implementing their ES applications. Most of these organizations declined to participate in this study while implementation was under progress because the implementation workload was too demanding. Several organizations that showed interest suggested that a few months post the planned go-live date would be a more suitable time for the study to take place. The views of the two participating organizations in this study confirmed those suggestions.

Another practical consideration is minimizing the risks involved in carrying out a case study for a doctoral thesis (Leonard-Barton, 1990). A longitudinal study would be a risky alternative because it involves heavy organizational commitments for a longer period of time.

Taking these suggestions into consideration, the criteria for case study selection was adjusted to include organizations that have completed or are expected to go-live with their ES implementation within six months of starting data collection.

The data collected was adequate to explore the ES implementation decision process. The retrospective study provides both an objective and efficient means of understanding the ES implementation as whole. The advantage of talking to key participants of the decision process during the post-implementation phase is that critical elements "stand out from the minutiae of daily life" (Volkoff, 2001, p. 37); in comparison to a longitudinal study where it is much more difficult to identify the critical incidents.

Because the retrospective study report is limited to informants' reports, this method still suffers from two main limitations. These are the distorting effects of hindsight and revealing the high-impact of recent events, which may play a disproportionate role in the final report (Glick et al., 1990; Leonard-Barton, 1990; Orlikowski, 1996).

To minimize the effects of these limitations, the data collected from interviews was supplemented by direct observation and the review of organizational, public and

industry literature. Furthermore, all key informants were senior managers, who were either actively involved or close observers of the events and the SDM processes they described (Glick et al., 1990). Other procedural safeguards that were included in the design, application and validation of the interview data were discussed earlier in chapter three. Citations from the research interviews were included in the case study report to share case evidence with the reader.

7.7 Future research

This study lays the foundation for future research in the area of strategic decision-making of ES implementation. An ambitious research project that can take this work further could include the following:

Research can start with formally testing the significance of strategic ES implementation decisions, either using a survey or a Delphi research approach. In addition to highlighting decisions' significance, study results can be used in future research investigations in two ways.

The first is to provide a focus to the later case study inquiry through the identification of different levels of significance for ES decisions. For example, Findings may suggest narrowing down the number of decisions if results prove that a few were highly insignificant.

The second is to explore the relationship between the significance of these 15 implementation decisions and the decision-making approach, as part of multiple-case study design. Another aim of the multiple-case study inquiry would be to validate the ES implementation process model that was presented in chapters four and five. Methodological limitations, as discussed in the previous section, had restricted the number of cases in this study. With the application of the case study selection framework developed here, a follow-up multiple-case study research design consisting of eight to twelve cases would provide an improved understanding and further refinements to the study variables.

Future research might also consider widening the scope to include more than one implementation cycle or the use of a longitudinal data collection approach. This is

helpful in exploring organizational learning and knowledge building, and their effects on the strategic decision processes pertaining to key implementation decisions.

Future research can approach the problem differently. First in taking a more inductive approach through grounded theory where the implementation story is synthesized and inductive decision-making models are developed. Or else, taking a more deductive approach through using the 15 decisions as the basic events to explore a large set of cases with the aim of developing a taxonomy of ES implementation processes based on the sequence of events. This is an approach similar to the Sabherwal and Robey study (1993) mentioned in chapter two. While the Sabherwal and Robey study inductively defined main implementation events before analyzing their sequence to develop the taxonomy, the suggested approach would start with these 15 ES implementation decisions as basic events.

As discussed above, this research was conducted in one of many different possible research areas that are related to ES implementations. This study and the findings it has provided would therefore contribute to future research that furthers our understanding of the complex process of ES implementation.

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APPENDIX A: INTERVIEW QUESTIONS (REV. A)

Case study interviews—phase **three**: Exploring the strategic decision-making process of ES implementation

Interview questions

Research study

The IT strategic decision process: Exploratory case studies of enterprise system implementations in New Zealand

March 2002

Notes:
If answers to any of the following question, especially these on both the background of ES implementation and the organization is available as part of the ES project documents that the researcher can have access to it, then please inform the researcher and provide details of how this piece of information can be accessed. The researcher will examine these documents and will get back to you for clarifications if needed.

A background of ES implementation

Question: can you provide a brief background of your ES implementation?

