

# **Understanding IS Development and Acquisition: A Process Approach**

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## Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

A handwritten signature in cursive script that reads "Laurie McLeod". The signature is written in black ink on a white background.

Laurie McLeod

In loving memory of  
my mother, Barbara,  
and sister, Fiona.

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Ethical approval for this research was obtained from the Auckland University of Technology Ethics Committee in two stages. The survey was approved on 23 March 2004 (reference number 04/45) and the case study on 18 November 2004 (reference number 04/201).

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## Abstract

Computer-based information systems (IS) play an increasingly pervasive and important role in contemporary organisations. Despite decades of continuing research and the development of an extensive prescriptive literature, IS development projects continue to be problematic, with many failing or being seriously challenged. In addition, the IS development environment has changed significantly in recent years, with rapid advances or shifts in technology, increasing devolution of IS responsibility and expenditure to user groups, high levels of packaged software acquisition and customisation, greater outsourcing of IS development, and an increasing emphasis on enterprise-wide and inter-organisational IS. In many cases these changes are interrelated and involve more flexible, ad hoc or non-traditional development approaches. Combined with the fact that at the same time IS have become increasingly sophisticated and integrated, the potential for unpredictable or unintended consequences has also increased.

Together, the continued problematic nature of many IS projects and the changing IS development environment, suggest that there is an ongoing need for a fuller understanding of IS development processes and practices. Given the limitations of factor-based, prescriptive studies, an understanding of how contemporary IS development is enacted needs to be grounded in and built upon the cumulative body of research that attempts to understand the complexity and dynamic nature of IS development. Accordingly, this study uses a conceptualisation of IS development as a process in which an IS emerges from a dynamic and interactive relationship between the technology, its social and organisational context, and the negotiated actions of various individuals and groups. The thesis presents the results of an extensive empirical investigation into contemporary IS development practices based on data collected from New Zealand. The study uses a range of research methods and ultimately develops a sociotechnical process model of IS development as situated action.

Following Walsham's (1993) emphasis on the content, context and process of IS-related organisational change, the methods used in this study are three-fold. First, an extensive literature review is undertaken to provide a comprehensive synthesis of contemporary empirical knowledge about the content of IS development. Second, a survey is used to collect contextual data about IS development and acquisition practices in New Zealand. Finally, these both support an in-depth longitudinal case study of the IS development process in an organisational setting.

The literature review synthesises the results of recent empirical studies of the various influences that shape IS development, using a classificatory framework based around actors, project content, IS development processes, and context. The review shows that, while a number of traditional factors influencing IS development continue to be relevant, other factors have emerged as important as a result of changes to the IS development environment and to IS development practice. In particular, increasing recognition within the IS literature has been given to the relative importance of people and process and of the organisational and environmental context in which IS development takes place.

The results of the literature review inform the design of a survey instrument intended to provide an updated assessment of IS development and acquisition practices in New Zealand organisations. A Web-based survey was administered to a sample of senior IS managers in 460 public and private sector organisations with 200 or more FTEs. Based on the 106 usable responses, the results of the survey confirm the ongoing relevance of a number of traditional factors identified in the IS literature as facilitating or inhibiting IS development. However, a

number of factors were identified as emerging or increasing in relevance in light of changes in the IS development environment.

While the survey provides a useful description of contemporary IS development and acquisition practice in New Zealand, it does not enable a detailed understanding of IS development in action. To address this, an IS project in a large New Zealand organisation was followed in action for over two years. The project involved the development of a sophisticated financial database model using a purchased commercial software package and external consultants. As such, it provides a useful exemplar of development in a contemporary IS environment. The case study illustrates how a seemingly small, well-defined project experienced delays and difficulties as might be expected in larger, more complex projects. It offers insights into the significance of external actors, the importance of full stakeholder participation, the influence of initial characterisations of the nature of the project, and the observance of project management processes. Consideration of the project outcome reveals its multi-dimensional, subjective and temporal nature.

A process approach (Markus & Robey, 1988) is employed to structure the analysis of the case study. A combination of temporal bracketing, narrative analysis and visual representation is used to analyse the sequence of social action and organisational processes involved in the project and to develop a process explanation of how and why the particular project outcome in this case study developed over time. Underpinning and informing this analysis is the construction and utilisation of a model of IS development as a situated, sociotechnical process. Drawing on theoretical concepts from structuration theory and the sociology of technology, the model considers the situated actions and practices of various individuals and groups involved in IS development, the ways in which these are enacted within different contextual elements, and the role of existing and new technological artifacts in this process. IS development is characterised as iterative and emergent, with change occurring dynamically from a trajectory of situated interactions (in which meanings and actions are negotiated) and intended and unintended consequences.

As a whole, this PhD highlights the changing nature of the IS development environment and the way a complex ensemble of 'factors' interact to influence IS project outcomes. Common themes emerge around the importance of people and process, and the context in which IS development takes place, while at the same time explicitly including a consideration of technology in the analysis.

## List of Outputs

The following journal and conference papers are outputs based on the research conducted in this PhD:

McLeod, L., MacDonell, S. & Doolin, B. (2008). IS development practice in New Zealand organisations. *Journal of Research and Practice in Information Technology* (Forthcoming).

McLeod, L., MacDonell, S. & Doolin, B. (2007a). Standard method use in contemporary IS development: an empirical investigation. *Journal of Systems and Information Technology*, 9(1), 6-29.

McLeod, L., MacDonell, S. & Doolin, B. (2007b). User participation in contemporary IS development: an IS management perspective. *Australasian Journal of Information Systems*, 15(1), 113-136.

McLeod, L. & MacDonell, S. Factors that affect software systems development project outcomes: a survey of research. Under second review with *ACM Computing Surveys*.

McLeod, L. (2007). IS development and acquisition: the use of standard methods. In F.B. Tan, J. Thong & L.J. Janczewski (Eds.), *Proceedings of the Eleventh Pacific Asia Conference on Information Systems* (pp. 561-574). Auckland: University of Auckland.

McLeod, L., MacDonell, S. & Doolin, B. (2004). An empirical investigation into IS development practice in New Zealand. In *Proceedings of the 15th Australasian Conference on Information Systems*.

McLeod, L. (2004). *Stakeholder interaction in the information systems development process*. Paper presented at the 15th Australasian Conference on Information Systems Doctoral Consortium, 29-30 November, Hobart.

# Chapter 1: Introduction

## 1.1 Rationale for This Study

Computer-based information systems (IS) are an integral part of modern society. Their development has been the subject of academic research for many decades. Despite this attention to IS development, many IS projects fail (are cancelled, abandoned before completion or never implemented) or are seriously challenged (are late, over budget, lacking in functionality and/or not meeting business objectives), wasting billions of dollars per year (Beynon-Davies, 1995; Briggs et al., 2003; Charette, 2005; Ewusi-Mensah, 1997; Goldstein, 2005; Neumann, 1997; Oz & Sosik, 2000; Royal Academy of Engineering, 2004). For example, Standish Group International (2008) report from their 2006 survey of over 60,000 US IS projects that 19% failed, while a further 46% were challenged. While the scale of failures is smaller, New Zealand is fundamentally no different (KPMG, 2005b), with high profile and expensive IS failures in areas such as policing and health (Clarkson, 2000; Gauld, 2007; Gauld & Goldfinch, 2006; NZ Herald, 2000). A recent estimate put the cost of failed or challenged IS projects in New Zealand at between \$200-300 million each year (National Business Review, 2005). The negative impacts of such project failures include the financial costs, the creation of a risk-averse attitude in managers and the alienation of users with regard to future IS initiatives.

IS development projects ostensibly fail for many reasons, more often related to organisational issues than technical problems (Doherty & King, 1998b, 2005; Ewusi-Mensah & Przasnyski, 1991, 1994). Reasons often given for project failure include poor project management, ineffective communication, inadequate financial and human resources, lack of top management support, departure from timetable or budget, and problems with user acceptance of an IS (Ewusi-Mensah, 1997; Keil et al., 1998; Oz & Sosik, 2000).

Numerous academic studies have attempted to identify such 'factors' that influence IS development, the results of which have led to various prescriptions for IS development practice. For example, the notion of 'correspondence failure' (Lyytinen & Hirschheim, 1987), in which the developed IS does not meet its specified objectives, could be said to have led to a focus on techniques and approaches for accurate and complete requirements determination. Similarly, 'process failure' (Lyytinen & Hirschheim, 1987), involving project abandonment or unsatisfactory project performance in relation to time or cost, encouraged the development of formalised standard methods in an attempt to structure and manage the IS development process. A consideration of 'interaction failure' (Lyytinen & Hirschheim, 1987), in which the IS is not used or not used to the extent intended, arguably motivated various calls for the participation of users in IS development activities.

However, as Sauer (1999) observes, ongoing IS development challenges and failures suggest that simple factor-based prescriptions are inadequate to explain or prevent IS project failure. Sauer suggests that either the 'true' causes of IS failure have not yet been identified or, more likely, the various factors are causes of failure but are not readily avoidable. Organisations apparently "continue to do the things identified as factors associated with or causing failure" (Sauer, 1999, pp. 291-292). Sauer argues that this may occur for four reasons. First, most prescriptions lack specificity. For example, while user participation has become an accepted practice in IS development, what actually comprises user participation, its nature and extent, or at what point in IS development it occurs, is often not specified (Cavaye, 1995).

Second, some prescriptions are not easily acted upon. Sauer uses the example of gaining top management support – simple in theory, but often difficult to achieve in practice. Third, organisational or environmental conditions may inhibit the performance of a prescription in practice: "it is quite possible therefore that deeper organisational conditions prevent the causal factors identified from being changed unless the organisational conditions themselves are changed" (Sauer, 1999, p. 291). Fourth, prescriptive 'cures' may exacerbate other problems in the IS development process. For example, standard methods may limit the usefulness of user participation by restricting the time available for effective participation or by couching development activities in language and concepts that users do not understand (Wastell, 1996; Westrup, 1993). To these could be added a fifth reason, that "old, tired concept[s]" (such as user participation) need updating for contemporary IS development environments (Markus & Mao, 2004, p. 514).

The inability of factor-based prescriptions to eliminate IS development failure problems has led to an acknowledgement by some researchers that "the complexity associated with the combination of technical, human, and organisational characteristics of IS makes theorising very difficult" (Sauer, 1999, p. 293). There is a growing realisation that research into IS development as a complex organisational and social phenomena requires more in-depth consideration and conceptualisation. For example, Sauer (1999) argues that technical or behavioural studies of IS development often fail to include a consideration of the wider context. As Bussen & Myers (1997, p. 146) put it, "no system is implemented in a vacuum". This suggests that attention needs to be given to the interrelated and interacting contextual influences operating in the complex IS development process (Butler & Fitzgerald, 1999b; Hornby et al., 1992; Nandhakumar, 1996; Walsham, 1993; Wynekoop & Russo, 1997; Yetton et al., 2000).

Simplistic, unitary assumptions about IS development are inadequate. More sophisticated approaches that recognise the pluralistic and subjective nature of IS development activities are needed (Galliers & Swan, 2000). For example, organisational culture is not an

objective and unitary phenomenon. Rather, subcultures exist within an organisation that can be regarded as dynamic, living phenomena through which individuals intersubjectively (re)create the organisational realities they inhabit (Walsham, 1993). Similarly, the notion of 'user resistance' can be more richly understood as the effect or outcome of a social and political process in which individuals and groups involved in an IS project manoeuvre and negotiate in an attempt to further their interests (Doolin, 2004; Markus, 1983). As Vickers (1999, p. 264) observes, organisational actors are not one-dimensional 'cardboard cut-outs':

[IS] are developed and used by people: people who communicate ... people who are political themselves ... people who respond to cultural influences within the organizational milieu including those caused by changing technology ... people who suffer stress under change ... people simply learning to incorporate the role of computers in their daily lives.

Such concerns have stimulated process-oriented research into the nature and causes of failure (or success). By studying the process by which particular IS development outcomes unfold (and in which relevant factors interact and achieve their effects) in detail and over extended periods of time, the hope is that greater insight into phenomena may be achieved than through factor studies (Sauer, 1999). Accordingly, IS 'failure' and 'success' are being viewed by some researchers as processes rather than discrete events (Lyytinen & Hirschheim, 1987; Sauer, 1993; Wilson & Howcroft, 2002), as are factors traditionally considered to influence IS development outcomes. For example, Markus & Mao (2004) treat user (or, more widely, stakeholder) participation as a process involving communication, influence, negotiation, creativity, and conflict resolution. Similarly, some authors have viewed requirements determination (e.g. Flynn & Jazi, 1998; Urquhart, 2001), project management (e.g. Galliers & Swan, 2000) and the enactment of a standard method of IS development in practice (e.g. Fitzgerald et al., 2002) as complex and dynamic social processes.

Not only is a consideration of context important in understanding IS development, but that context has itself changed over time. Many changes have occurred in the IS development environment in recent years that need to be taken into account in updating our understanding of this complex phenomenon (Markus & Mao, 2004). Examples include increased devolution of IS expenditure to user groups; higher levels of packaged software acquisition and customisation; increased outsourcing of IS development; and widespread development of enterprise-wide IS and inter-organisational IS. These changes have increased the number and type of groups with an interest in the IS, such as vendors, outsourcing contractors and external consultants, and the significance of the interactions between them, as well as the variety of technical and non-technical development activities involved, such as complementary business or process interventions (Markus & Mao, 2004).

The reasons discussed above suggest that the file is by no means closed on understanding IS development. There is still a need for detailed research on IS development that takes as its starting point a conceptualisation of IS development as a process in which an IS emerges from a dynamic and interactive relationship between the technology, its social and organisational context, and the negotiated actions of various individuals and groups. A better understanding of how this process is enacted can be achieved by building upon the growing body of cumulative research (Butler & Fitzgerald, 2001) that attempts to “capture the complexity of the dynamics of change” in IS development (Walsham, 1993, p. 214).

## 1.2 Research Aim

The aim of this PhD is to contribute a deeper understanding of IS development in New Zealand organisations, in light of the continued reported problems with many IS projects, the limitations of factor-based, prescriptive studies that dominate research in this area, and the changing nature of the contemporary IS development environment. For this latter reason, an extended definition of ‘IS development’ is used in this study that encompasses both IS development in the traditional sense and the acquisition and customisation of software packages. At times, the wider description of ‘IS development and acquisition’ is used in this thesis to reinforce this point. A process perspective is adopted, in which IS development is conceptualised as an emergent process involving dynamic interactions between multiple actors with potentially competing interests in changing (internal and external) contexts. To achieve the research aim, the study was conducted using a multi-phase research approach (Fitzgerald, 1998b), focusing on the content, context and process of IS development (Walsham, 1993). These three dimensions, and their related research questions, are outlined in Table 1.1.

Table 1.1: Research questions underpinning this study

Dimension	Research question	Method used to address this question
Content	What is currently known about the influences shaping IS development?	Review of prior IS development research
Context	What is the current state of IS development practice in New Zealand?	Survey of IS development practice in New Zealand organisations
Process	How is the process of IS development enacted?	In-depth case study of an IS development project

The first dimension is related to the *content* of IS development. The objective here is to research and summarise what is currently known about the various influences that shape IS development. Of interest are the various actors involved in an IS project, their characteristics, actions, interactions, and relationships; the practical and material project content including project characteristics, resources and technologies; the various processes associated with IS development (such as user participation, project management, or use of standard methods of IS

development) that constitute opportunities or sites for (inter)action; and the various layers of context in which the IS project unfolds. This research question is addressed through a detailed literature review of empirical research on the influences shaping IS projects and their outcomes.

The second dimension is related to the *context* of IS development. While some international information is available, little is known about IS development practice in New Zealand organisations. The objective is to obtain a 'snapshot' of current IS development practices in this context, within which the research associated with the third dimension can be located. This research question is addressed through a Web-based survey of New Zealand organisations involved in IS development. The findings of this survey are also viewed as a key outcome of this government-funded PhD research project, and were disseminated to New Zealand industry via a summary report to survey participants, two regional conference presentations and three journal articles.

The third dimension is related to the *process* of IS development. The objective here is concerned with developing a better understanding of how the process of IS development is enacted in the modern development context. This research question is addressed through an in-depth, longitudinal case study and fine-grained process analysis of IS development in an organisational setting. An IS project involving the configuration of a commercial software product is followed 'in action' (Latour, 1987), from project initiation to the implementation and initial (non-) use of the IS. This research addresses the need highlighted by Westrup (1993) for longitudinal case studies of IS development that centre on the observation of the practice of IS developers, users and managers in order to understand the complexity of IS development.

The outcome of the research is an empirically grounded, theoretically informed understanding of the IS development process as situated action, which contributes to the growing body of cumulative process and interpretive research in this area. Such an understanding also informs IS development practice from multiple perspectives, potentially leading to more beneficial outcomes for all stakeholders (Howcroft & Wilson, 2003a). The research also provides benefits to New Zealand through generating knowledge specific to the local context that can be disseminated to New Zealand organisations involved in IS development.

### **1.3 Structure of the Thesis**

Walsham's (1993) conceptual notions of content, context and process are also used as a metaphor to organise and structure this thesis. This structure is summarised diagrammatically in Figure 1.1, which shows how the different chapters are interrelated and build from each other.

Chapter 2 outlines the research approach adopted in this PhD. First, the philosophical assumptions of interpretivism that underpin this research are discussed. The various approaches

to causal influence within the IS literature are then reviewed to justify an approach that is emergent, processual and mixed-level. Finally, the specific details of the approach adopted in this PhD are outlined.

Chapter 3 focuses on the *content* of IS development in general, and presents a meta-review of prior empirical research on the many influences shaping IS projects and their outcomes. Building on the theoretical concepts developed in the previous chapter (such as the content, context and process of IS development), a classificatory framework is developed for organising and making sense of these influences. The findings of this chapter inform development of both the survey instrument (Chapter 4) and the model of IS development (Chapter 5) used for analysing the longitudinal case study. The full detailed literature review that underpins the chapter is included as Appendix 1.

Chapter 4 summarises the aims and key outcomes of a *contextual* survey of IS development practices in New Zealand organisations. A Web-based survey instrument was developed and implemented to collect information about various aspects of IS development and acquisition for actual IS projects between 2001 and 2003 in 106 New Zealand organisations with more than 200 FTEs. Full details of the survey instrument construction, as well as a description of the procedure followed in implementing the survey and analysing the data, are included as Appendix 2. The complete, detailed results of the survey analysis are included as Appendix 4.

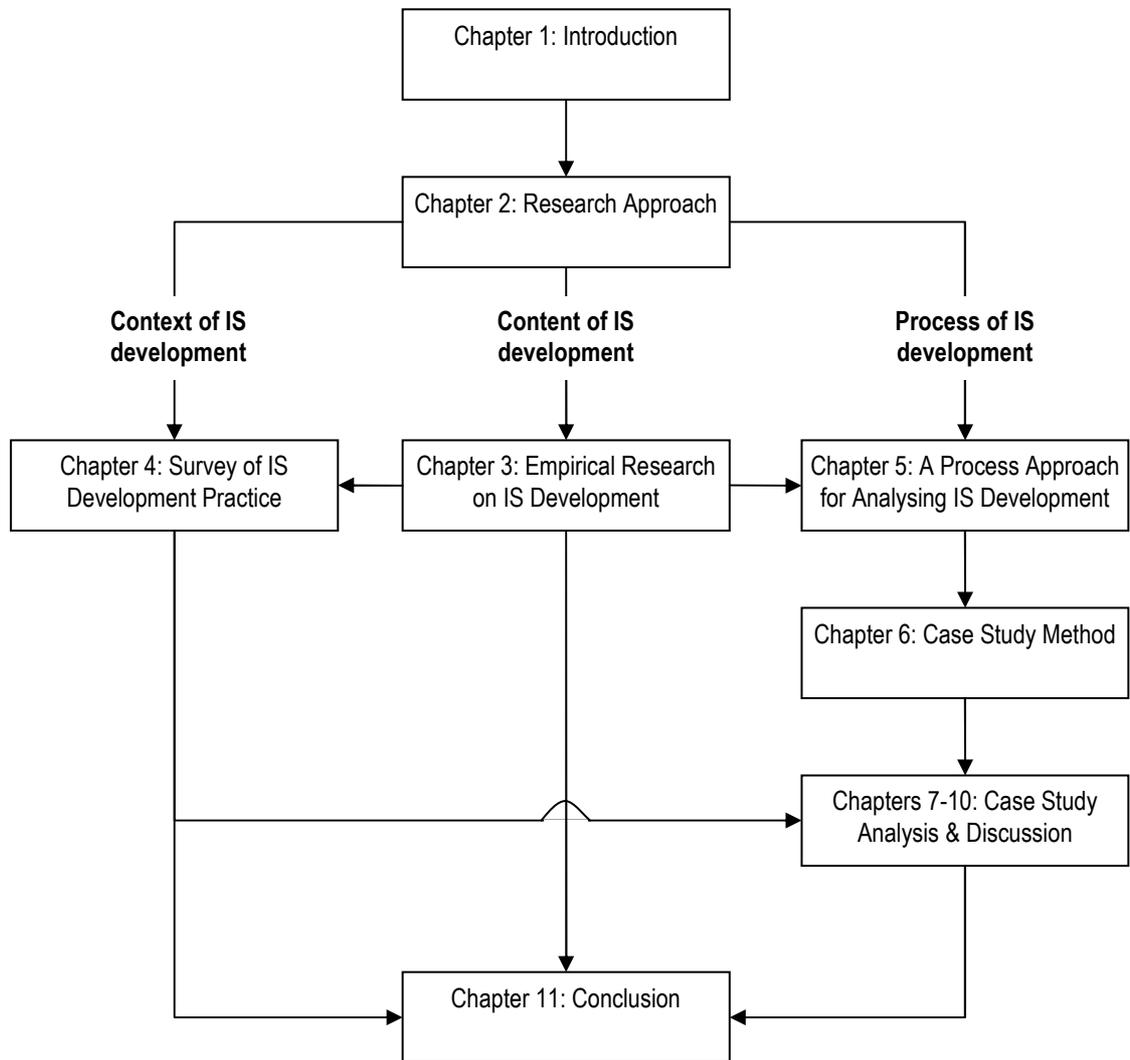
Chapter 5 develops a process approach for analysing IS development. The chapter sets out the elements of a process approach and develops a theoretically-grounded conceptual model of IS development as situated action that can be used to interpret the emergence of process outcomes. This theoretical model is used to analyse the in-depth case study of the IS development process in an organisational setting.

Chapter 6 outlines the method used in the case study. It includes a description of the case study site selection, data collection, and data analysis. Chapter 7 presents relevant information about the case study organisation and its IS practices, which is used to locate the case study project within its organisational and wider context. A detailed process analysis of the case study is presented in Chapters 8 and 9. The analysis is based on a detailed case narrative, informed by the model of IS development as situated action developed in Chapter 5, to explain how key events or actions in the IS project studied unfolded over time. The case narrative is supplemented by temporal bracketing and visual mapping techniques. Chapter 10 considers the extent to which the new IS solution developed in the project was used following project completion, and discusses key themes that emerged from the process analysis.

Chapter 11 is the concluding chapter of this study, and draws together conclusions from the three strands of this research – the content, context and process of IS development.

Limitations of the study are discussed and implications for theory and practice are suggested. Finally, a future research agenda is suggested.

Figure 1.1: The structure of this thesis



## Chapter 2: Research Approach

### 2.1 Introduction

In any detailed discussion about research, consideration needs to be given to the philosophical assumptions underpinning the research (Zuboff, 1988) and its theoretical structure in terms of what assumptions are made about causality (Markus & Robey, 1988), as well the theoretical substance of the topic under study. While these three aspects are not easily separated in a conceptual sense (Markus & Robey, 1988), they are dealt with individually here, in order to fit within a typical chapter structure. First, the research assumptions underpinning this PhD research are discussed. Second, the various approaches to causal influence that have been used within the IS literature are reviewed. Finally, the research approach that is adopted in this PhD is outlined. The theoretical substance of this research is presented separately in Chapters 3 and 4.

### 2.2 Research Philosophy

The purpose of this section is to discuss the philosophical assumptions underpinning this PhD research. In any field, disciplined inquiry is generally guided by what the researcher believes about the nature of physical and social reality (ontology) and what constitutes valid knowledge (epistemology) (Guba, 1990). Ultimately, it is the ontological and epistemological beliefs held by a researcher that determine how the research proceeds, what methods are used to collect data, and how that data is analysed and interpreted. As Zuboff (1988, p. 428) explains:

Behind every method lies a belief. Researchers must have a theory of reality and of how that reality might surrender itself to their knowledge-seeking efforts.... I believe that researchers ought to indicate something about their beliefs, so that readers can have access to the intellectual choices that are embedded in the research effort.

This PhD research focuses on the content, context and process of IS development (Walsham, 1993). It explores the relationships and interactions that occur between actors involved in, or with an interest in, IS development. The assumption is that an IS emerges from a dynamic and interactive relationship between the technology, its social and organisational context, and the negotiated actions of various individuals and groups involved in the IS development process. This focus on situated social action reflects the researcher's belief that human beings construct and reproduce social reality through the way they intersubjectively make sense of the world in social interaction. From this perspective, social reality can only be interpreted, not 'discovered'. Knowledge of that reality is a human construction, rather than an objective truth (Doolin & McLeod, 2005; Guba, 1990; Orlikowski & Baroudi, 1991; Walsham, 1993, 2006). As a consequence, a positivist epistemology such as that used in the natural

sciences is considered by the researcher to be inappropriate for studying complex behaviour. Instead, the research approach taken in this study is broadly interpretive (Walsham, 1993).

### **2.2.1 Interpretivism**

Interpretivism is an umbrella grouping encompassing diverse traditions concerned generally with meaning in social action. Research conducted in the interpretivist tradition is concerned with how individuals make sense of their world through their behaviour and language, and “why and how shared meanings exist” (Putnam, 1983, p. 41). Interpretive research generally takes a pluralistic, rather than unitary, view of social settings such as organisations. Organisations are regarded as coalitions of groups or individuals with different interests who may (or may not) work together to achieve a common outcome. Groups or individuals negotiate the meaning surrounding social action, reaching consensus by modifying or confirming existing meaning or by creating new meaning (Putnam, 1983).

Social interaction in settings such as organisations is believed to be relatively orderly as it is shaped by the continual enactment of shared concepts, norms and values, which become institutionalised as structural properties of social systems (Orlikowski, 1992; Orlikowski & Baroudi, 1991). However, because humans have agency, they can act to shape their organisational reality (Putnam, 1983) – although under specific conditions of possibility (Knights & Murray, 1994). Thus, while “meanings are formed, transferred, and used, they are also negotiated, and hence ... interpretations of reality may shift over time as circumstances, objectives, and constituencies change” (Orlikowski & Baroudi, 1991, p. 14).

Within an interpretivist worldview, it is believed that the researcher and what is being researched reflexively interact, with research findings being an outcome of the research process (Guba, 1990; Knights, 1995). Interpretivists construct accounts, interpretations of social practices and processes that focus on how meaning is (re)produced in particular settings (Orlikowski & Baroudi, 1991; Putnam, 1983). Interpretivists attempt to draw on multiple perspectives and views from different levels in the organisation (or the IS development process). The emphasis is on organisational participants’ experiences and interpretations of their social world, although the researcher attempts to provide a theoretically informed, ‘second-order’ interpretation of these (Nandhakumar & Jones, 1997; Orlikowski & Baroudi, 1991; Putnam, 1983; Van Maanen, 1979; Walsham, 1995b).

Although causality is not generally the focus of interpretivist research, where it is considered, researchers tend to use (non-linear) circular or reciprocal causal chains or models, with relationships and outcomes emerging from a dynamic and complex process that evolves over time (Putnam, 1983). Interpretivists tend to generalise their results by drawing on prior

studies to inform future work and collective understanding (Orlikowski & Baroudi, 1991; Putnam, 1983). The concern is not statistical generalisation (Nandhakumar, 1996; Walsham, 1995b), but to achieve a “deep understanding of a phenomenon in one context, which may bring insight into others” (Wynekoop & Russo, 1997, p. 51). The validity of the understanding derived from an interpretive study relies on its plausibility and clarity of the logical reasoning underpinning its argument (Walsham, 1993). The intention is “to derive theoretical interpretation from data ... rather than to test theory against data” (Nandhakumar & Avison, 1999, p. 180).

Interpretivism has become an established research approach in the IS field (Klein & Myers, 1999; Lee et al., 1997; Markus & Lee, 1999; Myers, 1997; Walsham, 1995a). Arguments supporting the interpretive approach as a valid basis of inquiry into the social implications of IS in organisations are well documented in the IS literature (Doolin & McLeod, 2005; Nandhakumar & Jones, 1997; Orlikowski & Baroudi, 1991; Walsham, 1993, 1995b, 2006). While the emphasis of an interpretive approach is on how people experience and interpret their social world, this does not deny the materiality of their social reality, which in relation to an IS is the technology itself. An IS has physical components such as hardware and software. Although individuals experience and understand a technology differently through their ongoing and situated use of it (Orlikowski, 2000), they also develop a shared understanding that is constituted through their social interaction in relation to it (Orlikowski & Gash, 1994; Pinch & Bijker, 1987).

The underlying premise of an interpretive approach to IS research is the need to study IS in their organisational context and for the researcher to get alongside the researched. This reflects a desire to access organisational participants’ interpretations, but also a need for familiarity and close engagement in order to understand the complex social and contextual interactions surrounding IS development and use (Doolin, 1996; Nandhakumar & Jones, 1997; Putnam, 1983; Walsham, 1995b, 2006). Interpretive researchers “gather rich data: thick descriptions saturated with contextual and cultural overtones” (Putnam, 1983, p. 44). In doing so, however, it is important to avoid treating description as an end in itself. Knights (1995) cautions against “the pursuit of accurate representations or exhaustive and comprehensive narratives” (p. 234), which lack critical reflection on “the divergent interpretations of reality that stem from distinctive political interests and identities” (p.248).

The emphasis on closeness to the phenomenon under study, rich description and the perspectives of organisational participants means that interpretive researchers tend to utilise methods that generate the qualitative data required for an inductive process of inquiry, such as interviews and observation of activities. There is a continuous interplay between theory and data interpretation, and the data collection process evolves in response to prior observations, interpretations and literature (Putnam, 1983; Walsham, 1995b, 2006).

This does not preclude the collection and use of quantitative data. The terms 'qualitative' and 'quantitative' apply at the level of data or method (as opposed to epistemology) (Guba, 1990; Putnam, 1983), and qualitative and quantitative methods can be treated as "complementary rather than antagonistic aspects of social research" (Giddens, 1984, p. 334). Mingers (2001) argues that it is possible to use research methods typically associated with one research context in another context, as long as they are used critically and knowledgeably. Different methods can be chosen for purely pragmatic reasons in order to address specific research problems, circumstances and objectives (Flyvbjerg, 2006; Silverman, 1998). Thus, within an interpretive worldview, both survey and case study methods can be considered as part of a portfolio of possible research methods (Walsham, 2006), recognising the limitations of each method and the appropriate interpretive status of the data they produce (Nandhakumar & Jones, 1997).

Indeed, combining qualitative and quantitative methods has been advocated by various authors in the IS literature (Cavaye, 1996; Mingers, 2001; Silverman, 1998). For example, Gallivan (1997) suggests that mixed methods provide an opportunity to gather mixed-level data, and mixed methods have been used in a number of IS research studies (e.g. Fitzgerald, 1998b; Gable, 1994; Markus, 1994; Poon & Swatman, 1998).

### **2.3 Theoretical Structure**

In their evaluation of research on the role and impact of IT in organisations, Markus & Robey (1988) focus on the theoretical structure of the research – what they refer to as "assumptions about the nature and direction of causal influence" (p. 583). They identify three dimensions that they consider to be relevant: causal agency, logical structure and level of analysis.

Causal agency refers to the researchers' beliefs about the nature of causality in IS-related organisational change: i.e. who are the agents of change - technology and/or human actors. Logical structure refers to the researchers' beliefs about the nature of the relationship between what may be regarded as antecedents and outcomes. In this regard, Markus & Robey distinguish between factor and process studies. The level of analysis refers to the types of entities focused on in the study: individuals, groups, organisations and society.

The three dimensions outlined by Markus & Robey (1988) are discussed further in this section in relation to IS development and the research in this PhD. First, the various perspectives (approaches to causal agency) that have been used to study IS development within the IS literature are reviewed. Second, a comparison is made between factor and process studies. Third, the level of analysis in studies of IS development is discussed.

### 2.3.1 Perspectives on the IS development process

As a central topic in the IS literature, IS development has been approached in a variety of ways, primarily because it continues to be problematic in practice in many cases. A number of authors have attempted to categorise perspectives on IS development based on their conceptual or philosophical orientation (e.g. Hirschheim & Klein, 1989; Hirschheim et al., 1995; Lyytinen, 1987). The following discussion categorises various ways of perceiving IS development based on their treatment of the relationship between technology and the social aspects of IS development – a “core theoretical position” in studies of IS and organisational change (Avgerou, 2002, p. 56). In the following discussion, a distinction is made between technical, social and ‘sociotechnical’ perspectives on IS development.

One approach to understanding IS development is as primarily a *technical* process (Doherty & King, 2005), focusing on the technological aspects of an IS and regarding IS development as a rational and controllable process to be engineered or managed (Franz & Robey, 1984; Lyytinen, 1987). For example, many formal IS development methods adopt a reductionist approach, assuming that an IS solution is attainable through systematically following a sequence of technical steps in which, for instance, an objective and complete set of requirements exists (Fitzgerald, 1996; Walsham, 1993). A ‘technological imperative’ (Markus & Robey, 1988) that emphasises the independent determining role of technology in organisational change around IS (Orlikowski, 1992) underlies this perspective on IS development.

As Bloomfield (1992) observes, constructing IS development in technical terms subordinates or overlooks a social dimension to IS development. A number of researchers have attempted to correct this perceived imbalance by viewing IS development as “a *social* process that involves actors in various interacting social roles” (Robey et al., 2001, p. 53, emphasis added). Such studies emphasise the political, cultural or interactional aspects of IS development as it occurs in a social and organisational context. Early examples of this sort of study can be seen in Markus’ (1983) classic case study of the politics of IS implementation and Kling’s (1987) development of ‘web models’, which portray IS development and use as dependent on a social context of complex social relations and actions. More recent examples include Heiskanen et al.’s (2000) focus on social relations and interaction in IS development and Avgerou’s (2001) consideration of the cultural, social and cognitive aspects of IS implementation as a process of socio-organisational change.

Paradoxically, while the focus placed on social dimensions of IS development has increased our understanding of how interests, values, power and politics can shape IS development and use in organisations, studies of this nature have often tended to reify or ‘black-box’ the technology itself, ignoring it, taking it for granted, or treating it as unproblematic

(Bloomfield, 1992; Orlikowski & Iacono, 2001). In this sense, these approaches reflect a form of social determinism or 'organisational imperative' (Markus & Robey, 1988), in that they privilege the role of the motives, choices and actions of organisational participants in shaping IS (Orlikowski, 1992). To address this imbalance, Orlikowski & Iacono (2001) call for a consideration of technology to be brought back into studies of IS.

There are a number of studies of IS development that have attempted to integrate both social and technical dimensions and which approach IS development as a *sociotechnical* process. A 'sociotechnical' perspective treats the technical and the social as a *duality* – a mutually defining, simultaneous and inseparable sociotechnical reality (Law & Bijker, 1992; Orlikowski, 1991). This is a different understanding of sociotechnical from that used in 'sociotechnical design' studies (e.g. Mumford, 1997; 2000; 2006), which treat the social and the technical as a *dualism*, maintaining a boundary between them (Bloomfield & Vurdubarkis, 1994). These latter studies tend to adopt an instrumentalist approach in which factors related to separate social and technical systems are given equal consideration and manipulated to produce an optimal combination for successful (humanistic) IS development (Mumford, 2006; Orlikowski, 1992).

Many sociotechnical approaches to IS development reflect an 'emergent perspective' (Markus & Robey, 1988), in that technological outcomes and the organisational change associated with IS emerge dynamically from the reciprocal interaction between the technological features of an IS and the organisational actors who develop or use it. For example, Orlikowski (1992; 2000) integrates an explicit consideration of technology into the structuration theory of Giddens (1984), in an attempt to explain how IS design, development and use is simultaneously enacted within social structures and implicated in the production and reproduction of social structures. Her conceptualisation of the 'duality of technology':

... emphasizes that there is flexibility in how people design, interpret, and use technology, but that this flexibility is a function of the material components comprising the artefact, the institutional context in which a technology is developed and used, and the power, knowledge, and interests of human actors. (Orlikowski, 1992, p. 421)

Knights & Murray (1994) develop a political process perspective on IS development that incorporates technology as 'conditions of technological possibility' that are mobilised to enable or constrain certain courses of action. A number of IS researchers have applied the actor-network theory developed by Latour (2005) and colleagues to analyse IS development and use. Actor-network theory sees society as comprising heterogeneous, sociotechnical networks, in which both humans and technology are accorded the status of an actor (Doolin & McLeod, 2005; Hanseth et al., 2004; Walsham, 1997). For example, Mahringer et al. (2004) use actor-network theory to examine the role of technology as an actor in IS project escalation.

The main characteristics of these three perspectives on IS development are summarised in Table 2.1. Over time, there has been a move away from viewing IS development as a technical process to a greater focus on the social dimension of development. While studies of these social processes have made an important contribution to our understanding of IS development, an approach that considers the sociotechnical nature of IS development reintroduces technology into the analysis and provides a more holistic treatment of this phenomenon.

Table 2.1: Approaches to IS development research

Approach	Technical	Social	Sociotechnical
Analytical focus	Technical control	Social action	Social and technical treated as mutually defining
View of IS development	As a technical process to be managed	As a socio-political process to be negotiated	As a dynamic process emerging from the interplay of technology, people and context
Causal agency (Markus & Robey, 1988)	Technological imperative	Organisational imperative	Emergent perspective
Contribution	Partial understanding of IS development as a technical solution	Highlight importance of values, interests and social relations in IS development, but 'black boxes' technology	More holistic understanding of IS development
Examples	Requirements engineering (Ramesh & Dhar, 1992) IS development methods (Carmel & Becker, 1995) IS project management (Gowan & Mathieu, 2005)	Power and politics (Markus, 1983) Social relations and interaction (Heiskanen et al., 2000) Culture and context (Avgerou, 2001)	Conditions of technological possibility (Knights & Murray, 1994) Technologies-in-practice (Orlikowski, 2000) Technology as an actor (Mahring et al., 2004)

### 2.3.2 Factor versus process models

Markus & Robey (1988) describe two main approaches to IS research: *factor* (or variance) research studies and *process* research studies. Essentially, factor studies are cross-sectional and attempt to predict outcomes from a set of one or more contingent conditions (variables) that act upon the outcome in a causal and deterministic way (Van de Ven & Poole, 2005). In contrast, process studies are longitudinal and attempt to explain how and why particular outcomes develop over time (Markus & Robey, 1988).

Factor studies treat causes (precursors) and effects (outcomes) as variables with a range of possible values. Precursor variables are hypothesised as necessary and sufficient conditions for a particular outcome. The assumption is that an outcome will invariably occur when these necessary and sufficient conditions are present (Markus & Robey, 1988). Much of the research on IS development has utilised a factor research approach. Such studies have focused on predicting IS project outcomes (usually some measure of success or failure) from a range of possible precursor variables including, for example, adequacy of resources, user participation, top management support, interpersonal conflict, and user expectations. Part of the popularity of

such studies stems from the fact that they are relatively easy to replicate and it is easy to develop prescriptions based on them (Sauer, 1999).

However, factor studies of IS development suffer from a number of limitations (Markus & Robey, 1988; Nandhakumar, 1996; Sauer, 1999; Walsham, 1993). First, they tend to be static or cross-sectional, rather than longitudinal, and lack a consideration of the dynamics of change and how IS project outcomes develop over time. Second, while precursor variables may represent necessary conditions for a particular outcome to occur, they are not sufficient to explain causality. Third, many factor studies fail to account for interactions between the various factors studied and with contextual elements. Fourth, the invariant relationships between precursor variables and outcomes assumed by factor studies rarely exist in complex, 'real world', social phenomena. Many 'factors' relevant to IS development are in effect enacted processes that vary with time. Reductionist approaches to dealing with such a complex social problem fail to adequately deal with the dynamic and interactive processes involved in IS development. As Wastell and Newman (1993, pp. 142-143) remark:

Simple prescriptions such as "get top management support" or the pious call for user involvement grotesquely oversimplify the exacting realities of actual systems work.

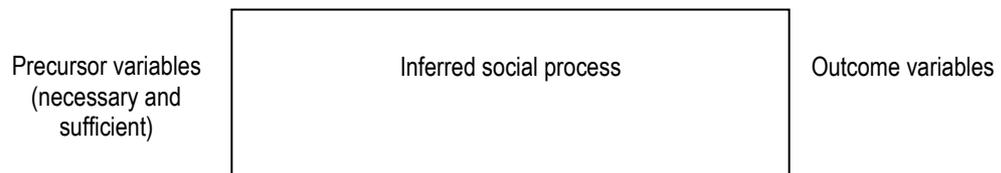
These limitations and a general lack of consistency in the results of factor studies of IS development have led some researchers to adopt a process research approach (Sauer, 1999). Process studies are longitudinal, concerned with developing knowledge of the process by which particular outcomes develop over time. Outcomes are not treated as variables but as discrete phenomena, often conceptualised as 'changes of state' (Markus & Robey, 1988). Typically, processes are analysed as sequences of events – instances of social action. Thus, process studies attempt to explain outcomes as the consequence of a preceding sequence of interrelated and inter-dependent events in organisational processes. While necessary conditions play a role in process studies, they are not sufficient to explain a particular outcome, as even when they are present the outcome may not occur. Chance and 'random' (unplanned) events may also influence outcomes (Markus & Robey, 1988; Newman & Noble, 1990; Sabherwal & Robey, 1995; Van de Ven & Poole, 2005).

The differences between factor and process approaches are illustrated in Figure 2.1. Robey (1994, p. 443) argues that "by conceiving of processes as systems of variables, the variance strategy affords little insight into the dynamics of the social processes it purports to explain". Similarly, Walsham (1993) notes that although results from factor studies could be included as elements in a broader analysis of the context and process of IS development, it is the interactions between them that are important in understanding the dynamics of the IS development process. In contrast to factor approaches, process approaches open up the 'black

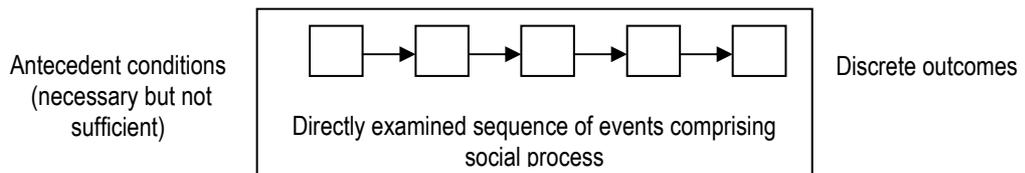
box' between antecedents and consequences by describing and explaining the events that connect them (Pentland, 1999). Sequences of social action are studied directly, so that causation is demonstrated empirically, rather than inferred as in factor studies (Newman & Robey, 1992; Robey, 1994). While the most common form of process approach in the literature is the linear event sequence shown in Figure 2.1, such simple process models have been criticised. More sophisticated process representations may show “divergences from the main route, recycling between phases and parallel tracks ... multilayered and changing contexts, multidirectional causalities, and feedback loops” (Langley, 1999, p. 694).

Figure 2.1: Factor and process approaches (adapted from Newman & Robey, 1992)

**Factor approaches:**



**Process approaches:**



**2.3.3 Level of analysis**

Markus & Robey (1988) recommend that IS researchers explicitly consider and discuss what level of analysis they are using and why. As noted earlier, the level of analysis relates to the type of entities under study. Markus & Robey draw a distinction between macro-level and micro-level analyses. While the former focus on large-scale collectives such as organisations, populations and societies, the latter focus on individuals and small groups. Markus & Robey suggest that the nature of IT is neither solely macro-level nor micro-level, and argue that mixed-level analysis may be appropriate for studying multi-level phenomena such as the introduction of IT into an organisation. By moving between levels of analysis, from “the macrosocial level ... down to the level of individual actions and back up again” (Coleman, 1986, p. 1322, cited in Markus & Robey, 1988)<sup>1</sup>, the dynamic relationships and interactions between individuals, IT and social structures can be explored. The inclusion of social structures and other

<sup>1</sup> Coleman, J.S. (1986). Social theory, social research, and a theory of action. *American Journal of Sociology*, 91, 1309-1335.

macro contextual elements within the analysis is particularly important where they act as conditions of possibility, structuring individuals' decisions and actions (Kling, 1987; Knights & Murray, 1994). Markus and Robey suggest that a mixed-level analysis grounds these macro-level structures in individuals' intentions and actions.

Prior studies of IS development have been undertaken at macro-, micro- and mixed levels of analysis. For example, Rahim et al.'s (1998) survey of the influences on the organisational adoption of standard methods of IS development presents a macro-level analysis, while Urquhart's (1997) micro-level analysis of user-developer conversations focuses on the tactics used to arrive at shared understanding during requirements gathering. Walsham (1993) provides a good example of a study involving mixed levels of analysis, spanning the individual, group, organisational and societal levels. His case studies of IS and organisational change combine an examination of social relations within each organisation with a consideration of organisational structures and wider historical, political and cultural contexts.

In conclusion, Markus & Robey (1988) emphasise the importance for researchers to reflect on the theoretical structure of the research, namely their views on causal agency, the logical structure of their research and their level of analysis. They suggest that studies on IT in organisations that are based on "theoretical structures which emphasise empirical fidelity will stimulate more and better research on these phenomena" (Markus & Robey, 1988, p. 596). This is interpreted here to imply research approaches that are emergent, processual and mixed-level.

## **2.4 Research Approach Adopted in this PhD**

Various elements of the research approach used in this PhD are summarised in Figure 2.2. This study is concerned with the nature and process of *IS development and acquisition* as it unfolds in an organisational setting. The research approach taken in this study is *broadly interpretive* (Walsham, 1993), in that it is the researcher's belief that understanding and meanings are subjective, and knowledge is socially constructed. A *sociotechnical* perspective is adopted; that is, the social and the technical are treated as mutually defining. The primary concern is arriving at a more holistic understanding of IS development, which is conceived of as a dynamic, *multi-level*, multi-dimensional *process* in which people and technology act and interact in locally situated contexts. While the focal level of analysis is individuals or groups, explicit consideration will be given to the multiple layers of context.

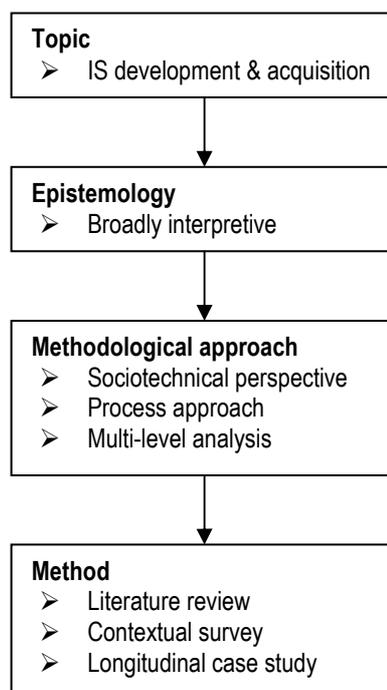
Following Walsham's (1993) emphasis on the content, context and process of IS-related organisational change, the methods used in this study are three-fold. First, an extensive *literature review* is undertaken to provide a comprehensive meta-review and synthesis of contemporary empirical knowledge about the content of IS development. Second, a *survey* is used to collect

contextual data about IS development practices in New Zealand. Finally, these both support a detailed *longitudinal case study* of the IS development process in an organisational setting.

The use of both qualitative and quantitative methods for data collection is compatible with the broadly interpretive approach taken in this PhD research, as discussed above (Section 2.2.1). In this study, the survey is used to collect data about the frequency and extent of use of various IS development practices in New Zealand organisations. While this is an appropriate method for gathering contextual information across a large number of organisations (breadth), it cannot provide the level of detail and understanding required to examine situated IS development processes and the social interaction that occurs in relation to them (depth). This is the role of the case study in the overall research design.

This use of a survey for addressing one research requirement and an in-depth case study for a different research requirement is consistent with the research approach used by Markus (1994). In her study of email communication, a survey was used to ascertain managers' awareness of communication media use and frequency of email usage, while social aspects of email use were investigated in interviews. Similarly, Fitzgerald (1998b, p. 106) used a "pluralist multi-phase research strategy" involving a pilot study, survey and subsequent field study. This is a different multi-method approach to say Gable (1994), who used case studies to develop a conceptual model for subsequent testing by a survey.

Figure 2.2: The research approach used in this PhD (following Walsham, 1993)



## **Chapter 3: Empirical Research on IS Development**

### **3.1 Introduction**

This chapter presents the results of a comprehensive review of recent empirical studies of IS development. The purpose is to synthesise contemporary knowledge of the various influences that shape IS development. A classificatory framework is proposed as a way of organising the voluminous literature on this subject.

The chapter is structured as follows. First, prior classifications of the literature on IS development are considered as a benchmark for the classificatory framework developed in this chapter. Next, the approach taken to conducting the literature review is outlined. A brief consideration is then given to what is meant by IS project outcomes, as terms and measures used to describe outcomes are often ambiguous or left undefined. The four subsequent sections summarise the empirical findings of potential influences on IS development. Only a brief overview of individual influences is presented here due to space constraints, the need to preserve readability and, more importantly, the intent to use the review as the basis of subsequent research reported here. The full literature review is available in Appendix 1. The chapter concludes with a discussion of a number of themes synthesised from the literature review.

### **3.2 A New Classificatory Framework**

IS projects and the influences shaping their outcomes have been the subjects of a sustained research effort in the IS field for over thirty years (Lucas, 1975). Making sense of the huge volume of empirical findings on this topic is a daunting task. A number of authors have produced classificatory frameworks or models in an attempt to organise the research in this area (Table 3.1). It is worth noting that the majority of this empirical research has followed a factor-based approach, and that the various prior classificatory schemes reflect this in developing categorisations of factors reported to influence IS project outcomes. For convenience and consistency, as well as to enable comparison with these prior schemes, the classificatory framework developed here also refers to 'factors' influencing IS project outcomes, although acknowledging the potential limitations of, and connotations associated with, factor-based approaches.

Table 3.1: Prior schemes classifying influences on IS development

Study	Scope	Categories (as defined in original study)
Lyytinen & Hirschheim (1987)	Reasons for IS failure	<ol style="list-style-type: none"> <li>1. Technical and operational features of the IS</li> <li>2. Lack of fit of IS with users, rest of organisation, or operating environment</li> <li>3. Features of the IS development process (e.g. methods, decision-making, implementation)</li> <li>4. Cognitive and skill limitations of analysts or users</li> </ol>
Ewusi-Mensah & Przasnyski (1991)	Factors contributing to IS project abandonment	<ol style="list-style-type: none"> <li>1. Economic factors (e.g. project cost, completion time)</li> <li>2. Technological factors (e.g. technical feasibility or difficulty, availability of technology or technical expertise, dependence on technical infrastructure)</li> <li>3. Organisational factors (e.g. stakeholder expectations, senior management attitude, organisational politics or changes, staff turnover)</li> </ol>
Davis et al. (1992)	Dimensions of IS failure	<ol style="list-style-type: none"> <li>1. Technical system – technology, user interfaces, information requirements, organisational fit</li> <li>2. Social system – user reactions, measures of IS performance, development processes, beliefs/ideas/objectives of system builders</li> </ol>
Cavaye (1995)	Contingent factors for user participation in IS development	<ol style="list-style-type: none"> <li>1. Organisational variables – time for development, available financial resources, top management commitment</li> <li>2. Project-related factors – task-structure, project complexity, project initiator, available technology, resultant change</li> <li>3. User-related factors – user willingness, ability, characteristics and attitudes</li> </ol>
Poulymenakou & Holmes (1996)	Contingent variables for IS failure	<ol style="list-style-type: none"> <li>1. Organisational (macro) – culture, planning, accountability, irrationality, evaluation</li> <li>2. Project (micro) – power and politics, user resistance to change, development methods</li> </ol>
Butler & Fitzgerald (2001)	Model for user participation and management of change in IS development	<ol style="list-style-type: none"> <li>1. Institutional context – organisational policy</li> <li>2. Project-related factors – project initiator, top management commitment, type of system, project complexity, task-structure, time for development, available financial resources, resultant change</li> <li>3. Process-related factors – user-developer relationship, influence and power, communication</li> <li>4. User-related factors – user perceptions, commitment, willingness, ability, characteristics and attitudes</li> </ol>
Scott & Vessey (2002)	Model of risk factors in ERP system implementations	<ol style="list-style-type: none"> <li>1. External business environment</li> <li>2. Organisational context – culture, structure, strategy, IT infrastructure, business processes</li> <li>3. Systems context – data, technology, project governance</li> <li>4. Project – project focus and scope, project management, change management</li> </ol>

While of value, the classificatory schemes summarised in Table 3.1 are limited in one or more ways. For example, the studies on which the Lyytinen & Hirschheim (1987) framework is based date from 1985 or earlier and may not reflect more recent changes in the nature of IS development. The studies used by Ewusi-Mensah & Przasnyski (1991) and Davis et al. (1992) are similarly dated. Subsequent classificatory schemes are limited in their level of detail or scope, either focusing on specific aspects of IS development (Butler & Fitzgerald, 2001; Cavaye, 1995), a subset of influential factors (Poulymenakou & Holmes, 1996), or specific types of IS projects (Scott & Vessey, 2002).

This chapter redresses these limitations by offering a more current survey of empirical work on IS development, while maintaining the desirability of a systematic conceptualisation of the field emphasised by Lyytinen & Hirschheim (1987). It synthesises the findings of empirical studies that address a wide range of project outcomes, including both IS success and failure, as well as project performance or abandonment. Based on this synthesis, and informed by the conceptual understanding of IS development discussed in the previous chapter, a classificatory framework is developed that builds on the earlier examples described above. Although the final form of the framework emerged after reviewing the empirical literature, it is presented first in this chapter in order to provide conceptual assistance to the reader (Gallivan & Keil, 2003).

Walsham's (1993) theoretical treatment of the content, process and context of IS-related organisational change was used as a conceptual basis for the classificatory framework. Walsham suggests that a consideration of these three components in IS design, development and implementation overcomes a prior over-emphasis on the content of IS-related change at the expense of the process of change and its relationship with organisational and wider contexts. The content, process and context concepts have been used elsewhere in the IS literature, suggesting a degree of recognition and acceptance (Kautz, 2004; Kautz & Nielsen, 2004; Serafeimidis & Smithson, 1999; Stockdale & Standing, 2006). In addition, these concepts are sufficiently generic to accommodate the wide variety of proposed factors influencing IS project outcomes, while providing a parsimonious framework for reviewing and classifying them (Stockdale & Standing, 2006).

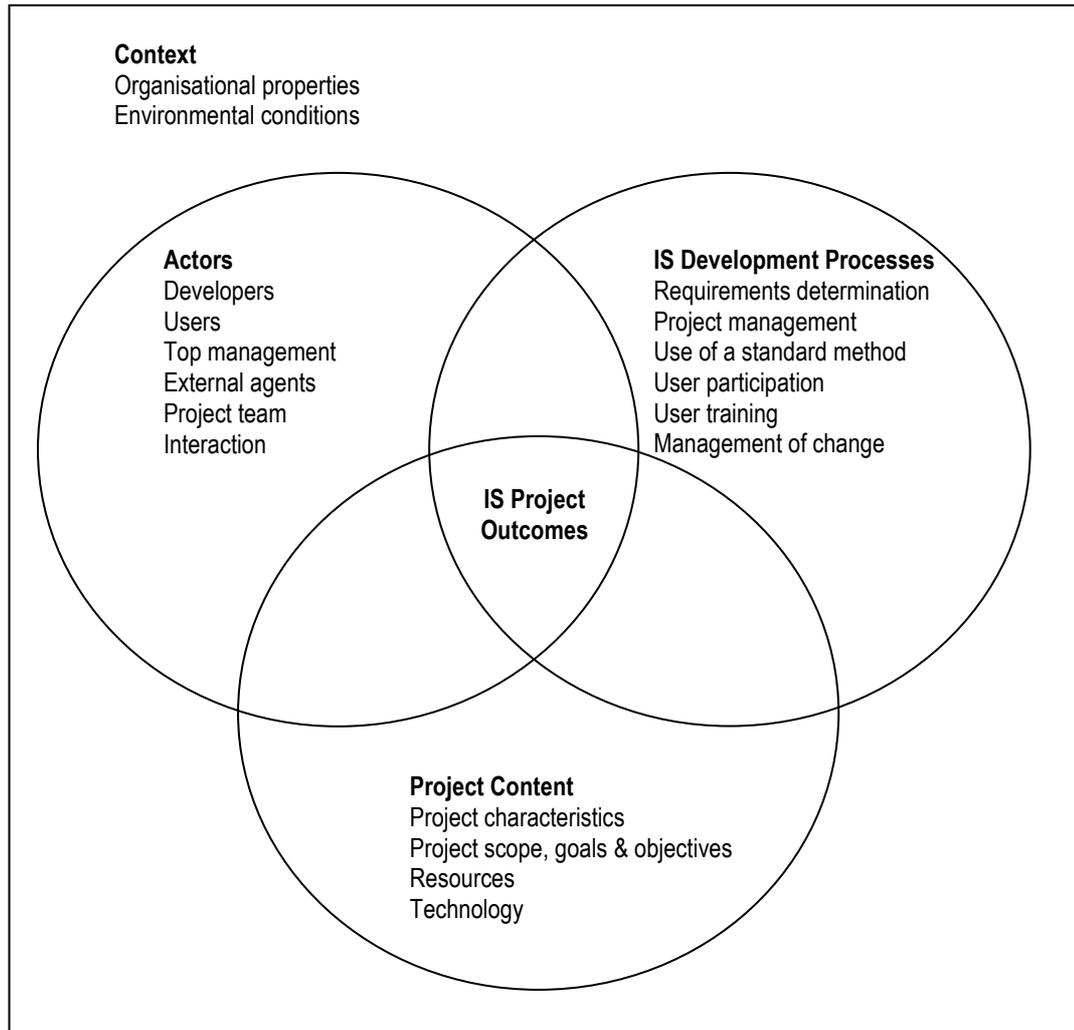
The resultant framework is shown in Figure 3.1. Influences on IS development are divided into four major dimensions, each containing a number of factors highlighted in the subsequent review of empirical studies of IS development<sup>1</sup>. The interaction of these four dimensions represents the project trajectory at particular points in time, including *IS project outcomes*. However, the evaluation of project outcomes is problematic given their multi-dimensional nature, the different evaluative criteria used by various stakeholders, and their often negotiated or contested nature. These and related issues are considered further in Section 3.4.

*Project content* includes factors that are typically considered as properties of the IS project itself, including its dimensions, scope and goals, the resources it attracts, and the hardware and software used in development. The project's properties, whether technological, strategic or resource-related, materially influence the development outcome or are mobilised and drawn upon by various individuals or groups in their development activities and interactions with each other.

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<sup>1</sup> While the use of overlapping circles to represent various dimensions resembles Stockdale & Standing's (2006) model for evaluating IS, the subject and detail of the two frameworks differ.

Figure 3.1: A framework for understanding influences on IS project outcomes



*IS development processes* include the various activities typically associated with IS development, ranging from requirements determination and standard method use to the management of change resulting from implementation of a new IS. Grounded in a long history of received wisdom, these processes reflect the evolution of IS development practice. They constitute both opportunities and sites for action and interaction among the interested individuals and groups as they negotiate a particular IS outcome.

*Context* includes factors related to both the organisation in which IS development is located and the wider socio-economic environment in which the organisation operates. A range of contextual properties or conditions, operating across local, national and international levels, and including the historical circumstances from which IS are developed and used, may shape the course of development in an IS project by constraining or facilitating certain courses of action.

Finally, as can be seen from the content, context and process descriptions above, consideration needs to be given to the various actors, both individuals and groups, who are involved or interested in the IS development project. Their characteristics, actions, interactions

and relationships shape the development trajectory and project outcomes in multiple ways, so that an understanding of their roles and actions during IS development is also necessary.

The classificatory framework developed here serves as an analytical device to facilitate understanding and order out of the vast amount of information available on factors influencing IS development. The framework does not attempt to privilege any factor or set of factors over others. Project outcomes are highly situational in nature. While generic influences are common to a range of IS development contexts, they manifest themselves differently in specific situations (cf. Poulymenakou & Holmes, 1996). Further, it is acknowledged that many of these factors are interrelated and that often project outcomes involve multiple factors that interact in complex ways. Indeed, the theoretical concepts of the content, process and context of change are typically treated as interlinked and in continuous interplay (Kautz, 2004; Kautz & Nielsen, 2004; Serafeimidis & Smithson, 1999; Stockdale & Standing, 2006). This is represented in Figure 3.1 using overlapping circles to reflect the interaction between project content, IS development processes and people's actions during development, all situated within the broader context in which IS development occurs.

### **3.3 Reviewing the Literature**

The classificatory framework was used to structure the results of the extensive review of recent empirical literature on IS development presented in Appendix 1 and summarised in the remainder of this chapter. The scope of the review was studies of IS development published in academic journals between 1995 and 2006. Studies published in conference proceedings were not explicitly targeted, although some did emerge from secondary searching. Each study was examined to establish that it (1) fell within the 1995 to 2006 timeframe, (2) focused on IS project outcomes or factors influencing IS development (rather than IS evaluation or IS in use), and (3) provided empirical data on these.

An initial sample of studies was obtained using two EBSCO Information Services databases, *Computer Source* and *Business Source Premier*. *Computer Source* offers full text access to some 300 publications in computer science and IS. *Business Source Premier* (over 2,300 full text journals) was included to provide coverage of journals in business and management information systems not covered by *Computer Source*. The two databases were searched between 1995 and 2006 using the terms 'project failure' or 'project success', in combination with the subject terms 'computer software' or 'information technology'. These searches provided an initial total of 290 publications, many of which were eliminated from the study on the basis of the criteria outlined above. The remaining studies were reviewed and further candidate studies were identified from their reference lists using a 'snowballing' technique. In

addition, a number of journals particularly relevant to IS development but not covered in the initial database searches were subjected to targeted searches using the same search terms, resulting in a small number of additional studies being found. The aim was to be as inclusive as possible and the result was a comprehensive (although not exhaustive) survey of empirical research on factors influencing IS development outcomes. Altogether, 189 empirical papers were reviewed. Where appropriate, conceptual or theoretical papers on IS development and project outcomes were also consulted to provide clarification or explanation of factors highlighted in the empirical studies.

The empirical studies reviewed used a variety of data collection methods, including surveys, interview programmes, Delphi studies and case studies. The most common approach was a factor-based study utilising a large-scale survey and focused on one or a combination of factors relating to project content, IS development processes or actors. The case studies included in the literature review proved to be a particularly important source of contextual factors influencing IS development. Factor-based empirical studies were reviewed first. These studies generated a range of author-reported influential factors, which were then assigned to one of the four dimensions of the classificatory framework and grouped into categories within each dimension based on their commonalities. As more studies were reviewed emergent categories were refined or combined to produce the categories used to populate each dimension in the classificatory framework shown in Figure 3.1. Where available, reported statistical significance was used to identify influential factors affecting IS project outcomes in empirical studies based on quantitative data. Other quantitative studies used rank order to indicate the relative importance of individual factors. In empirical studies using qualitative data, reliance was placed on the authors' descriptions of influential factors, particularly the frequency with which a factor was mentioned, the magnitude of the reported effect, or authors' self-reported estimates of relative importance.

Details of the focus, method, findings and measurement criteria for thirty factor-based studies that considered multiple (at least eight) influential factors across at least three dimensions, are tabulated in Table 3.2. These studies illustrate the summarised findings of the detailed literature review (Appendix 1) in the sections that follow. Where appropriate, other empirical studies that focused on IS project outcomes or that concentrated on a smaller number of relevant factors or a specific aspect of IS development are also cited.

Table 3.2: Empirical studies reporting multiple factors influencing IS project outcomes. ('+' or '-' respectively indicate a positive or negative relationship to the project outcome measure. Italics indicate a statistically significant relationship at  $p \leq 0.10$ .)

Study	Focus	Method	Actors	Project content	IS development processes	Context	Outcome measure
Aladwani (2000)	Systems project performance	Survey Kuwait	Project staff expertise (+) Top management support (+) Project team conflict (-) Horizontal coordination (+)	Project complexity (-) Adequate development tools (+)	Project planning (+) User participation (+)		Project efficiency Project effectiveness
Barry & Lang (2003)	Multimedia systems project performance	Survey Ireland	Inadequate staff skills (-) Unrealistic user expectations (-)	Scope creep (-) Project complexity (-) Staff shortages (-) Cost overruns (-) Time overruns (-)	Unclear requirements (-) Lack of standard method (-)		Not defined
Bussen & Myers (1997)	EIS implementation	Case study NZ	Lack of user commitment (-) Lack of user readiness (-) Lack of top management support (-) Lack of user-developer communication (-) Organisational politics (-)	Non-alignment with business goals (-) Time overruns (-) Staff turnover (-) Technical problems (-) Data problems (-)	Poorly defined requirements (-) Lack of project planning (-)	Hierarchical organisational structure (-) Changes in company ownership (-) Rapid organisational growth (-) Economic context (-)	Project abandonment
Buller & Fitzgerald (1999b)	Systems development critical success factors	Case studies Ireland	Top management support (+) Adequate vendor support (+)	Use of prototyping tools (+) Technical problems (-)	Well-defined requirements (+) Project management (+) Project planning (+) Use of a standard method (+) User participation (+) Management of change (+)		Not defined
Clegg et al. (1997)	Systems project performance	Interviews UK	Lack of project staff expertise (-) Unrealistic user expectations (-) Lack of top management support (-) Organisational politics (-)	Non-alignment with business goals (-) Cost overruns (-) Time overruns (-) Project complexity (-)	Unclear requirements (-) Poor project management (-) Inadequate standard methods (-) Lack of user participation (-) Adequate user training (+) Poor management of change (-)		Meeting system objectives
Irani et al. (2001)	MRP system implementation	Case study UK	User resistance (-) Lack of top management support (-) Use of external consultants (+) Issues with external vendors (-)	Alignment with business goals (+) Technological issues (-)	Project management (+) Project management techniques (+) User participation (+) User training (+) Management of change (+)	Organisational culture (+)	System use
Jiang et al. (1996)	Systems implementation	Survey US	User commitment (+) Project staff expertise (+) Top management support (+) User-developer communication (+)	Clear project goals (+) Adequate resources (+) Appropriate technology (+)	Project management (+) Project leadership (+) User participation (+)		Not defined

Table 3.2 continued

Study	Focus	Method	Actors	Project content	IS development processes	Context	Outcome measure
Jiang et al. (1998a)	Systems development problems	Survey US	Lack of project staff communication skills (-) Lack of project staff expertise (-)	Restricted scope (-) Unclear project goals (-) Inadequate resources (-) Cost overruns (-) Time overruns (-)	Unclear requirements (-) Lack of project planning (-) Inadequate documentation (-) Inadequate testing (-) Lack of user participation (-) Lack of user training (-) Lack of management of change (-)		Not defined
Jiang & Klein (1999; 2000)	Systems project risks	Survey US	Lack of user commitment (-) Lack of user experience (-) Lack of project staff expertise (-) Lack of project staff domain knowledge (-) Lack of functioning of project team (-) Unclear role definition (-) Project team conflict (-)	Project size (-) Project complexity (-) Technological newness (-) Inadequate resources (-)	Extent of change (-)		Project effectiveness Satisfaction with system Organisational impact
Kappelman et al. (2006)	Systems project risks	Survey US	Lack of project staff expertise (-) Lack of top management support (-) Lack of project team commitment (-) Poor communication (-)	Unclear business case (-) Lack of resources (-) Unavailability of appropriate expertise (-)	Lack of documented requirements (-) Poor project planning (-) Poor project leadership (-) Lack of user participation (-) Lack of management of change (-)		Not defined
Keil et al. (2002)	IS project risks (users)	Delphi study US	User resistance (-) Lack of project staff expertise (-) Unclear role definition (-) Poor project team relationships (-) Organisational conflict (-)	Changing scope (-) Inadequate/inappropriate project staff (-)	Misunderstanding requirements (-) Lack of project planning (-) Non-use of a standard method (-) Lack of user participation (-)		Not defined
Keil et al. (1998); Schmidt et al. (2001)	IS project risks (project managers)	Delphi study Hong Kong US Finland	Unmanaged user expectations (-) Lack of user commitment (-) Lack of project staff expertise (-) Lack of top management support (-) Unclear role definition (-) Organisational conflict (-)	Changing scope (-) Inadequate/inappropriate project staff (-) Staff turnover (-) Technological newness (-)	Misunderstanding requirements (-) Changing requirements (-) Lack of project leadership (-) Lack of user participation (-) Poor management of change (-)		Not defined
Kim & Pan (2006)	CRM systems critical success factors	Case studies Singapore	Top management support (+) Project champion continuity (+) Project team skills (+)	Adequate resources (+)	Requirements management (+) Effective system design & development (+) User participation (+) Management of change (+) Business process design (+)		IS quality User satisfaction Use Net benefits
Kumar et al. (1998)	Inter-organisational system implementation	Case study Italy	User commitment (+) Support of institutional stakeholders (+)	Alignment with business goals (+) Adequate resources (+) Proven technology (+)	Clear requirements (+) Adequate user training (+) Adequate testing (+)	Inattention to national cultural context (-)	Not defined

Table 3.2 continued

Study	Focus	Method	Actors	Project content	IS development processes	Context	Outcome measure
Lennon et al. (2002)	Systems project performance	Survey Australia US	Realistic user expectations (+) Unmanaged user expectations (-) Project staff expertise (+) Top management support (+)	Clear project goals (+) Inadequate/inappropriate project staff (-) Inappropriate technology (-)	Clear requirements (+) Lack of project management (-) Project planning (+) Small project milestones (+) Lack of risk management (-) Lack of project governance (-) User participation (+)	Corporate culture (-)	Not defined
Linberg (1999)	IS project performance	Case study US	Lack of top management support (-) Functioning of the project team (+) Organisational conflict & politics (-)	Under-estimated project size (-) Project complexity (-) Low project importance (-) Inadequate resources (-) Time overruns (-) Cost overruns (-) Inadequate development tools (-)	Project management (+) Project leadership (+) Use of a standard method (+)		Project completion or project cancellation
Mabert et al. (2003)	ERP systems implementation	Survey US	Top management support (+) Communication with external stakeholders (+) Communication with internal stakeholders (-)	Project size & complexity (-) Major software modification (-)	Project planning (+) Benchmarked progress against milestones (+) Empowered decision-makers (+) Accelerated implementation strategy (+) User training (+) Minor alignment of business processes (+)		Completed on time and to budget
Martin & Chan (1996)	Systems project performance	Survey NZ	User resistance (-) Lack of project staff expertise (-) Lack of top management support (-) Project champion (+) Project team conflict (-) Organisational politics (-) Poor communication (-)	Project size (-) Project complexity (-) Project newness (-) Project importance (+) Clear project scope & goals (+) Alignment with business goals (+) Adequate resources (+) Inadequate/inappropriate staff (-) Cost overruns (-) Time overruns (-) Staff turnover (-) Inappropriate technology (-)	Changing requirements (-) Inexperienced project leader (-) Realistic project plan & schedule (+) Allowance for developer learning (+) Cost-benefit analysis (+) Use of standard methods (+) Lack of user participation (-) Lack of user training (-) Lack of management of change (-)	Growing IT function (-) Focus on assimilating new technology (-) Organisational restructuring (-)	Project smoothly completed, redefined or abandoned
Nandhakumar (1996)	EIS critical success factors	Case study Europe	Top management support (+)	Alignment with business goals (+) Availability of resources (+) Use of appropriate technology (+) Management of data problems (+)	Project planning (+)	Hierarchical organisational structure (-) Organisational policy on resource allocation (+) Poor market conditions (-)	Not defined

Table 3.2 continued

Study	Focus	Method	Actors	Project content	IS development processes	Context	Outcome measure
Oz & Sosik (2000)	Systems project performance	Survey US Europe	Lack of project staff expertise (-) Lack of top management support (-) Lack of functioning of the project team (-) Organisational politics (-)	Unclear project goals (-) Time overruns (-) Unrealistic deadlines (-) Cost overruns (-) Inappropriate technology (-)	Changing requirements (-) Poor project management (-)		Project abandonment
Parr & Shanks (2000)	ERP systems critical success factors	Case studies Australia	Top management support (+) Project champion (+) Balanced project team mix (+)	Clear project scope and goals (+) Small project scope (+) Availability of appropriate project staff (+) Realistic deadlines (+) Minimal software modification (+)	Empowered decision-makers (+) Commitment to change (+)		
Procaccino et al. (2006)	IS project performance	Survey US	Realistic user expectations (+) Project staff expertise (+) Functioning of the project team (+) User-developer interaction (+)	Lack of project scope creep (+) Availability of appropriate expertise (+)	Clear requirements (+) Realistic & achievable requirements (+) Project management (+) Use of standard method (+) User participation (+)		Not defined
Peterson et al. (2002); Kim & Peterson (2003)	Systems project performance	Survey US Korea Japan	Project staff expertise (+) Top management support (+)	Appropriate project scope (+) Clear project goals (+) Alignment with business goals (+) Appropriate technology (+)	Project planning (+) Peer review & feedback (+) Project leadership (+) Use of standard method (+) User participation (+) Management of change (+)		Not defined
Skok & Legge (2002)	ERP systems critical success factors	Case studies Europe	User resistance (-) Project staff expertise (+) Lack of developer domain knowledge (-) Top management support (+) Effective management of external consultants (+) User-developer communication (+) Conflict management (+)	Inadequate/inappropriate project staff (-) Staff turnover (-)	Experienced project leader (+) User participation (+) User training (+) Management of change (+)	Differences in national cultural context (-)	Not defined
Somers & Nelson (2001)	ERP systems critical success factors	Survey US	Management of user expectations (+) Project staff expertise (+) Top management support (+) Project champion (+) Adequate vendor support (+) Use of external consultants (+) Communication (+)	Clear project goals (+) Adequate resources (+) Use of appropriate software (+) High quality data sources (+) Compatible IT architecture (+) Minimal software modification (+)	Project management (+) Appropriate project governance (+) User training (+) Management of change (+) Alignment of business processes (+)	Organisational culture of cooperation (+)	Not defined

Table 3.2 continued

Study	Focus	Method	Actors	Project content	IS development processes	Context	Outcome measure
Summer (2000)	ERP systems project risks	Case studies US	Lack of developer domain knowledge (+) Lack of top management support (-) Lack of project champion (-) Ineffective use of external consultants (-) Ineffective communication (-)	Inadequate/inappropriate project staff (-) Staff turnover (-) Major software modification (-) Lack of data integration (-) Integration with legacy systems (-) Incompatible IT architecture (-)	Lack of centralised project management (-) Lack of user training (-) Lack of user participation (-)		Not defined
Standish Group International (2001); Johnson et al. (2001)	Systems project performance	Survey US	Top management support (+)	Clear business objectives (+) Minimized scope (+) Standard software infrastructure (+)	Stable requirements (+) User participation (+) Project leadership (+) Project planning (+) Use of a project management method (+)		Completed on time, to budget and to specifications
Wastell & Newman (1996)	Systems project performance	Case studies UK	Top management support (+) Consultative management style (+)	Adequate resources (+) Proven technology (+)	Human-centred design approach (+) User participation (+) User training (+) Adequate testing (+)	Good industrial relations (+)	Service level improvement Project abandonment
Wixom & Watson (2001)	Data warehouse systems implementation	Survey US	Project staff skills (+) Top management support (+) Project champion (+)	Adequate resources (+) Appropriate technology (+) High quality data sources (+)	User participation (+) Management of change (+)		Implementation success System success
Yeiton et al. (2000)	Systems project performance	Survey UK NZ	Top management support (+) Project team conflict (-)	Project size (-) Project newness (-) Project importance (+) Project technical risk (-) Staff turnover (-)	Project planning (+) User participation (+)		Project completion Budget variances

### 3.4 IS Project Outcomes

In the IS development literature, IS project outcomes are typically described in terms of 'success' or 'failure'. However, success and failure are multi-dimensional constructs with inter-related technical, economic, behavioural, psychological and political dimensions, and there is lack of consensus on how to define and measure them (e.g. DeLone & McLean, 2003; Lynch & Gregor, 2004; Wilson & Howcroft, 2002; Wixom & Watson, 2001).