Please use the following probes

What

- What is the name/version of the implemented ES?
- What is the number of users (per user type)?
- What is the number of modules implemented (core modules and their details)?
- What is the cost of implementation in dollars (software and implementation costs)? Provide a cost breakdown if possible.
- If the ES is implemented in more than one location, what is the number of locations where ES is implemented?
- If there are major differences in ES implementation across business units, what are the number of independent business units where ES is implemented?

When

- When did ES implementation start?
- What was the plan? What were/are the key milestones?
- What are the major changes to the initial ES project plan?
- What is the status of ES implementation now? What is the plan for the future?

A background to the organization where ES is implemented

Question: can you provide a brief background of your organization?

Please use the following probes

- What is the legal position of the organization?
- What is the size of the organization (in dollar revenue/in number of employees)?
- What is the organization structure (How many business units/How many locations)?
- What is the industry the organization belongs to? Who are your main customers? Who are your competitors?

The ES implementation process

Question: Can you please discuss the **story of ES implementation** in your organization, particularly focusing on your role in the process. **ES implementation** is to span the time from when the organization made a decision to go for an ERP system until the system is working and operational and beyond, depending of your particular case.

Please use the following probes

- Who are the **key stakeholders** of ES implementations?
- What are the **organizational structures/entities** that support ES implementations (please list)?
- Are these organizational structures temporary or permanent?
- What is their composition? Please discuss in terms of members, their roles and the locus of leadership responsibility.
- If composition changes over time, how? Please discuss with relationship to the ES project key milestones.

The SDM process of ES implementation

Please answer the following questions in relation to each of the strategic decisions listed exibit-1

Duration

Duration is defined as the length of time from the first deliberate action towards a decision and when a choice is made and implemented, and if needed, authorized.

- How long was the SDM process (in days/weeks/months)?
- If that decision is revisited during ES implementation:
  - how long did it take between the point in time when the decision was made and later, the moment where further deliberations started to revisit that same decision (in days/weeks/months)?
  - How long was the SDM process (in days/weeks/months)?

Objectives

Objectives are defined as the aim of implementing the decision

- What are the one or more objectives to this decision?
- Are these objectives?
  - Well defined/clear or ambiguous.
  - Aligned or conflicting (in the context of this single decision).
  - Aligned or conflicting (in the context of the other strategic decisions).

Involvement

Involvement is defined as the type of stakeholders' involvement in the SDM process.

- Who are the **key stakeholders** of the SDM process?
- How? Please discuss

  Probes:

  - Key stakeholders at the ES project level—project sponsor, project champion, project manager, power users, etc.
  - Key stakeholders at the inter-organizational level—management, user departments and the IT function.
  - Key stakeholders at the intra-organizational level—Evaluation/implementation partner(s), vendor(s), customers and suppliers.

Centrality

Centrality is defined as the extent to which SDM is concentrated in the hands of one stakeholder group.

- If the decision is made in a group context, which of the five leadership styles would describe the way the decision was made?

  Decide—Consult individually—Consult group—Facilitate—Delegate

Formality

Formality is defined as the type of organizational structures established to support ES implementation.

- What is/are the type(s) of organizational structures established to support the SDM process?

  Probes:

  The three main types of organizational support structures are:
  - Working groups /IT boards
  - Special committees/Policy committees
  - Standing committees/Steering groups
- How? Please discuss

Analysis

Analysis is defined as the extent to which decision alternatives are evaluated prior to making a decision.

- How many alternatives were evaluated prior to making the decision?
- How comprehensive was the evaluation process?

Planning

Planning is defined as the future horizon to a decision.

- How long is the period in the future considered for decision implications?

Dependency between decisions

- Is there a dependency between this decision and the others listed in exibit-1? Please discuss.

APPENDIX B: Interview Questions (REV. B)

Case study interviews—phase **three-b**: Exploring the strategic decision-making process of ES implementation

Interview questions

Research study

The IT strategic decision process: Exploratory case studies of enterprise system implementations in New Zealand

April 2002

Notes:
If answers to any of the following question are available as part of the ES project documents that the researcher can have access to it, then please inform the researcher and provide details of how this piece of information can be accessed. The researcher will examine these documents and will get back to you for clarifications if needed.