In general, IS success can be defined in terms of the *product* of IS development and/or the IS development *process* itself (e.g. Karlsen et al., 2005; Nelson, 2005). For example, DeLone and McLean (2003) describe the success of the IS product in terms of IS quality, information quality, services quality, use (or intention to use), user satisfaction and net benefits. In terms of the IS development process, some authors define success in terms of whether the IS project is completed on time and/or in budget (e.g. Johnson et al., 2001; Mabert et al., 2003), while other authors evaluate IS project outcome in terms of whether the project is smoothly completed, redefined or abandoned (e.g. Martin & Chan, 1996; Oz & Sosik, 2000).

Some authors propose additional concepts of IS success. For example, Markus & Mao (2004) distinguish IS *development* success from the concept of IS *implementation* success, which they view as the process of change management associated with preparing users for use of the IS and/or the outcome or product of this change process. They suggest that, given changes in the IS development environment, it may be appropriate to extend the concept of IS success beyond the IS itself to a wider solution that also includes complementary business or process interventions (i.e. *solution* success).

Some authors suggest that IS success or failure is constructed as the result of negotiated or contested subjective interpretations, and needs to be viewed against the historical context of IS development and the complex social and political interactions it involves (e.g. Mitev, 2000; Wilson & Howcroft, 2002). Different groups or individuals may differ in their assessments of IS success, judging the IS according to different criteria. Further, their opinions and evaluative assessments are fluid and may change over time, in response to political manoeuvring, persuasion, or changes in the organisational and technological context. Indeed, not all interpretations are afforded equal status in the negotiation of the success or failure of an IS project (e.g. Briggs et al., 2003; Bussen & Myers, 1997; Standing et al., 2006; Wilson & Howcroft, 2002).

From the above, it can be seen that labelling an IS project outcome as a success or failure can be problematic. However, despite their definitional or conceptual ambiguity, these terms are still frequently used (and measured, often via proxy indicators) in IS research. The position taken here is that IS project outcomes vary along a continuum, may be interpreted

differently from different perspectives, and are in many cases constructed through processes of sense-making and negotiation within an organisation. The use of the terms 'success' or 'failure' in the following discussion reflects their use by authors of the empirical studies reviewed.

### **3.5 Influences on IS Development – Actors**

This section discusses influences related to the characteristics and (inter)actions of various actors with an interest in the IS. While there are a range of roles individuals can perform in IS development, attention in the IS literature has focused on four main groups of actors: developers, users, top management and external agents, as well as the project team as a composite group. However, it is important to remember that the definition of such roles and groups is provided for analytical purposes, and that groups such as 'users', 'developers', and even 'top management' are not homogeneous, comprising individuals with different characteristics, interests and capabilities (e.g. Butler & Fitzgerald, 1997; Jiang et al., 1998b). Further, individuals can have multiple or changing roles (e.g. Pouloudi & Whitley, 1997), and their actions may be influenced by organisational commitments, sectional interests or professional affiliations (e.g. Butler, 2003). Moreover, other actors outside these main groups may potentially influence an IS project.

#### **3.5.1 Developers**

Empirical studies suggest that adequate developer expertise can play an important role in facilitating positive project outcomes (Jiang et al., 1996; Procaccino et al., 2006; Somers & Nelson, 2001), while a lack of developer expertise is considered to be a project risk and may contribute to poor IS project outcomes (e.g. Kappelman et al., 2006; Keil et al., 2002; Schmidt et al., 2001). Expertise considered particularly important includes technical skills (e.g. Aladwani, 2002; Kim & Peterson, 2003; Wixom & Watson, 2001), problem solving competency (Aladwani, 2002), communication skills (e.g. Hornik et al., 2003; Jiang et al., 1998a), and understanding of the problem or application domain (e.g. Jiang & Klein, 2000; Skok & Legge, 2002; Sumner, 2000).

The motivation and commitment of developers can also be an important influence on IS project outcomes (e.g. Fitzgerald, 1998b). Developer motivation is likely to be influenced by a range of factors, including the composition and culture of the project team, a positive working environment, the availability of resources, their level of autonomy, and the technical challenge offered by the IS project (e.g. Linberg, 1999; Nandhakumar & Avison, 1999; Oz & Sosik, 2000).

Developers' values, beliefs and assumptions about the users of an IS and the context of its use may shape the form of an IS. For example, developers may design an IS using

themselves as typical users, resulting in an IS more suited to expert users (Iivari, 2004), or their professional norms may lead them to focus on technical matters at the expense of human or organisational issues (Poulymenakou & Holmes, 1996), which can adversely affect the outcome of an IS project (Skok & Legge, 2002).

### **3.5.2 Users**

As an important group in an IS project, users' expectations and desires about how the IS will serve their interests may shape an IS project (e.g. Staples et al., 2002). Empirical studies have found that realistic or managed user expectations are perceived to be important for IS project success (e.g. Lemon et al., 2002; Procaccino et al., 2006; Somers & Nelson, 2001). Similarly, unrealistic or unmanaged expectations may pose a risk to the successful completion of IS projects (e.g. Barry & Lang, 2003; Schmidt et al., 2001). Schmidt et al. (2001) note that the growing sophistication of users is leading to higher user expectations of IS.

User attitude, defined as a psychological state reflecting an evaluative judgement or feeling towards an IS (Barki & Hartwick, 1994), is considered to affect the intention to use or actual use of an IS, with users being likely to have a positive attitude if they perceive an IS as useful, easy to use, or in their interests to use (e.g. Mahmood et al., 2000). There is some empirical evidence that positive user attitudes can be an important factor in IS success (Yoon et al., 1995). Negative user attitudes towards an IS can result from a perceived lack of relevance, changes to the way work is performed, or when users feel challenged or threatened by the new IS (e.g. Bussen & Myers, 1997), and may lead to user resistance to an IS project or use of the resulting IS (e.g. Irani et al., 2001; Keil et al., 2002; Skok & Legge, 2002). Empirical studies have suggested that user involvement, defined as a psychological state reflecting the extent to which an IS is perceived to be important and personally relevant (Barki & Hartwick, 1994), and commitment can be a positive influence on IS project outcomes (e.g. Hwang & Thorn, 1999; Jiang et al., 1996; Kumar et al., 1998), while lack of user commitment or support is considered to be an IS project risk (e.g. Jiang & Klein, 1999; Jiang & Klein, 2000; Schmidt et al., 2001).

Other specific user characteristics that may adversely affect an IS project outcome, such as their lack of experience with IS generally, the specific IS or type of application, or the activities the IS is intended to support (Jiang & Klein, 1999, 2000).

### **3.5.3 Top management**

The presence of top management support continues to be consistently reported in the IS development literature as important in positively influencing IS project outcomes (e.g. Aladwani, 2002; Johnson et al., 2001; Mabert et al., 2003; Yetton et al., 2000). Conversely, lack of top

management support is considered an important project risk factor (e.g. Kappelman et al., 2006; Schmidt et al., 2001; Sumner, 2000) and has been implicated in challenged or abandoned projects (e.g. Martin & Chan, 1996; Oz & Sosik, 2000). The importance placed on top management support is usually attributed to its perceived role in overseeing IS development, ensuring alignment with business goals, making available necessary resources, or influencing user attitudes (e.g. Kim & Peterson, 2003; Parr & Shanks, 2000; Sharma & Yetton, 2003).

#### **3.5.4 External agents**

Prior studies have found only limited evidence for the importance of vendor support or the use of external consultants on the outcome of an IS project (e.g. Butler & Fitzgerald, 1999b; Irani et al., 2001; Somers & Nelson, 2001; Sumner, 2000). However, given the increasing prevalence of enterprise IS and packaged software, external agents have a potential role in bridging the gap between IS consumers and software producers or providing specific expertise (Butler, 2003; Sawyer, 2001b; Sumner, 2000). Some authors have suggested that using external consultants, vendors or contractors may create challenges in terms of management and control, communication and understanding of organisational requirements (e.g. Howcroft & Light, 2006; Pan et al., 2004; Schmidt et al., 2001; Skok & Legge, 2002).

#### **3.5.5 Project team**

IS projects are usually conducted by a team that may include IS personnel, user representatives, managers, and possibly external consultants. The size, composition and stability of the project team, their collective expertise and skill mix, and their roles and relationships, may influence IS project outcomes through project team performance. Empirical evidence suggests that the functioning of a project team can affect IS project performance (e.g. Jiang & Klein, 1999, 2000; Linberg, 1999; Oz & Sosik, 2000; Procaccino et al., 2006). For example, project team cohesiveness (Wang et al., 2005) and project team effectiveness (Jiang, Klein et al., 2002) have been found to improve IS project outcomes. Conversely, poor team relationships or conflict within the project team can adversely affect IS project outcomes (e.g. Aladwani, 2000; Keil et al., 2002; Martin & Chan, 1996; Yetton et al., 2000). Unclear definition of the roles and responsibilities of the various project team members has been found to be a perceived risk to successful IS completion (Keil et al., 2002; Schmidt et al., 2001) and a negative influence on IS success (Jiang & Klein, 1999, 2000).

#### **3.5.6 Interaction**

IS development can be perceived (though not exclusively) as a social process involving interaction between actors in various social roles (Kirsch & Beath, 1996). Throughout IS

development, individuals from the groups described above may interact in various ways, including negotiation, decision-making, communication, conflict or political manoeuvring. This interaction will be shaped by similarities and differences in the various groups' values and beliefs, professional or social norms, expectations and perceived interests. Some authors have suggested that successful IS development relies on alignment or congruence between these things (e.g. Jiang, Chen et al., 2002; Marion & Marion, 1998; Pan, 2005). Similarly, cultural differences of this nature between groups are widely considered to be responsible for a gap in understanding between groups, such as between users and developers (e.g. Al-Karaghoulis et al., 2005; Flynn & Jazi, 1998; Jiang et al., 2000; Taylor-Cummings, 1998), which may have negative consequences for the IS development process or outcome (e.g. Enquist & Makrygiannis, 1998; Sauer, 1999). Communication is often perceived to be an important dimension of interaction between users and IS staff, with effective communication considered a key factor in IS success (e.g. Jiang et al., 1996; Skok & Legge, 2002; Somers & Nelson, 2001) and poor communication a negative influence on IS project outcomes (e.g. Bussen & Myers, 1997; Kappelman et al., 2006; Sumner, 2000).

Interaction between participants in an IS project can facilitate the alignment of goals and expectations, achieve mutual understanding, and encourage effective communication. The nature and quality of interactions between participants, particularly users and developers, can influence IS project outcomes (e.g. Procaccino et al., 2006; Wang et al., 2006). Such interaction is dynamic and changes in the relative influence of groups, or critical encounters between them, can affect the course of an IS project (Heiskanen et al., 2000; Robey & Newman, 1996). However, interaction can also lead to more contradictory outcomes when differences between participants emerge, or when misunderstandings or breakdowns in communication occur. Conflict may occur between different groups associated with IS development or individuals within such groups because of different interpretations of a problem (e.g. Coakes & Coakes, 2000; Symon, 1998), and may adversely impact IS project outcomes (e.g. Keil et al., 2002; Linberg, 1999; Schmidt et al., 2001). Robey et al. (2001) suggest that conflict can sometimes have a positive effect if it encourages constructive debate among participants. Political issues and activity by various organisational groups can contribute to conflict in an IS project, and in certain cases organisational politics can adversely affect an IS project outcome (e.g. Clegg et al., 1997; Oz & Sosik, 2000; Pan & Flynn, 2003).

### **3.6 Influences on IS Development – Project Content**

The characteristics of the IS project itself, its scope and goals, the resources made available for it, and the technology used for IS development, can influence IS project outcomes.

### **3.6.1 Project characteristics**

There is some evidence that the outcome of an IS project may be related to various characteristics of the project itself. For example, large project size and high complexity can adversely affect IS project outcomes (e.g. Barry & Lang, 2003; Jiang & Klein, 1999, 2000; Yetton et al., 2000). An increase in IS project success rates observed in the US between 1994 and 2000 has been partly attributed to smaller project sizes (Johnson et al., 2001). The newness of a project to an organisation (Martin & Chan, 1996; Yetton et al., 2000), or a low level of importance attached to it (Linberg, 1999), has been associated with problematic IS projects.

### **3.6.2 Project scope, goals and objectives**

A number of studies have highlighted the perceived importance to IS project success of appropriate and achievable project scope (e.g. Johnson et al., 2001; Kim & Peterson, 2003), or the problems that can arise from changing scope or 'scope creep' (e.g. Barry & Lang, 2003; Keil et al., 2002). Well-defined and clear project goals or objectives are also perceived to be important to IS project success (e.g. Jiang et al., 1996; Lemon et al., 2002; Somers & Nelson, 2001). Aligning project goals with business goals may be important in ensuring that an IS supports organisational strategies (e.g. Irani et al., 2001; Kappelman et al., 2006; Kim & Peterson, 2003).

### **3.6.3 Resources**

The provision of adequate financial resources and development time are perceived to be important for ensuring successful IS development (e.g. Jiang et al., 1996; Martin & Chan, 1996; Wixom & Watson, 2001). Conversely, the allocation of inadequate financial resources and inadequate development time or unrealistic deadlines can contribute to the problems encountered in IS projects (e.g. Jiang et al., 1998a; Linberg, 1999; Martin & Chan, 1996; Oz & Sosik, 2000). With respect to human resources, the availability of appropriately skilled project staff is perceived to be important to IS project success (e.g. Parr & Shanks, 2000; Procaccino et al., 2006). Insufficient or inappropriate project staff, as well as project staff turnover, are perceived as contributing to problems encountered in IS projects (e.g. Schmidt et al., 2001; Sumner, 2000; Yetton et al., 2000).

### **3.6.4 Technology**

The use of appropriate technology is perceived to be important for IS success in some cases (e.g. Kim & Peterson, 2003; Nandhakumar, 1996). In particular, adequate or appropriate IS development technology and tools have been significantly positively associated with IS project performance (e.g. Aladwani, 2000; Wixom & Watson, 2001). The introduction of unproven or new

technology is perceived to be an important risk factor in various aspects of successful completion of an IS project (e.g. Jiang & Klein, 1999; Schmidt et al., 2001; Wastell & Newman, 1996). Problems with the form or quality of data can also present challenges to an IS project (e.g. Bussen & Myers, 1997; Nandhakumar, 1996). Data quality is particularly critical in the development and implementation of enterprise-wide IS (e.g. Somers & Nelson, 2001; Wixom & Watson, 2001). The level of software modification undertaken can negatively impact on project success in packaged software projects such as ERP implementations (e.g. Mabert et al., 2003; Sumner, 2000).

### **3.7 Influences on IS Development – IS Development Processes**

Various processes associated with IS development provide opportunities for action and interaction as IS project participants negotiate a particular IS outcome. The product of the historical evolution of IS development practice, such processes are often treated as influential factors in empirical studies of IS projects. This section discusses the influence of aspects of processes of requirements determination, project management, use of a standard method, user participation in the IS development process, user training, and the management of change arising from IS development and implementation.

#### **3.7.1 Requirements determination**

Requirements determination is widely regarded as a critical step in IS development, and essentially involves developing a shared understanding of the information, processes and functions that need to be incorporated into the new IS (e.g. Al-Karaghoul et al., 2005; Coughlan et al., 2003; Flynn & Jazi, 1998). Inadequate or ineffective requirements determination can result in unclear objectives for the IS project team, inadequate or inappropriate resource allocation, or an IS that does not meet the needs and expectations of one of the groups with an interest in it. A number of empirical studies have highlighted the importance of stable, well-defined and clearly stated requirements to IS project success (e.g. Butler & Fitzgerald, 1999b; Johnson et al., 2001; Lemon et al., 2002; Procaccino et al., 2006). Conversely, other authors observe that changing, poorly defined or unclear requirements can render IS projects problematic (e.g. Barry & Lang, 2003; Bussen & Myers, 1997; Jiang et al., 1998a; Oz & Sosik, 2000). Similarly, a lack of or misunderstood requirements is considered to be a project risk factor (e.g. Kappelman et al., 2006; Keil et al., 2002; Schmidt et al., 2001).

Requirements determination is a complex social process, in which communication and mutual understanding between participants play an important role. Problems can arise when various groups in an IS project have different requirements, interests or objectives, or differing

perspectives on requirements. For example, users and developers often have different frames of reference and may utilise different mental models or ontological views of organisations and IS. Even if users are willing or able to share their requirements, these are typically translated by developers in most IS development approaches. These problems may be compounded by requirements determination approaches and tools that assume requirements are objective artifacts, ignoring their emergent, socially-constructed and negotiated nature (e.g. Al-Karaghoul et al., 2005; Flynn & Jazi, 1998; Guinan et al., 1998; Urquhart, 2001).

### **3.7.2 Project management**

Empirical studies have emphasised the perceived importance placed on effective project management for facilitating IS project outcomes (e.g. Butler & Fitzgerald, 1999b; Jiang et al., 1996; Linberg, 1999; Procaccino et al., 2006). Conversely, a lack of or poor project management may adversely affect IS project performance (e.g. Clegg et al., 1997; Lemon et al., 2002). Particular aspects of project management that have been the focus of empirical studies on IS projects include project planning, the use of project management techniques, and the role played by the project leader. For example, some studies have highlighted the perceived importance of planning activities to successful project outcomes (e.g. Aladwani, 2000; Mabert et al., 2003; Yetton et al., 2000), while others emphasise the risks and problems to IS projects associated with a lack of or poor project planning (e.g. Jiang et al., 1998a; Kappelman et al., 2006; Keil et al., 2002; Oz & Sosik, 2000). The use of formal project management methods or techniques is believed to facilitate the project management process (e.g. Gowan & Mathieu, 2005; Irani et al., 2001; Johnson et al., 2001), as is the presence of an experienced or competent project manager or leader with technical, management and interpersonal skills (e.g. Jiang et al., 1996; Johnson et al., 2001; Kim & Peterson, 2003; Skok & Legge, 2002). In some studies, appropriate project governance or empowered decision-makers was identified as important for IS project performance (e.g. Mabert et al., 2003; Parr & Shanks, 2000; Somers & Nelson, 2001).

### **3.7.3 Use of a standard method**

A standard method of IS development is a formal or documented set of procedures for directing or guiding IS development, whether commercially or publicly available, or developed internally by an organisation. The focus of a standard method in IS is not just on software development, but on the analysis, design and implementation of the whole IS (Wynekoop & Russo, 1995). Each standard method embodies a set of guiding principles and is based upon a particular philosophy, paradigm or approach to IS development. Usually, each method is

supported by a set of preferred development techniques and tools (e.g. Fitzgerald et al., 2002; livari et al., 2000/2001; Robey et al., 2001).

According to much (although not all) of the IS literature, use of an appropriate standard method of IS development can improve both the development process and its outcomes, particularly in large or complex IS projects, by supplying an element of control (e.g. Butler & Fitzgerald, 1999b; Kim & Peterson, 2003; Procaccino et al., 2006). Conversely, some authors suggest that non-use of a standard method or the use of an inadequate standard method can increase the risk of IS project failure (e.g. Clegg et al., 1997; Keil et al., 2002). However, relative to other factors influencing IS development, use of a standard method has not usually been regarded as a primary mechanism for improving IS project outcomes, and may not be enough in itself to ensure success of an IS project (e.g. Barry & Lang, 2003). Further, different groups may have different perceptions of the relative value of using a standard method. For example, while the users in Keil et al.'s (2002) study perceived the lack of an effective development process or method as the most important risk to an IS project, project managers in the same study did not perceive it to be a risk at all.

#### **3.7.4 User participation**

The participation of users in various roles and activities in IS development has been an ongoing focus of interest within the IS literature since the early 1980s (Ives & Olson, 1984). Extensive support for user participation in IS development can be found in both the IS academic and practice literature, and it has become an established practice within many organisations (e.g. Howcroft & Wilson, 2003b; Kiely & Fitzgerald, 2002). Meta-analyses of prior empirical studies examining the relationship between user participation and IS success have noted that, while in some cases user participation positively influences IS outcomes, many studies were inconclusive regarding this issue (Cavaye, 1995; Hwang & Thorn, 1999; Mahmood et al., 2000).

A number of recent empirical studies have identified a significant positive relationship between user participation and various measures of IS success, including project completion and performance (e.g. Aladwani, 2000; Procaccino et al., 2005; Wixom & Watson, 2001; Yetton et al., 2000). Case study evidence also suggests that active user participation is an important component of successful IS development (e.g. Kim & Pan, 2006; Wastell & Newman, 1996). Perhaps more importantly, various groups of organisational participants perceive user participation to be important to IS project success, including development managers, IS developers, users, and user managers (e.g. Butler & Fitzgerald, 1999b; Johnson et al., 2001; Kim & Peterson, 2003; Lemon et al., 2002). Similarly, lack of user participation is perceived to be a

project risk factor, contributing to problematic or abandoned IS projects (e.g. Jiang et al., 1998a; Keil et al., 2002; Schmidt et al., 2001).

### **3.7.5 User training**

User training has been identified in the IS literature as a factor that may influence the outcome of an IS project. Training seems to affect IS project outcomes through its influence on users' attitudes towards the IS. Through training, users gain knowledge and understanding of the IS, as well as skills and confidence in using it (Skok & Legge, 2002). A number of studies have found that adequate user training can be important for IS success (e.g. Irani et al., 2001; Skok & Legge, 2002; Wastell & Newman, 1996), although it may be time-consuming in some large projects (Mabert et al., 2003). Conversely, a lack of user training is sometimes perceived to be an IS project risk (e.g. Jiang et al., 1998a; Sumner, 2000)

### **3.7.6 Management of change**

The development and introduction of an IS to an organisation can produce considerable changes to structures, business processes, work loads, organisational roles, job content or autonomy (e.g. Clegg et al., 1997; Doherty et al., 2003). While change management is not necessarily an issue in every project (Martin & Chan, 1996), recent studies highlight the ongoing importance for IS success of managing the changes resulting from IS implementation (e.g. Butler & Fitzgerald, 1999b; Irani et al., 2001; Kim & Peterson, 2003; Kim & Pan, 2006), or the negative consequences of ignoring or inadequately managing the dynamics of change that occur for both individuals and the organisation (e.g. Jiang et al., 1998a; Kappelman et al., 2006; Schmidt et al., 2001). Change management can be particularly important for enterprise-wide IS projects, such as ERP systems or data warehousing systems (e.g. Skok & Legge, 2002; Somers & Nelson, 2001; Wixom & Watson, 2001).

## **3.8 Influences on IS Development – Context**

IS development occurs across layers of context, ranging from the local organisational context to the national and international environment (e.g. Avgerou, 2001; Christiaanse & Huigen, 1997). This section discusses influences on IS development related to the context in which it occurs, separated for convenience into internal organisational properties and external environmental conditions.

### **3.8.1 Organisational properties**

Particular structural properties and context-specific features make IS development possible and necessary, and can enable or constrain its course. These include: institutionalised

norms, values and beliefs; the distribution of available organisational resources (time, money and skills); standard rules and operational procedures; established customs and practices; formal and informal organisational structures; control and coordination mechanisms; reward structures; and the division of labour (Knights & Murray, 1994; Orlikowski, 1992). For example, structures of authority within an organisation will influence the time, money, tools and other resources available for development (Bussen & Myers, 1997; Nandhakumar, 1996). An organisational culture may reflect widely accepted norms and values that shape interactions between users and developers, inter-departmental cooperation, the intended use of an IS, or acceptance of organisational change (e.g. Gallivan & Keil, 2003; Nandhakumar & Avison, 1999; Somers & Nelson, 2001; Umble et al., 2003).

Organisational policies and established practices related to IS development are potential influences on the course and outcome of an IS project through the way they define and shape appropriate or acceptable behaviour in development activities (e.g. Butler, 2003; Butler & Fitzgerald, 2001). Of particular relevance are policies and practices related to IS procurement, user participation, standard method use, and change management. For example, established practice may constrain the appropriation of IS development innovations, such as new standard methods, techniques or tools (Gasson, 1999). It is worth noting that such policies and practice can change over time (e.g. Butler & Fitzgerald, 2001). The history of IS development and use in the organisation may also influence IS development. For example, an organisational history of IS failure may become institutionalised (Pan et al., 2004) or create cynicism or resistance towards new IS development (Doolin, 2004). Lyytinen & Robey (1999) argue that many organisations fail to learn from their previous IS development experiences. An organisation's legacy IS and existing IT infrastructure may also shape the direction and course of IS development, including the technological choices made (Chae & Poole, 2005).

### **3.8.2 Environmental conditions**

Aspects of the wider socio-political, economic, cultural and historical environments within which IS development occurs can influence IS project outcomes, often in unpredictable ways. For example, economic or market conditions may lead to organisational restructuring or rapid organisational growth, which in particular cases may have an adverse affect on IS project outcomes (e.g. Bussen & Myers, 1997; Martin & Chan, 1996). Differences in national cultural contexts may also cause a range of problematic issues in IS development (e.g. Krishna & Walsham, 2005; Kumar et al., 1998; Mitev, 2000; Skok & Legge, 2002). A range of external entities (including government authorities, professional and industry associations, trade unions and business partners) may influence IS development decisions and practices by subsidising or

directing development, establishing standards and regulatory requirements, or exerting coercive pressures (e.g. Chae & Poole, 2005; Myers & Young, 1997; Nicolaou, 1999; Wastell & Newman, 1996).

### **3.9 Discussion**

From the review of recent empirical studies on IS development summarised in the preceding sections, five general themes emerge. These relate to the persistence of certain traditional factors influencing IS development, the influence of the changing nature of IS development, the relative importance of people and process in IS project outcomes, the recognition of the importance of the organisational and environmental context in which IS development takes place, and the need to focus on the interrelationships and interactions between factors influencing IS projects.

#### **3.9.1 The more things change, the more they stay the same**

A number of factors affecting IS project outcomes present in the traditional IS development literature continue to be perceived, and empirically demonstrated, as important influences on IS development. These are probably best regarded as necessary but not sufficient for achieving positive IS project outcomes. They include:

##### *Actors*

- developers with adequate experience, application domain knowledge and interpersonal skills;
- committed users with realistic expectations of the IS;
- committed and supportive top management;
- effective functioning of the project team;

##### *Project content*

- clear, well-defined and well communicated project goals and objectives;
- adequate time, financial and human resources;
- the use of appropriate technology;

##### *IS development processes*

- well defined and clearly stated user requirements;
- the use of an appropriate standard method of IS development
- the active participation of users in IS development; and
- adequate user training.

Many of these have become well established in the IS development culture, and are frequently rehearsed in the IS practitioner literature (e.g. Charette, 2005; Jurison, 1999; Reel, 1999). What is difficult to explain is why, despite the apparent knowledge of these factors in IS

development practice, does IS project failure continue to occur? As Cobb's Paradox states, "We know why projects fail, we know how to prevent their failure – so why do they still fail?" (Royal Academy of Engineering, 2004, p. 10).

While it is tempting to place responsibility for this situation on a failure to adhere to best practices, as discussed previously in Chapter 1, Sauer (1999) criticises prescriptive, factor-based research on project failure for four reasons. First, prescriptions tend to lack specificity. For example, the 'adequacy' of resources and training, the 'appropriateness' of development technology and methods, or the 'clarity' of goals and requirements, typically remain undefined in prescriptive lists of project 'success' factors. Critically, such evaluations are only made post hoc and, in a circular argument, in reference to the perceived success or failure of the project (Sauer, 1999). Second, some prescriptions are not easily acted upon. For example, while the importance of top management support is commonly emphasised, its absence is difficult to measure and gaining top management support is often difficult to achieve in practice. Third, organisational or environmental conditions may inhibit whether a prescription can be followed in practice. Fourth, prescriptive 'cures' may exacerbate other problems in IS projects. For example, an unqualified prescription for top management support may lead to escalation of commitment to a failing course of action (Keil & Robey, 2001).

Finally, prescriptive lists of generic factors also imply that each factor is independent, universally applicable, and of equal importance in specific IS projects. In practice, the influence of factors is temporal in nature. Rather than being "frozen in time" (Nandhakumar, 1996, p. 62), factors may vary dynamically in their relative importance and influence at different times during the course of a project. This suggests that different factors may be significant, and thereby require explicit attention, at particular times or stages (Nandhakumar, 1996; Somers & Nelson, 2001, 2004). In addition, several authors have conceptualized factors as operating from within different layers of a multilayered context, suggesting that factors from different layers will vary in the magnitude and frequency of their impact (Nandhakumar, 1996; Scott & Vessey, 2002). Moreover, it is likely that factors in a particular project context involve complex interrelationships and interactions. As Sauer (1999) observes, this complexity makes theorising about IS project outcomes difficult.

The continued emphasis given to the factors listed above in the IS literature over a long period of time suggests that they constitute a set of fundamental (but not exclusive) issues that need to be addressed in most IS projects. However, changes to the nature and practice of IS development in relatively recent times have brought other issues and factors to the fore.

### 3.9.2 The changing nature of IS development

Various authors have argued that the nature of IS development has changed significantly in recent years (e.g. Kautz et al., 2007; Kiely & Fitzgerald, 2003; Markus & Mao, 2004). These changes tend to reflect rapid advances or changes in technology, the demands of an increasingly complex, global business environment, and changing IS development practices. In many cases, these changes are inter-related. For example, IS based around new technologies, such as the Web or rich media, have typically involved more flexible, non-traditional development approaches, often ad hoc or informal in nature (Avison & Fitzgerald, 2003; Barry & Lang, 2003; Britton et al., 1997; Kautz et al., 2007; Markus & Mao, 2004; Taylor et al., 2002), although Lang & Fitzgerald (2005; 2006) suggest that Web and hypermedia IS development is more disciplined than previously thought. For example, Bahli & Tullio (2003) discuss the emergence of 'web engineering' – new methods and tools for Web-based IS development projects. Further, differences between traditional and Web-based development projects are likely to become less pronounced over time as the latter are increasingly integrated with other organisational IS (Vidgen, 2002).

Modern IS development is generally characterised by increasing devolution of IS expenditure to business units or user groups, high levels of packaged software acquisition and customisation, increased outsourcing of IS development, and concomitant reduced levels of in-house IS development (Avison & Fitzgerald, 2003; Clegg et al., 1997; Fitzgerald, 2000; Hind, 2002; Keil & Tiwana, 2006; Sawyer, 2001b; Schmidt et al., 2001). The increase in package software acquisition and implementation by organisations, in effect consuming software rather than developing it, has led to changed or new influential factors in IS deployment. For example, increased emphasis is placed on vendor selection and relationships, product feature analysis and comparison, system configuration or customisation, and necessary changes to business processes (Sawyer, 2001b; Somers & Nelson, 2001; Umble et al., 2003).

Another aspect of the changing nature of IS development seems to be the development of smaller-sized projects or the delivery of larger projects in parts, which may increase the chances of successful project outcomes (Johnson et al., 2001; SoftwareMag, 2004). Smaller-sized projects are partly a result of factors such as standard software infrastructure use (Johnson et al., 2001), incremental or agile development, and the need for rapid delivery of IS in the short time frames characterising the modern business environment (Avison & Fitzgerald, 2003; Baskerville & Pries-Heje, 2004; Fitzgerald, 2000).

At the same time, the emergence of enterprise-wide IS, inter-organisational IS and globally distributed IS have led to increased complexity in some IS projects (Bahli & Tullio, 2003; Espinosa et al., 2006; Gowan & Mathieu, 2005; Keil & Tiwana, 2006; KPMG, 2005a; Parr &

Shanks, 2000; Royal Academy of Engineering, 2004; Wixom & Watson, 2001). Increased complexity and the concomitant organisational changes associated with such IS may adversely affect IS project outcomes. This has highlighted the ongoing need to effectively manage such changes, particularly from early in the development process (Eason, 2001; Skok & Legge, 2002). However, as IS become increasingly sophisticated and integrated, the possibility of unpredictable or unintended consequences also increases (Doherty et al., 2003; Robey & Boudreau, 1999).

Within the modern IS development context, the range of potential stakeholders with an interest in an IS project (both internal and external to an organisation) has also increased. This highlights the need for active participation of a wider range of participants in an IS project (Markus & Mao, 2004). For example, the trend towards outsourcing of IS development or the increasing prevalence of enterprise-wide IS introduces new actors such as vendors and outsourcing contractors, and the external consultants who play an increasingly active role in mediating between these actors and the IS client (Chang, 2006; Howcroft & Light, 2006; Sawyer, 2001b). Managing or controlling such parties is becoming increasingly important in IS development (Pan et al., 2004; Schmidt et al., 2001). The range of activities in which they may potentially participate has also increased, such as in the process reengineering or change management often associated with the development and implementation of enterprise-wide IS (Markus & Mao, 2004). In another example, the development of electronic commerce systems may need to consider customers as users external to the client company. Similar issues are raised in the development of packaged software (Sawyer, 2001b).

There is some evidence that improved project management and having more skilled project managers has led to increased IS project success (Johnson et al., 2001). Project management may be assuming a more influential role in IS development, particularly in large or complex, enterprise-wide IS where there is likely to be a need for project management interventions (Gowan & Mathieu, 2005; Somers & Nelson, 2001). Indeed, in a recent report on the challenges of complex software and IT projects, the UK Royal Academy of Engineering and British Computer Society (Royal Academy of Engineering, 2004) emphasised that the importance of project management is still not well understood and is often underestimated.

### **3.9.3 People and process**

Difficulties associated with IS development and implementation are often divided into technical issues and organisational or human-related issues. Historically, technical issues dominated accounts of IS development outcomes. However, in the last decade there has been increasing recognition that IS project failures are rarely caused by technical problems alone (Clegg et al., 1997; Eason, 2001; Flynn & Jazi, 1998; Luna-Reyes et al., 2005; Markus &

Benjamin, 1996; Markus & Mao, 2004; Poulymenakou & Holmes, 1996; Royal Academy of Engineering, 2004). A number of studies have recognised the importance of organisational, political and human-related issues, often finding that these are more important than technical issues in determining IS outcomes (Beynon-Davies, 1995; Clegg et al., 1997; Doherty & King, 1998a, 1998b, 2001; Doherty et al., 2003; Drummond, 1996; Irani et al., 2001; Martin & Chan, 1996; Oz & Sosik, 2000; Riley & Smith, 1997). As the Standish Group (1999, p. 5) note, "What has become clear ... is that people and process have a greater effect on project outcome than technology".

Organisational or human-related issues that may contribute to IS underperformance include: inadequate or misaligned organisational and business strategies to guide development and implementation; inadequate user participation and ownership of the IS; insufficient education and training; insufficient organisational resources or support for organisational or human-related issues; lack of attention to organisational structure, processes, culture and professional autonomy; and lack of attention to job and task design, usability, and user working styles and motivations (Clegg et al., 1997; Doherty & King, 1998a, 1998b, 2001; Doherty et al., 2003; Riley & Smith, 1997). For example, in an IS project described by Gallivan & Keil (2003), the reasons given by users for not using the IS were technically-based. Even when these shortcomings were addressed, so that the users' perceptions of the problems improved, usage of the IS still did not improve. Gallivan & Keil (2003) conclude that the underlying reasons for not using the IS were related to a perceived incongruence in task-technology fit, and that these reasons had not changed despite the technical redesign that occurred.

Increasingly, IS professionals are recognising the importance of organisational issues, although they still tend to address those issues which have a more technical element than those which are less tangible (Doherty & King, 1998a, 1998b, 2001; Doherty et al., 2003). This is compounded by the techno-centric nature of much IS development and the use of standard methods, which encourages addressing organisational implications after IS implementation (Clegg et al., 1997; Doherty & King, 1998b). Many organisations appear to be using ad hoc interventions to address organisational issues as they occur (often after implementation), rather than formal socio-technical approaches (Doherty et al., 2003; Eason, 2001). Doherty et al. (2003) report that IS projects are significantly more successful in organisations that treat a variety of organisational issues, treat them at multiple stages in the development process, or actively involve members of the user community.

There is also increasing recognition in the IS literature that IS development is a process of social interaction, and that the nature and quality of interactions between participants can influence the course and outcome of an IS project (e.g. Heiskanen et al., 2000; Wang et al.,

2006). Increasing participation of more groups in IS development suggests that the problems associated with interaction amongst participating groups, such as differences in goals, expectations, and understanding of the IS being developed, may be exacerbated. The potential for conflict around IS development increases when the number and diversity of participants increases, such as in IS that require high levels of integration across the organisation or involve external parties (e.g. Yetton et al., 2000). Some authors are now suggesting that conflict, if resolved, can be beneficial if it leads to constructive debate or better decision making (Robey et al., 2001; Sawyer, 2001a).

Similarly, there is increased recognition that the various groups of participants associated with an IS project are not homogeneous. For example, Jiang et al. (1998b) suggest that developers are heterogeneous in their technical, socio-political and user orientations. Similarly, in projects that involve the development or implementation of complex, enterprise-wide or inter-organisational IS there may be multiple user groups or functional units with different interests (e.g. Markus & Mao, 2004; Pan, 2005). The introduction of a new or changed IS may be problematic where it challenges professional roles, autonomy and cultures (e.g. Doolin, 2004; Myers & Young, 1997; Wilson, 2002). A number of authors have suggested that user representatives may not actually represent the full user community or may be 'captured' by the IS project team (Butler & Fitzgerald, 1999a; Gallivan & Keil, 2003).

#### **3.9.4 The importance of context**

An area of relative neglect in the IS development literature that is beginning to receive more attention is the importance of the links between IS development people and process and the organisational and environmental contexts in which IS development occurs. A number of authors have emphasised a strong interrelationship between context and action, such that the form, nature and conduct of IS development processes need to be viewed as situated within their contextual setting (e.g. Constantinides & Barrett, 2006; Gasson, 1999).

At the level of the organisation, IS development occurs within a context of established organisational practices and structures that guide appropriate behaviour in organisational activities. Further, IS development involves multiple interested groups and hence potentially traverses different subcultures or communities of practice, each with distinctive shared beliefs, norms, and understandings. The institutionalisation of particular IS development policies and practices, which both facilitate and constrain IS project outcomes, is the result of negotiation or contestation between these different organisational groups. In particular, the history of IS development and use in an organisation may play an active role in shaping the direction of new IS development.

Organisations and their IS development efforts exist in a wider social, political and economic environment. Various elements of the wider environmental context may shape the course of development in any given IS project. These include the influence of labour and market conditions, government regulation or intervention, industry or competitive pressures, and specific dimensions of national culture. Empirical research on IS projects needs to incorporate a consideration of the way in which project outcomes emerge from their historical and organisational context, together with an appreciation of IS development in the context of a wider set of social, cultural, political and economic conditions.

### **3.9.5 Interrelationships and interaction**

As noted above, many factor-based studies implicitly assume, or give the impression, that individual factors implicated in IS projects are independent in their operation and effect. In practice, however, this is not the case. A number of empirical studies have emphasized that IS project outcomes typically involve multiple factors that interact in complex ways, either directly or indirectly (e.g. Akkermans & van Helden, 2002; Butler & Fitzgerald, 1999b; Clegg et al., 1997; Nandhakumar, 1996; Scott & Vessey, 2002). The relationship between factors is dynamic, varying in terms of the direction, strength, and timing of their influence on each other (Butler & Fitzgerald, 1999b; Nandhakumar, 1996). Understanding these interactions is likely to be critical to gaining greater insights into how and why IS project outcomes occur (Nandhakumar, 1996). Although it is beyond the scope of this chapter to provide a detailed summary of the interrelationships between factors influencing IS project outcomes, this is an area that requires further work. Two broad strategies for attempting this were observed in the recent empirical literature.

Some quantitative empirical studies reviewed in this paper hypothesised and found statistical evidence for relationships between specific factors, indirect effects on IS project outcomes, or the role of mediating factors on relationships. However, where present, such findings were difficult to synthesise given the lack of clarity and inconsistent treatment of various factors or outcome measures across empirical studies. Future factor-based research would presumably benefit from a greater degree of consensus or agreement over terminology, instruments and scales. For example, as part of a move to address methodological problems associated with early factor studies of the participation of users in IS projects, Barki & Hartwick (1994) defined two distinct constructs, 'user participation' and 'user involvement', where previous studies had used the terms interchangeably. Subsequent empirical studies (e.g. Hunton & Beeler, 1997; Lin & Shao, 2000; McKeen & Guimaraes, 1997) and meta-analyses (e.g. Hwang & Thorn,

1999) have used Barki & Hartwick's definitions of these constructs (although other studies have tended to perpetuate the confusion).

A second group of empirical studies addressed the complexity of interrelationships between factors by using process research approaches, which attempt to explain how particular project outcomes develop over time as the consequence of a preceding sequence of interrelated and interdependent events and factors in organisational processes (Markus & Robey, 1988). These studies use longitudinal, qualitative data to identify simultaneous influential relationships among multiple factors over time. Their analyses are often represented using mapping techniques, such as causal loop diagramming (Akkermans & van Helden, 2002), network analysis (Butler & Fitzgerald, 1999b) and influence diagrams (Kim & Pan, 2006). The aim is to illustrate the complex interrelationships and influences between factors, while avoiding the reductionism of other research approaches (Butler & Fitzgerald, 1999b). Kim & Pan (2006, p. 63) suggest that such an approach:

... facilitates linking pieces into a whole picture, and interpreting the influence of any one factor on others. This in turn facilitates an understanding of the chain of events that link the factors to success.

Rather than more research that generates simplistic, unitary prescriptions, there is a need for further empirical research that undertakes a more in-depth consideration and conceptualisation of IS development. After all, as Butler & Fitzgerald (1999b, pp. 351-352) observe:

[IS] development is, in essence, a multi-dimensional change process that takes place ... [within] a complex web of social conditions and factors that shape and influence the IS development process and its outcomes.

### **3.10 Summary**

This chapter summarises and discusses the findings of an extensive review of recent empirical studies of the influences that shape IS development (detailed findings from the review are presented in Appendix 1). A classificatory framework is developed as an analytical device for structuring the vast amount of information on this topic. Within the framework, the various influences are categorised into four main groupings: actors, project content, IS development processes, and context. These groupings helped inform the construction of the theoretical model developed in Chapter 5 for analysing the longitudinal case study presented later in the thesis. The review shows that, while a number of traditional factors influencing IS development remain relevant, other factors have emerged as important as a result of changes to the IS development environment and to IS development practice. In particular, increasing recognition within the IS literature has been given to the relative importance of people and process, the organisational and

environmental context in which IS development takes place, and the complex interrelationships and interactions between factors influencing IS projects.

The chapter provides a synthesis of contemporary knowledge of the content of IS development, namely the various influences that shape IS development. This information is used to inform both the development of a survey instrument used in this PhD to obtain a picture of current IS development practice in New Zealand (Chapter 4) and the interpretation of an in-depth, longitudinal case study of IS development (Chapters 7-10).

## **Chapter 4: Survey of IS Development Practice**

### **4.1 Introduction**

This chapter presents the outcomes of a Web-based survey of IS development and acquisition practices in recent IS projects in New Zealand organisations. The main objectives of the survey were to obtain an updated assessment of IS development practices in New Zealand organisations and to provide contextual detail for the longitudinal case study presented in the latter part of this thesis. Surveys are a useful tool for gathering descriptive information from a large sample, providing a 'snapshot' of current practices and opinions regarding their effectiveness (Barry & Lang, 2003; Fitzgerald et al., 1999; Wynkoop & Russo, 1995, 1997).

The justification for conducting the survey is four-fold. First, little is known about IS development practices in New Zealand organisations. Given their age and restricted nature, prior surveys of New Zealand organisations reveal only limited information (Groves et al., 2000; Kenny, 2005; MacDonell, 1994; Taylor, 2000; Urban & Whiddett, 1996). Second, many empirical studies of IS development practice focus on soliciting the views of IS professionals or managers on the efficacy or benefit of various factors deemed influential in IS development success. Relatively few studies provide information on actual IS projects. Third, many studies of IS development also tend to focus on the experiences of US or European organisations. Fourth, many changes have occurred in the IS development environment in recent years that need to be taken into account in updating our understanding of IS development (Markus & Mao, 2004).

The remainder of this chapter is structured as follows. Section 4.2 summarises the design of the survey instrument and its implementation in the Web-based survey. Sections 4.3 to 4.9 summarise the main findings of the survey. (Further detail is available in Appendix 4, which provides the complete set of survey results.) Where appropriate, the findings are compared to those reported in prior international studies of this nature. The chapter concludes with a discussion of the findings in relation to the traditional factors previously identified in the IS literature as influencing IS development outcomes.

### **4.2 Survey Design and Implementation**

The survey instrument used in this study was a multi-page Web-based design. A Web-based survey is defined as a self-administered survey in which a computer questionnaire based on HTML is presented to the participant in a standard Web browser, and responses are submitted over the Internet (Vehovar et al., 2000). Web-based delivery was chosen for this survey because it was believed to be the most appropriate medium to reach the target population, and because of benefits such as a comparatively low cost of implementation, short response times, and the ability

to enter response data directly into a database for subsequent analysis. Dillman's (2000) principles for constructing Web surveys were followed in order to minimise the effects of measurement, non-response, coverage and sampling errors. Full details of the construction of the Web-based survey are given in Appendix 2. The survey consisted of three separate Web pages: an introductory page, the survey questionnaire, and a concluding page, copies of which are presented in Appendix 3.

The major part of the survey questionnaire solicited information about aspects of IS development practice in recent IS projects in New Zealand organisations, including factors influencing the IS development process, the results of which are summarised in this chapter. While the survey also explored in further detail aspects of the use of standard methods and the participation of users in the development process, these results are less relevant to the thesis in its current form and are presented in Appendix 4 as part of the complete set of detailed survey results. In the survey an IS was defined as a computerised system used to satisfy the information needs of an organisation (excluding standard desktop applications). IS projects of interest were limited to those a New Zealand organisation had developed or otherwise acquired for its own use. IS development was defined as including both the traditional process of IS development, and the selection, possible customisation, and implementation of packaged software.

Within the questionnaire, respondents were first asked to estimate the total number of IS projects that had been undertaken and completed by their organisation during the preceding three-year period. Respondents were asked to categorise these IS projects in terms of the size of the project, different types of IS development and acquisition, different levels of standard method use in the development process, and different levels of user participation in the development process. For those projects where no standard method was used or where users did not participate, respondents were asked to identify the reasons for this.

Respondents were then asked to rate the relative importance of a number of factors that might be influential in 'facilitating' or 'inhibiting' IS development. These generic terms were used on the basis that they were less likely to be associated with participants' preconceived notions of IS development 'success' or 'failure' (given the general lack of agreement on the meaning of these terms), and were more inclusive of practices that may have influenced the development process, irrespective of the eventual perceived project outcome. The review of the extant literature presented in Chapter 3 resulted in a wide variety of factors that might potentially influence IS development outcomes. Realistic constraints in survey design prohibited asking participants to respond to the full range of possible factors. Instead, a selection of factors considered to be most related to IS development stakeholders and their interaction were used, together with a small number of traditional IS development factors as a basis for establishing the

comparative importance of the interaction-related factors. Space constraints and the desire to encourage participants to complete the questions meant that the items used for some factors were relatively broad. The factors used in this part of the survey are summarised in Table 4.1. In rating each item, respondents were asked to select a number from a five-point anchored rating scale of 1 ('Not important') to 5 ('Very important'), or alternatively a 'Don't know or Not applicable' option.

Table 4.1: Items representing factors facilitating or inhibiting IS development

Facilitating IS development	Inhibiting IS development	Source
Adequate resources or time	Resource or time constraints	(Fitzgerald, 1998a; Jiang & Klein, 2000; Jiang et al., 1996; Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995; Wixom & Watson, 2001; Yetton et al., 2000)
Adequate developer knowledge of the system context	Inadequate developer knowledge of the system context	(Fitzgerald, 1998a; Jiang & Klein, 2000; Schmidt et al., 2001)
Effective communication between developers and users	Ineffective communication between developers and users	(Jiang & Klein, 2000; Jiang et al., 1996)
Effective management of changes resulting from system implementation	Ineffective management of changes resulting from system implementation	(Schmidt et al., 2001; Wixom & Watson, 2001)
Effective project management	Ineffective project management	(Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995)
Effective functioning of the project team	Ineffective functioning of the project team	(Jiang & Klein, 2000; Schmidt et al., 2001; Yetton et al., 2000)
Effective user participation in the development process	Ineffective user participation in the development process	(Fitzgerald, 1998a; Johnson et al., 2001; Schmidt et al., 2001; Wastell & Sowards, 1995; Wixom & Watson, 2001; Yetton et al., 2000)
Top management support	Lack of top management support	(Jiang et al., 1996; Johnson et al., 2001; Rainer & Watson, 1995; Schmidt et al., 2001; Verkerk et al., 2000; Wixom & Watson, 2001)
Use of a standard method of IS development	Not using a standard method of IS development	(Barry & Lang, 2003; Fitzgerald, 1998a; Johnson et al., 2001; Schmidt et al., 2001; Wastell & Sowards, 1995)
Use of external consultants		(Irani et al., 2001; Rainer & Watson, 1995)
User commitment or buy-in	User resistance	(Jiang & Klein, 2000; Jiang et al., 1996; Schmidt et al., 2001; Yetton et al., 2000)
Well-defined user requirements	Poorly defined or changing user requirements	(Barry & Lang, 2003; Johnson et al., 2001; Rainer & Watson, 1995; Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995)
	Political manoeuvring or disagreements within the organisation	(Schmidt et al., 2001; Wastell & Sowards, 1995; Yetton et al., 2000)
	Technological problems	(Jiang & Klein, 2000; Schmidt et al., 2001; Wastell & Sowards, 1995; Yetton et al., 2000)
	Unrealistic user expectations of the system	(Barry & Lang, 2003; Schmidt et al., 2001)

Respondents were also asked to identify any anticipated changes in IS development practice in their organisation in the subsequent three years. Finally, respondents were asked to

describe their official position and to classify their organisation in terms of business sector, organisational size, and the size and location of its IS function.

The survey was pilot tested to 20 organisations in March 2004, resulting in some minor modifications to question wording. The main survey was undertaken during April and May 2004. The target population was those organisations large enough to require IS beyond that which could be achieved by standard desktop applications and to have an inherent need for systematisation and computerised integration of organisational functions. Altogether, the survey was administered to 460 New Zealand public and private sector organisations with 200 or more FTEs. The manager responsible for IS project work within the organisation (typically an IS/IT Manager or CIO) was targeted as the respondent in order to provide both an organisational view and one informed by knowledge of the organisation's IS development practice. Although single-respondent managerial surveys have their limitations with respect to distance from actual development work (Wynekoop & Russo, 1997), managerial level respondents are more likely to be knowledgeable about organisation-wide issues (Doherty & King, 2001). In order to ensure currency of the results and to ensure more accurate recall by survey respondents, the survey focused on IS projects undertaken and completed (or substantially completed) in the three calendar years 2001 to 2003.

The number of responses received was 113, for a response rate of 25%. Seven responses were unusable, either because critical (demographic) data was missing or the reported organisational size was below 200 FTEs. This left 106 usable responses that formed the basis of subsequent data analysis. Characteristics of the respondent organisations are shown in Table 4.2. These 106 organisations represent 17% of the target population and provide a reasonable match with respect to business sector and organisational size (for more detail see Appendix 4).

Just over half the respondent organisations reported sizes of IS function of fewer than 10 FTEs, and in the majority of organisations (78%) the IS function was located in one central unit. This latter finding is consistent with Rahim et al. (1998) who found that 75% of their survey respondents reported having a separate IS function. Most of the organisations in this study reporting an outsourced IS function also had fewer than 4 IS FTEs. The majority of the IS functions with fewer than 10 FTEs were located in the 200 to 499 FTEs-sized organisations. Conversely, the largest IS functions were most commonly found in the organisations with 2000 or more FTEs.

The respondent organisations were divided into those with 200–499 FTEs (43% of respondents) and those with 500 or more FTEs (57% of respondents). In their Australian survey, Falconer & Hodgett (1999a; 1999b) defined 'large' organisations as having more than 500 employees. Similarly, the respondent organisations were divided into those with IS functions of 9

or less FTEs (53% of respondents) and those with IS functions of 10 or more FTEs (47% of respondents). In their survey, Rahim et al. (1998) defined a 'small' IS function as having fewer than 20 IS personnel. However, this represented 86% of their respondents. Using these size categorisations for 'small' and 'large' organisations and IS functions, a positive association between organisation size and size of IS function was found using Kendall's tau ( $T_b=0.414$ ,  $p=0.000$ ). No such association was found to exist between the location of the IS function and organisation size.

Table 4.2: Characteristics of respondent organisations

<b>Business Category</b>	<b>% organisations (n=106)</b>	<b>Size of IS function (FTE)</b>	<b>% organisations (n=104)</b>
Communications & Media	2	Fewer than 4	23
Construction & Engineering	8	4 to 9	30
Education, Health & Community Services	16	10 to 19	9
Electricity, Gas & Water Utilities	3	20 to 49	13
Finance, Insurance & Banking	8	50 to 99	16
Government & Local Government	12	100 or more	10
IT, Business, Legal & Property Services	8		
Manufacturing & Processing	24	<b>Location of IS function</b>	<b>% organisations (n=106)</b>
Primary Industries	1	Centralised	78
Tourism, Accommodation & Food Services	3	Distributed	12
Transportation, Logistics & Storage	6	Mainly outsourced	8
Wholesale & Retail Trade	11	Don't know	1
<b>Organisational size (FTE)</b>	<b>% organisations (n=106)</b>	<b>Respondent's role</b>	<b>% organisations (n=106)</b>
200 to 499	43	Chief Information Officer	22
500 to 999	25	IS Manager	45
1000 to 1999	13	Development Manager	9
2000 or more	19	Project Manager	8
		System Administrator	5
		Non-IS Manager	10

### 4.3 IS Projects

The number of projects completed (or substantially completed) over the three year period surveyed ranged from 0 to 230 projects per organisation, for an average of 7 projects per organisation per year. This figure is comparable with the 9 projects per organisation per year obtained by a 1994 survey of New Zealand organisations by Martin and Chan (1996). Five percent of organisations did not undertake any IS projects, while 59% of organisations undertook between 1 and 10 IS projects (Table 4.3). Mann-Whitney tests for equality of medians established that larger organisations (500 or more FTEs) undertook significantly more IS projects than smaller organisations (200-499 FTEs) ( $U=848.0$ ,  $p=0.001$ ).

The majority of the reported projects (72%) cost between \$1,001 and \$100,000, with just over half (54%) costing \$50,000 or less (Table 4.3). The 5% of projects costing over \$1 million

were undertaken by 41% of the organisations, suggesting that they are not the exclusive preserve of the larger organisations. However, the larger organisations had significantly higher medians than smaller organisations for the total cost of projects undertaken ( $U=541.5$ ,  $p=0.000$ ) and the average project cost ( $U=728.5$ ,  $p=0.001$ ).

Table 4.3: IS project details

Number of projects undertaken by an organisation	% organisations (n=105)	Project cost	% projects (n=2215)
0	5	\$1000 or less	7
1-5	39	\$1,001 - \$10,000	20
6-10	20	\$10,001 - \$50,000	27
11-20	13	\$50,001 - \$100,000	18
21-50	12	\$100,001 - \$500,000	16
51-100	7	\$500,001 - \$1,000,000	7
More than 100	4	\$1,000,001 or more	5
		Don't know the project cost	1

#### 4.4 IS Development and Acquisition

Table 4.4 shows the types of IS development and acquisition of reported IS projects. Just over half (54%) were bespoke developments, while the remaining 46% involved the purchase of packaged software or applications. Of these package acquisitions, 38% were used as is, and 62% were customised for or by the organisation. Eighty-two percent of the reported projects involved bespoke development or customisation of packaged software. The majority of this work was done in-house (67% of these projects), with the remainder outsourced (33%). This is comparable with data reported by the Standish Group for US application projects in 2000 (Standish Group International, 2001). They found that 46% involved bespoke development, 14% involved purchase of packages without modification, 27% involved customisation of packaged software and 13% involved developing some components and purchasing others. Mann-Whitney tests indicated that, compared with the smaller organisations, the larger organisations in this survey had significantly more IS projects that were bespoke IS developments ( $U=820.0$ ,  $p=0.005$ ) and in-house bespoke developments ( $U=859.5$ ,  $p=0.009$ ).

Taking into account the fact that organisations could use one, many or all of the development categories, 91% of 100 organisations reported using packaged software at some stage, while 76% reported using bespoke development (either in-house or outsourced) at some stage. Twenty four (24%) organisations reported obtaining all of their IS as packaged software. The data in Table 4.4 is comparable to an earlier survey of New Zealand organisations where 88% of the respondents reported using packaged software, 61% reported using in-house bespoke development, and 62% reported using outsourced bespoke development (MacDonell,

1994). The main difference over the 10 year period seems to have been a decrease (of 17%) in the proportion of organisations undertaking outsourced bespoke development.

Table 4.4: Types of IS development and acquisition

	% projects (n=2039)	
Purchase of packaged software or application	46	
With little or no customisation	18	
With in-house customisation	13	
With outsourced customisation	15	
Bespoke IS development	54	
In-house	42	
Outsourced	12	
	% organisations (n=100)	
Purchase of packaged software or application	91	
With little or no customisation	61	
With in-house or outsourced customisation	77	
Bespoke IS development	76	
In-house	57	
Outsourced	45	
In-house customisation or development	76	
Outsourced customisation or development	70	

While 76% of 100 organisations reported using in-house customisation or development, 23% reported using this type of development exclusively. Similarly, while 70% reported outsourcing customisation or development, 19% used outsourcing exclusively. However, 44% used outsourcing for at least half of their projects. This compares well with the 43% of New Zealand organisations who reported that they outsourced most or all of their applications development in 2002 (up from 37% in 2001) (Hind, 2002). Half the organisations in the current study used both in-house and outsourced customisation or development.

Compared to prior studies between 1994 and 2001 (Table 4.5), the average development profile of organisations in this study has a higher level of packaged solutions use and a lower level of bespoke development. In terms of bespoke development, while the level of outsourced development is consistent with some prior overseas studies (Fitzgerald, 1998a; Fitzgerald et al., 1999), the level of in-house development is lower for this study. Consideration of the New Zealand data shows a continuing trend towards packaged solutions and away from bespoke development. MacDonell (1994) suggests that the preference for packaged solutions stems from the increasingly availability of quality software packages and the relatively high cost of in-house development.

Table 4.5: Comparative development profile of survey respondents

Type of IS development and acquisition	New Zealand			Ireland	UK		
	This study†	MacDonell (1994)	McAulay (1987), cited in MacDonell (1994)	Fitzgerald (1998a)	Fitzgerald et al. (1999)	Wastell & Sowards (1995)	Doherty & King (2001)*
% In-house development of IS	27	29	56	47	45	55	50
% Outsourced development of IS	14	27	8	13	15		50
% Use of packaged software/application	59	44	27	40	40		
With little or no customisation	23				23		
With in-house customisation	16				17		
With outsourced customisation	20				-		
† Projects reported in each category were expressed as a proportion of an organisation's total projects, then averaged over the 100 organisations.							
* Estimated from reported ranges of in-house developed IS							

#### 4.5 Standard Method Use

Table 4.6 shows the extent of reported use of a standard method (a formal or documented approach for directing or guiding the IS development process) by project and by organisation. The vast majority of reported projects (91%) used a standard method of IS development for at least part of the development process. Similarly, 92% of organisations used a standard method in at least part of the development process in at least some of their IS projects. That 17% reported using a method for some but not all of their projects accords with Wynekoop and Russo (1995), who note that just because an organisation has a standard method does not mean that it will be used in all of their projects.

Table 4.6: Extent of standard method use

Standard method not used	% projects (n=2026)	
Standard method used	9	
For more or less all of development	91	
For only part of development	77	
	13	
	% organisations (n=99)	
Standard method never used	8	
Standard method used	92	
Standard method always used	69	
For more or less all of development		44
For only part of development		6
For either all or only part of development		19
Standard method used for some but not all projects	17	
Missing some project data	6	

Compared to prior empirical studies (Table 4.7), this study shows higher reported levels of standard method use, either in terms of the proportion of organisations that reported using a standard method, or the relatively low proportion of reported projects in which a standard method was not used and the large proportion of organisations doing at least some of their IS development without using a standard method. This may in part reflect the nature of the target population in this study (organisations with 200 or more FTEs). It is worth noting that the highest prior reported level of method use (85%) was from another New Zealand (albeit a small sample, preliminary) study (Taylor, 2000).

Table 4.7: Comparative use of standard methods

Standard method use	This study	Prior studies
% organisations reporting use of a standard method	92	40 to 85 (Barry & Lang, 2001, 2003; Eva & Guilford, 1996; (μ=69 Fitzgerald, 1998a; Fitzgerald et al., 1999; Hardy et al., 1995; livari & Maansaari, 1998; Kiely & Fitzgerald, 2002; Rahim et al., 1998; Russo et al., 1996; Taylor, 2000; Wastell & Swards, 1995) σ=12)
% organisations reporting at least some IS development without use of a standard method	25	46 (Russo et al., 1996)
% projects in which a method was not used at all in development	9	31 (Chatzoglou, 1997; Russo et al., 1996)

In this study, larger organisations reported significantly more projects for various extents of standard method use than their smaller counterparts: a method was used for more or less all ( $U=884.5$ ,  $p=0.026$ ), for only part ( $U=959.5$ ,  $p=0.051$ ), and for at least part ( $U=810.5$ ,  $p=0.006$ ) of the development process. Smaller organisations tended to report a higher median number of projects where a standard method was not used, although the difference in median compared to the larger organisations was not significant ( $U=1049.5$ ,  $p=0.171$ ). This is consistent with prior empirical studies that have found that the use of standard methods is correlated with organisation size (Fitzgerald, 1998a; Kiely & Fitzgerald, 2002; Russo et al., 1996; Urban & Whiddett, 1996; Wastell & Swards, 1995).

The most common reasons given for not using a standard method in particular IS projects were related either to the nature of the project (e.g. the project was small or non-critical, was a packaged solution involving little or no customisation, or control of the project was outside the IS function) or to organisational practice (e.g. the organisation had an informal or ad hoc approach towards development or no method was in place in the organisation). These reasons are consistent with prior studies (Fitzgerald, 1998a; Fitzgerald et al., 2002; Huisman & livari, 2002; Kiely & Fitzgerald, 2002, 2003; Roberts et al., 2000; Wynekoop & Russo, 1995), and imply that organisations often choose to not use a standard method in a given IS project for pragmatic reasons (cf. Fitzgerald, 1996; 1998a; 2000).

Further detailed analysis of standard method use in IS projects in the surveyed organisations can be found in Appendix 4 and was reported in McLeod et al. (2007a).

#### 4.6 User Participation

Table 4.8 shows the extent of reported user participation in the IS development process by project and by organisation. Users participated in the majority of reported projects (92%) for at least part of the development process, and for more or less all of the development process in 61% of the reported projects. This level of user participation is higher than that reported in Kiely and Fitzgerald's (2002) survey of medium to large Irish organisations, in which users participated in 65% of the projects and played a significant role in 56% of projects. All organisations in the current study reported having at least some level of user participation in at least some of their IS projects. Larger organisations reported significantly more projects in which users participated for at least part of the development process ( $U=876.0$ ,  $p=0.017$ ).

Table 4.8: Extent of user participation

	<b>% projects</b> (n=2129)
Users did not participate at all	8
Users did participate	92
For more or less all of development	61
For only part of development	31
	<b>% organisations</b> (n=100)
Users did not participate at all	0
Users did participate	100
Users always participated	84
For more or less all of development	46
For only part of development	19
For either all or only part of development	18
Users participated for some but not all projects	16

The most common reason given for no user participation in particular IS projects was that the project was perceived to be of little or no relevance to users, usually because of its technical or infrastructural nature. Users were also not involved in two projects where the IS was packaged software requiring little or no customisation, consistent with Butler and Fitzgerald (1999a).

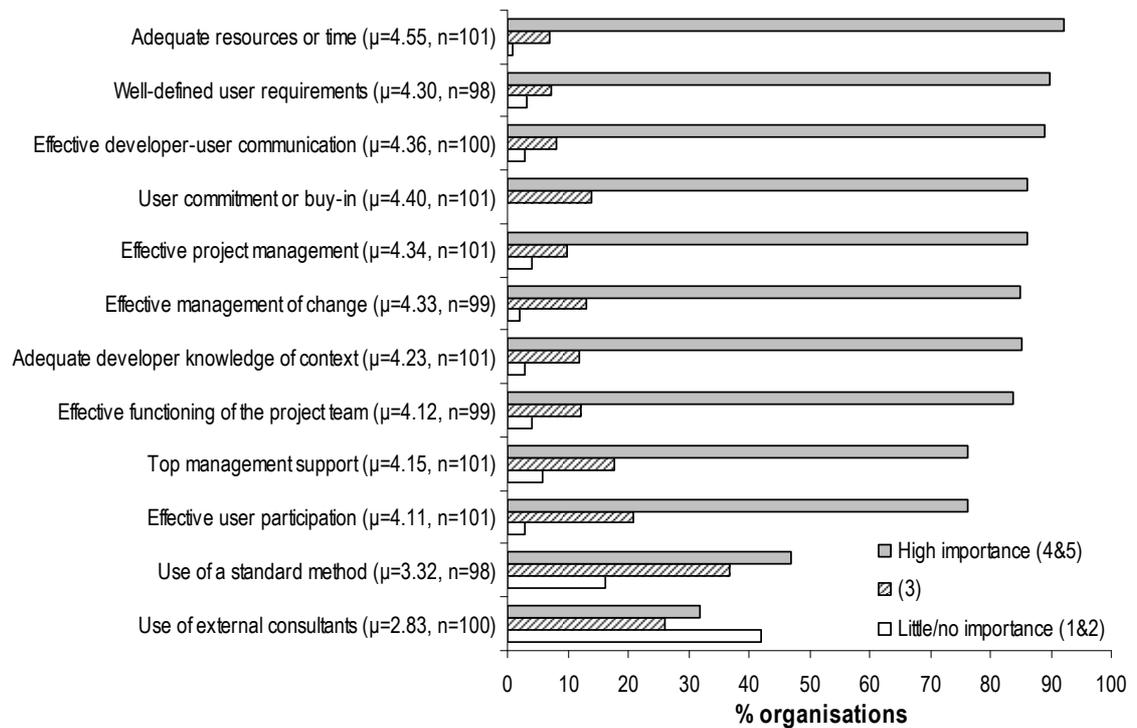
Further detailed analysis of user participation in IS projects in the surveyed organisations can be found in Appendix 4 and was reported in McLeod et al. (2007b).

#### 4.7 Factors Facilitating IS Development

Respondents were asked to indicate how important twelve factors had been in facilitating IS development in the projects undertaken over the three-year time frame. These factors are shown in Figure 4.1, in order of their perceived relative importance. In order to facilitate

representation of the various factors in the subsequent figures and tables, it was decided to treat respondent ratings of '4' and '5' on the 5-point measurement scale as representing a 'high' level of importance placed on a factor. As might be expected, the respondents felt that most of the factors identified in the literature had played a highly important role in facilitating IS development, reinforcing the validity of their inclusion in the survey.

Figure 4.1: Relative importance of factors in facilitating IS development



The two factors perceived to be important by most respondents were *adequate resources or time* and *well-defined user requirements*. Virtually none of the respondents felt that *adequate resources or time* was of little importance in facilitating IS development. Of interest is the high level of importance placed on aspects potentially related to users in the development process, including *well-defined user requirements*, *effective communication between developers and users*, and *user commitment or buy-in*. Although *effective user participation* was the third lowest factor, it was still perceived as important by 76% of the respondents. None of the respondents felt that *user commitment or buy-in* was of little importance in facilitating IS development.

By contrast, the *use of a standard method* was perceived as important by only 47% of the respondents. That the majority of respondents used a standard method suggests that use of a standard method is well entrenched in practice despite the perception of some organisations that standard methods were not of relatively high importance in facilitating IS development in their IS projects. The factor perceived to be of least importance was *use of external consultants*. This probably reflects the relatively low use of external consultants across all projects, despite

changes to the IS development environment, such as the increase in package software acquisition.

Overall, the relative ranking of the factors facilitating IS development in this study do not show a high degree of consistency with comparable factors in prior empirical studies (Table 4.9). Of the two highest ranked factors in this study, *adequate resources or time* and *well-defined user requirements* are also ranked highly in some of the prior studies. *Effective project management*, of middle order ranking in this study (although still of relatively high importance), was generally ranked highly in other studies. *Effective management of change*, also of middle order ranking in this study, was ranked lowly in other studies. *Effective functioning of the project team*, *top management support* and *effective user participation*, all of low ranking in this study, tended to be ranked higher in other studies.

Table 4.9: Comparative ranking of factors facilitating IS development

	NZ	NZ	Ireland	UK	Mostly US	US	US	US
	This study IS executives	Verkerk et al. (2000) IS & other executives	Fitzgerald (1998a) IS managers	Wastell & Sowards (1995) IS directors	Wixom & Watson (2001) IS managers	Johnson et al. (2001) IS executives	Jiang et al. (1996) IS professionals	Rainer & Watson (1995) Various†
Total number of factors ranked	12	10	5	6	8	10	13	23
Adequate resources or time	1		2		5		5	21
Well-defined user requirements	2	3				7		3
Effective communication between developers & users	3						7	
User commitment or buy-in	4						12	
Effective project management	5	1		4		3	3, 10	
Effective management of changes resulting from system implementation	6				7			17
Adequate developer knowledge of the system context	7		3					
Effective functioning of the project team	8				3		4	
Top management support	9	2			1	1	2	2
Effective user participation in development process	10	6	1	3, 5	4	2	6	
Use of a standard method of IS development	11		4	6		8		
Use of external consultants	12							23
† Including IS professionals, executive users, vendors & consultants								

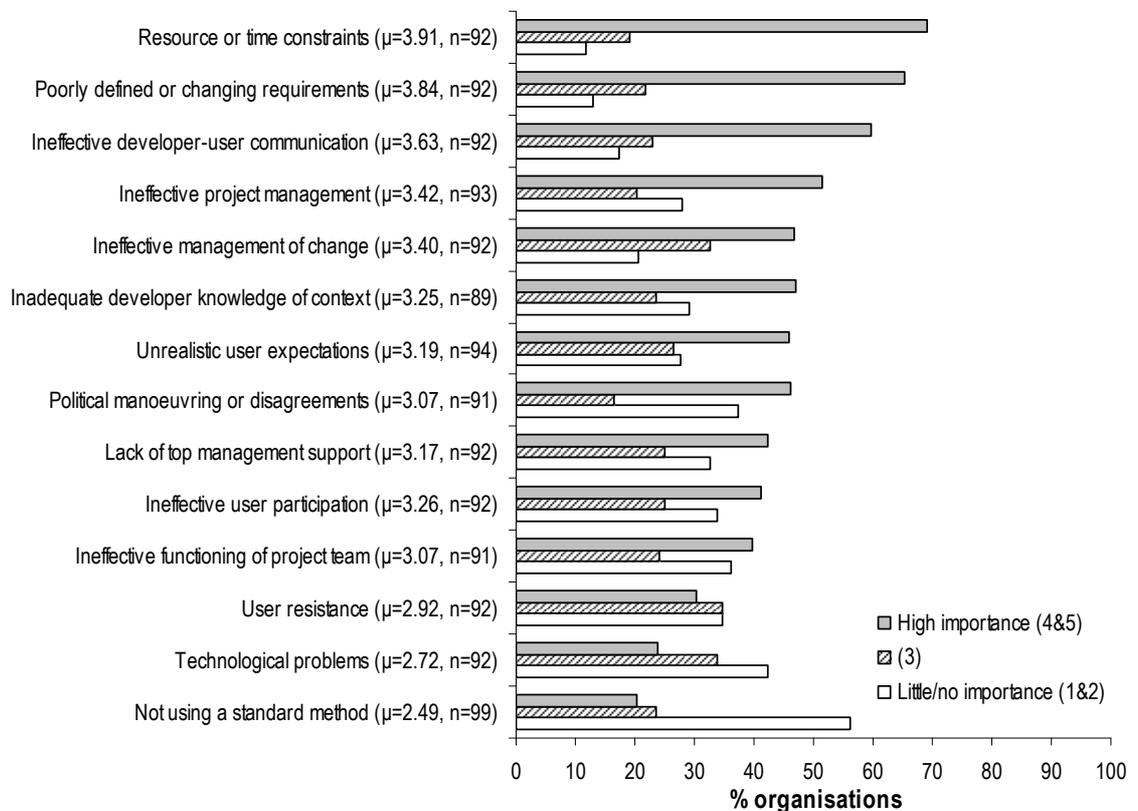
However, the low ranking of *use of a standard method* and of *external consultants* in this study is consistent with prior studies measuring these factors. The current study is consistent with the other New Zealand study that considered factor influence (Verkerk et al., 2000) in that *well-defined user requirements* was ranked relatively highly, while *effective user participation* had a

low rank. However, the very high rankings of *effective project management* and *top management support* in the earlier study are not confirmed in the current study.

#### 4.8 Factors Inhibiting IS Development

Respondents were asked to indicate how important fourteen factors had been in inhibiting IS development in the projects undertaken over the three-year time frame. These factors are shown in Figure 4.2, in order of their perceived relative importance. The two factors perceived to be the most important in inhibiting IS development were *resource or time constraints* and *poorly defined or changing user requirements*. *Ineffective communication between developers and users* was also ranked highly, with 60% of respondents rating it as of high importance. The bi-polar distribution of responses for the factors related to *political manoeuvring or disagreements*, *lack of top management support*, *ineffective user participation*, and *ineffective functioning of the project team*, suggest that these factors have the potential to be influential in certain projects. *User resistance*, *technological problems* and *not using a standard method* were not considered to be important in inhibiting IS development, with more respondents ranking them of little or no importance than of high importance.

Figure 4.2: Relative importance of factors in inhibiting IS development



Overall, the relative ranking of the factors inhibiting IS development in this study show a reasonable degree of consistency with comparable factors in prior empirical studies (Table 4.10).

Looking first at the more highly ranked factors in this study, both *resource or time constraints* and *poorly defined or changing user requirements* display considerable variation in importance in prior studies, although both are ranked highly in the other New Zealand study (Verkerk et al., 2000). *Ineffective project management* and *ineffective management of change* are also generally ranked highly in prior studies.

Table 4.10: Comparative ranking of factors inhibiting IS development

	NZ	NZ	NZ/ UK	Global	UK	Ireland	Finland	Hong Kong	US	US	US
	This study IS executives	Verkerk et al. (2000) IS & other executives	Yetton et al. (2000) IS managers	KPMG (2005a) ?	Wastell & Sowards (1995) IS directors	Barry & Lang (2003) Developers	Schmidt et al. (2001) Project managers	Schmidt et al. (2001) Project managers	Schmidt et al. (2001) Project managers	Jiang & Klein (2000) Project managers	Standish Group (1995) IS executives
Total number of factors ranked	14	10	12	?	7	14	23	14	17	12	10
Resource or time constraints	1	3	5		7	1, 2, 8, 10	7, 15	15	13	3	6, 9
Poorly defined or changing user requirements	2	1, 2	6	1	1	4, 3	9	8	14		2, 3
Ineffective communication between developers & users	3										
Ineffective project management	4	5		2	4		1		5		
Ineffective management of changes resulting from system implementation	5						4		3	4	
Inadequate developer knowledge of the system context	6						3	13	11	7	
Unrealistic user expectations of the system	7	9				5	23	9	7		7
Political manoeuvring or disagreements within the organisation	8				5		22	10	16		
Lack of top management support	9	4		3			2	1	1		4
Ineffective user participation in development process	10	7	11		3		11	2	6	8	1
Ineffective functioning of the project team	11		7, 12							5, 12	
User resistance	12		9				8	3, 4	4	6	
Technological problems	13		10		6		13	12	12	1, 9	10
Not using a standard method of IS development	14					14		14		10	

Of the middle ranked factors in this study, *unrealistic user expectations* also tends to be of moderate importance in prior studies (although low in Finland and New Zealand). *Inadequate developer knowledge of the system context* shows mixed importance in prior studies, while *political manoeuvring or disagreements* is only rated lowly. In contrast, *lack of top management*

*support* is generally given high importance in other studies (although not in the prior New Zealand study). Of the lower ranked factors in this study, *ineffective user participation* and *user resistance* tend to be ranked more highly in other studies. The low rankings for *ineffective functioning of the project team*, *technological problems*, and *not using a standard method* are largely consistent with other studies. Interestingly, the current study is consistent with the other New Zealand study (Verkerk et al., 2000) across four of the five common factors.

The ten matched pairs of inhibiting and facilitating factors from Table 4.9 and Table 4.10 tended to be given comparable relative rankings of importance (Table 4.11). Equivalent (but opposite) factors were given the same relative ranking in seven of the cases, including the top six factors. However, overall, the inhibiting factors listed tended to have lower average rankings of importance than the factors facilitating IS development. The differences between the ten matched pairs of inhibiting and facilitating factors were found to be significant ( $p < 0.001$ ) using a Wilcoxon signed-rank test. This suggests that, overall, factors facilitating IS development outcomes were perceived as more influential than factors inhibiting development in the IS projects surveyed. A similar result was found in a survey of New Zealand organisations involved in IS development where respondents gave significantly higher ratings to the importance of factors in IS success than they did for factors in IS failure, a result attributed to developer optimism (Hood, 1999).