The ES implementation process

Question: Can you please discuss the **story of ES implementation** in your organization, particularly focusing on **your role** in the process. **ES implementation** is to span the time from when the organization made a decision to go for an ERP system until the system is working and operational and beyond, depending on **both** your particular ES implementation case and your involvement.

Please use the following probes

- Discuss your **role** throughout the life of the ES project—including changes over time.
- Discuss your **involvement** and other **key stakeholders** in **the organizational structures/entities** that facilitated ES implementations—including the changes throughout the life of the ES project.

The SDM process of ES implementation

Question: Can you please discuss the **decision-making process** for each of the strategic decisions listed in **exibit-1,** particularly focusing on **your role** in the process.

Organizational decision-making can be best viewed as a **process** and not as an event that takes place at one point in time. The decision-making process is therefore the interrelated set of activities leading to a decision.

Please use the following probes

Involvement

- **Who** was involved? **How**? **When**? **Why**?—Discuss your involvement, the involvement of other key stakeholders and the organizational structures that facilitated arriving at, and implementing this decision

  More probes:

  - Key stakeholders at the ES project level—project sponsor, project champion, project manager, power users, etc.
  - Key stakeholders at the inter-organizational level—-management, user departments and the IT function.
  - Key stakeholders at the intra-organizational level—-Evaluation/implementation partner(s), vendor(s), customers and suppliers.

Objectives

- What are the one (or more) objectives to this decision?

Planning

- How long is the period in the future considered for decision implications?

Analysis

- How many alternatives were evaluated prior to making the decision?
- How comprehensive was the evaluation process?

Centrality

- Which of the five leadership styles would best describe the way the decision was made?

Decide—Consult individually—Consult group—Facilitate—Delegate

APPENDIX C: STRATEGIC ES IMPLEMENTATION DECISIONS

Exhibit 1: Strategic decisions in the implementation of ES

Research study

The IT strategic decision process: Exploratory case studies of enterprise system implementations in New Zealand

February 2002

1.	Decide on evaluation team
2.	Decide on evaluation partners (i.e. consultant(s))
3.	Decide on vendor(s)
4.	Decide on key business processes
5.	Decide on functionalities or modules
6.	Decide on bolt-on applications
7.	Decide on IT infrastructure
8.	Decide on implementation team
9.	Decide on implementation partners (i.e. consultant(s))
10.	Decide on implementation strategy, considering: - The business process reengineering (BPR) approach - The software customization approach
11.	Decide on go-live strategy[22], considering the alternatives: - Phased - Big-bang - Parallel
12.	Decide on ES variation strategy, considering: - Similar or different versions of the same ES, across business units or locations
13.	Decide on personnel training strategy
14.	Decide on reporting needs
15.	Decide on maintenance strategy

[22] The pilot option is not included as an alternative to the installation strategy because it is implied that each of the three alternatives listed above would be preceded with a pilot phase.

APPENDIX D: RESEARCH INFORMATION SHEET

Research information sheet

Research study

The IT strategic decision process: Exploratory case studies of enterprise system implementations in New Zealand

January 2002

Introduction

This research is being carried out by **Maha Shakir,** a Ph.D. candidate at the Institute of Information and Mathematical Sciences, Massey University, Albany Campus.

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Study abstract

The purpose of this study is to report on a multiple comparative case study of two to four companies that have or are in the course of implementing an ES. Companies will be compared on the basis of their approach to the strategic decision-making process of their ES implementations. The two questions the study addresses are; **what are the strategic decisions in the implementation of ES? and how are these decisions made?** The review of the ES implementation literature identified a list of 15 strategic decisions that need to be addressed in the course of implementation. The list was validated with key expert ES stakeholders during the pilot phase of the study. Using this list of strategic decisions, the study applies the two theoretical perspectives of descriptive decision models and the communication network model to explore both the patterns and the network of the decision-making process, respectively. Understanding will be achieved through the focus on the sequence of activities in order to explain how and why observed outcomes evolve over time. The study will further attempt to understand the relationship between the strategic decision-making process and the ES implementation process.