Table 4.11: Relative rank order of ten matched pairs of factors

<b>Factors facilitating IS development</b>	<b>Rank</b>	<b>Factors inhibiting IS development</b>	<b>Rank</b>
Adequate resources or time	1	Resource or time constraints	1
Well-defined user requirements	2	Poorly defined or changing requirements	2
Effective developer-user communication	3	Ineffective developer-user communication	3
Effective project management	4	Ineffective project management	4
Effective management of change	5	Ineffective management of change	5
Adequate developer knowledge of context	6	Inadequate developer knowledge of context	6
Effective functioning of project team	7	Ineffective functioning of project team	9
Top management support	8	Lack of top management support	7
Effective user participation	9	Ineffective user participation	8
Use of a standard method	10	Not using a standard method	10

#### **4.9 Proposed Changes in IS Development**

Table 4.12 summarises the general changes to IS development in the subsequent three years anticipated by the respondents. Two of the most common expected changes were an increase in IS development (often because of the need to replace or integrate legacy systems or to migrate to new architectures), and an increase in outsourced development. The latter is consistent with an established trend towards outsourcing IT operations in New Zealand (Bell et al., 2003; Bland, 2005; Greenwood, 2006; Hind, 2002) and overseas (Colquhoun & Paredes, 2004; Santosus, 2005).

Another common anticipated change mentioned by respondents was an increasing requirement for IS development to meet business needs or benefits. This was referred to in terms such as IS development being “driven for business benefit”, “focus[ed] on business outcomes”, “better align[ed] with real business needs”, and “more strategically aligned”. As one respondent summarised, this reflected a “stronger focus on business processes driving the development of systems, rather than the other way around”.

Table 4.12: Anticipated changes in IS development

	% organisations (n= 63)
No change	21%
Less IS development	3%
More IS development	11%
More outsourced development	13%
More in-house development	5%
More packaged solutions	6%
Development moving off-shore	3%
More local development (compared to offshore)	2%
More focus on business outcomes	16%
Increased requirement for accountability	6%
Closer involvement with external business partners	3%
Improved project management	6%
Increased IS control of IS projects	6%
Change in development techniques or tools	3%
Changes arising from a change in company ownership	2%

#### 4.10 Discussion

This chapter presented the findings of a survey of IS development practice in 106 New Zealand organisations with 200 or more FTEs distributed across a representative range of organisational sizes and business categories. A comprehensive and updated assessment of IS development practice based on some 2218 IS projects undertaken between 2001 and 2003 was obtained.

The size of an organisation’s IS function was positively associated with the organisation’s size. Most organisations had a centralised IS function. Organisations that outsourced their IS function tended to have few IS personnel, presumably as either a cause or consequence of outsourcing. The number of IS projects undertaken by the organisations ranged from 0 to 230, with an average of 21 projects per organisation over the three-year period. While the costs of the IS projects reported ranged from \$1,000 or less to over \$1 million, 72% of projects cost under \$100,000. Larger organisations undertook significantly more projects or more expensive projects than their smaller counterparts, although very expensive projects were not the exclusive preserve of larger organisations. The prevalence of smaller sized projects is consistent with the IS

literature in that most organisations spend the majority of their time on smaller projects (Eva & Guilford, 1996) and that the development of smaller-sized projects is an emerging part of the modern IS development landscape (Johnson et al., 2001; SoftwareMag, 2004).

At 54% of reported projects, bespoke development was the most common method of IS development and acquisition. The balance (46%) involved the purchase of packaged software, 62% of which were customised before use. Two-thirds of development or customisation work was conducted in-house, although the outsourced remainder represents 27% of reported projects. On an organisational basis, the trend towards increased use of package solutions and outsourced development or customisation appears to be even stronger. These results, together with observations in the local IS practice literature (e.g. Bell et al., 2003; Bland, 2005; Gordon, 2005; Greenwood, 2006; Hind, 2002; Watson, 2004), suggest that New Zealand organisations have been realising some of the benefits of using packaged software or outsourcing. These include reduced cost, reduced requirements for internal skilled technical staff, ongoing support, access to upgrades and avoiding operations outside their core business (Cope, 2000; Palmer, 1999). Even so, these acquisition options are unlikely to answer all of the IS needs of an organisation (especially in terms of non-standard problems), suggesting that there is still a place for in-house development (Palmer, 1999).

Both user participation and standard method use continue to play a role in IS development in New Zealand, although there seems to be some variation in how these techniques are enacted in practice. All organisations that undertook IS projects had users participate to some extent in at least some of the projects, and users participated in 92% of reported projects. Standard methods of development were never used in only 9% of projects and 8% of organisations. Standard methods were used for all of the development process in 77% of reported projects, and always for all of development by 44% of organisations. The implication is that, despite the various criticisms directed at standard methods within the IS literature and questions about the relevance of traditional standard methods in the modern IS development context, the organisations that participated in this survey still perceive some benefit to be had in using standard methods for at least part of development in some of their projects. The number of projects in which users participated or in which a standard method was used was significantly higher for larger organisations.

The survey respondents rated the importance in their IS projects of a range of factors considered to facilitate or inhibit IS development. Overall, factors facilitating IS development in this study were rated as more important than factors inhibiting IS development. Whether viewed as facilitating or inhibiting IS development, the six most highly ranked factors influencing development in the projects surveyed in this study were related to availability of resources or

time, definition of user requirements, communication between developers and users, project management, management of IS development-related change, and developer knowledge of the IS development context. Overall, the results of this survey support observations in the IS literature highlighting the importance of organisational or people-related issues in determining the outcome of IS development (Doherty & King, 2001, 2005; Doherty et al., 2003; Eason, 2001). These studies suggest that organisations that treat various organisational issues are more likely to enjoy a higher level of IS project success.

The study confirmed the importance of a number of traditional factors identified in the IS literature as facilitating or inhibiting IS development. These factors can be perceived as being of ongoing relevance to IS development outcomes. In addition, a number of factors were identified as emerging or increasing in relevance in light of changes in the IS development environment. There is some evidence that a number of these latter factors are ranked more highly in importance in this study than was previously the case. Table 4.13 summarises the comparative rankings of these 'ongoing' and 'emergent' factors in this study with prior empirical studies published between 1995 and 2006 (Tables 4.9 and 4.10).

Table 4.13: Comparative state of ongoing and emergent factors in influencing IS outcomes

Facilitating IS development	
<p><b>Ongoing factors</b></p> <p><b>Consistent with post-1995 prior studies:</b></p> <ul style="list-style-type: none"> <li>• High rankings of <i>adequate resources or time</i> and <i>well-defined requirements</i></li> <li>• Moderate ranking of <i>adequate developer knowledge of system context</i></li> <li>• Low ranking of <i>use of a standard method</i></li> </ul> <p><b>Inconsistent with post-1995 prior studies:</b></p> <ul style="list-style-type: none"> <li>• Lower rankings of <i>effective functioning of the project team, top management support</i> and <i>effective user participation</i></li> </ul>	<p><b>Emergent Factors</b></p> <p><b>Consistent with post-1995 prior studies:</b></p> <ul style="list-style-type: none"> <li>• Low ranking of <i>use of external consultants</i></li> </ul> <p><b>Inconsistent with post-1995 prior studies:</b></p> <ul style="list-style-type: none"> <li>• Higher rankings of <i>effective communication between developers &amp; users, user commitment or buy-in, and effective management of change</i></li> <li>• Moderate ranking of <i>effective project management</i></li> </ul>
Inhibiting IS development	
<p><b>Ongoing factors</b></p> <p><b>Consistent with post-1995 prior studies</b></p> <ul style="list-style-type: none"> <li>• Moderate ranking of <i>unrealistic user expectations</i></li> <li>• Low ranking of <i>ineffective functioning of the project team, technological problems</i> and <i>not using of a standard method.</i></li> </ul> <p><b>Inconsistent with post-1995 prior studies</b></p> <ul style="list-style-type: none"> <li>• Lower ranking of <i>lack of top management support, ineffective user participation</i> and <i>user resistance</i></li> </ul> <p><b>Inconclusive results:</b></p> <ul style="list-style-type: none"> <li>• High rankings of <i>resource or time constraints</i> and <i>poorly-defined or changing requirements</i> cf. mixed results in prior studies</li> <li>• Moderate ranking of <i>inadequate developer knowledge of system context</i> cf. mixed results in prior studies</li> </ul>	<p><b>Emergent Factors</b></p> <p><b>Consistent with post-1995 prior studies:</b></p> <ul style="list-style-type: none"> <li>• High ranking of <i>ineffective project management and ineffective management of change</i></li> </ul> <p><b>Inconsistent with post-1995 prior studies</b></p> <ul style="list-style-type: none"> <li>• Higher ranking of <i>political manoeuvring or disagreements</i></li> </ul> <p>No comparative data for <i>ineffective communication between developers &amp; users</i></p>

The changes to IS development anticipated by many of the survey respondents reflect the changing business and IS development environments. For example, some respondents anticipated increased levels of IS development, purchase of packaged solutions and outsourcing. Others emphasised an increasing need for accountability or IS control of projects, or for IS development to be more aligned with business needs. Linking IT and business strategies or objectives has emerged as a key concern of senior IS managers in both New Zealand and overseas (e.g. Chang, 2006; Hind, 2002; KPMG, 2005a), and seems to reflect the demands placed on IS by the modern business.

#### **4.11 Summary**

The survey summarised in this chapter provides an updated assessment of IS development practices in New Zealand organisations (with 200 or more FTEs) based on empirical data from actual IS projects. The survey addresses the second research question underlying this PhD research, relating to the *context* of IS development. Where available, data from other countries is compared to the New Zealand findings.

In order to develop a better understanding of how the *process* of IS development is enacted in practice, an in-depth longitudinal case study of an IS development project was conducted in a contemporary organisational setting. The next chapter develops a process approach for analysing IS development in the case study. Subsequent chapters present the case study method and analysis.

## **Chapter 5: A Process Approach for Analysing IS Development**

### **5.1 Introduction**

As introduced in Chapter 2, process studies (as opposed to factor studies) are longitudinal and are concerned with developing knowledge of the process by which particular outcomes, in this case in IS-related organisational change, develop over time. Process studies typically require empirical closeness to the organisational context, recognising the way in which “the uses and consequences of information technology emerge unpredictably from complex social interactions” (Markus & Robey, 1988, p. 588). Outcomes are analysed as the consequence of a sequence of interrelated and interdependent events or instances of social action in organisational processes. Process studies also accommodate the possibility of unintended or unanticipated events influencing outcomes (Markus & Robey, 1988; Van de Ven & Poole, 2005).

The purpose of this chapter is to outline a process approach for analysing IS development that can be applied to the longitudinal case study presented in this thesis. The elements of a process approach are examined through a review of prior process studies of IS development and the analytical strategies they utilise. Process studies require a relevant theoretical or conceptual framework with which to interpret and explain the emergence of process outcomes. In this chapter, concepts from structuration theory and the sociology of technology are used to theorise IS development as a sociotechnical and situated process. These theoretical concepts are used in the construction of a model of IS development that can be utilised for both analysing the processes occurring in the longitudinal case study and illustrating that analysis.

### **5.2 Prior Process Studies of IS Development**

While a variety of process studies have been conducted in relation to IS development, a particularly influential stream of work has been conducted by Newman, Robey and their colleagues. In an early paper, Newman and Noble (1990) analysed user participation in a case study of IS development using four process models of the interaction between users and developers over time. They found that particular process models were better for explaining the nature of user participation at different stages of IS development. Newman & Robey (1992) further developed a process model of the user-developer relationship that treats IS development as a dynamic social process. They used Gersick’s (1991) ‘punctuated equilibrium’ model of organisational change to conceptualise the social action that occurs during IS development as a sequence of longer episodes (sets of like events) of relative stability in the user-developer relationship, punctuated by (relatively brief) critical events or encounters between users and developers that disrupt or change the nature of this equilibrium, within a context described by

antecedent conditions. Within their model, the trajectory of the user-developer relationship is shown as shifting between three states: acceptance, equivocation and rejection. At any point in time, the relationship is shaped by both past development work and what has previously occurred in the current project, and is also capable of shaping future patterns of interaction.

Newman & Robey's (1992) conceptualisation of IS development as a sequential process involving antecedent conditions, episodes, encounters, and changes of state provided a foundation for future process studies. For example, Sabherwal & Robey (1993) empirically examined fifty-three IS development projects in order to classify them according to the sequence of events through which the projects progressed. They constructed six different development process archetypes based on common patterns of event sequences. Using Newman & Robey's (1992) social process model, Robey and Newman (1996) analysed the development and implementation of an IS in an organisation over a 15-year period. They identified repeating patterns of behaviour that contributed to project failure before a solution was eventually implemented. Robey and Newman (1996) conclude that an understanding of the patterned sequences of events that comprise the social process of IS development is a valuable platform for interpretation from multiple theoretical perspectives.

Heiskanen et al. (2000) use two different forms of social process model to analyse software procurement in three different case studies over ten years. Like Newman & Robey (1992), the authors conceptualise the procurement process as a trajectory consisting of a series of longer episodes, punctuated by brief encounters, representing periods "of relative instability in the project during which the issues related to the project come under close scrutiny" (Heiskanen et al., 2000, p. 7). While they replicate Newman & Robey's (1992) process model of user-developer relationships, Heiskanen et al. extend their analysis to include relationships between other key actors, namely the clients and vendors. They use transaction cost theory "as a powerful explanatory vehicle" (Heiskanen et al., 2000, p. 26) to interpret the client-vendor relationship as moving between three strategies: market, hierarchy and hybrid.

While suitable in principle for the investigation of IS development, process studies of this nature tend to suffer from a number of limitations. For example, there may be a loss of detail associated with the simplification that occurs in this type of analysis. Many process studies have tended to focus on only one dimension of IS development, such as user-developer encounters (Newman & Robey, 1992), commitment (Newman & Sabherwal, 1996) or user-developer communication (Gallivan & Keil, 2003). The restriction of the range of possible actions and responses of participants in IS development to a relatively small number of 'states' often occurs in the construction of a (necessarily simplified) process model. As a result, the explanations developed from these studies provide only partial understandings of the complex social and

technical interactions that occur in IS development (Al-Muharfi et al., 2004; Kim & Pan, 2006; Lyytinen & Newman, 2006). Some process studies assume an unrealistic homogeneity with respect to relevant social groups such as 'users' or 'developers' (Newman & Robey, 1992). Differences within groups, or individuals who span the boundary between groups, may play an important role in the IS development process.

Despite the inclusion of antecedent conditions in process studies, their role in shaping the development trajectory is under-utilised in some studies. Sauer (1999) suggests that the dominant focus on developer and user behaviour in process studies has led to a neglect of the wider context. He argues that this can lead to an assumption that such behaviours are under the autonomous control of project participants and overlooks the potential for contextual conditions to constrain or otherwise shape participants' actions.

Finally, the conceptualisation of the IS development process as one of 'punctuated equilibrium' (Newman & Robey, 1992) tends to overlook the intricate and dynamic interactions that occur within both critical events and the periods of supposedly stable behaviour between them. The focus on major events and 'revolutionary change' (Newman & Robey, 1992) made possible by the long timeframe of many of the cases analysed is often at the expense of a consideration of change as continuous and incremental. Moreover, the emphasis on the temporal sequencing of events seems to reflect the treatment of IS development as a linear trajectory, rather than as a continuous and iterative process (Nandhakumar, 1996; Srinivasan & Davis, 1987).

More recent process studies of IS development have acknowledged such limitations and have attempted to address them by developing more sophisticated types of process models. For example, Lyytinen & Newman (2006) adopt a more holistic and multi-level treatment of IS development change as "complex, non-deterministic, emergent and path dependent" (p.14), developing a punctuated socio-technical IS development process model. The model incorporates multiple levels, comprising four interacting socio-technical components (task, structure, actor and technology) of two parallel organisational systems – the 'work' system and the 'building' (development) system – and the influence of the organisational and wider environmental contexts. When a system state is stable, the four socio-technical components are aligned. A significant change in one or more of the system components can create a 'gap' or misalignment between components that destabilises the system and breaks down its equilibrium. The model maps sequences of events within and between the parallel work and building systems. An important feature of the model is a narrative description of the overall IS development change sequence of events to explain how and why the system developed over time and produced the observed outcome.

Kim & Pan (2006) develop a process model of IS implementation that shows how the interrelationships and interactions between various critical success factors produced the observed outcomes. Kim & Pan (2006, p. 61) suggest that their process model, which attempts to explain relationships between multiple events that “can occur simultaneously and affect each other concurrently”, is an improvement over single linear sequential process models. Luna-Reyes et al. (2005) suggest that linear process models of IS development ignore the recursive nature of episodes and encounters. They incorporate several feedback processes, representing organisational, or technological, change and adaptation, in their process model in order to accommodate the recursive interplay between action (practice) and structure (knowledge). They argue that this model better represents the emergent and iterative nature of IS development.

### **5.3 Strategies for Process Analysis**

The process approach used in this study builds on these prior process approaches of IS development, drawing on various elements from them without explicitly following any one particular approach. It is also informed by Pettigrew’s (1987; 1990; Pettigrew et al., 2001) influential approach to studying the historically and contextually situated process of organisational change. By process of change, Pettigrew is referring to the actions and interactions of interested actors as they participate in “sequences of individual and collective events, actions, and activities unfolding over time in context” (Pettigrew et al., 2001, p. 700).

Pettigrew emphasises four requirements for researching change. First is the importance of ‘embeddedness’; that is, analysing multiple and interconnected levels of context. Second is the importance of revealing ‘temporal interconnectedness’; that is, “locating change in past, present, and future time” (Pettigrew, 1990, p. 269). By this Pettigrew is referring to the sequential relationships between phenomena in time and the role that antecedent conditions play in shaping emerging outcomes. However, he stresses the need to avoid deterministic assumptions about the order and inevitability of sequences, noting that “trajectories of change are probabilistic and uncertain because of changing contexts” (Pettigrew, 1990, p. 270). Third, Pettigrew emphasises both context *and* action, and their mutual influence on each other. In particular, he notes that contexts and structures are not just constraining, but also enable action, mobilised by organisational actors to effect change. Fourth, Pettigrew argues that explanations of change are more likely to be holistic and multi-faceted than linear and singular: “changes have multiple causes and are to be explained more by loops than lines” (Pettigrew, 1990, p. 270). As he observes:

Change is multifaceted; involving political, cultural, incremental, environmental, structural, as well as rational dimensions. Power, chance, opportunism, accident are as influential in

shaping outcomes as are design, negotiated agreements and master plans. (Pettigrew, 1990, p. 268)

Langley (1999) describes a range of complementary strategies for analysing process data. She notes that most process research uses a 'narrative' strategy to make sense of process data to some extent. However, the use of the narrative depends on the researcher's objectives, and can range from a chronological description of the event sequence for subsequent analysis to a more substantial role as the main product of the research. Langley (1999) suggests other strategies that can be used instead of or, in combination with, narrative analysis include: 'temporal bracketing' as a way of organising the description of a sequence of events to enable analytical treatment of overlapping or mutually influencing phenomena (e.g. Langley & Truax, 1994); 'visual mapping', in which graphical representations facilitate the summarising of large amounts of process data, the depiction of time, and the simultaneous presentation of multiple dimensions or parallel processes (e.g. Lyytinen & Newman, 2006; Madsen et al., 2006; Newman & Robey, 1992; Vidgen et al., 2004); 'alternative templates', where the explanatory capacity of several different interpretations of the same events are assessed (e.g. Newman & Noble, 1990); 'grounded theory', in which a theoretical understanding of a phenomenon is derived inductively from process data using a structured approach outlined by Glaser & Strauss (1967) (e.g. Urquhart, 1997); and 'quantification', where detailed process data is systematically reduced to quantitative data that can be analysed statistically, for example, as time series (e.g. Van de Ven & Poole, 1990) or using optimal matching procedures and cluster analysis (e.g. Sabherwal & Robey, 1993). Langley does not advocate the use of any particular strategy or strategies, arguing instead that the choice should be personal, driven by the research objectives, the kind of data available, imagination, and the desired level of accuracy, simplicity and generality.

Three of these strategies are used to analyse and interpret the longitudinal case study of IS development in this study: narrative, temporal bracketing and visual mapping. Process studies attempt to provide a theoretical explanation for discrete outcomes from a knowledge and understanding of process. Within this, narratives are used to tell "stories [that] help explain the relationships between events in a process" (Pentland, 1999, p. 711) – how and why a sequence of events in a particular context unfolds over time to produce a particular outcome (Markus & Robey, 1988; Van de Ven & Poole, 2005). For Pentland (1999), narrative is a useful approach to developing process explanations because it incorporates a representation of time. However, while chronology is an important organising device in process narratives, Pentland cautions that overly focussing on event sequences can exclude important details of, or abstract away from, the focal actors, their social relations and narrative voices, and the evaluative context that gives events meaning for them and guides their actions – all of which are needed "to tell a whole story"

(Pentland, 1999, p. 721). In other words, meaningful explanation requires more than description of event sequences:

To describe a process, one needs event sequences. But to *explain* a process, one needs to identify the generative structures that enable and constrain it. (Pentland, 1999, p. 722, emphasis in original)

As Pentland (1999) notes, an event sequence typically provides the central structure of process narratives. This implies that the process studied can be decomposed into temporal phases as a way of structuring the description of events into successive adjacent periods (Langley, 1999). These phases or episodes presume “there is a certain continuity in the activities within each period and there are certain discontinuities at its frontiers” (Langley, 1999, p. 703). Conceptualising and identifying which events constitute episodes or their boundaries in the process data is largely a matter of subjective judgement on the part of the researcher based on documentary and observational evidence, some encounters thus being given higher analytical status (Heiskanen et al., 2000; Langley, 1999; Newman & Robey, 1992; Van de Ven & Poole, 2005). Defining temporal episodes is complicated by the abstract nature of some organisational phenomena, difficulties in accessing data about specific events, and temporal variation in what constitutes an event (Langley, 1999). Nevertheless, an episodic approach allows the researcher or the reader to consider actions and interactions in one period in the context of the larger temporal whole or interconnectedness (Pettigrew, 1990; Urquhart, 1997).

The third analytical strategy used in this process study is visual mapping. Visual representations can provide a useful technique for data reduction and synthesis, summarising process data and highlighting relations of temporal precedence or influence between events, objects and actors (Langley, 1999). While they are a simplification, necessarily emphasising some types of information over others, they can be a useful support to the process narrative. Vidgen et al. (2004) suggest that this style of presentation enables the comparison of multiple projects and the identification of common themes. Robey and Newman (1996) argue that by foregrounding essential information about the sequence and character of events, graphical process models enable one to make sense of complex processes. This high level information about the IS development process is supported by the more detailed narrative and theoretical explanation of events; i.e. “the story behind the pictures” (Heiskanen et al., 2000, p. 3).

Together, the three strategies described above provide a way of organising and structuring a case study analysis of the IS development process, and are sufficient to support the achievement of the goals of this research. Process studies are capable of accommodating analyses based on various theories of social process, and even multiple theoretical interpretations within the same analysis (Newman & Robey, 1992). As noted above, interpretation of a process requires some theoretical apparatus with which to articulate how and why a

particular process outcome emerges. Theory “supplies language from which to construct particular descriptions and themes from which to develop particular interpretations” (Heiskanen et al., 2000, p. 10). The next section explores how IS development can be theorised as a sociotechnical and situated process.

#### 5.4 Theorising IS Development

This study is based upon an understanding of IS development as a dynamic and emergent, multi-dimensional process in which people and technology interact in local settings across a range of levels of context. Inherent to this understanding is the assumption that IS development is both sociotechnical and situated.

A *sociotechnical* perspective (as outlined in Section 2.3.1) views a technology and the social systems in which it is embedded as inseparable and mutually constitutive (Horton et al., 2005). In IS development, the technological content of the emergent IS is so intertwined with the social and organisational context in which it is developed that treating them as ontologically separate domains “is a simplification obscuring the complex processes in which technology and human actors jointly take part in forming socio-technical entities” (Avgerou, 2001, p. 46; see also Orlikowski, 1991). From a sociotechnical perspective, the apparent boundaries between the technical and social aspects of an IT artifact or IS become less clear-cut, and such entities are better conceptualised as complex sociotechnical ‘ensembles’ (McLaughlin et al., 1999; Orlikowski & Iacono, 2001), the construction of which involves the interweaving of technical, social, political, economic and cultural elements in “a heterogeneous and seamless web” (Law & Bijker, 1992, p. 291). Adopting a sociotechnical perspective on IS development thus answers Orlikowski & Iacono’s (2001) call for a more serious and explicit engagement with the material *and* social nature of IT artifacts.

The notion of “situated action” was used by Suchman (1987) to emphasise that “every course of action depends in essential ways on its material and social circumstances” (Suchman, 2007, p. 70). A *situated* perspective on IS development thus acknowledges that the form and nature of IS development activity is interrelated with and inseparable from its contextual setting, and must be viewed as situated in its organisational context, rather than isolated (Gasson, 1999; Lang & Fitzgerald, 2007). A situated perspective avoids understanding IS projects “as episodes divorced from the historical, organizational or economic circumstances from which they emerge” (Walsham, 1993, p. 53), including “the structural distribution of power, authority, knowledge, control and resources that constitute the institutional context of systems development” (Beath & Orlikowski, 1994, p. 375). From such a perspective, the way in which an IS is developed, the forms or configurations that are proposed, and the intended (and unintended) consequences of

its implementation and use, all depend on an institutional and cultural context of complex social relations and actions, the infrastructure that supports its development and use, and the organisational history of social arrangements and commitments that accompany any instance of IS development and use (Horton et al., 2005; Kling, 1987, 1991; Lamb et al., 2000; Orlikowski & Iacono, 2001; Walsham, 1993):

Situated studies reveal the local dynamics of change: the way people enact their roles and what meaning these roles ascribe to a particular technology innovation; how the organizational structures and relationships enable or constrain them; what opportunities they perceive; and how, within the context of constraints and opportunities of the organization's particular setting, technology is shaped and change is enacted. (Avgerou, 2002, p. 9)

Understanding IS development as a situated, sociotechnical process requires a theoretical approach that considers the situated actions and practices of various individuals and groups, the ways in which these are enacted within different contextual elements, and the role of existing and new technological artifacts in this process (Constantinides & Barrett, 2006). Such an approach needs to address both social action around IS development (including actor strategies, relations and interactions) and structural aspects (involving wider collective and institutionalised social processes) (Sawyer et al., 2003), while explicitly taking into account the technological aspects of IS (Orlikowski & Iacono, 2001). A "theoretically aware" (Avgerou, 2002, p. 57) approach to researching IS development examines the relationship between IT and organisations and society through wider social science theories such as the sociology of technology (Bijker & Law, 1992) and structuration theory (Giddens, 1984). In the following sections, a number of concepts from these theoretical sources are discussed. Ultimately, these theoretical concepts are used in constructing a sociotechnical model of IS development as situated action that is used as part of the process narrative to analyse and interpret the case study.

#### **5.4.1 Structure and action**

Attempts to understand the nature of the relationship between human actions and the social systems they create and occupy have generated two competing traditions in sociology. One sees society as primarily an effect of human agency; the other emphasises the operation of external social structures that act upon relatively passive human agents (Jones et al., 2004). These two approaches are often constructed as an agency/structure dualism that emphasises extreme voluntarism on one hand and deterministic functionalism or structuralism on the other (Chiasson, 2002; Jones, 1999). As Giddens (1993, p. 4) notes, the former approach is "strong on action, but weak on structure", while the latter is "strong on structure ... weak on action".

Giddens (1984), in his theory of structuration, attempts to transcend the agency/structure dualism by treating them as a mutually constitutive duality. According to structuration theory,

social systems are produced and reproduced in “the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts ... The structural properties of social systems, and “are both the medium and outcome of the practices they recursively organize” (Giddens, 1984, p. 25). Giddens refers to this as the ‘duality of structure’ – a reciprocal and recursive relationship between social structure and human agency. Structure mediates human action, in both enabling and constraining ways, when agents draw upon rules and resources to make sense of and guide their actions. Through this enactment of structures in everyday, routine and recurrent social interaction and practices, human agents reproduce and institutionalise those structures.

The potential also exists to transform existing structures – “all action carries with it the seeds of change” (Walsham & Han, 1991, p. 78). Within structuration theory, human actors are knowledgeable agents, capable of “reflexive monitoring” of the conditions and consequences of their everyday actions (Giddens, 1984, p. 5). However, this knowledgeability is bounded by unacknowledged conditions and the unintended consequences of action (Giddens, 1984, p. 282). Together, the reflexive monitoring of action and the possibility of unintended consequences of action provide the potential for change. In addition to reproducing and reinforcing existing structures, human actors may, in their routine activities, enact changed or transformed structures, whether intentionally or inadvertently (Orlikowski, 1996, 2000; Walsham, 2002; Walsham & Han, 1991):

Change in social structure basically arises from the reflexive monitoring of knowledgeable human agents concerning such aspects as the unintended consequences of intentional conduct, the interaction between individuals with different views and perceptions, and the assessment of new material or non-material circumstances. (Walsham, 1993, p. 236)

For Giddens, structures are not external objective phenomena, but are instantiated through their enactment in recurrent social practice (Orlikowski, 2000). They form a ‘virtual order’ of “rules and resources, recursively implicated in the reproduction of social systems” (Giddens, 1984, p. 377). In this sense,

Social systems, as reproduced, do not have ‘structures’ but rather exhibit ‘structural properties’ and that structure exists, as time-space presence, only in its instantiations in such practices and as memory traces orienting the conduct of knowledgeable human agents. (Giddens, 1984, p. 17)

In order to analyse the relationship between structure and agency, Giddens proposes three interlinked dimensions or ‘modalities’ of structuration that are drawn upon by human actors, and which recursively relate

the knowledgeable capacities of agents to structural features. Actors draw upon the modalities of structuration in the reproduction of systems of interaction, by the same token reconstituting their structural properties. (Giddens, 1984, p. 28)

*Interpretive schemes* are the shared knowledge that human actors draw on to make sense of behaviour and events in social interaction and communication. In doing so, they enact structures of meaning, which Giddens calls 'structures of signification'. *Facilities* are the capabilities and resources available to human agents to act intentionally and exercise power over people (authoritative resources) or material objects (allocative resources). Asymmetries of resources become institutionalised as 'structures of domination'. *Norms* are rules and conventions governing legitimate human conduct. Human agents draw on these to sanction their actions and, in doing so, reproduce 'structures of legitimation' (Giddens, 1984; Orlikowski & Robey, 1991; Walsham & Han, 1991). When routinely mobilised, interpretive schemes, facilities and norms become rules and resources implicated and incorporated within processes of structuration. The enactment of rules and resources both structures human action and reproduces the structures they constitute.

For example, in following an institutionalised IS development method or practice, developers draw upon associated interpretive schemes that mediate their understanding of how to build a new IS. An emphasis on technical aspects of the process may help reproduce a narrow view of the social implications of development (Walsham, 1993). Other more participative methods may offer different roles and responsibilities for developers and users, which influence the way these two groups of actors interact. Developers also work within organisational structures of authority that may facilitate the time, money, tools and other resources available for development (Orlikowski & Robey, 1991). Finally, the established organisational culture may reflect institutionalised norms and values that shape legitimate or sanctioned communication patterns between actors or the intended use of an IS. When actors routinely mobilise these norms and values in their everyday practice, they reproduce and reinforce the established organisational culture.

While Giddens did not explicitly incorporate IT in the development of his structuration theory, his ideas have received considerable attention in IS research (see e.g. Jones, 1999; Jones & Karsten, 2008; Jones et al., 2004). One of the more influential interpretations of structuration theory in the IS field is that of Orlikowski (1992; 2000). Orlikowski conceptualises the organisational deployment of IT as both the product of human action and structuring human action through its routine use in organisations. How an IT or IS is designed and appropriated in a given context is influenced by structures that, in turn, are reinforced or transformed through human use of the technology. IS "are thus deeply implicated in the modalities that link social action to structure" (Walsham, 1993, p. 64). IS are 'inscribed' (Akrich, 1992) with symbolic and material properties that reflect aspects of the interpretive schemes, facilities and norms drawn upon by actors in their design and development. When organisational actors routinely use the

resulting IS, these properties become implicated as rules and resources in the enactment of particular structures associated with the use of that IS (Orlikowski, 2000). Orlikowski (2000, p. 406) emphasises that IT “does not embody structures because those are only instantiated in practice”. Rather, the structures associated with IT use are emergent and enacted in recurrent social practices:

While a technology can be seen to have been constructed with particular materials and inscribed with developers’ assumptions and knowledge about the world at a point in time ... it is only when this technology is used in recurrent social practices that it can be said to structure users’ action. That is, it is only when repeatedly drawn on in use that technological properties become constituted by users as particular rules and resources that shape their action. (Orlikowski, 2000, p. 408)

Walsham & Han (1991) suggest that structuration theory can be used to inform empirical studies of processes such as IS development, either as a meta-theory – a way of thinking about the world that focuses attention on the relationship between context and process and the interlinking of action and structure (see also Avgerou, 2002) – or in the use of specific theoretical concepts while remaining true to the meta-theoretical principles of structuration (see also Jones, 1999). In the latter case, structural concepts may be combined with those from other, compatible, theories relevant to the topic of interest (Walsham, 2002), as is the case in this PhD.

#### **5.4.2 Negotiating IS development**

As noted earlier, developing an understanding of IS development as a situated, sociotechnical process, requires a theoretical approach that addresses both the contextual nature of organisational activities, and the “social process of communication, learning and negotiation within and between individuals and stakeholder groups” (Walsham, 1993, p. 236) that occurs in IS development. In addition, this social process is better conceptualised as a sociotechnical process, in that material resources and technological artifacts mediate design, development and deployment activities. To consider how IS development is enacted through the work practices and interactions of various groups and individual actors (Schultze & Orlikowski, 2004), IS development is conceptualised here as a trajectory of situated interactions in which meanings and actions are negotiated (Constantinides & Barrett, 2006; Gasson, 2006).

When confronted with a complex problem such as the development of an IS, individuals engage in sensemaking, seeking and interpreting information in order to construct meaning in relation to an IS project (Galliers & Swan, 2000). In doing so, they use interpretive schemes – stocks of knowledge and systems of meaning, based on past experiences and participation in social processes and groups, that help them to interpret and make sense of objects, actions or events (Garnsey, 1993; Orlikowski, 2000; Walsham, 1993, 2002). Individual stocks of knowledge include some knowledge developed in autonomous problem solving, but most is derived from

social stocks of knowledge – “socially distributed inventor[ies] of meanings which function to supply individual systems of orientation in the world” (Luckmann, 2008, p. 286). The understandings, meanings and intentions actors have about an object, action or event, are constantly shaped in response to new knowledge, changing contextual elements, the behaviour of others, and their engagement with existing or new artifacts and technologies (Constantinides & Barrett, 2006). As noted above, Giddens (1984) argues that this is a capacity of knowledgeable human actors, who routinely and reflexively monitor their actions and those of others, as well as social and material aspects of the settings in which these occur.

Interpretive schemes also represent the shared knowledge used to constitute and communicate meaning in human interaction (Orlikowski, 1992). This shared knowledge is not simply the background to interaction but provides the interpretive schemes through which the sharing and sustaining of meanings is enacted in processes of interaction (Garnsey, 1993). Interactions among participants involved in the design and development of an IS involve an iterative process of sensemaking, communication and learning, as they construct, share and synthesise their knowledge and understanding into an emergent IS solution (Gallivan & Keil, 2003; Luna-Reyes et al., 2005; Roberts et al., 2000). Participants in an IS project learn about a problem situation and then plan short-term and partial design goals, “as design problems and goal conceptualizations arise or are discarded” (Gasson, 1999, p. 84). Thus, IS project interactions are both reflective and practical, involving consequential decisions and actions (Engestrom, 2004). In this way, interaction “not only generates solutions for the particular issue but also more general new patterns of activity” (Engestrom, 2004, p. 97). This process can be “unpredictable, with decisions generating unintended consequences that then shape further decisions and actions” (Galliers & Swan, 2000, p. 77). Viewed in this way, IS development is both iterative and emergent. Over time, some degree of congruence in design goals and solutions may emerge as actors achieve a degree of shared understanding and agreement (Gasson, 1999):

The critical processes of design thus become the exploration, representation, sharing, and evolution of partial, emergent design goals and the inductive assessment of when a satisficing solution has been reached. (Gasson, 1999, p. 91)

In the interactive process involved in developing understanding and agreement, actors use a range of communicative behaviours or interactional tactics to facilitate the exchange of information, ideas and meanings (Tan, 1994; Urquhart, 1997). For example, Tan (1994) proposes three key communication behaviours that influence the development of mutual understanding. ‘Managing transaction’ involves the ability to structure, control and maintain a conversation through processes of topic negotiation, turn-taking and so on. ‘Establishing rapport’ is a supportive behaviour that facilitates constructive communication in interpersonal relationships by showing responsiveness, perceptiveness and attentiveness to others. ‘Shifting perspective’ is an

accommodative behaviour that involves 'tuning in' to another person's perspective or viewpoint, According to Tan (1994, p. 163):

The ability to shift to the other person's perspective is important as it allows the individuals to assimilate and integrate information on the other's frame of reference ... It increases flexibility and helps integrate ... [and] bring convergence to the differing viewpoints.

Another strategy for developing understanding, particularly in design processes, is the creation and use of 'transient constructs' (Lanzara, 1999). Transient constructs are temporary constructs that provide some new or plausible meaning in a complex, ambiguous or changing situation (such as the development of a new IS), where the established order and knowledge is disrupted or inadequate. Such constructs introduce new ways of thinking and acting that allow participants in an IS project to find alternative ways to make sense of local events and to overcome cognitive or relational inertia: "Based on them, some actions can be taken, some choices can be made, some changes can be introduced" (Lanzara, 1999, p. 339). Transient constructs can take a range of forms, including material or symbolic objects, metaphors, routines and stories. Makeshift, incomplete and experimental, they serve as transitional carriers of knowledge and meaning before being abandoned and forgotten (or possibly reworked in yet other transient constructs). As Lanzara (1999, p. 342) argues:

We need transient constructs to make sense of the world when sensemaking becomes difficult, because our preexisting framework is lost, unusable, or inappropriate to the situation. They work as 'fixes' to assure some provisional order and meaning, 'pithons' to pull ourselves up on a cliff – perhaps upward to the safest high grounds of more established certainties, always to be re-examined.