Key words

Enterprise system (ES), strategic decisions, strategic decision-making (SDM), implementation process, steering committee (SC)

Ethical issues

Access to participants
The CEO, managing director, managing partner or a senior administrator in the organization will be first approached. If other informants in that organization need to be interviewed, the researcher will negotiate access to other informants through that first contact. The first contact person will be named as the main contact in that organization unless he/she assigns responsibility to a different person.

Informed consent
The informant will be forwarded a copy of this information sheet prior to or at the start of the interview. The researcher will briefly explain the details of this research information sheet at the start of the interview and will answer any questions the informant may have. No written consent is required, however the informant agreement to proceed with answering interview questions is an indication of his/her verbal consent. The informant will also be advised that by participating in this study, he/she:

- Agrees to provides information to the researcher on the basis that his/her name will not be used without his/her permission
- Has the right to withdraw at any time during the interview or decline to answer any particular questions
- Has the right not to agree to the interview audiotaped

Anonymity
Informants will not be named in written accounts of the research. In particular, the names of all organizational and individuals in both case study reports and the cross-case analysis will be pseudonyms. The use of pseudonyms is implemented to protect the privacy of informants and their respective organizations. Furthermore, all controversial and sensitive comments will be placed in a broader interpretive context for the purpose of making these comments non-attributable to a particular informant. However and because of the informant past or present profile in the organization and/or the uniqueness of the organization, some information could be linked to them.

Confidentiality
All information given to the researcher is treated as confidential. The researcher will be personally responsible for managing the process of: tape recording of interviews; transcribing interviews; storage and sharing of artifacts such as audio tapes, hard and soft copies of interview transcripts, interview notes, observation notes, and company documents; and the writing of case study reports. When an audiotape is used, the researcher will ask the informants permission to turn the audiotape on and explain that he/she can ask to turn it off any time during the interview. The storage of interview tapes will be managed by the researcher. Interviews will either be transcribed by the researcher herself or through a trusted assistant, which the researcher will be responsible

to supervise. At the end of the research, tapes and transcripts will be retained by the researcher, otherwise they will be destroyed.

Validating research findings

The researcher will use one or more of the following means to ensure the validity of interview findings:

- Follow-up interviews with the informant to clarify unclear issues or provide further details
- Each informant will be kindly asked to review his/her interview transcript to correct any misunderstanding by the researcher and highlight issues that need not be disclosed, because they may pose either confidentiality or anonymity threats to either the informant or the organization.
- The researcher will hold a presentation to discuss case study findings. Verbal consent will be sought through the main contact in the organization first. All other informants will be separately contacted later for their verbal consents. The presentation will be held either at the organization premises or the university. Access will be restricted to the researcher, the main contact in the organizations and the key informants interviewed. Selected faculty members may be invited after negotiating that invitation with the main contact person in the organization.

APPENDIX E: SDM CHARACTERISTICS FOR DISTCO

ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	**Objectives**	**Participation**	**Analysis**	**Planning**
D02-Evaluation partners	Muddling through	During ES acquisition—the RFI, RFP, and contract negotiations stages	- To take ownership of new system implementation—"We felt that if we couldn't as a team evaluate whether a solution was robust enough then we weren't doing our jobs" (MD). - To minimize spending, yet convince the parent company that there is a feasible business case for new system implementation	FC, MD, and parent company/high Senior mgt and parent company Medium formality	Low—"we knew that there weren't people in our business who actually had a robust solution that would suit our market, so there was no point in engaging consultants in our view" (MD).	Long-range—to take ownership of new system implementation Short-range—to minimize spending, yet develop a feasible case for the new implementation
D05-Functionalities & modules	Muddling through	The decision was considered during the RFP stage but was revisited several times during implementation	The process started with the two conflicting objectives: - To achieve best fit between the unique business process and the ES application - To limit system customization—probably constrained by available resources	Senior mgt, applications team, and ES vendor/high business contacts and DistCo Australia Senior mgt, applications team, and ES vendor Informal at the start but evolved through formal structures	High—as a result of the decision being revisited several times. The (vendor's) brief wasn't detailed enough. We felt it did cover everything adequately but it wasn't until a little later on in the process when we really started to get into it in depth that our interpretation wasn't necessarily the same as their interpretation. (Business Consultant)	Long-range

(Continued on the next page)

ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	**Objectives**	**Participation**	**Analysis**	**Planning**
D07-IT infrastructure	Muddling through	Started during the design phase but was revisited during implementation	- To attain a flexible solution that supports future growth - To support the implementation of the new system	FC, IT Manager, hardware vendors/high IT Manager and hardware vendors Formal—RFI then RFP	Low—relied on hardware vendors to provide a meaningful criteria for comparison	Long-range—to support the future growth of the new system Short-range—to minimize spending through a constrained design that only meets go-live requirements
D10-Implementation strategy	Muddling through	A decision that was made during contract negotiations took a gradual, though a dramatic change during implementation—"It wasn't until really over a period of months and months where we understood the product better and they understood our business better that we could actually start to see how we were going to mesh the modifications into the core product" (IT Manager).	Conflicting objectives - To avoided extensive customization—'vanilla' implementation - To achieve the best fit of business process to the new ES	FC, MD, IT Manager, and ES vendor Senior mgt, and ES vendor Formal (steering committee, PM team, and ES vendors forums)	High—however, budget limitation constrained evaluating different costly alternatives	Short-range—focus was on getting more functionalities within the available budget
D14-Reporting needs	Muddling through	An initial decision was made during the contract negotiations stage but was formalized and reviewed—as a result of reconsidering functionality—during the design phase	- To reduce costs through producing critical reports only—"The understanding is that we'll get exactly the same reports that we currently get" (Operations Manager).	FC, IT Manager, applications team and ES vendor Senior mgt, and ES vendor Formal (PM team and applications team)	Medium—The first consideration reflected existing legacy system reports, while a thorough consideration took place in the later revisiting of reporting outputs.	Short-range—focus was on re-producing existing reports

(Continued on the next page)

ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D15-Maintenance strategy	Muddling through	Decisions incrementally evolved during implementation	The objective was unclear—the understanding was that the maintenance strategy would greatly depend on system performance after go-live	FC, MD, DistCo "Australia, parent company, and ES vendor Senior mgt Informal for phase II plans but formal for upgrade decisions	Medium—although the maintenance strategy was unclear, consideration for the upgrade decision was evaluated to offset some of the development costs through the partnership with DistCo Australia.	Short-range—focus was on going live with the new system
D01-Evaluation team	Rational	During ES acquisition—the RFP stage	To have "the backing and support of all the people in the business" (IT Manager). Criteria for team membership included key people, most knowledgeable, and busiest people.	FC and MD/high Senior mgt Informal. It was a "quite a straightforward decision ... as to who should be involved" (MD); it was "just cherry picking" people within the business (FC).	High "We'd all identified people that were going to participate in the project so we had those people present. Then we actually cast a wide net to ensure all the various managers throughout the organization were present in those early evaluation stages." (IT Manager)	Long-range
D06-Bolt-on applications	Rational	During the RFP stage	- To minimize complexity through minimum customization and eliminating bolt-on applications.	Senior mgt/high applications team, and ES vendor Senior mgt Formal	Low—-bolt-on applications would not be thoroughly considered until go-live	Short-range
D08-Implementation team (Applications team)	Rational	During the contract negotiations stage	- To involve key people from all functions	FC, MD, IT Manager, Business Consultant, and Project Manager-JDE FC and Project Manager-JDE Informal	Low—For a small organization, it was clear who the key people were.	Long-range

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D12-ES variation strategy	Rational	During contract negotiations	- To achieve a centralized implementation that is managed at head office	FC, MD, IT Manager, and ES vendor Senior mgt, and ES vendor Formal (PM team)	Low—the nature of business operations did not necessitate an alternative consideration	Short-range—focus was on going live with the new system
D13-Personnel training strategy	Rational	During contract negotiations	The main objectives were: - To utilize the business knowledge employees had gained over long years of working with the company - To reduce costs - To maintain continuous training	FC, MD, IT Manager, and ES vendor Senior mgt, and ES vendor Formal (PM team)	Low—no analysis of employees IT competency was conducted to validate the assumptions underlying the decision, nor there was a reevaluation of the chosen strategy during implementation	Long-range
D03-Vendor(s): The RFI stage	Mixed scanning	18 months	- To research the availability of systems that could meet the unique needs of business operations in the magazine distribution industry	FC and MD/high Parent company, DistCo Australia, and ES vendors Senior mgt Formal and informal	High—many alternatives were explored.	Long-range
D03-Vendor(s): The RFP stage	Mixed scanning	Eight months	- To guarantee a viable vendor - To Implement a flexible IT architecture - To develop organizational ownership of the new ES during implementation - To keep the parent company informed - To ensure the new system supports key business functions	FC, MD, IT Manager, and ES vendors/high Evaluation team, parent company, casual consultant, and client referrals Senior mgt, PM team and ES vendors Formal (steering committee and PM team)	High A thorough evaluation of a few solutions was conducted with a focus on the business key processes—"That was a long process ... very long process meeting with the vendors and then as a group evaluating each individual proposal" (Business Consultant).	Long-range