While IS development is often conceptualised in principle as the outcome of a consensus on meaning or a shared understanding among actors involved in the IS project (Alvarez, 2002; Avgerou, 2002), consensus is not always necessary for cooperation or the conduct of a project (Star & Griesemer, 1989). Any apparent consensus or shared understanding may be mediated through power relations. Certain actors, such as those with perceived expertise or authority, may introduce particular interpretations that come to dominate the shaping of meaning for others (Gasson, 1999; Lin & Silva, 2005). Less influential actors may withhold or substitute information or interpretations that they perceive as politically or socially unacceptable (Gallivan & Keil, 2003). Further, diverse and conflicting interpretations may occur. Where individuals' interpretive schemes lack congruence on key elements or categories, such that a sufficient degree of shared understandings and expectations is not achieved, interactions in an IS project may be subject to division, difficulties and conflict (Garnsey, 1993; Orlikowski & Gash, 1994; Sawyer, 2001a).

Gasson (1999) argues that an important part of the iterative and emergent process of IS development is the production of artifacts that reflect representations of the design problem and

solution. These design artifacts represent an attempt to materialise a particular meaning or 'translation' of the design problem or solution. The term 'translation' is derived from actor-network theory and refers to the alignment of the interests of different actors through, for example, a 'problematization' or particular interpretation of a problem situation (Callon, 1986; Latour, 1987). While actor-network theory tends to focus on translation as a political process in which influence and power are exercised, the translation of interests can also occur in a less reflective or intentionally political way, such as in the definition of best practices in a procedures manual (Gasson, 2006). In this study, translation is used to describe the ways in which certain actors (individually or collectively) interpret design goals and solutions, which are often materialised in artifacts such as models or project documents that represent a (more or less) negotiated and (temporary) stability of meaning in the IS development trajectory. In practice, such artifacts do not necessarily reflect a consensus on understanding or meaning, as different actors may have more or less influence in their construction. Project participants draw on the meanings attached to commonly used artifacts, such as design representations or models, work procedures, charts, and plans, in performing IS development activities. In this sense, such artifacts can be thought of as 'mediating artifacts' (Constantinides & Barrett, 2006; Gasson, 2006) that stand in for particular viewpoints, representations or interests.

Design artifacts and representations can also be understood as 'boundary objects' that facilitate understanding and interaction between different groups of IS project participants (Gasson, 2006; Luna-Reyes et al., 2005). Boundary objects are objects for enabling cooperation across social worlds or communities of practice. They maintain a common identity across various intersecting communities, but are sufficiently flexible to meet the informational needs of each (Bowker & Star, 1999; Star & Griesemer, 1989):

Such objects have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. (Bowker & Star, 1999, p. 297)

In IS development, artifacts and representations acting as boundary objects enable boundary-spanning knowledge transfer or sharing across different communities (Gasson, 2006; Luna-Reyes et al., 2005). They offer a common focus or reference for the negotiation of interpretation without necessarily enforcing a particular shared meaning among project participants (Constantinides & Barrett, 2006; Sapsed & Salter, 2004). For example, in situations where the emerging IS solution becomes part of the IS development, such as in prototyping or this case study, it acts as a boundary object, facilitating interaction and knowledge sharing between users and developers (Asaro, 2000). Published representations of a solution design may perform a contractual role in the IS project, for instance in defining the problem and solution boundaries (Gasson, 1999). Other examples of boundary objects in IS development include development

tools, which can offer a common schema to facilitate shared understanding between users and developers (Butler & Fitzgerald, 1999a), and project management tools such as status reporting tools or project timelines, which facilitate the temporal coordination of divergent interpretations of project progress (Sapsed & Salter, 2004).

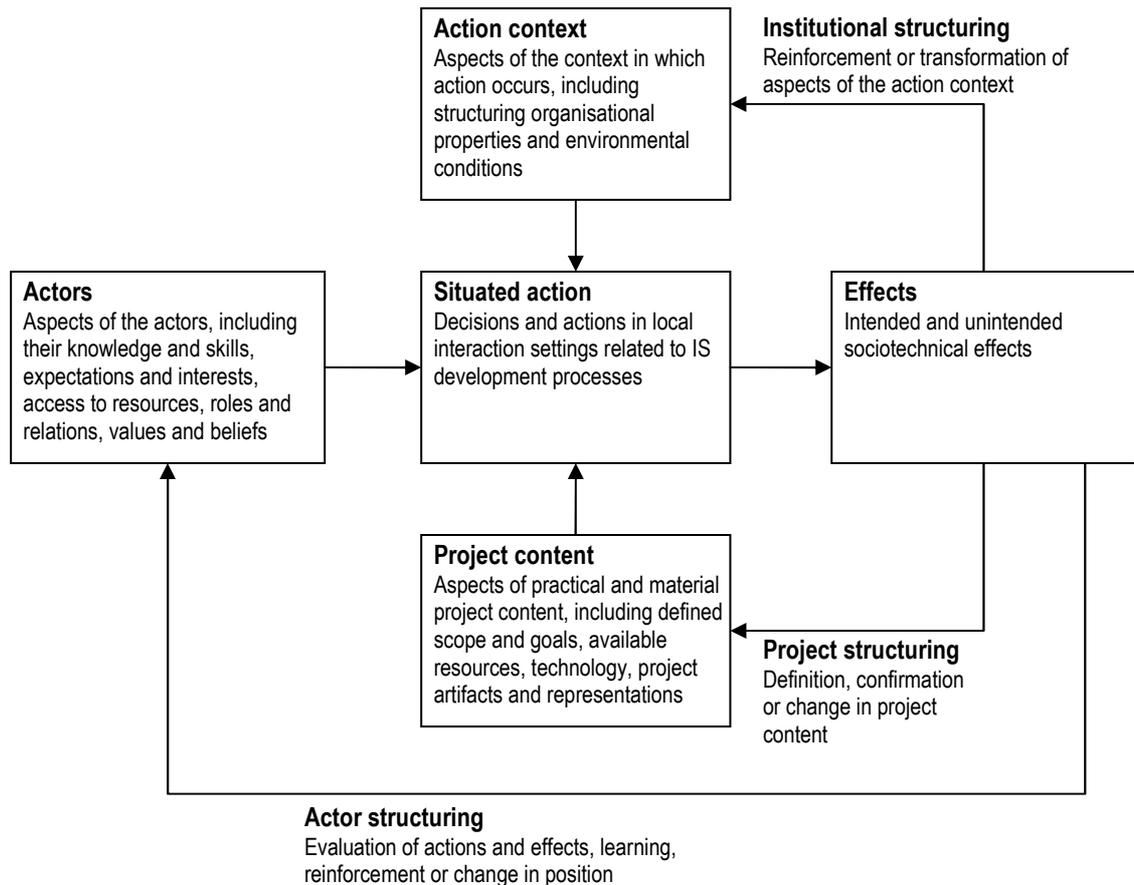
### **5.4.3 A sociotechnical model of IS development as situated action**

This section describes the construction of a model of IS development as situated action, which can be used to assist analysis and interpretation of the longitudinal case study that follows. Fitzgerald (1998b) provides a useful justification for using a conceptual framework or model to guide the research process and analysis. A framework or model maps the territory being investigated (Miles & Huberman, 1984) and facilitates an understanding of the phenomenon of interest. While a model necessarily simplifies the process being modelled, it allows graphical representation of significant elements and helps communicate key ideas and concepts. Fitzgerald suggests that frameworks or models can be derived from theory or prior research, and then refined or modified in light of empirical findings. He emphasises that the framework or model is an analytical device, intended to aid interpretation rather than serve as a deterministic or predictive tool.

The sociotechnical model of IS development as situated action used in this study is presented in Figure 5.1. The model is grounded in a conceptual understanding of IS development as an emergent, multi-dimensional, sociotechnical, situated process involving human action and interaction. Informed by the earlier literature review of influences on IS development (Chapter 3) and the theoretical concepts discussed above, the model was further adapted and refined in the course of analysing the longitudinal case study of IS development. It provides a vehicle both for theorising about and analysing the processes occurring in the case study, and for illustrating the interpretive explanation offered by the analysis.

The form of the model is adapted from a sociological model of actor-system dynamics first proposed by Burns & Flam (1987) and subsequently used in research on socio-technical systems (Geels, 2004) and IS (Kim & Kaplan, 2006). Aspects of the Burns & Flam model are generally consistent with Giddens' (1984) structuration theory, and are used in the model constructed for this study. However, in doing so, the intention is not to replicate the theory of actor-system dynamics underpinning Burns & Flam's model. The model used here also differs in its treatment of context (not separating out 'exogenous factors' from other contextual conditions) and in the introduction of an explicit consideration of material and technological aspects of the project content. The focus is on understanding the micro-level process of IS development rather than the more macro-level structuring of social systems discussed by Burns & Flam.

Figure 5.1: Sociotechnical model of IS development as situated action



The focal point of the model constructed for this study is the *situated action* related to various IS development processes and activities. Organisational actors involved in the work practices and interactions surrounding IS development engage in a process of sense-making, communication and negotiation to develop an emergent IS solution. Various ‘boundary objects’ that reflect shared representations of the design problem and solution help mediate understanding and interaction between different actors involved in the IS project. IS project interactions are both reflective and practical, involving decisions and actions with effects or consequences, whether intended or unintended, that shape future actions.

How people in organisations design, develop and implement an IS “is a function of the material components comprising the artefact, the institutional context in which a technology is developed and used, and the power, knowledge, and interests of human actors” (Orlikowski, 1992, p. 421). The model thus portrays three interrelated dimensions of situated actions related to IS development: the relevant actors involved, the context in which action occurs, and the material content of the IS project. As Asaro (2000, p. 286) notes,

Every design process is thus permeated with issues of value and how these will be decided is contextually dependent on work and process organization, power relations among individuals which implicate expertise, information access, authority, and rhetorical skill, restrictions on time and financial resources, and a myriad of incidental factors, not

the least of which are the actual material capabilities and practical demands of the technology in question.

As knowledgeable *actors*, individuals involved in an IS project routinely and reflexively monitor their actions and those of others, as well as aspects of the local settings and practices in which action and interaction occurs. In doing so, actors draw on individual and shared interpretive schemes that help them to interpret and make sense of objects, actions or events. Individuals act purposefully within defined roles and relationships and with differential access to material and non-material resources. Their knowledge and skills, expectations and interests, values and beliefs also shape their sense-making, decisions and actions.

Actors act and interact within the opportunities and constraints offered by the structural properties of the *action context*. The model incorporates multiple levels of context, including structures and elements of the immediate organisational context as well as wider social, political, economic and cultural environmental conditions, within which the organisation is located. These structures function as 'conditions of possibility' (Knights & Murray, 1994). Actors draw on and mobilise these structuring conditions, interpreting, constructing and reconstructing their meaning, in order to understand, rationalise and legitimate particular courses of action. Particular conditions of possibility that can enable or constrain the course of IS development include formal and informal organisational structures of relations and authority that define divisions of labour and the distribution of available resources; institutionalised norms and rules that constitute organisational culture; established organisational policies and practices relating to IS development; the history of IS development and use in the organisation; industry, market and regulatory conditions; and professional and discipline-based norms, practices and codes of conduct (Knights & Murray, 1994; Orlikowski, 1992).

It is important to note that the structuring conditions of action and interaction represented in the model do not operate in a deterministic way. Social structures exist as 'traces in the mind' (Jones, 1999), a virtual order of rules and resources (Giddens, 1984) that are instantiated and enacted in social practice (Orlikowski, 2000). While such conditions shape and structure what is considered feasible or appropriate action in specific contexts, human actors are agents with the possibility of acting otherwise (Jones, 1999). Further, actors may be subject to multiple, potentially contradictory, social structures in a specific action context (Burns & Flam, 1987). Social systems do not necessarily display a high degree of homogeneity or 'systemness' and may reflect variability and structural contradiction (Giddens, 1984; Walsham, 2002).

Aspects of *project content*, whether technological, practical or strategic, or related to the resources a project attracts, may materially influence the development outcome or be mobilised and drawn upon by actors in their development activities and interactions. For example, the

material capabilities and demands of a given technology (including the hardware, software and data with which an IS is developed and used) shape the range of possible technological solutions that can be developed (Asaro, 2000; Knights & Murray, 1994). The decisions and actions taken in situated action around IS development are also mediated by various development resources, technologies and tools. Their routine use in IS development activities by actors structures action and interaction, enacting particular structural rules and resources (Orlikowski, 2000).

Various project artifacts and representations produced during an IS project function to (temporarily) stabilise translations of problem or solution goals and parameters. For example, a project's scope, goals and objectives, requirements and budgeted resources become defined in various (material and non-material) forms in the course of IS development. Such shared representations offer a common focus or reference point in the negotiation of meaning and action. Actors also construct and draw upon interpretations of project characteristics (such as size or complexity) in rationalising or justifying particular courses of action. Project artifacts and representations, together with development tools or project management tools used in an IS project, can also function as boundary objects, mediating understanding and interaction between different actors and groups by facilitating knowledge sharing, cooperation and coordination.

Situated action and interaction have *effects* in material and non-material domains, which may be both intended and unintended (Burns & Flam, 1987; Giddens, 1984). A situated analysis of IS development recognises that change often emerges from actors' responses to the everyday contingencies and unintended consequences they encounter (Avgerou, 2002; Orlikowski, 1996). These effects have the potential to shape future situated actions through their structuring (either by reproduction or transformation) of material and social aspects of the action context, the actors, or the project content. Such structuring is represented in Figure 5.1 as three feedback loops between the 'effects' and these three dimensions.

In particular, the model draws on structuration theory to understand and conceptualise the reciprocal and recursive relationship between social structure and human agency. For example, as well as being structured by various organisational conditions of possibility, action and interaction in the development and use of an IS can shape elements of the action context by reinforcing or transforming the institutionalised properties and practices of an organisation (Davidson & Chiasson, 2005; Orlikowski, 1992; Orlikowski & Robey, 1991). This latter aspect of recursive structuration is shown in the model as the 'institutional structuring' arrow, and is typically envisaged as operating over long time scales (Geels, 2004), generally longer than an individual project. Situated action and interaction within an IS project is implicated in this longer term structuring through the continued reproduction of practices that reinforce existing structures, but may also introduce the potential for change if actors choose to do otherwise.

Some effects of situated action and interaction may reinforce or produce change in the actors involved in an IS project, including their positions and relationships, and access to resources. This 'actor structuring' (Geels, 2004) also includes the possibility of change as actors actively evaluate the effects of decisions and actions, and learn from them. Effects, either intended or unintended, may also influence the practical and material content of an IS project. 'Project structuring' can result in the definition of aspects of the project content, their subsequent confirmation or adaptation, and in changes in resources and technologies available for development in an IS project. In the model, actor structuring and project structuring are envisaged as operating within the timescale of an IS project, although some structuring effects may have longer term implications.

The model makes an analytical distinction between the actors involved in IS development, the institutionalised rules and structures that shape and guide actors' actions, and the material and technological content of the IS project itself. In practice, all three dimensions are interrelated and constitute a mutually interactive, complex sociotechnical ensemble. For example, various structuring conditions of an action context may influence actors' organisational roles and relationships, or the technological resources available to a project. In the model, such structuring or influence is shown as occurring within the central field of situated action. Similarly, technology can be considered as constituting part of the organisational and environmental conditions of possibility associated with the action context (Knights & Murray, 1994). By analytically separating out the material or technological aspects of project content, the model places an explicit focus on the material dimensions of IS development and the role played by technology itself. Finally, the arrows used in the diagram to connect 'actors', 'action context' and 'project content' with 'situated action' are not intended to represent mechanistic or deterministic causality, but rather to indicate their inclusion in situated sociotechnical action.

## **5.5 Drawing Things Together**

A process approach provides a convenient and appropriate vehicle for conceptualising, analysing, interpreting and theorising about activities that are themselves processes that unfold over time. In this study, a process approach is applied to a longitudinal case study of a particular IS development project in a large New Zealand organisation. As outlined in Section 5.1 above, three particular analytical strategies are used in the process analysis: a detailed narrative, temporal bracketing and visual mapping. In researching historically and contextually situated change processes (such as in IS development), Pettigrew (1990; Pettigrew et al., 2001) calls for a pluralistic approach which incorporates multiple contexts and levels of analysis, a consideration of time and history, the reciprocal interplay between context and actions, and the portrayal of

change as a continuous and multi-faceted process. The process approach adopted in this study meets these four criteria.

First, it incorporates multiple, interlinked levels of context within the sociotechnical model of IS development as situated action (represented by the 'action context' in Figure 5.1). The model conceptualises situated action in IS projects as structured by conditions that extend beyond the focal setting to include the broader organisational context and context beyond organisational borders (Avgerou, 2002; Walsham & Han, 1991). The model is informed by structuration theory, which can be applied across varying levels of analysis, including individual, group, organisation and society (Orlikowski & Robey, 1991; Walsham, 1993). By moving between micro and macro levels of analysis, the model facilitates an understanding of "how macrophenomena are constituted by microinteractions, and how those microinteractions, in turn, are shaped by macro influences and effects" (Schultze & Orlikowski, 2004, p. 88).

Second, IS development is conceptualised here as a trajectory of situated actions and interactions in which a negotiated outcome emerges over time. Temporal bracketing is used to divide the narrative into a number of successive temporal phases or episodes, each of which shares a logical or natural association of activities and is distinguishable from activities in adjacent phases. The sequential relationship between episodes and the way that outcomes emerge over time is discussed in the narrative and visually represented using a 'process chart' (Langley & Truax, 1994) that reveals the temporal interconnectedness of events and episodes over the course of the IS project trajectory.

Third, the process analysis emphasises both context and action. Walsham (1993) emphasises that understanding the process of organisational change around IS development requires a consideration of the dynamic interplay between the two. Structuration theory is used to inform the model of IS development as situated action used in the analysis, allowing for the conceptualisation of a recursive relationship between structure and action. Such an approach represents a "constitutive process perspective" (Garnsey, 1993, p. 241), in which the meaningful interactions of actors continuously constitute (maintain and change) the social systems to which they belong.

Fourth, the holistic and multi-faceted nature of change is addressed by the use of a detailed narrative that explains the activities that occurred over the course of the IS project. The narrative is informed by relevant theory and the findings of prior empirical studies (see Chapter 3), and is complemented by the model of IS development as situated action, which is used to both interpret and visually summarise key actions and effects in each project episode. The model of IS development as situated action used in the analysis avoids a linear and singular explanation of change by focusing on multiple dimensions of situated action and incorporating feedback

processes (Luna-Reyes et al., 2005) that extend the analysis to the consequences of the intended and unintended effects of action and interaction (Nandhakumar & Avison, 1999). As such, the model represents IS development as an emergent and iterative process involving continuous local adaptations and change (Luna-Reyes et al., 2005).

The process approach outlined here is used to interpret the longitudinal case of IS development introduced in the next chapter, and analysed and discussed in Chapters 8 to 10.

# Chapter 6: Case Study Method

## 6.1 Introduction

In order to develop a detailed understanding of IS development in action, an in-depth, longitudinal case study of an IS project was undertaken in a large New Zealand organisation. This chapter describes the case study method used. A brief summary of the characteristics of interpretive case study research is presented, followed by a description of the processes used in selecting the case study site, data collection, and data analysis. Finally, ethical considerations relevant to the case study are discussed.

## 6.2 Case Study Research

Case study research is the study of social phenomena in the context in which they occur.

Yin (2003, p. 13) defines a case study as:

An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

Given that the object of much IS research is the study of IS in organisations, case studies have become a commonly used and legitimate method of inquiry in IS research (Markus & Lee, 1999; Myers, 1997, 2008). As Vickers (1999, p. 266) puts it, in arguing for qualitative research approaches to IS development:

IT is part of the organization along with key elements including people, structure, operating procedures, politics and culture ... - elements that require qualitative, reflexive studies. Only by uncovering the subjective, the earthy and the serendipitous will deeper understanding of the difficulties associated with IT implementation be explored.

Within the IS field, the case study method has been advocated and used by researchers from diverse research traditions, including positivist (e.g. Benbasat et al., 1987; Paré, 2004), interpretivist (e.g. Walsham, 1993, 1995b, 2006) and critical (e.g. Howcroft & Trauth, 2005; Myers & Young, 1997) scholars. Because of the different philosophical assumptions underlying each research tradition, the case study method plays a different role in each research tradition in terms of research design and purpose (Cavaye, 1996; Doolin, 1996; Markus & Lee, 1999; Myers, 1997).

In relation to this PhD study, the researcher's interpretivist worldview had specific consequences for the way in which the case study method was perceived and utilised. In terms of research design, a single, longitudinal case study was adopted, allowing an in-depth and rich understanding of the phenomena of interest (Darke et al., 1998). Such 'thick description' of the characteristics and complexities of the research context is important for IS researchers trying to

interpret the complex interactions around IS, intertwined organisational structures and multiple participant groups (Walsham, 1995b).

A number of authors have argued that detailed, longitudinal case studies are required to explore the complex social and organisational dynamics of IS development (Beynon-Davies, 1995; Cavaye, 1995; Luna-Reyes et al., 2005; Mitev, 2000; Myers, 1994; Sauer, 1993; Walsham, 1993; Westrup, 1993). IS development unfolds within constantly changing contexts and conditions, which are difficult to capture using cross-sectional methods (Heiskanen et al., 2000; Kirsch & Beath, 1996; Wynkoop & Russo, 1995). Pettigrew (1990) also emphasises the complex dynamics of organisational change. He highlights its historically and contextually specific nature, stressing the importance of analysing multiple and interconnected levels of context in producing case studies.

A longitudinal case study enables IS development to be followed as it unfolds, describing events as they occur and accessing participants' interpretations at the time. Such an approach is more likely to reveal alternative or shifting interpretations and the political nature of organisational activities, rather than retrospective rationalisations and legitimised interpretations (Bansler & Bødker, 1993; Franz & Robey, 1984; Howcroft & Wilson, 2003a; Mahmood et al., 2000; Westrup, 1993; Wilson & Howcroft, 2002). A longitudinal case study also lends itself to a "holistic and multifaceted treatment of change" (Pettigrew, 1990, p. 270), which recognises that "multiple and conflicting representations of reality are generated in organizations" (Knights, 1995, p. 247).

The emphasis on studying a phenomenon in its context means that case study research focuses on actual organisational tasks or processes, and involves direct contact and close interaction between the researcher and organisational participants (Doolin, 1996; Nandhakumar & Jones, 1997). Case studies typically involve a range of sources of data, including observation, interviews, documents and archival records, in order to allow an in-depth analysis and contextual understanding of the research setting from multiple perspectives (Cavaye, 1996; Darke et al., 1998; Pettigrew, 1990; Walsham, 2006; Yin, 2003). Analysis of this rich set of data proceeds inductively, moving from field observations to emergent conceptualisations or theorisations (Pettigrew, 1990). Such an inductive process of inquiry involves a continuous, iterative interplay between data collection, interpretation and theorisation (Putnam, 1983; Walsham, 1995b, 2006; Zuboff, 1988), in which the researcher is "immersed in a stream of organizational events in an inductive attempt to create categories that are revised through interaction and integration of data from observed experiences" (Alvarez, 2002, p. 92).

A commonly expressed concern about case studies is the perceived difficulty of generalisation from a single case study (Flyvbjerg, 2006; Yin, 2003). Yin (2003) argues that analytic generalisation (as opposed to statistical generalisation) is the goal of case study

research. Accordingly, case studies “are generalizable to theoretical propositions and not to populations or universes” (Yin, 2003, p. 10). Walsham (1995b) extends Yin’s approach to generalisation, arguing that interpretive case studies can be used to develop theoretical concepts that inform further theoretical development, to generate or refine theoretical frameworks, to draw specific implications from one particular domain that can be useful in understanding similar phenomena in other contexts, and to contribute rich insights or implications on a wide range of issues. Walsham (1995b, p. 79) argues that while such generalisations “are not wholly predictive”, they do provide “explanations of particular phenomena derived from empirical interpretive research in specific IS settings, which may be valuable in the future in other organizations and contexts”. In order to provide convincing explanations of organisational phenomena, interpretive case study accounts need to demonstrate authenticity, plausibility, cogency and credibility (Klein & Myers, 1999; Walsham, 1995b; Walsham & Sahay, 1999).

The case study research approach discussed here was used to guide an interpretive case study of a particular IS development project in a large New Zealand company. The aim was to develop a process model of IS development that focused on action and structure over time, examined the reciprocal relationship between process and context, took into consideration the historical situatedness of IS development and change, and acknowledged the pluralistic nature of organisational participants’ experiences and interpretations (Pettigrew, 1990).

### **6.3 Site Selection**

The 37 respondents to the survey of IS development practice who indicated their willingness to consider participation in an in-depth case study were examined to identify appropriate case study sites. That is, organisations in the Auckland region who reported undertaking significant numbers of large to mid-sized IS projects involving in-house development or customisation, and that typically used some form of user participation and standard method of IS development – both of interest to this PhD research as potential structural influences on IS development. This resulted in a short-list of six potential organisations, who were contacted in turn. The first two respondents contacted declined to participate, one through lack of interest and the other because of concern over the commercial sensitivity of some of their IS projects. The third respondent contacted, the CIO of AlphaCo, a large manufacturing company, agreed to meet to discuss the organisation’s potential involvement in more detail. AlphaCo is a pseudonym, and will be used to refer to the case study organisation throughout this PhD. Similarly, pseudonyms have been used for key individuals, position titles, and organisational units or teams within AlphaCo and other organisations involved in the case study, to preserve confidentiality (as requested by the company).

A series of meetings were conducted with various members of AlphaCo's IS team, in order to negotiate access to the organisation and to identify a suitable IS project that could be observed as it unfolded (Table 6.1).

Table 6.1: Initial meetings with AlphaCo IS staff

Date	Duration (mins)	Meeting with (pseudonym)	Purpose of the meeting
13 Dec 04	60	CIO (Wayne) CIO's assistant	To discuss the nature of the research and negotiate access to AlphaCo
17 Feb 05	60	IS Project Office Manager (Andrew)	To discuss suitable IS projects that could be observed
23 Mar 05	60	IS Commercial Analyst (Claire)	To discuss the nature of the research and the IS project to be followed
26 April 05	20	IS Project Office Analyst (Brenda)	To discuss a confidentiality agreement

At the initial meeting in mid-December 2004, the CIO was supportive of the proposed case study, suggesting that AlphaCo had a "role in society" to play in supporting research. He agreed to raise the matter with Andrew, AlphaCo's IS Project Office Manager, who would be able to identify a list of potential projects to observe. After a two month delay, a meeting was finally secured with Andrew, who gave an overview of how IS projects are executed within AlphaCo and outlined several projects that he thought might be suitable. He agreed to approach the various business owners associated with these projects in order to see who might be receptive to having an external observer on their project. After a further month, Andrew successfully identified a potential project and cooperative business owner, and arranged a meeting between the researcher and Claire, a business analyst with the IS Outsourcing Management (ISOM) team that manages AlphaCo's infrastructure outsourcing. This team was about to commence a project involving the development of a database solution to replace existing financial models used for outsourcing contract management. Claire described the project and discussed the nature of the researcher's requirements with respect to the project. Finally, a meeting was set up with Brenda, an IS Project Office Analyst, to discuss a confidentiality agreement protecting AlphaCo's rights with respect to commercially sensitivity, and which was subsequently signed by the researcher.

#### 6.4 Data Collection

The case study was conducted between June 2005 and July 2007. The intention was to follow the development of the solution, its implementation and initial use 'in action' (Latour, 1987). Field work involved an initial intensive 8-month period of participant observation (June 2005 to January 2006) coinciding with the main project activity, followed by a number of follow-up visits to the field site in subsequent years, as work on the project became more sporadic and some form of closure could be made in terms of actual use of the new solution (Figure 6.1). During this

second, less intensive, period of the project, regular phone and email contact was maintained with the main informants, in order to keep abreast with progress on the project and to coordinate site visits. In total, 558 hours were spent on site within AlphaCo, observing project activities or interviewing staff (Table 6.2).

Figure 6.1: Time spent on site at AlphaCo over the course of the project

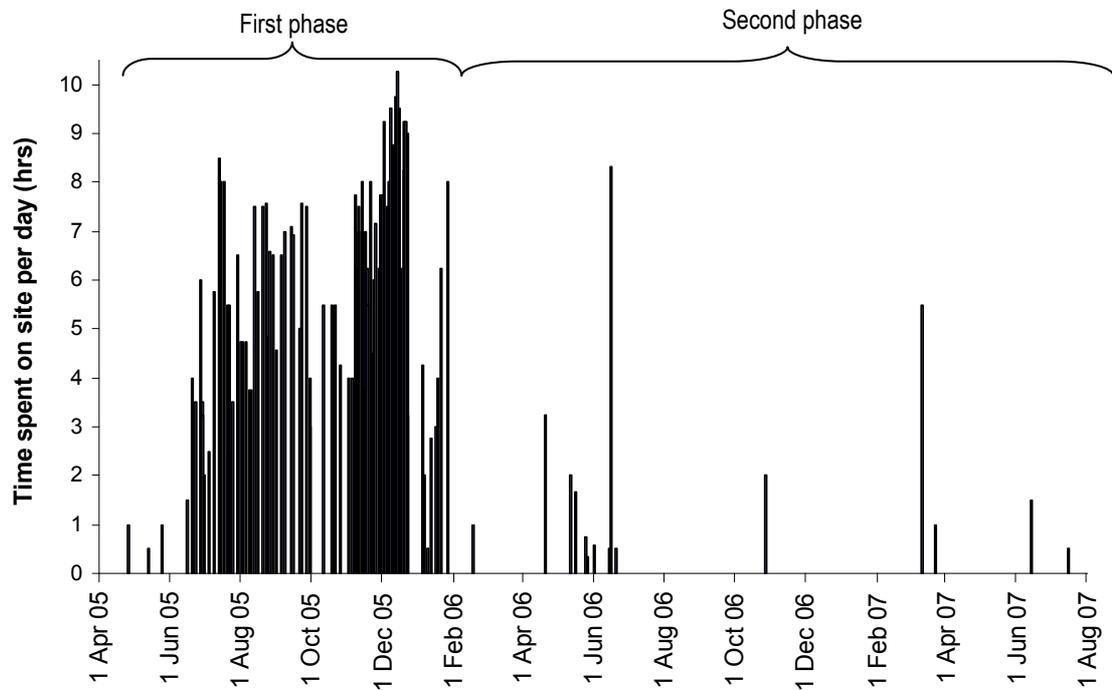


Table 6.2: Researcher’s involvement at AlphaCo

Research activity	Time (hrs)
Observation of project activities	534
Interviews	24
Phone conversations	4
Total	562

Direct observation of project activities was a primary source of data in this study. During the first phase of the project, the kinds of activities observed included various project management activities (done in accordance with AlphaCo’s established processes), in-house preparation of a prototype model for subsequent use by the vendors, preparation and distribution of an RFI, interaction with vendors, product demonstrations, formal selection of a vendor/product, solution development, testing, training, and solution delivery. Subsequent activities observed included project management activities, reconciling the new solution and existing financial models, transfer of the solution to the organisational environment, training, and demonstration and use of the new solution.

In undertaking field observation, two methods of recording observations were used. The primary method was writing detailed notes of what was going on or being discussed, wherever possible using the actors' own words in order to preserve the essence and integrity of what was being said. In total, seven A5 books (each with 200 leaves) of field notes were filled. Audio recordings were also made of a number of activities (with permission), including formal meetings and various informal activities, particularly those involving interactions between the project team from AlphaCo and the developers from SoftCo (a pseudonym), the vendors eventually selected to implement a solution (Table 6.3). Audio recordings provided a comprehensive record of what was said, particularly when more than one participant was involved. In recording project activities, the participants did not appear to temper what they were saying because the session was being recorded. Most audio recordings were transcribed in full; the remainder were listened to and transcribed in part when considered relevant. Comparison of the field notes with transcripts from various taped sessions shows good internal consistency, both in terms of the quality and extent of content that is recorded (Zuboff, 1988).

Table 6.3: Audio-recording of project activities

<b>Research activity</b>	<b>Total time (hrs)</b>	<b>% transcribed in full</b>
Formal meetings	25	76
Informal activities	17	46
Interviews	21	100
Total	63	76

In undertaking this study, the researcher took the role of a participant observer, in the sense that the researcher participated in the actual research setting as much as possible over a prolonged period (Tolich & Davidson, 1999). While this did not (usually) comprise direct participation in functional project activities, it did entail close involvement and familiarity with the team at the centre of the study and their daily practices (Nandhakumar & Jones, 1997). As a participant observer, the researcher developed a close relationship with participants and was not excluded from confidential or sensitive issues, enabling the development of an in-depth 'inside view' on people, issues, events and activities (Walsham, 1995b, 2006). The researcher had a desk co-located with the project team for the first phase of the project, and access to workspace as required for the rest of the time. Her presence and what she was doing were readily accepted by staff at AlphaCo and members of SoftCo. In fact, people at AlphaCo were very supportive of the researcher, often enquiring about the progress of her PhD or whether she had support or access she required.

The researcher interacted on a social level with members of the project team and staff from SoftCo, such as taking coffee breaks or lunch with them, or being included in conversations and jokes. A standard joke was threatening to involve the researcher in some of the project work:

Marie (SoftCo Project Manager): You'll be able to get to her [Laurie] to help do some testing. Frank's got a greater plan for you.

Laurie (the researcher): I don't know the model well enough to do any testing.

Frank (Project Manager): Oh, it's just data validation. (Conversation, 24 November 2005)

Claire (IS Commercial Analyst): Man this must be boring for you. It's boring for me, and I'm doing it ... Aren't you glad you spent years at university to do that?

Laurie (the researcher): [laughs] Yeah." (Conversation, 14 December, 2005)

From the outset, an open and unconstrained approach to data collection was possible. For example, notes were openly written in field notebooks during the observation period as events occurred, and formal meetings, project activities and informal conversations were regularly taped (with permission). At no time was there any need to hide what was being done or to seek "the privacy of the toilets" (Whittle, 2005, p. 1308)! At various points in the fieldwork, explicit reference was made by research participants to the field notes or recordings made. For example, during some of the taped sessions, staff from AlphaCo reminded the researcher that certain commercially sensitive material could not be revealed. In another example, in trying to work out how part of the eventual database solution had been created, Claire commented, "Your notes will probably say it, somewhere, Laurie" (Claire, IS Commercial Analyst, informal conversation, 18 January, 2006). In a relatively light hearted conversation between Claire and Gary from AlphaCo and Marie and Nancy from SoftCo about an error that had been made in the new model, Claire and Marie joked about using the tape recordings made by the researcher for more sinister purposes:

Claire (IS Commercial Analyst): You had to change a couple of things.

Gary (IS Commercial Analyst): The NPV calculation. I don't know what school you went to.

Nancy (SoftCo Senior Developer): Do you know, I wrote that with Frank?

Gary: Did you?

Nancy: Yeah ... [to Laurie] You were there.

Laurie (the researcher): I know nothing about NPV.

Marie (SoftCo Project Manager): I can see your little recordings are going to become interesting.

Claire: Very sought after! (Project meeting, 27 January 2006)

A large number of formal meetings (37) were held over the course of the project. For convenience, these meetings are presented in two tables (Tables 6.4 and 6.5), separated by their timing relative to the engagement of SoftCo as development vendors in November 2005. In total, 36 of these meetings were observed, spanning around 47 hours. Information about the initial

planning meeting between AlphaCo and SoftCo (missed due to unforeseen circumstances) was obtained from discussions with participants and reviewing formal documentation.

Table 6.4: Formal meetings (May – October 2005)

Date	Duration (mins)	Meeting	Present†
13 May 05	30	Interview for external project manager	Claire, Dave, interviewee
25 May 05	60	Interview for external project manager	Claire, Dave, interviewee (Frank)
16 June 05	60	Meeting to define the scope of the project	Frank, Claire, Gary, Harry, James, Dave
23 June 05	120	Training of Frank in the use of Tracking§	Kate, Frank
30 June 05	60	Meeting about aspects of the new model	Frank, Claire
18 July 05	60	Meeting about aspects of the new model	Frank, Claire, Gary
22 July 05 <sup>Ω</sup>	45	Meeting with Vendor1†	AlphaCo: Frank Vendor1: two reps
12 Aug 05 <sup>Ω</sup>	180	Product demonstration from Vendor3†	AlphaCo: Frank, Claire, Gary, Harry, James Vendor3: Jack (rep)
15 Aug 05	120	Meeting with Vendor2†	AlphaCo: Frank Vendor2: one rep
19 Aug 05 <sup>Ω</sup>	60	Meeting to evaluate their options	Frank, Claire, Gary, Dave
22 Aug 05	30	Meeting to discuss options with James	Frank, Claire, James
26 Aug 05	70	Meeting with alternative implementer to discuss implementation of Vendor3's product	AlphaCo: Frank Alternative implementer: one rep
08 Sept 05 <sup>Ω</sup>	40	Conference call Vendor3† about pricing	AlphaCo: Frank, Claire, Dave Vendor3: Jack (rep), one manager
27 Sept 05 <sup>Ω</sup>	90	Product demonstration from SoftCo†	AlphaCo: Frank, Claire, Gary, Dave SoftCo: Leon, Nancy, one other
30 Sept 05 <sup>Ω</sup>	90	Product demonstration from SoftCo†	AlphaCo: Frank, James SoftCo: Leon, Nancy

<sup>Ω</sup> Meeting audio taped  
<sup>§</sup> AlphaCo's project management tracking and reporting tool  
<sup>†</sup> Vendor1, Vendor2, Vendor3 and SoftCo are pseudonyms for vendors who became involved in the case study  
<sup>‡</sup> Organisational position titles of named individuals (pseudonyms) are given in Table 6.6

Another primary source of data was semi-structured interviews (Myers & Newman, 2007). Very early on, one senior IS manager said that staff at AlphaCo were fairly open and that most of them would be prepared to be interviewed as long as the demands on their time were not excessive. This was the researcher's experience. In order to obtain information relevant to the project, all organisational participants with a direct interest in the IS at the centre of this study and/or those who participated in the project itself were interviewed. Other members of AlphaCo's IS function, chosen because of their knowledge and experience (Zuboff, 1988), were also interviewed in order to understand the IS environment within the organisation. The interviews were an important and rich source of data about the project itself, as well as IS practice within both AlphaCo and SoftCo.