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D03-Vendor(s): The Contract negotiations stage	Mixed scanning	Two-three months	- To negotiate a price cut - To agree on key system specifications	FC, MD, IT Manager, and ES vendors/high Evaluation team, legal consultant, and client referrals PM team and ES vendor Formal (steering committee and PM team)	Medium - Two alternatives were considered - A thorough process with a focus on details	Long-range
D04-Key business processes	Mixed scanning	Before and during implementation	- To support the business key processes—"DistCo had been through some strategic planning...and we knew exactly what our core competencies were.... Allocations.... was the only pure business process that was amongst those objectives so it was absolutely clear" (MD).	Everyone Everyone Informal at the start but formality gradually developing during implementation	Low at the start with detailed operationalization and documentation developing during implementation	Long-range
D09-Implementation partner(s)	Mixed scanning	Started at the RFI stage and was finalized during the contract negotiations phase	- To gain ownership of system implementation	FC, MD, IT Manager, client referrals, and ES vendor Senior mgt Medium formality—part of the ES acquisition process	Medium—no prior commitment to either a partner-implementer or vendor-implementer model was made until contract negotiations. However, no formal process besides reference checking was carried out to evaluate alternatives	Long-range

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
DI 1-Go-live strategy	Rational Mixed scanning	During contract negotiations, when approaching the first go-live date, and again when approaching the final go-live date	- To go-live at minimum risk to the business It was more important for the business to get it right than to do it quickly. People rely on distributors and in a way you need to be more like a bank. (MD)	FC, MD, IT Manager, and ES vendor Senior mgt, and ES vendor Formal (steering committee, PM team, and ES vendor)	High—the decision was revisited twice	Long-range

Legend:

- The participation construct addresses the involvement, influence, centrality, and formality in the decision process.
- The analysis construct addresses the number of alternatives and the thoroughness of decision evaluation.

APPENDIX F: SDM CHARACTERISTICS FOR HEALTH BOARD

ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D01-Evaluation team	Rational	During the preparation phase	- To involve key people within the organization—"Just making sure you've got a good sample of people, but not too big because it's very difficult to get people to the meetings" (Group accounting mgr).	CFO, Redesign mgr, Group accounting mgr, IS general mgr, and other senior mgrs CFO and Redesign mgr Less formal—considered by both the CFO and the Redesign mgr, then negotiated involvement with their senior mgrs	High—validated the choice of team member with their senior managers and consulted to check if a key member was missing. Overall, the main person (Redesign Manager) will pick a core sample, then check with the CFO to see if there were anybody else who missed out and check with IS general manager whether there's anybody else she views as important to be involved. Just making sure you've got a good sample of people, but not too big because it's very difficult to get people to the meetings. (Group accounting mgr)	Long-range
D03-Vendor	Rational	During the preparation phase (three months)	- To attain a cost effective implementation - To consider IT alignments with other DHBs—"Return to the business is an important one, strategy and alignment with other hospitals is also a big consideration" (Group accounting mgr).	CFO, Redesign mgr, Oracle account mgr, and ConsultCo Redesign mgr and Oracle account mgr Formal, however, less formal if compared to a first ES implementation (RFI only)	High, however, not as thorough if compared to a first ES implementation (RFI only)	Long-range—a focus on vendor's viability Short-range—a focus on costs

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D05-Functionalities & modules	Rational	During the preparation phase—"We recruited people. We had to train them. We then started writing the business case. We involved the people we had trained. They went into the project. When they finished, they went into the live function again" (Redesign Manager).	- To select functionality that business needs - To identify the gaps between the business process and the software best-practice	Redesign mgr, Group accounting mgr, and ConsultCo Redesign mgr, Group accounting mgr, and ConsultCo Formal (PM team and implementation team)	High—"We did that during the course of writing the business case and so forth. What does the business need? What are all the problems? Where are all the gaps? Well to do that we need the following modules" (Redesign Manager)	Long-range
D06-Bolt-on applications	Rational	During the preparation phase	- To minimize complexity - To implement and go-live with a tight framework (six months)	Redesign mgr and ConsultCo Redesign mgr and ConsultCo Informal—driven by the ES implementation strategy	Low—driven by the ES implementation strategy The implementation strategy for ERP was: Get rid of all the databases and put all the processes into our ERP system.... So bolt-on applications was a 'no no.' (Redesign Manager)	Long-range—a focus on future system maintenance From the ConsultCo review (SCO review) and from the strategy, which was deemed to be 'vanilla,' as much as possible, it is better in the future for upgrading as we'd had a very modified system in the past. (Group Accounting Manager)

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D10-Implementation strategy	Rational	Prior and during the preparation phase	- To attain easier and cheaper future system maintenance - To operationalize the new organizational design/restructure - To go-live with a short timeframe	CFO, Redesign mgr, and ConsultCo. CFO, Redesign mgr, and ConsultCo. Formal (SCO review and system's business case)	High—the new implementation was part or the new change program We used the SCO review to identify (business process problems). The only way we were going to (overcome those problems) was to put some quality people in place, go through an upgrade, and discipline the processes with minimal configuration. (Redesign mgr)	Long-range Short-range
D12-ES variation strategy	Rational	During the preparation phase	- To achieve standardization of system across the whole organization	Redesign mgr, ConsultCo, and IS Redesign mgr, and ConsultCo Formal (PM team)	Low—other alternative were considered infeasible and impractical—"It's just one organization. So it's driven by the structure of the general ledger at the time" (CFO).	Long-range
D02-Evaluation partners	Rational Political	During the preparation phase (three months)	- To seek a consulting partner that has the business as well as ES implementation experience - To favor parties that had previous working experience with the Health Board	CFO, Redesign mgr, and other organizational stakeholders Redesign mgr Less formal—ConsultCo's earlier involvement in the SCO review made them a favorable candidate	Low—ConsultCo's earlier involvement in the SCO review made them a favorable candidate. "When ConsultCo completed their work (SCO review), they knew at that point where all the gaps were, from a supply chain point of view" (Redesign mgr).	Long-range—seeking both depth and wealth in partner's experience

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D07-IT infrastructure	Rational Political	During the preparation phase and then prior to go-live	- To adhere to the Health Board IT standards - To minimize costs - To mitigate risks	CFO, Redesign mgr, Oracle account mgr, ConsultCo, and IS IS first, then CFO, Redesign mgr, and ConsultCo Formal (Board, steering committee, and PM team)—"[It] had a major impact on the project. ... [It] went up through to the steering committee, even to the Board saying this is a change" (Redesign Manager).	High	Long-range—"Part of our strategy was preferably to go down an NT operating system route" (Redesign Manager).
D08-Implementation team (Applications team)	Rational Political	During the preparation phase	- To operational the organization change and restructure program—"for an organization like us that is going through a major process redesign initiative, not having the initial skills required in this organization to drive those initiatives through, we would need to recruit some new people" (Redesign Manager). - To develop and then maintain implementation knowledge in-house—"We were quite clear that we didn't want a third party person to run the whole thing. We wanted people to have the knowledge and expertise" (Group Accounting Manager).	CFO, Redesign mgr, Group Accounting Manager, and existing employees CFO, Redesign mgr, and Group Accounting Manager Formal—team members selection was part of a formal recruitment program	High	Long-range—"The whole purpose of the project team being structured the way it was, was to transfer knowledge about the product from ConsultCo. Also, people having the knowledge and skills around running functional departments were back into the line function and made sure that that system carried on ticking the way it was always planned" (Redesign Manager).