Table 6.5 Formal meetings (November 2005 onwards)

Date	Duration (mins)	Meeting	Present <sup>‡</sup>	
			AlphaCo	SoftCo
02 Nov 05 <sup>ψ</sup>	90	Initial planning meeting	Frank, Claire, Gary	Leon, Marie
10 Nov 05 <sup>Ω</sup>	105	Basic training in the use of MDS <sup>§</sup>	Frank, Gary	Marie
10 Nov 05 <sup>Ω</sup>	60	Meeting to discuss the rules in the model	Frank, Gary	Marie, Nancy, Ross, Peter
14 Nov 05 <sup>Ω</sup>	30	Project meeting 1	Frank, Claire, Gary	Marie, Nancy, Ross, Peter
14 Nov 05 <sup>Ω</sup>	120	Basic training in the use of MDS <sup>§</sup>	Frank, Claire, Gary	Marie
16 Nov 05 <sup>Ω</sup>	120	Training in the use of rules in MDS <sup>§</sup>	Frank, Claire, Gary	Ross
21 Nov 05 <sup>Ω</sup>	30	Meeting to revise the project plan	Frank	Nancy, Ross
24 Nov 05 <sup>Ω</sup>	10	Meeting to resolve misunderstanding	Frank	Marie
25 Nov 05 <sup>Ω</sup>	15	Project meeting 2	Frank, Claire, Gary	Marie, Nancy, Ross
28 Nov 05 <sup>Ω</sup>	60	Meeting to discuss requirements for the front-end	Frank, Gary	Nancy, Ross
02 Dec 05 <sup>Ω</sup>	35	Project meeting 3	Frank, Claire, Gary	Marie, Nancy, Ross
07 Dec 05 <sup>Ω</sup>	120	Training in the use of the front-end	Frank, Claire, Gary	Nancy, Ross
09 Dec 05 <sup>Ω</sup>	30	Project meeting 4	Frank, Claire, Gary	Marie, Nancy, Ross
15 Dec 05 <sup>Ω</sup>	60	Project meeting 5	Frank, Gary	Marie, Nancy, Ross
23 Dec 05 <sup>Ω</sup>	30	Project meeting 6	Frank, Claire, Gary	Marie, Nancy, Ross
16 Jan 06 <sup>Ω</sup>	30	Project meeting 7	Claire, Gary	Marie, Nancy
27 Jan 06 <sup>Ω</sup>	30	Project meeting 8	Claire, Gary	Marie, Nancy
26 May 06 <sup>Ω</sup>	15	Conference call about transferring new model onto a networked server	Gary, one other, various staff from InfraCo	Nancy
02 June 06 <sup>Ω</sup>	30	Final project meeting	Claire, Gary	Marie, Nancy, Ross
16 June 06	500	Training in the new model	Gary, Jack	Nancy, Ross
12 Mar 07	210	Training in the new model	Gary, 2 others	Ross
13 June 07 <sup>Ω</sup>	60	Meeting to demonstrate the new model to members of IS Commercial Services and others	Gary, Dave, 3 others	

<sup>Ω</sup> Meeting audio taped  
<sup>ψ</sup> Meeting not observed by researcher  
<sup>§</sup> MDS (a pseudonym) is SoftCo's proprietary application development tool  
<sup>‡</sup> Organisational position titles of named individuals (pseudonyms) are given in Table 6.6

Participants were asked about their organisational role, their involvement or interest in the project, specific aspects of the project that they could comment on, and their experiences of IS practice in their organisation. Where relevant, documented artefacts (such as images contained in official IS documents) were used as the focal point of discussion, so as to minimise the potential for misunderstanding. Some interviewees were interviewed multiple times over the course of the project as new developments or issues emerged. Combining interviews with observation enabled questions to be tailored to the individual experiences of these key informants (Whittle, 2005), in an iterative process of observation and verification (Pettigrew, 1990). Interviews were typically taped (with permission) and transcribed in full. Where taping was not appropriate extensive field notes were made. A total of 34 interviews were conducted, spread over 24 hours (Table 6.6).

Table 6.6: Interviews

Date	Duration (mins)	Interviewee	Pseudonym
26 Apr 05 <sup>Ω</sup>	60	IS Project Office Analyst	Brenda
16 June 05	30	Project Manager	Frank
05 July 05 <sup>Ω</sup>	10	Project Manager	Frank
21 July 05 <sup>Ω</sup>	150	IS Project Office Analyst	Kate
25 July 05 <sup>Ω</sup>	60	IS Process Documentation Repository (ISPDR) Project Manager	-
24 Aug 05 <sup>Ω</sup>	90	IS Performance Reporting Analyst	-
29 Aug 05	30	IS Architecture Manager	-
13 Sept 05	30	IS Commercial Analyst	Gary
13 Sept 05	30	Project Manager	Frank
15 Sept 05	30	ISOM Manager	Dave
22 Sept 05 <sup>Ω</sup>	105	IS Architect for Corporate Services	Harry
18 Oct 05	15	IS Commercial Analyst	Gary
21 Oct 05	30	IS Commercial Analyst	Claire
21 Oct 05 <sup>Ω</sup>	30	Project Manager	Frank
11 Nov 05 <sup>Ω</sup>	45	IS Strategy Analyst	-
12 Dec 05 <sup>Ω</sup>	30	Project Manager	Frank
21 Dec 05 <sup>Ω</sup>	30	SoftCo Project Manager	Marie
21 Dec 05 <sup>Ω</sup>	45	SoftCo Senior Developer	Nancy
22 Dec 05 <sup>Ω</sup>	45	SoftCo Senior Developer	Ross
05 Jan 06 <sup>Ω</sup>	60	IS Commercial Analyst	Gary
20 Jan 06 <sup>Ω</sup>	20	IS Commercial Analyst	Claire
21 Apr 06 <sup>Ω</sup>	30	IS Commercial Analyst	Gary
12 May 06 <sup>Ω</sup>	10	IS Commercial Analyst	Gary
16 May 06 <sup>Ω</sup>	40	IS Project Office Analyst	Brenda
16 May 06 <sup>Ω</sup>	60	IS Project Office Manager	Andrew
25 May 06 <sup>Ω</sup>	45	ISOM Manager	Dave
14 June 06 <sup>Ω</sup>	30	IS Commercial Services Manager	James
20 June 06 <sup>Ω</sup>	30	IS Commercial Analyst	Claire
27 Oct 06 <sup>Ω</sup>	60	IS Commercial Analyst	Gary
12 Mar 07 <sup>Ω</sup>	60	IS Commercial Analyst	Gary
23 Mar 07 <sup>Ω</sup>	30	ISOM Manager	Dave
13 June 07 <sup>Ω</sup>	30	IS Commercial Analyst	Gary
16 July 07 <sup>Ω</sup>	30	IS Commercial Analyst	Gary

<sup>Ω</sup> Interview audio taped

Other data collection techniques were used to supplement the direct observation and interviewing described over. Full access to project-related emails was ensured by inclusion in the project e-mailing list. All project documentation was made available to the researcher through the co-operation of project managers from both AlphaCo and SoftCo. This included project deliverable documents produced as part of AlphaCo's project management processes, progress reports, the RFI and its responses, product information supplied by vendors, the agenda and minutes of project meetings. A range of organisational documents and electronic sources provided a rich source of contextual information, including IS induction manuals, IS strategy

documents, IS policies and organisational project management standards, material contained in the IS process documentation repository, organisational and IS function (re)structure documents and presentations, IT infrastructure outsourcing project documents, the organisational website, staff intranet, internal company magazine, and company annual reports. In addition, over 100 publicly available articles on AlphaCo and its IS function were accessed and reviewed.

## **6.5 Qualitative Data Analysis**

Preliminary data analysis began early in the project and continued during the main period of intensive field work (to the end of January 2006). It entailed repeatedly reviewing the field notes and other documentation available at the time in order to identify themes and issues related to the project. A Microsoft Excel spreadsheet was developed that contained these themes or issues, and a record was kept of whose views had been or needed to be sought. The spreadsheet served as an important resource drawn upon by the researcher to manage data collection from project participants.

After the end of the main data collection period, a more comprehensive, thematic analysis was used to interpret the data collected. The data from the various sources described above (i.e. field notes, audio-taped transcripts, emails, and various project and organisational documentation) was progressively collated into electronic form in Microsoft Word documents. Initially, this data was broadly categorised around the 18 main 'influences' that shape IS development that emerged from the comprehensive literature review presented in Chapter 3, and which formed the basis of the classificatory framework that was developed in that chapter. For ease, each of these influences was contained in a separate document. Each data extract was identified by reference to its source (e.g. the date and page number in a field notebook, or the electronic file from which it came). Where data was considered to be relevant to more than one influence, it was included in multiple locations (Whittle, 2005). Cross-references were made between different influences to reflect and reinforce their inter-relatedness and interaction.

For each influence, the data was read and re-read multiple times, often separated by significant periods of time. It was continually grouped and re-grouped as common themes in the enactment of the project emerged and were compared. This process was informed by the researcher's understanding of IS development and by reference to the relevant literature. As a more detailed understanding of and familiarity with the data was achieved, progressively more detailed categories (based around research participants' own vocabulary) were applied to the data and used to organise it. In this way, the data analysis was an emergent process involving interplay between data interpretation and theory (Putnam, 1983; Walsham, 1995b, 2006). To illustrate the range and depth of categories that could develop around a given influence, a list of

some of the categories that evolved from the data around participants' 'understanding' in relation to the IS development is presented in Table 6.7.

Table 6.7: Categories developed in this project around the notion of 'understanding'

<b>- Conceptions of the project</b>	<b>- Understanding the original models</b>
- As a database solution	+ For all
+ Within AlphaCo	+ For Claire
+ Within SoftCo	+ For Frank
+ Within Vendor1	- For Gary
+ As a tool	- His understanding of the models
+ Building/constructing a solution	- Of the evaluation model
- Configuration	- Of the scorecard model
- Translation	- Source of that understanding
+ Migration of existing model	- Through his involvement in the project
+ Replication of existing model	- Asking questions
<b>- Understanding the process</b>	- Using the model
<b>- Barriers to understanding</b>	- Consequences for the project
- Time/Tight deadline	- From his understanding of evaluation model
- The model itself	- Using the model in MDS
- Access to Claire's original model	- Contributing to others' understanding
- Concerns over not accessing C's model	- Role in testing
- Were SoftCo's concerns justified?	- Contributing to form of emerging model
- Not having all the information at the outset	- Caused things to drag at the end
- Things not 100% defined	- From his understanding of scorecard model
- Coming in late and under-prepared	- Consequences for ongoing use of MDS model
<b>+ Aspects of the model causing difficulty</b>	- From his understanding of evaluation model
+ Understanding scenario copying	- From his understanding of scorecard model
- Resource calculations	- For SoftCo
+ These are complex	- Understanding of the models
+ Getting it right	- Consequences of late/partial understanding
+ Getting it right for Year 2 onwards	- Inefficiencies
<b>+ Understanding the MDS technology</b>	- But model largely the same
<b>- Understanding the emerging model</b>	- Source of that understanding
- The overall model	- What they did not do
- Developing the emerging model	- Project definition
+ Aspects of the model itself & how it is built	- Missing the scoping meeting
<b>+ Misunderstanding</b>	- What they did do instead
	- Using the prototype model
	- Diagrams from Claire
	- Interactions
<p>+ Indicates further detail or sub-categories under the category            - Indicates no further detail under the category</p>	

Being able to manipulate the data electronically (as opposed to using traditional paper-based techniques) was a convenient way of handling, searching and comparing the large volumes of data involved. Co-locating extracts of data from various sources in their entirety (as opposed to single codes) in the same document meant that the researcher revisited the textual context in which the data was situated each time the data was read. The aim of this was to

minimise the possibility of making interpretations based on the data removed from the context in which they occurred. Throughout the data analysis, attempts were made to retain chronological order and temporal relativity of the data, in order to facilitate the subsequent identification and description of episodes within the case study. One technique used was to visually map across elapsed project time critical events and changes in aspects of the project content, context, actors and their interactions, and IS development processes. These visual maps were an important resource in interpreting the case study data and structuring the case description.

In the case analysis and discussion in Chapters 7 to 10, participant quotations are used to illustrate various points. Typically, these have been selected as representative of the views of the participants involved. Where appropriate, unique views are also presented (Zuboff, 1988).

## **6.6 Ethical Considerations**

Ethical approval for this research was sought from the Auckland University of Technology Ethics Committee, and was granted on 18 November 2004. During the course of the field work, as people became involved in the project under study or were interviewed, they were spoken to individually by the researcher about their potential involvement as research participants. At this point, the person was told about the purpose of the research, the nature of any involvement, what measures would be taken to protect their rights as participants (including protection of their identity), and the option to not participate or to withdraw at any stage. Participants were given an information sheet to read detailing this information. All of the individuals spoken to agreed to participate in the research, and they each signed a consent form. In doing so, they acknowledged that they understood what was entailed by their participation and agreed to have various activities audio-taped and used for research purposes. A signed copy of the consent form and information sheet was retained by each participant and by the researcher.

Organisational participants encountered during the case study engaged with the researcher in a very open, genuine and cooperative way. An overriding concern in conducting fieldwork and subsequent data analysis was to treat their contributions with respect and integrity at all times.

## **Chapter 7: Case Study Analysis – Organisational Context**

### **7.1 Introduction**

As noted in Chapter 6, this study focuses on a project to develop a database solution to replace the existing financial models used to manage the InfraCo outsourcing contract by AlphaCo's IS Outsourcing Management (ISOM) team, the IS unit responsible for managing this contract. The main period of activity in this project (from hereon referred to as the ISOM database project) occurred between June 2005 and February 2006, although the project continued to be of interest for the following two years.

The purpose of this chapter is to present and analyse relevant contextual information about the case study organisation, AlphaCo, and its IS practices. This analysis, which represents the 'antecedent conditions' of a process approach, is drawn on in subsequent case study analysis chapters to facilitate an understanding of the events and processes that unfolded during the ISOM database project.

The chapter begins with a brief overview of AlphaCo, a relatively new organisation operating in a competitive global environment. The chapter then discusses the AlphaCo IS function, its structure and role, its evolution as a shared service, and its emergent nature. Established policy and practice related to IS projects within AlphaCo are then discussed, with particular attention given to the documentation of IS policies and processes, IS project management practices, the use of methods, and the participation of users in IS development. Finally, consideration is given to the ISOM team, the organisational unit at the centre this study.

Unless specifically referenced, information in the following sections was derived from publicly available reports or media coverage of AlphaCo, internal company documentation, its intranet and public Website, interviews and observations during fieldwork, and the organisation's response to the survey conducted as part of this PhD (completed by the CIO, Wayne).

### **7.2 Introducing AlphaCo**

AlphaCo is a large, global manufacturer and distributor with operations in over 140 countries, including New Zealand (a market-driven economy), where its head office and a large proportion of its operations are located. At the time of the study, its annual revenue exceeded \$NZ13 billion, and it employed around 17,000 staff, over 60% of these in New Zealand. AlphaCo's core business is segmented into two major, independent divisions that operate under different business models: a manufacturing division, AlphaCo Manufacturing, which is based on a centralised business model, and a consumer products division, AlphaCo Consumer Products,

which is based around a decentralised business model. There are also a number of smaller, subsidiary companies; for example, involved in research and development, and retail.

AlphaCo's organisational vision is to be a global leader in its industry sector. Its primary goal is to maximise shareholders' returns. Because it operates in a technologically innovative industry and in competitive global markets, within AlphaCo there is a strong emphasis on reducing costs, increasing efficiency and competitiveness, and on innovation. Review of AlphaCo's internal documentation suggests that information is regarded as an important asset for organisational decision making. Emphasis has been placed on having accurate, reliable, timely and relevant information. Leveraging IT is regarded as one way to maintain the global competitiveness AlphaCo currently enjoys. Business requirements drive IT investment (not vice versa), with IS within the company being regarded as supporting business strategy and change programmes.

AlphaCo was formed in 2001 from the merger of three existing companies, each with its own systems, processes, and culture. From the outset, the new organisation experienced issues with respect to duplication and even incompatibility of systems and processes (both business and IS), and lack of co-operation between organisational units. In order to reduce duplication (and hence costs) and create a unified organisational culture or identity, AlphaCo has undergone a number of organisational transformations since its formation. The emphasis on a single organisational identity is exemplified through the use of phrases or slogans incorporating "One Company", "One Team" or "One AlphaCo", in relation to various change initiatives.

In order to facilitate the organisational vision and to realise the benefits of the merger, a new business model was introduced into AlphaCo Manufacturing in 2003, aimed at simplifying the supply chain and making it more visible. Over a three year period, an extensive organisational change programme was undertaken, with the objective of creating "One Team, One Way of Working". This entailed establishing common global business processes and implementing an ERP system. As the head of AlphaCo Manufacturing commented, the change was both cultural and operational:

When AlphaCo was created, nothing really changed but for the name ... We needed to radically and fundamentally change how we operated our core business. We needed to go way beyond simply changing systems. We needed to challenge the relevance of everything we had done in the former structure and create an operating model for our business ... We needed to rewire AlphaCo and establish ways of doing things that built trust and collaboration across a business that had been very fragmented and quite distrustful of anything outside our immediate silo. (General Manager AlphaCo Manufacturing, internal publication, September 2005)

Another source of organisational change was associated with the adoption of a shared service model for the delivery of support services (such as human resources, legal services,

finance, and IS) to various organisational divisions. Such services were to be provided by a shared services team, in the newly created Corporate Services division. The extent to which the shared services model was enacted varied between service functions and with time. When shared services were first introduced in 2004, the Consumer Products division retained much of their own backroom support. However, the extent of shared services increased with time. This culminated in the “One AlphaCo” change programme in 2005/2006, when the various support services across the company’s businesses were brought under a single team. Again, the focus was on removing duplication, reducing costs and increasing efficiencies by leveraging shared services across the organisation:

You’ve got the different business pillars, and there might be a bit of shared service down the bottom. But that model, that model’s changing. Now the One AlphaCo view is more now towards a kind of fat shared service layer ... there’s a big drive towards shared services ... Historically, you know, particularly on the Consumer Products side, they were running like a federated business model; they were autonomous business units ... They’d do their own thing. And now we’re under One AlphaCo, the opportunity is for everyone to leverage common components of the organisation and to get benefits across the organisation that we couldn’t have before, because there wasn’t transparency and visibility of what was happening. (Harry, IS Architect, interview, 23 September 2005)

From the outset, duplication and/or incompatibility of systems and data were seen as impediments to being able to implement rapid business change in AlphaCo. For example, in 2003 AlphaCo’s CEO publicly described its IT systems as “a weak link”. AlphaCo’s original CIO likened the company in its early days to Noah’s ark with “two of everything”. Since AlphaCo’s formation, there seems to have been a consistent and active focus on integrating and rationalising IT infrastructure, personnel, applications, systems, processes, and suppliers across the company, in order to reduce complexity, costs and redundancy. The stated intention was to break down information “silos”, reduce reliance upon individuals for data or processes, create a common operating environment and, in the words of the CIO, establish “one version of the truth”. In particular, two major strategic initiatives (originating from AlphaCo Manufacturing division’s IS function) were undertaken to outsource “non-core” IS infrastructure and services, while retaining added-value IS activities within the company.

First, AlphaCo adopted a “utility vision” for its IT infrastructure, which envisaged this being delivered as an effective and integrated global utility. In conjunction with external consultants, AlphaCo undertook a detailed project to evaluate its infrastructure sourcing options. This resulted in the selection of an outsourcing partner and, in December 2003, AlphaCo signed a seven-year contract with InfraCo, a global IT infrastructure provider, for the provision of desktop, server and network services across AlphaCo, on a per-user basis. The contract became operational in March 2004 and, in December 2006, was extended for a further period.

Outsourcing of IT infrastructure was underpinned by a number of key objectives, such as improving service quality and business integration, reducing costs (through economies of scale, removing duplication and leveraging InfraCo's existing infrastructure, experience and expertise). The rationale behind the outsourcing was to reduce business risk and enable AlphaCo to focus on its core business:

We've outsourced the infrastructure because that wasn't our core business. So we don't want to manage putting in services and stuff. We want to buy services, lower the risk, buy services as per user basis, and they can worry about how they're going to supply it all. We don't care. We're just going to buy it. So that reduces the risk and all that. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

Subsequently, AlphaCo adopted a similar approach to outsourcing its IS applications development and support. The original intention had been to commence the evaluation exercise for this in the year following the IT infrastructure outsourcing. However, this was postponed when it was realised how much effort the infrastructure outsourcing had entailed. Consequently, after evaluating its sourcing options, AlphaCo signed a contract for the delivery of applications development and support with an external provider in 2007.

The practice of outsourcing non-core business services, such as IT infrastructure and IS applications development and support, reflects the wider circulation in business more generally of industry 'best practices' based on focusing on a business's 'core competencies' and the 'strategic outsourcing' of other activities (Prahalad & Hamel, 1990; Quinn & Hilmer, 1994; Slaughter & Ang, 1996). As one staff member put it:

It's the whole idea of outsourcing - no matter what you are outsourcing - it's the principles of what is your business's core business. So AlphaCo can say 'Well, our core business is taking [raw material], turning it into things and selling it. So therefore what do we need to do? Do we need to own all that IS infrastructure to do that? No'. And that's just common business principles that, and all those ... it's just all those influences of trends, and trends that do go through cycles of life. Yeah, AlphaCo's certainly participating in those. (Dave, ISOM Manager, interview, 25 May 2006)

### **7.3 AlphaCo IS**

The size and nature of AlphaCo IS, the organisational unit responsible for IS governance and service delivery responsibilities across AlphaCo, have changed over time as a consequence of multiple organisational restructurings. In particular, the outsourcing of IT infrastructure services in 2004 caused a significant reduction in the number of IS staff employed by AlphaCo IS. Since 2005, the IS function has consistently employed over 200 staff, many of these distributed in various organisational units within AlphaCo.

This section provides an overview of the structure and function of the teams within AlphaCo IS. It then considers the evolution of AlphaCo IS, in both practical terms through the enactment of a shared service model, and conceptual terms as an emergent organisation.

### 7.3.1 The organisation of IS within AlphaCo

At the time of AlphaCo's formation in October 2001, three separate and distinct IS functions were created, each with its own governance and service delivery responsibilities: a small corporate IS function, and an IS function in each of the Manufacturing and Consumer Products divisions. In December 2002, the first two of these merged into one IS function, under the leadership of an overall CIO for AlphaCo. The Consumer Products division continued with its own CIO. With the adoption of the shared service model, a company-wide IS function, AlphaCo IS, was created in May 2004 under a single CIO (Wayne), with the departure of Consumer Products' CIO. However, the decentralised nature of the various companies within the Consumer Products division (whose IS functions reported directly to their own management and only indirectly to Consumer Products IS) meant that any change in IS governance and strategies was gradual. As one IS staff member put it:

Manufacturing has a centralised model in terms of management governance. Consumer Products has a federated model because we don't own every single entity of Consumer Products ... they are driven by different drivers, so they don't see the value of being part of the centralised model. (Brenda, IS Project Office Analyst, 24 April 2005)

Consequently, the various aspects of the structure, function and processes of AlphaCo IS that are discussed in this thesis relate largely to those operating with respect to AlphaCo Manufacturing, rather than those in the Consumer Products division.

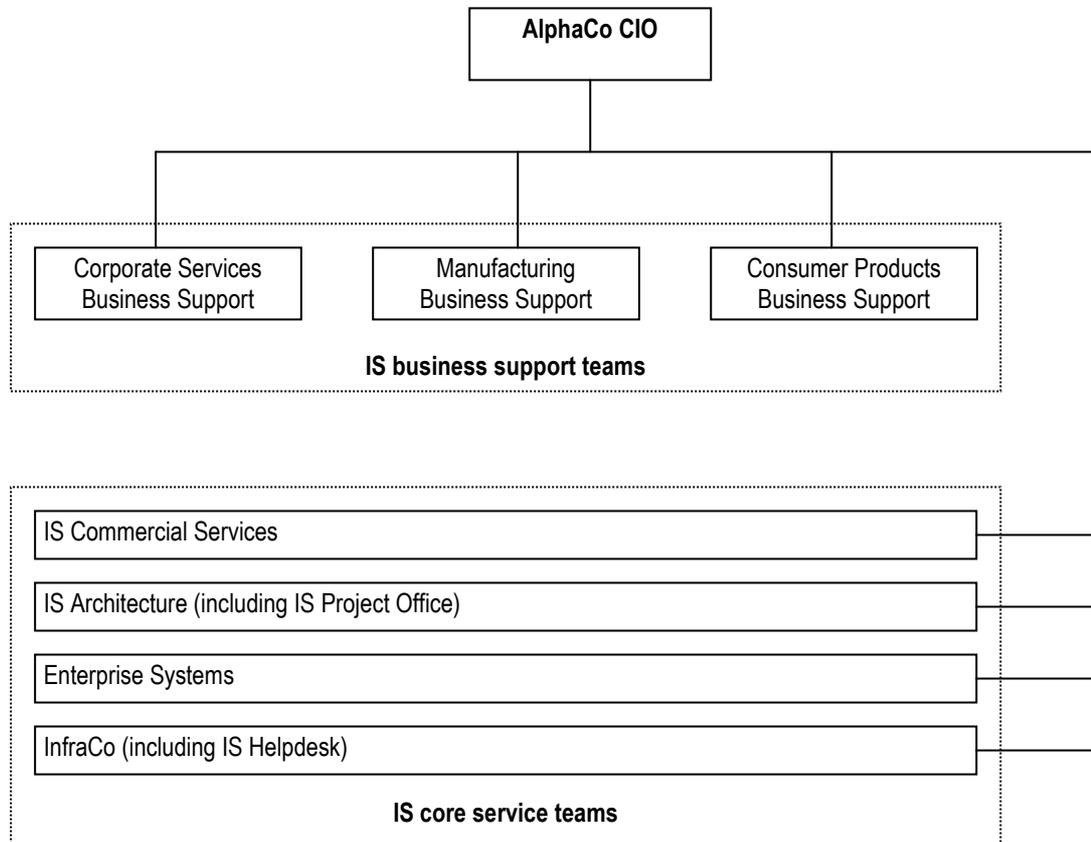
With the creation of AlphaCo IS, a new organisational structure was introduced (Figure 7.1). The various teams within AlphaCo IS can be loosely grouped into business support and core services teams, forming a matrix structure for IS services:

The business support teams are aligned to the business ... but the other four [core services] are aligned across the business functions, because we all look at it right across [AlphaCo]. We don't make a definition between this area and that area. We'll look at it right across and provide a service right across the other business areas. And doing it like that means that we got a pretty good hold on the robust structure that makes sure that very little falls through the gaps. They still do though, but we try our best. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

*IS business support teams* provide IS operational support to the various organisational divisions (their "business customers"). Each team supports a specific division, with whom they are aligned and co-located. For example, the Corporate Services Business Support team provides IS operational support to the Corporate Services division, including shared services such as AlphaCo IS itself. *IS core service teams* provide centrally managed IS services across AlphaCo's divisions. These teams include IS Commercial Services, IS Architecture, Enterprise Systems (responsible for AlphaCo's enterprise-wide applications) and the outsourced infrastructure with InfraCo. The manager of each IS team belongs to the IS management team, which reports to the

CIO. While minor changes were made to this organisational structure between 2004 and early 2006 (e.g. the number of business support and/or core service teams varied), these had no material effect on this study.

Figure 7.1: The teams within AlphaCo IS



For the delivery of services to its business customers, AlphaCo IS uses an engagement model (officially endorsed by AlphaCo's senior management in 2004) to define the points of interaction between an AlphaCo business unit and the various IS teams. This model covers all IS services, including project delivery. In general, the main points of contact for business customers are with the IS Helpdesk for operational support requests and the relevant IS business support team for all other services. For project delivery, the points of interaction are project-specific, depending on the services being provided by IS. These are usually defined in the relevant project documentation. Project teams are made up from staff within parts of AlphaCo IS, the relevant business and external resources, as appropriate.

The core service functions encountered during this study included strategic oversight provided by IS Architecture, project management support provided by the IS Project Office, vendor management provided by IS Commercial Services, and infrastructural services provided by InfraCo. Each of these units will be discussed in turn.

The *IS Architecture* team have strategic oversight for the various applications used within AlphaCo, including the implementation of IS strategy through the development of two to five-year architecture and application roadmaps. Part of this role entails ensuring that any new application being considered for use within AlphaCo accords with these roadmaps by, for example, involving IS architects in any IS project. There is an IS architect to support each IS business support team:

We've got our own objectives and tasks around keeping the strategy alive and keeping that refreshed and relevant. When it comes to actual project work, it's more architecture to the extent that we want to position the requirement to understand where it fits roughly in terms of like packaged versus custom, or trying to understand the governance model - who the necessary stakeholders might be, so that we can be sure that our strategy is being implemented ... So, as I say, where we tend to get involved, to make sure strategy is being implemented, is at the front end of the project. And being the sort of organisation that we are, and the way we choose to achieve our objectives, our influence is mainly during procurement and vendor selection, those types of processes. (Harry, IS Architect, interview, 23 September 2005)

The *IS Project Office* provides administrative support for the formal IS project management processes, and undertakes project management process improvement. It performs portfolio reporting to the CIO and his management team on all active IS projects, based on the monthly progress reports prepared by the project managers. This provides individual IS managers with visibility of what is happening with projects in the areas under their control. These projects are often delivering business applications but have a large IS component to them, so that funding for them is through an IS controlled budget:

The IS Project Office essentially, was set up to do oversight reporting functions across ... [the] forty, fifty million dollars worth of projects in IS each year, that are not big system transformation programmes ... Each of the projects are usually sponsored and managed through the various IS management team members ... The IS Project Office function was to sit across the top of that to ensure that there were some basic compliance, in terms of reporting, in terms of financial control and tracking, in terms of quality assurance. So, really focused on time and budget. The visibility was to be for the IS management team ... They needed some visibility of what was happening across their resources ... We put together a programme portfolio or a project portfolio dashboard. We did the monthly reporting on that. (Andrew, IS Project Office Manager, interview, 16 May 2006)

The IS Project Office also provides various forms of project management support to IS projects, including sourcing external project managers and training them in AlphaCo project management processes and practices, following up on progress reporting and assisting with reporting issues, and project financial administration:

I suppose you could call it project support, because we have to maintain a certain level of consistency in the project delivery. And given we have about between forty-five to fifty-five active projects every month, some of them aren't exactly consistent to how we'd like it run. So, we do a lot of, I suppose, holding hands and maybe driving, herding them in the right direction, that sort of stuff. (Brenda, IS Project Office Analyst, interview, 16 May 2006)

*IS Commercial Services* are responsible for vendor, contract and commercial management (including that of any outsourcing partners) in general. More specifically, in relation to project delivery, *IS Commercial Services* are involved in capital planning and business case review, *IS* tendering processes, and in vendor evaluation, negotiations and engagement:

We've got some ... RFI [Request for Information], RFP [Request for Proposal] tendering-type processes and the sort of steps and outcomes you'd expect to see ... You want to engage *IS Commercial Services*, so they can strike a good deal, and make sure the vendor's solid, and all those sorts of things. (Harry, *IS Architect*, interview, 23 September 2005)

The *ISOM* team, responsible for commercial aspects of the *InfraCo* outsourcing contract and the owners of the *IS* project followed in this study, are part of *IS Commercial Services* (see Section 7.5 below).

Within *AlphaCo*, IT infrastructural support and services are provided by the external provider, *InfraCo*. To all intents and purposes "from an *IS* perspective, *InfraCo* is just one team of *IS*" (Kate, *IS Project Office Analyst*, interview, 21 July 2005). In the first instance, any requests for infrastructure go through *IS Helpdesk*, which is operated by *InfraCo*.

[In terms of] the infrastructure, *InfraCo* need to be aware of [a project] because, 'This new wonderful application that they want to put in, is it going to run on the boxes that we've got? Do we then need to get a new box?' That sort of thing. (Kate, *IS Project Office Analyst*, interview, 21 July 2005)

### **7.3.2 Enacting *IS* as a shared service**

As CIO of both *AlphaCo IS* and the *IS* function that preceded it, Wayne was effectively CIO of *AlphaCo* from December 2003 until when he left (of his own accord) in March 2005. During this time, he established the foundation for *IS* as a shared service within *AlphaCo*. His focus was on standardising, rationalising and consolidating the various legacy systems, applications and processes inherited from the organisations from which *AlphaCo* had been formed. In particular, two major IT initiatives undertaken were the IT infrastructure outsourcing to *InfraCo* and the implementation of an ERP system in *AlphaCo Manufacturing* in 2003.

In March 2005, Edward replaced Wayne as *AlphaCo CIO*. His role was perceived within *AlphaCo IS* as bringing a greater strategic and business focus, along with greater financial discipline, to the *IS* function:

The old CIO was an IT-type CIO, who had a very much more laid back, 'Let's get it done, find the best way', kind of thing. Whereas the new CIO's more, more financial based, I guess, and he cares a bit more about the numbers and making sure things are value for money and things like that. So, yeah, so, it's a bit of a paradigm shift. (Gary, *IS Commercial Analyst*, interview, 5 January 2006)

Under Edward, the shared services philosophy became more entrenched. Immediately after his appointment, he set about updating the vision for *AlphaCo IS*, to reflect a greater

emphasis on IS as a shared service. The new vision, “Leading IS ... aligned, enabling and agile”, directly supported the organisational vision on which it was based. Senior IS staff were directly involved in creating the new vision, which was subsequently communicated to the rest of AlphaCo IS as part of a road show by Edward:

When we had a new CIO come in, one of the first things he did was, ‘I want to change the vision’ ... We managed to go through and identify and do kind of a workshop, white board session around where we want to take IS or what we see IS being. We then took all the content off that and the input from the greater IS forum of about seventy people ... and then we massaged it into a vision and then we presented this as our vision. So that’s, that was really, really positive and very good. And very good for Edward as well, in the sense that he was able to deliver a refreshed IS vision that everyone, or at least seventy people, could feel that they owned and had contributed to” (IS Strategy Analyst, interview, 11 October 2005)

The new IS vision frequently appeared in various AlphaCo IS documentation such as IS strategy documents, the IS balanced scorecard, in the header of IS PowerPoint presentations, and as part of the electronic signature at the bottom of IS employee emails. Parts of the vision were often mobilised by IS staff in talking about various IS initiatives or the organisational role of the IS function:

The vision is especially, I think, lived more and more. I mean we try to brand it. We try to put it across on every email. And quite often when you hear people talking, you know, if we want to recite anything back, ‘Well, is it making us more aligned with the business?’, ‘Is it enabling the business?’ you know, and ‘Are we becoming more agile to be able to support the business as well?’ ... The vision itself, is becoming - there’s a great deal of ownership in IS. Far more so than the previous one, and it’s good, very positive. (IS Strategy Analyst, interview, 11 October 2005)

One of the challenges that we do have is that we need AlphaCo as a whole ... to realise that we need IS to provide an enabling platform for AlphaCo itself to be competitive ... And not only that, now we’ve got a future strategic vision where we recognise we also need to be agile as well. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

The application of terms such as ‘alignment’ and ‘agility’ in relation to IS and IT (such as in strategic alignment of IT and business or the role of IT in enabling enterprise agility) has become prevalent in the academic literature (e.g. Chang, 2006; Overby et al., 2006; van Oosterhout et al., 2006), as well as within organisations in New Zealand and worldwide (e.g. InfraCo, AlphaCo’s external IT infrastructure provider). Such terms were being used within AlphaCo IS prior to the creation of the new IS vision (e.g. in official documents related to the IT infrastructure outsourcing).

At the instigation of Edward and his IS management team, a major transformation of AlphaCo IS, called “One AlphaCo IS”, was undertaken in the first half of 2006, which “broadened [the] scope and depth of services to business units” and “transform[ed] IS to meet the AlphaCo shared services mandate” (IS strategy document, 2005). The reorganisation was aimed at

accomplishing the IS vision (“aligned, enabling and agile”) while buffering the IS organisation against future organisational changes. It also aimed to reduce costs by simplifying and standardising services. The reorganisation also brought Consumer Products IS further within the scope of AlphaCo IS.

The new structure was intended to enable IS to better serve AlphaCo’s businesses (which had undergone, and were continuing to undergo, rapid changes) by being more aligned to, focused on, and involved in them. IS became a single “global” service, in which the “One AlphaCo IS” branding was an attempt “to shift the perception overseas that IS is New Zealand-focused, to being globally focused” across the entire organisation (IS Commercial Services team member, informal conversation, 16 November, 2005). The new structure was more hierarchical, with fewer IS managers reporting directly to the CIO. The various IS teams changed in composition (some reduced in size, some disappeared and new ones emerged), focus and roles. For example, the ISOM team, which had previously largely focused on managing the InfraCo outsourcing contract, was down-sized, renamed and made responsible for all commercial activities across AlphaCo IS.

In March 2006, Edward moved on to another role within AlphaCo, and was replaced by Ian. Under Ian’s leadership, the “One AlphaCo IS” restructuring continued through to completion, and the timeframe of InfraCo outsourcing contract was extended. In 2007, a contract was signed with an external provider for the delivery of applications development and management services within AlphaCo. This resulted in another major reorganisation of AlphaCo IS to align it with the external provider. As a consequence, Ian moved onto another role and yet another CIO was appointed in August 2007.

From the outset, members of the AlphaCo IS (both collectively and individually) embraced the shared service philosophy. They perceived AlphaCo IS, and their own role within it, to be the provider of IS services across AlphaCo (in a timely and cost-effective manner). The following quotes illustrate the way in which AlphaCo IS staff often reproduced the official position outlined in the IS strategy documentation: “[Our] sole purpose for being is for our business to win. IS does IS. Business does business. IS partners with the business” (IS strategy document, 2005):

The business pays for it and we provide the service for them ... that’s part of being a service to the business ... because while the business is driving the project, it touches those points within IS ... and that’s where we’re a shared service, because we do touch on the all those points. (Kate, IS Project Office Analyst, interview, 21 July 2005)

IS is a shared service ... we can assist the business to add value to the operation by, in a timely fashion, delivering the IS technology they need to make the business changes. (Harry, IS Architect, interview, 23 September 2005)

IS is all about delivery to the business, to keep the business going. So, it’s not that IS comes up with something, ‘Let’s deploy that’, and force it on the business. It’s always the other way around. (Dave, ISOM Manager, interview, 25 May, 2006)

Such attitudes reflect the commonly-held view of IS not being AlphaCo's core business, which was often voiced by individual IS staff members, and was the official position adopted in relation to the outsourcing of non-core IS services mentioned earlier.

Related to the shared services philosophy was the notion of business ownership of the IS projects managed by the IS Project Office. IS staff from the CIO down emphasised that in general such projects were business projects that were being done in response to a need identified within one of AlphaCo's divisions. They acknowledged that, although IS as a shared service played an important role in these projects, they were ultimately owned by the business itself:

The very first time I stood up and said, 'There are no such things as IS projects. There are only business projects' ... The reason you're doing things is because you're doing it for business. And there needs to be a business benefit, business payback. So, and that's the philosophy that's been around AlphaCo ever since I've been here, that we were trying to, to push out to the business, is to get them to realise that, 'IS is just a service. You know, it's an enabler and, you know, we wouldn't do anything unless you needed it to be done' ... As I said, you don't spend a cent on IS unless you have a business benefit for it. (Andrew, IS Project Office Manager, 16 May 2006).