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D09-Implementation partner(s)	Rational Political	During the preparation phase	- To pursue a combination of technical and business process redesign experience - To maintain reliability of service during implementation—partner needed to have the ability to replace or provide extra personnel if needed - To favor prior involvement with the Health Board - To enable an implementation partnership with the Health Board that facilitates knowledge transfer—"When we went to the market place, we looked for an implementation partner who would actually help us put the business case together: they had to own the business case like we did" (CFO).	CFO, Redesign mgr, Group Accounting Manager, and other senior mgrs Redesign mgr, Group Accounting Manager, and other senior mgrs Formal—the Health Board followed a structured tender process similar to that of a large capital expenditure	High—two rounds of evaluation	Long-range—"To ensure that we left the knowledge with the people in the business (Group Accounting Manager).
D15-Maintenance strategy	Rational Political	The decision was made during the preparation phase. Upgrades were introduced soon after go live to overcome problems with the new ES software. The second phase was delayed due to both resource shortage and organizational acceptance.	- To minimize risk - To limit expenditure within available budget	CFO, Redesign mgr, Group accounting mgr, Oracle account mgr, ConsultCo, and other organizational stakeholders Redesign mgr, and ConsultCo Formal (Steering committee and PM team)	High—explored different alternatives thoroughly	Long-range—future plans were mentioned in both the system's business case, in recalling past events, and in discussing current status

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	**Objectives**	**Participation**	**Analysis**	**Planning**
D11-Go-live strategy	Rational Mixed scanning	During the preparation phase. However, the decision was revised and minor adjustments during the go-live period There was some phasing in fixed assets, because we couldn't convert all the data in the downtime period.... (Also) we deferred Discoverer a little bit as well. ... Discoverer took a lot of memory and it was deemed let's leave this for a few weeks and just make sure that the purchasing system, all the critical systems, are in place" (Group Accounting Manager).	- To implement with a short timeframe and minimum costs—"We didn't have the resources to run accounts payable in parallel. It wasn't practical for our particular implementation "(Group Accounting Manager). - To produce the required end-of-period financial reports—"We had to do statutory accounts at the end of December that would close out accounts"(CFO). - To maintain a supply chain focus—"The focus was on supply chain. Inherently supply chain transactions affect accounting entries. We said that the majority of supply chain and financials—all one shot, one big-bang" (Redesign Manager).	Redesign mgr, ConsultCo, and IS Redesign mgr, and ConsultCo Formal (PM team)	Medium—few alternative were considered, however, the decision was revisited in tandem with implementation progress	Short-range

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D14-Reporting needs	Rational Mixed scanning	During the preparation phase. The decision was later revisited during implementation and again post go-live.	- To identify the critical and important reports - To centrally review the reports that belong to different functions for importance, relevance, and priority I was the one who said 'hey we're running out of time here, drop this report as it's not as important as another one.' So…I was reviewing the overall priorities. … I was the one who had the sheet with all the reports and ConsultCo would update where they were at with me. When they started to run out of time, we'd reprioritize them. (Group accounting mgr)	Redesign mgr, Group accounting mgr, and ConsultCo Group accounting mgr, and ConsultCo Formal (PM team and applications team)	High—continuously reevaluated during implementation and after go-live	Short-range
D04-Key business processes	Mixed scanning	Prior and during the preparation phase	- To develop the organization change and restructure program - To use IT to operationalize business change	CFO, Redesign mgr, Group accounting mgr, ConsultCo, and implementation team Redesign mgr, Group accounting mgr, ConsultCo, and implementation team Formal (SCO review, system's business case, PM team and implementation team)	High	Long-range

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ES implementation decisions	ES decision process models	SDM characteristics				
		Duration	Objectives	Participation	Analysis	Planning
D13-Personnel training strategy	Mixed scanning	During the preparation phase. The decision was later revisited during implementation and again post go-live.	- To empower module champions to train the end-users - To maintain implementation knowledge in-house	CFO, Group accounting mgr. and ConsultCo Group accounting mgr. and ConsultCo Formal (PM team)	High—explored different alternatives in response to implementation changes	Long-range—

Legend:

- The participation construct addresses the involvement, influence, centrality, and formality in the decision process.
- The analysis construct addresses the number of alternatives and the thoroughness of decision evaluation.