I think obviously business users should be driving most of the things we do in IS ... a lot of the projects are driven from the business, yeah, business driven. (Gary, IS Commercial Analyst, interview, 5 January 2006)

Initially, achieving business ownership of IS-related initiatives was problematic. In his survey response, in 2004, Wayne (CIO at the time) identified the need for "continuous improvement in user ownership" as an ongoing endeavour for AlphaCo IS. He also spoke of difficulties in achieving business ownership (Wayne, CIO, meeting to negotiate access to AlphaCo, 13 December 2004). Over time, increasing business ownership was actively pursued. In 2006, the then CIO, Ian, publicly spoke about having achieved greater business ownership and governance of IS-based projects through a cultural change in the way that these projects are talked about within AlphaCo – as business projects, rather than IT projects. The following quote illustrates both the promulgation of the business ownership concept and its relationship to the notion of shared services:

They're driving it [greater business ownership] really hard. And what it is, is that we are not going to do anything unless the business wants to do it ... So, they are driving it even harder ... because we're a service provider. We don't go around doing things [laughs] unless they want us to do things. (Brenda, IS Project Office Analyst, interview, 16 May 2006)

### **7.3.3 An emergent IS organisation**

In many respects, the AlphaCo organisation in general, and AlphaCo IS organisation more specifically, can be regarded as 'emergent' (Truex et al., 1999), in that "adaptation and flexibility [are seen] as a dominant feature of the organizational landscape" (Truex et al., 2000, p.

76). The various organisational transformations that occurred in AlphaCo were rationalised by senior management as being in response to meeting the challenges of its organisational environment, and necessary to achieve the organisation's vision and goals:

We understand and accept the need for continuous change ... these things suggest a positive momentum in terms of building a culture and an organisation to achieve our vision. (CEO, internal publication, 2004)

A similar situation existed in AlphaCo IS with respect to its reorganisation into a global, shared service that was at least partially buffered against future organisational changes. At various times, the IS organisation was described by IS staff as "organic" or "continuously changing", with the level of change often referred to as "massive". Organisational change came to be an accepted part of the organisational culture:

AlphaCo's supposed to have quite a distinct culture, a culture of 'change' and 'nothing stands still' and 'just constantly evolving'. Because we're having yet other restructuring in the next few weeks and no one seems very surprised about it. So, yeah, I think it does have quite a crazy culture. (Gary, IS Commercial Analyst, interview, 05 January 2006)

The extensive organisational changes experienced by AlphaCo were regarded as a natural consequence of its large size and relatively recent origin in a merger of three organisations. For example, one IS staff member portrayed AlphaCo's history of change as a progression – from consolidation, through specialisation, to agility – as the result of its large size and complexity (more like an elephant than a single-celled amoeba!):

We're talking about three separate organisations that decided to come together for critical mass, right. But it's a bit like a cell amoeba and an elephant. If you're going to put in place something huge like an elephant, you kind of need the alimentary canal. You need the brain. You need the blood network system. You know, everything to make it alive and going ... So when you've got something this big you need some sort of order amongst the chaos ... We started with consolidation. Then it went on to specialisation. And it went on further to the bit ... where we recognise we also need to be agile. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

Another IS staff member used a 'tanker' metaphor to explain that AlphaCo's large size meant any change had necessarily been slow and well-planned:

AlphaCo's a big company. I liken it to a ship ... In terms of turning or changing direction of where you're going, a big ship is going to take a lot longer to turn a corner than a tiny little dinghy, where you can just, you know, a small business, where you can just, make these decisions really quickly. Zip here, zip there. And that's just an analogy that I think works for the company. (Kate, IS Project Office Analyst, interview, 21 July 2005)

IS strategy documents depicted the progression of the IS organisation through the various organisational changes as the "IS maturity journey", from the original "IT aligned" "silos" in 2003 to potentially a "fully commercialised", "customer aligned" shared service (IS strategy document, 2005), including the adoption of commercial disciplines and practices:

The final step of any shared service model is commercialisation ... So, in theory, what that means is, I think, we've got all those disciplines of a commercialised organisation, all those procedures and tools in place, so people can see what they're paying for. They can see their costs ... And, you know, I'm actually just repeating what [the CFO] told us the other day. The CFO came down, and he said, 'Look, we've got to get to the point where all those things are transparent, so we can drive the right behaviours'. (Harry, IS Architect, interview, 23 September 2005)

The first stage in the IS maturity journey entailed the development of standard processes across AlphaCo IS. While the importance of having standard processes to achieving operational excellence (an organisational value) has always been recognised within AlphaCo and its various IS functions, IS processes at the formation of the company were considered problematic. For example, within AlphaCo Manufacturing IS, in early 2003, IS processes were evaluated (with the help of external consultants) as being immature, with a CMM (Capability Maturity Model) process maturity of level 1. A major (ongoing) process improvement initiative was undertaken to develop the IS process maturity to a more suitable level of 3.5 in order to achieve the desired level of operational performance, perceived in terms of efficient, effective, standard, global processes (IS strategy documents, 2003, 2004, 2005).

This is a journey. We've defined the framework, and we've defined what we are or who owns it, what the framework is. We're defining the processes, and we're focusing on the higher priority processes before others. And then we'll start doing compliance testing and driving out compliance to process and getting to that point of the vision of being operationally excellent within IS. And that's where we want to go. So, I mean, there's still work to be done. (IS Strategy Analyst, interview, 11 October 2005)

Various IS staff members referred to the lack of maturity of the IS function and its processes.

It's probably conspicuously less mature than other places where I've worked. For what is in fact, quite a big IS shop, it doesn't have very much at all in the way of what I consider a very, very basic process, which is a bit alarming. (ISPDR Project Manager, interview, 25 July 2005)

Certainly some of the things that I would have seen, or have seen, have suggested that change, finding our identity and that whole change process, had meant that some of the things were let slip, which you might expect a mature organisation to have systems and controls in place to manage. (IS Performance Reporting Analyst, interview, 24 August 2005)

More specifically, members of the IS Project Office (particularly early on in the study) spoke about the lack of maturity in project management processes within AlphaCo IS:

We've come a long way in the last two years with project management. From a process perspective, we've got a long way to go to get maturity levels. We're not a mature project management company. (Kate, IS Project Office Analyst, informal conversation, 23 June 2005)

When this [ISOM database] project started, the maturity of the project management environment within AlphaCo IS, was middling. It wasn't, I wouldn't call it mature. (Brenda, IS Project Office Analyst, interview, 16 May 2006)

## **7.4 Established Policy and Practice**

Organisational policy and established IS practices are potential influences on the course and outcome of an IS project. They can enable or constrain individuals' actions by enforcing organisational rules or norms of what constitutes appropriate or acceptable behaviour (Butler, 2003). This section outlines the forms of policies and documented processes that exist within AlphaCo IS, as well as describing established practices related to IS development and acquisition, project management, the use of methods and the participation of users in IS development.

### **7.4.1 IS policy**

AlphaCo IS utilises a multi-layer policy framework, based on the COBIT (Control Objectives for Information Technology) framework, which it adopted in 2004. This framework incorporates organisational policies (e.g. around security, risk management etc), IS codes of practice, IS standards, and (at the lowest level) IS processes, guidelines, templates, and tools.

There was some work done a year, a year and a half ago to develop a policy framework for IS, as a result of which they selected COBIT... Following on from that, they wanted to make sure that we have policies and procedures and processes and stuff in place to support that framework ... So I guess in as much as COBIT has policy statements, those are the IS policies in those areas. (ISPDR project manager, interview, 25 July 2005)

A number policy documents (variously called policy, principle or charter documents) exist that set out the official position on particular aspects of IS practice at AlphaCo. For example, the "Customer Engagement Principle" outlines the model for engagement between AlphaCo IS and its business customers. Similarly, the "Requirements Management Principle" governs requirements identification and management for business problems or requests.

AlphaCo IS also utilises a set of operational principles to guide IS practice. The official view is that these "guiding principles" provide a "decision-making framework" to enable AlphaCo to align its IT with its business vision and derive business value from IT (IS strategy document, 2005). The guiding principles originated in 2003 as a set of six general principles, officially endorsed by AlphaCo's senior management, and subsequently expanded to twenty-seven principles in 2005.

AlphaCo IS staff had different levels of awareness of the various forms of IS policies. For example, some staff were unaware of whether specific policies existed; some talked about IS policies but were vague as to what they were; while other staff conflated policies with standards or guiding principles. However, most IS staff spoken to had some awareness of the guiding

principles. A number of them explicitly referred to the guiding principles and their role, while others talked about specific principles in relation to IS practice or their everyday role:

We produced a set of six principles. And these were summarised principles ... And they were really good because quite often we'd go through for a selection or we'd go through a solution design or something, and we'd keep referring back to the principles: 'Oh, are they in line with our principles? And, if they're not in line, is there a solid justification as to why they're contradicting what the principles are?' (IS Strategy Analyst, interview, 11 October 2005)

#### **7.4.2 Documented IS processes**

In order to achieve a higher level of process maturity within AlphaCo IS, a repository of the various processes used in AlphaCo IS was created, called the IS Process Documentation Repository (ISPDR):

AlphaCo suffers a little bit by being cobbled together from previous, three earlier organisations. So there are, more than in most organisations, there are pockets with different ways of doing things, which are historical ... What we were doing with ISPDR was to get the baseline. To get key processes documented. (ISPDR Project Manager, interview, 25 July 2005)

The aim was that the ISPDR would be drawn on in everyday IS practice to enable AlphaCo IS to provide better service to the wider business divisions. ISPDR represents AlphaCo IS's own "understanding of what AlphaCo IS does" (IS strategy document, 2005). It is "a repository of good practice that's in place within AlphaCo" (ISPDR Project Manager, interview, 25 July 2005), or even "how we live our lives" (IS Strategy Analyst, 11 October 2005).

The ISPDR project entailed identifying, categorising and then documenting twenty-nine IS processes spread across seven process areas. In doing so, the COBIT framework was used in conjunction with other reference models, such as CMM, ITIL (IT Infrastructure Library, [www.itil-officialsite.com](http://www.itil-officialsite.com)) and various Australian and NZ standards. In defining processes within ISPDR, efforts were made to ensure that their content was consistent with the relevant COBIT objectives. Existing processes were documented and compared to the COBIT control objectives to check coverage. Where appropriate, processes were modified to ensure they addressed relevant control objectives: "So we are using it as a check list for completeness, rather than actually trying to try to drive it" (ISPDR project manager, interview, 25 July 2005).

For each process in the ISPDR, there is a range of documents, which may include procedures, templates or other tools, checklists, guidelines, 'hints and tips' about the process, process overviews, and example documents. Work on the ISPDR project finished in June 2005, by which stage, seven processes had been fully documented. The intention was to make what had been completed available for use, and for work to continue documenting other areas. According to the owner of this initiative,

At some point, we realised that the ISPDR should not be a project. It should be a way of life, so a conscious decision was made to bring it from an externally managed project to an internal organisational role. (IS Architecture Manager, interview, 29 August 2005)

Each IS process documented in the ISPDR is now owned by a member of the IS management team, who is responsible for its documentation, use, and continuous improvement (with help from a small dedicated team).

The ISPDR became accessible to IS staff via the AlphaCo's intranet in August 2005. At the time that this study began, those processes directly relevant to this study – around project management and vendor engagement – were largely documented. Parts of these processes continued to evolve over time (e.g. assessments of a project by a project manager were introduced in December 2005). Overall, achieving process maturity was ongoing:

[CMMI] Level 2 would be probably where we are. In places, we're just starting to have a documented structure. Starting to have a consistent way of doing things. Starting to do things like post-implementation reviews, so you've got to learn from previous projects and look at some kind of repeatability. Level 3 would be everything is documented and people can go and find things. You've got good examples and templates and checklists. There is consistency of process across projects. (ISPDR Project Manager, interview, 25 July 2005)

#### **7.4.3 IS development and acquisition practices**

In its approach to IS development and acquisition, AlphaCo prefers to acquire their IS solutions as packaged software (rather than developing bespoke solutions) with minimal customisation. Within AlphaCo IS, this approach is expressed in two main guiding principles. First, the *acquisition preference* principle clearly outlines the official stance on acquisition preferences: in choosing a solution, consideration will be given (in decreasing order of preference) to (1) the reuse of existing packaged solutions within AlphaCo, (2) buying a packaged solution, and (3) building a bespoke solution. Development should only be considered where there is strategic benefit in doing so, and packaged solutions are not commercially available (IS strategy document, 2005). This principle appeared to be well known among AlphaCo IS staff and was commonly referred to by them as variously the need to “leverage” existing technology and “buy not build”. Many of the members of AlphaCo IS spoken to articulated this principle in their explanations of AlphaCo's approach to IS solution acquisition, with a number of them seeing it as an important part of AlphaCo's IS strategy:

We want to buy. We don't want to build. And, I mean, that's, that's part of our core strategy. It's actually one of our key architectural principles. So 'buy not build' absolutely ... [The rationale is] lower risk. A solution that works. And we're not a software house. It's not our core business. Yeah, ultimately, you know, ultimately, you spend more money on a custom built thing. (Andrew, IS Project Office Manager, interview, 16 May 2006)

Part of our strategic policy is we will leverage packages that we strategically decide what we are going to own. And ... we're going to try for packaged solutions. So we're not going to sort of like have somebody build something up from scratch. We're actually going to get something and use it ... if you're reviewing the solution for this, for the requirements, first of all think of those three things. Leverage, leverage, leverage. Or, use a package solution. At all times align with the strategic direction. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

Second, according to the *package modification* principle, modifications and extensions to packages will be minimised in order to facilitate package upgrades. Pragmatically, in some cases customisation does occur, but without modifying the base package software. The preference is to add an extension outside the base package so as to not compromise future package upgrades. The principle explicitly recognises the need for extensive user training and change management as a consequence of any required changes to business processes arising from the vanilla implementation of software packages (IS strategy document, 2005). Again, this principle appeared to be familiar to many IS staff, who commonly referred to it as “vanilla” implementation:

The standard is that it's vanilla applications. You buy off-the-shelf ... I guess, that the original plan, I think, was 'Go vanilla', as in, 'Just keep it plain, keep it simple'. Because you end up with lots of different systems – oh, not lots of different systems – but you end up with systems that are so customised that it makes it very difficult if you upgrade another system that feeds into or links into them. And I think that's where the problems or issues have been in the past. (Kate, IS Project Office Analyst, 21 July 2005)

You don't customise packages. It's not worth it ... Change how you do the work to suit the package. That's the way to do it ... I always say, 'Rule number 1, no customisation'. I don't introduce 'Rule number 2' [customise] until it is necessary. (Andrew, IS Project Office Manager, meeting, 17 February 2005)

Evidence from various sources suggests that the “buy not build” and “vanilla” implementation approaches based on these two guiding principles are being adopted, to a large extent, in practice in AlphaCo. For example, according to the CIO's response to the survey, the majority of the IS projects undertaken in the survey period involved packaged software acquisition, with a large proportion of these being implemented without customisation. He also anticipated that in the future there would be “more package-driven process standardisation”. According to official AlphaCo documentation, in 2005, packaged solutions were being used to meet common business requirements, with bespoke development only occurring to meet organisation-specific requirements (IS strategy document, 2005). This is supported by conversations with various AlphaCo IS staff, who noted that while the intention is to purchase packaged solutions, there were (relatively rare) exceptions where some customisation or development did occur:

It's the rubber band principle, you know. Sometimes a package, yeah, it's a great package, but only does we think about 60-70%. But there's a gap between what you want to do and what this package lets you do standard, and it's the rubber band – well,

how much tension are you going to tolerate before you just say no, the package just isn't good enough? Or, we've got to take a lot of mitigating steps and customise it? Or, you just don't use the package and develop your own thing? (Harry, IS Architect, interview, 23 September 2005)

Other guiding principles within AlphaCo IS may also potentially impact on package selection (IS strategy document, 2005). The *scalability* principle requires that applications need to be scalable in capacity and functionality to meet changing business needs. The *vendor selection* principle encourages the use of "preferred suppliers", unless an alternative vendor offers considerable benefits or savings, with the long term intention of minimising the number of vendors across the organisation to a few strategic partners:

That's our strategy and ... we've got a strategic sourcing project that's been running for a while to enact that. So, preferred suppliers. You know, you start building relationships, building equal partnerships where it makes sense. Like, InfraCo is a partnership. And you start getting more consistent quality of service from your providers. (Andrew, IS Project Office Manager, interview, 16 May 2006)

The *package selection* principle encourages the use of a small number of enterprise-wide applications to meet business requirements. Over time, effort is being made to rationalise the range of applications being used and to use software from strategic partners, in order to remove duplication.

This has been a voyage of discovery. We should have, AlphaCo should use one type of [application], keeping sure it's licensed globally and always up to date, that it's deployable over the network within that common operating environment. So the software policies around that, are exactly that ... Certainly part of that policy is to reduce the range of software that's deployed. [Although] there'll always be exceptions and the one-offs. (Dave, ISOM Manager, interview, 25 May 2006)

The *technology adoption* principle encourages the use of proven technologies, except where newer technology offers considerable additional strategic business capabilities that outweigh the risk associated with new technology. This also applies to using established vendors:

We want software supported by an external organisation that's got lots of other customers, preferably kind of like us. So, we've got lots of confidence they're financially stable, we're going to get software updates, everything's going to keep ticking along. (Harry, IS Architect, interview, 23 September 2005)

The *total cost of ownership* principle requires that any IS investment proposal needs to be based on both initial and full-cycle costs, such as support and maintenance costs. As the IS Project Office Manager explained:

We've had build projects in the past that have occurred because no one's done the analysis for that properly. That's one of the things that the new structure is going to focus on: more robust business cases. They need to be based on total cost of ownership ... So not just, 'What is it going to cost to build this now?' (Andrew, IS Project Office Manager, interview, 16 May 2006)

With respect to AlphaCo IS projects, relevant guiding principles are typically operationalised through the involvement of a member of the IS Architecture team in the early stages:

The [IS] strategy takes effect when you apply those [guiding] principles and objectives during the actual project, obviously. So, as I say, where we tend to get involved, to make sure strategy is being implemented, is at the front end of the project. (Harry, IS Architect, interview, 23 September 2005)

The conscience of the guiding principles, to ensure that people are living by them, is the IS Architecture team, right? They are their standards ... and I think that, generally, where tools or software is considered, those guiding principles are actually part of you know the evaluation criteria or, you know, conscience of the IS Architecture team. (James, IS Commercial Services Manager, interview, 14 June 2006)

As can be seen from the above quote, the guiding principles are intended to function as a source of guidance for “living by” – in effect, a “conscience”. They reflect the “kind of ideal end state that we’re after” (Harry, IS Architect, interview, 23 September 2005), a target for improving behaviour to where “we want to move towards” (IS Strategy Analyst, interview, 11 October 2005) in terms of aligning and driving business value from IT. However, it was noted that in practice exceptions occurred:

Is there sometimes reasons why a guiding principle is not followed? Yes. Does that happen? Probably a little too often. Yeah, it probably does, you know, I think, in some areas of the business. You know, there’s always reasons why if you had a standard, why that standard doesn’t work for me. But I think they’re [the guiding principles] recognised. It’s just whether there’s a conscious decision sometimes to not follow them. It’s probably more that latter. (James, IS Commercial Services Manager, interview, 14 June 2006)

The overall rationale behind AlphaCo’s approach to IS acquisition is to reduce costs and business risk. It reflects staff’s perceptions of the role of AlphaCo IS as a shared service, supporting the organisation’s core business:

It comes back to some pretty simple objectives, which is to keep the cost down and to, over time, continually trying to leverage more out of our existing relationships and contracts. You know, get more out of the InfraCo infrastructure services. See what we can leverage out of our [ERP] footprint that we paid lots of money for ... There's not a lot of requirement for risks to be taken in the IS solutions ... The objective is to ... assist the business to add value to the operation by, in a timely fashion, delivering the IS technology they need to make the business changes. (Harry, IS Architect, interview, 23 September 2005)

#### **7.4.4 IS project management practices**

AlphaCo IS operates within an established company project management regime. In 2002, a cross-functional organisation-wide group set up to oversee project management practices across the company established AlphaCo’s project management standards. These apply to any AlphaCo project and represent the minimum requirements for project management that must be

met by all project staff (internal and external) (AlphaCo Project Management Standards, 2002). The standards are intended to promote standardisation and consistency in project management across AlphaCo:

From the legacy companies, everybody was doing project management, but it was all slightly different. So, what they had to do was get everybody together, 'Okay, what do you do? How do you do it? What's the documentation you use?', and then match them up ... So, they did a, you know, huge amount of work just to get everything in, and decided, 'Right, this is what it's going to be called'. (Kate, IS Project Office Analyst, 21 July 2005)

A purpose-built project management support tool was developed, called Tracking, which was aligned to the project management standards. Tracking became operational in November 2003, replacing applications in use from the legacy organisations. Its use in any AlphaCo project became mandatory in June 2004, meaning that these standards are continually reproduced. Tracking serves as a repository for key project documentation (including project deliverables).

Central to the company's project management standards is AlphaCo's project lifecycle. This defines the various phases through which a project must pass, the decision points (gates) for proceeding to the next phase, and the documentation produced in each phase. AlphaCo IS uses its own lifecycle, the IS project lifecycle, which is consistent with, but more extensive than, the lifecycle defined in AlphaCo's project management standards. The IS project lifecycle comprises six phases and six gates (Table 7.1). At the time of the study, only the first three gates were being administered by the IS Project Office, the remainder being left up to a project's governance group (although informally monitored by the IS Project Office), for want of process maturity:

Gate 4, we don't have at the moment, as such. If there's any sign-offs or business acceptance ... as a Project Office, we don't look at that at the moment. Maturity levels, once again. We've only had Gate 3 implemented this year and educated people about that ... I think Gate 5 will be the next one, because ... we're sort of lacking a little bit there. When it comes to completing the project, there is a Closure Report that they need to do in the Tracking system. However, it's not mandatory. They can complete a project without completing a Closure Report. So if we don't notice, or don't follow them up, it could potentially not happen." (Kate, IS Project Office Analyst, interview, 21 July 2005)

Gating meetings are held weekly for any IS projects submitted for review, and involve the managers of the various core service teams and the IS Project Office Manager, as well as the manager of any IS business support team with a project up for review. Depending on its size, an IS project may begin either at the Concept phase (for projects costing over \$NZ50,000) or Feasibility phase (for projects costing under \$NZ50,000). The project deliverables officially required by the IS Project Office (but not always done) for any IS project beginning at the Concept phase are: (1) a Concept Document, a Feasibility Report, and a Project Plan, which are used for gating review in each of the first three gates, respectively; (2) monthly progress reports

from Feasibility to Completion; and (3) a Closure Report. As noted above, these deliverables are held within Tracking.

Table 7.1: The documented IS project lifecycle

<b>Concept</b>	Problem definition and project concept development <i>Deliverables:</i> Concept Document
➤ Gate 1	
<b>Feasibility</b>	Feasibility evaluation of the project. <i>Deliverables:</i> Feasibility Report; monthly progress reports
➤ Gate 2	
<b>Planning</b>	Detailed analysis and planning of the project. <i>Deliverables:</i> Project Plan; communication plan; risk & issues register; monthly progress reports
➤ Gate 3	
<b>Development</b>	Design, development and testing of the designed solution. <i>Deliverables:</i> Testing sign-off; risk & issues register; scope change register; monthly progress reports
➤ Gate 4	
<b>Implementation</b>	Transfer of project deliverables to business units. <i>Deliverables:</i> Business acceptance; risk & issues register; scope change register; monthly progress reports
➤ Business Acceptance	
<b>Completion</b>	Closing down the project. <i>Deliverables:</i> Closure Report
➤ Gate 5	

A range of information related to project management practice within AlphaCo IS is documented within ISPDR, separated across three main processes: project initiation, project planning, and project monitoring and control. It includes various procedures, hints and tips, and guidelines on these processes, as well as information about the IS project lifecycle itself and each of its phases (e.g. phase overviews and checklists) and deliverables (e.g. templates and examples).

One way of viewing the various project management frameworks and tools utilised within AlphaCo IS is as boundary objects, produced to facilitate boundary-spanning knowledge transfer or sharing across different communities (Gasson, 2006; Star & Griesemer, 1989). For example, the IS project lifecycle provides a map or common framework for IS project management while permitting flexibility in the use of project management methods relevant to a specific IS project. It functions as a means of ensuring a degree of consistency across the different IS project communities and the IS Project Office. The IS project lifecycle is supplemented by the range of standard forms, guidelines and procedures contained in the ISPDR, which provide a common format for producing the various project deliverables required by the IS Project Office. In this sense, the ISPDR functions as a boundary object, or perhaps a 'system' of boundary objects (Star & Griesemer, 1989). Project deliverables are created in or added to the Tracking system.

Tracking functions as a repository for these deliverables and the reporting of project status, transferring knowledge between project teams, the IS Project Office and senior IS management.

#### **7.4.5 Use of methods**

Within AlphaCo IS, emphasis is placed on “applying professional disciplines” and using standard processes in order to achieve operational excellence in IS service delivery (IS strategy documents, 2003, 2004, 2005). Compliance with operational and development disciplines was also highlighted by the CIO in his response to the survey. In relation to IS project delivery, part of this potentially involves the use of methods, which offer the opportunity for standardisation of processes. In light of the changing nature of IS development (Chapter 3), consideration is given here to the use of both standard methods of IS development and project management methods.

Within AlphaCo IS, there does not appear to be an organisationally-sanctioned standard method of IS development or even a requirement to use a standard method, although analysis of the ISPDR documentation and discussions with IS staff suggest that the use of “proven ... standard methodologies for developing, implementing and maintaining AlphaCo's systems” (ISPDR template document) is encouraged, particularly in large IS projects:

Standardisation is important. Like for big stuff like SAP, you want to use the SAP methodology. One that's been used successfully before and it's been tested, for sure.  
(Harry, IS Architect, interview, 23 September 2005)

In the implementation of packaged software, consideration might be given to the perceived efficacy of package-specific or vendor-specific methods in assessing the relative merits of potential vendors as part of the procurement process:

If you've got a project that's doing a lot of development work or a project that's bringing a package or a project that's doing an enhancement, then you'll have completely different approaches to how you do those things ... There'll be a particular package, which might have a particular set of expertise and ... the company that put that particular thing, or installs those things, will have their own methodology. And I'm talking about a detailed methodology where they will have all their pro-formas for, you know, filling in the requirements and how they do their data setups and how they do their, you know, configurations etc, etc. So you start, you get into package-specific methodologies.  
(Andrew, IS Project Office Manager, interview, 16 May 2006)

There was some mention made that developers in the AlphaCo IS Enterprise Systems team had developed aspects of their own standard method based on the Rational Unified Process (RUP), and used it in undertaking in-house development work. These standard templates for development were not necessarily stored or accessed through the ISPDR. The ISPDR documentation refers to the use of iterative or agile development methods, although the ISPDR project manager was hesitant about AlphaCo's readiness to utilise such approaches:

[ISPDR] is very much geared to having less sort of single big bang project, because that's the way AlphaCo tends to do things. It does talk about iterative development, incremental development, the new agile methods. There's not very much focus on them here. There's not very much understanding. It's a very immature organisation in a lot of ways ... So they tend to do big lump developments, which of course have their own risks, [and] that are no longer considered good practice. But, there you are! (ISPDR Project Manager, interview, 25 July 2005)

Taking into account the range of development and acquisition options used within AlphaCo, it is not surprising that “there are a variety of methodologies in use, particularly where vendors undertake specification and development work for us” (ISPDR document). According to the CIO’s response to the survey, a standard method was used for at least part of the development process in most IS projects undertaken in the survey period. In some cases, the approach was ad hoc and not compliant with any standard method. The CIO was generally positive about the benefits of using a standard method, but also felt that they had several limitations (such as being time-consuming or difficult to use, and difficult to adapt). He did note that the methods used in AlphaCo’s IS projects were typically chosen because of their fit with the project characteristics, and were often adapted or used in part.

As with standard development methods, there is not a prescribed project management method that must be used in IS projects, or even a requirement to use a project management method. A project manager can use whatever method he or she chooses, as long as it conforms to the overall organisational project management standards and AlphaCo IS processes (e.g. using the Tracking system and producing project deliverables):

[AlphaCo] developed project management standards, but not a methodology. There's lots of different methodologies on how you actually run a project. From an IS perspective, when we look at external project managers, we don't really care what methodology they use, but they need to follow our process of putting things into Tracking, sorting out the finances, you know doing that sort of thing. And that's where we guide them through that as they come on board. (Kate, IS Project Office Analyst, interview, 21 July 2005)

This flexibility in the use of project management methods is consistent with AlphaCo’s practice of outsourcing non-core competencies:

As long as you produce the required deliverables for the gates, you are actually fairly free [to use any project management method], which is what we want. I mean the last thing you want to do is to take someone who is a specialist in delivering a certain type of project and say, 'Come in with all your skills and expertise. Now do it our way'. That's not actually helpful. (ISPDR Project Manager, interview, 25 July 2005)

As noted above, project management within AlphaCo IS “is driven off the IS project lifecycle” (Brenda, IS Project Office Analyst, 16 May 2006), which was designed to be generic rather than specific in order to achieve the dual aims of consistency in project management practice across the organisation and flexibility across “different project types within the diverse

business units” (ISPDR project management document). The IS project lifecycle is perceived to function as a high-level framework, supplemented by processes contained in the ISPDR, “allow[ing] us to, more or less, shoehorn anything into that lifecycle” (Brenda, IS Project Office Analyst, 16 May 2006). For example, a project management document in the ISPDR outlining the IS project lifecycle refers to it as the “IS project management framework”, and the IS Project Office Manager variously described the IS project lifecycle as a “framework”, “umbrella”, “umbrella methodology”, and “a high level methodology” (Andrew, IS Project Office Manager, interviews, 17 February 2005, 16 May 2006):

We said, ‘Well, if we just make sure the umbrella is right, we’ll just plug in the methodology that’s relevant to the type of project that you have’. And that seems to be what we have now ... It’s an umbrella methodology that says, ‘This is the minimum you will do’. (Andrew, IS Project Office Manager, interview, 16 May 2006)

This approach towards the use of methods reflects the personal belief of the IS Project Office Manager that methods should be appropriately chosen and applied in a specific project:

My position has been that the methodology as appropriate to the project is the one to use ... It’s a philosophical debate ... and my view has been that the project will determine the methodology, not the other way round. (Andrew, IS Project Office Manager, interview, 16 May 2006)

While all IS projects are generally consistent in terms of their project management from project initiation until the end of the planning phase, they can start to diverge once the development phase begins. The over-arching IS project lifecycle is sufficiently flexible to accommodate project-specific methods (including standard methods of IS development) during development and implementation. The expectation is that a project manager would use his or her initiative to customise the project management process to suit a particular project:

Methodologies are a framework – not a straitjacket. We expect project managers will use their initiative and apply the process as appropriate for their project. While the IS project lifecycle is consistent for all IS projects in AlphaCo, the different approaches to delivering different types of solutions require some customisation. (ISPDR project management document)

#### **7.4.6 Participation of users in IS projects**

As a consequence of its constitution as a shared service, AlphaCo IS is focussed on IS services delivery to other parts of the organisation, which are invariably referred to (both by staff members and in official IS documentation) as the “business” (e.g. as in “business stakeholders”, “business involvement”, “business ownership”, “business need” or “business benefits”). The term “user” is also used within AlphaCo IS but in a more specific sense, typically to refer to end users of a particular IS. The term “user participation”, while widely utilised in academic IS literature (Chapter 3), was not used by AlphaCo IS staff or mentioned in official IS documentation. Instead,

user participation tended to be conceptualised in terms of the “involvement” or “engagement” of the “business” or of “users”.

Within AlphaCo IS, there is no formally documented policy on user participation in IS projects. The engagement model used within AlphaCo IS defines, at a relatively high level, the participation of “business customers” in IS projects in terms of project governance and project teams. The nature of business staff participation is project-specific and specified in the relevant project documentation. The idea of user participation was perceived by AlphaCo IS staff to be encapsulated in the processes documented in the ISPDR, where various participatory roles and activities for business unit staff in an IS project are specified:

What COBIT says about user participation is generally embedded in the processes in ISPDR. Now, it's got things like, we've got documents on project governance, which say you should have good user representation, or this is how you might do it. Like, you know, you do stakeholder analysis, and you include them in your communications, include them in the steering group. That sort of stuff. So, it's all embedding it in the processes. (ISPDR Project Manager, interview, 25 July 2005)

IS staff spoken to felt that the participation of relevant stakeholders in an IS project was something that should occur as part of good IS project practice and in order to obtain user acceptance or buy-in:

[Users] don't tend to necessarily run the projects because they don't necessarily have the skill or the expertise to run an IS project. But an IS project delivering services to end users that operated without end users' involvement [is unlikely]. (Andrew, IS Project Office Manager, interview, 16 May 2006)

I guess it's, if you want to tell someone to start using a paper clip rather than a stapler, if you don't go and involve them in that change management process, they might not be too happy about it. That's kind of just human nature. Once again, that comes back to the governance model and good practice, like identifying your stakeholders, who needs to be involved, who's going to have to accept change, and drive it through. (Harry, IS Architect, interview, 23 September 2005)

It was difficult to ascertain the actual level of user participation in IS projects within AlphaCo. As noted above, the various AlphaCo IS staff spoken to generally felt that it should occur, and probably did. The CIO's response to the survey noted at least some form of user participation in all the IS projects undertaken during the survey period, and was generally positive about the benefits of user participation. User participation was reported as typically involving user representatives, who participated to varying degrees in the various stages of IS development: *always* during requirements determination, training or evaluation; *often* during planning, design or testing; and *sometimes* in programming or installation. Moreover, users *always* participated in a formal advisory capacity as a group; *often* participated in a formal advisory capacity as individuals, had sign-off responsibility for various stages of development, or were part of the

project team; and *sometimes* were informally consulted during development or had full responsibility for development.

This description seems consistent with accounts provided by AlphaCo's IS staff during the fieldwork, suggesting that the nature of business participation is project-specific. It appears that a strong emphasis is placed on user representation on the project steering committee. Users are also involved in requirements determination, acceptance testing and, to a lesser extent, design:

One of the key things for us is the steering committee for project governance. And we ensure that we get representation from not just the business owners, but also from somebody who represents the users, as well as somebody who represents the resources that are provided for the project ... We ensure that, you know, that all the affected parties to a project are represented on the steering committee ... [Users are also involved in] requirements and testing. Sometimes in design. In workshops. When you go through blue printing and you develop the design, you'll do a walk through. So you'll have key users or key super users that are often allocated to a project as a member of the team and they will work alongside the configurers and the business analysts, through all stages of the project. (Andrew, IS Project Office Manager, interview, 16 May 2006)

In practice, the logistics of user participation in AlphaCo's IS projects can be problematic given the need to coordinate participation with everyday duties:

I get the distinct sense that at the real nitty-gritty project level, there has not been enough involvement. That very often, the project will say, 'This is how you're going to do it', and the users say, 'How? When are we going to reconcile that with our day-to-day processes?' (ISPDR Project Manager, interview, 25 July 2005)

When business users participate in or are seconded to IS projects within AlphaCo, it is common practice to "back-fill" their roles with temporary staff or contractors.

#### **7.4.7 IS project performance**

Historically, the outcome of IS projects within AlphaCo has been problematic. For example, in mid-2004, an internal AlphaCo IS document highlighted the poor record of IS project performance in terms of: "1. Projects often late, over budget. 2. Maintenance of systems difficult. 3. Systems may not support business needs" (AlphaCo IS induction document, 2004). The same document articulates the solution to this perceived problem as a two-pronged "plan of attack" involving the application of "documented policy and process"; one prong being the IS policy framework and the other the ISPDR (both outlined above). A subsequent document produced by the IS Project Office at the beginning of 2005 also highlighted problems with IS project performance:

AlphaCo IS currently does not have a good record of consistent delivery of project value to date. A key role of the IS Project Office is to ensure that IS projects are effective and efficient. (ISPDR project management document, 2005)

However, at the time this study was conducted, there did not seem to be a consistent definition of project success or failure within AlphaCo IS. For example, the ISPDR does not formally define what project success constitutes, although various documents contained within it refer to project success. This lack of a working definition of project success was confirmed by IS Project Office staff who, in 2006, suggested that it was an area that was still being worked on: "It's a weak area for us, quite frankly" (Andrew, IS Project Office Manager, interview, 16 May 2006).

In practice, different success criteria seemed to be being used for different purposes. For example, in tracking the performance of active IS projects on a monthly basis, the IS Project Office utilise traditional measures of IS success: on time, to budget and to specification:

We have a measure on the [IS] balanced scorecard around project performance. And that's on three measures. It's on 'projects on time', 'projects on budget', and 'projects in scope' ... In terms of project control, we look at it on a milestone basis ... [We] want to track it through the whole life of the project ... So it's those three measures. And it's kind of related to time, but it's more a measure of control, I think. (Andrew, IS Project Office Manager, interview, 16 May 2006)

In terms of project delivery, the measure of success seems to be somewhat broader, encompassing business acceptance of a solution as well as other criteria. For example, documents within the ISPDR refer to IS process and/or product quality and the delivery and realisation of benefits, in addition to the traditional success measures. There is also recognition of multiple perspectives on project success; for example, part of the requirements management process involves identifying success criteria for each of the stakeholders in a project. In his response to the survey conducted as part of this PhD in 2004, Wayne (the CIO at the time) indicated that AlphaCo IS used an understanding of successful IS development based around whether the project "meets the criteria as outlined in the business case". Other IS staff highlighted the importance of business acceptance of the solution although, as indicated above, the business acceptance gate was not formally monitored by the IS Project Office at the time of this study:

We are still arguing about the criteria for [project success], but generally it is, we have (a) deliver everything the project scope said they'd deliver, and (b) the business – well, assuming that the business agrees up-front what the scope and the deliverables are – the business has signed them all off. (Brenda, IS Project Office Analyst, 16 May 2006)

You know, if the IS teams need business sign-off or whatever, they will get it and, sort of want, to use the term, 'cover your butt', type of thing, so that it doesn't come back and bite them in the future. It's, I guess, a standard process that each of the IS business support teams go through. From a Project Office perspective, that's not something that we actually get involved in. So, I can only speak from knowing what should happen. Does that happen? I believe it does. (Kate, IS Project Office Analyst, interview, 21 July 2005)

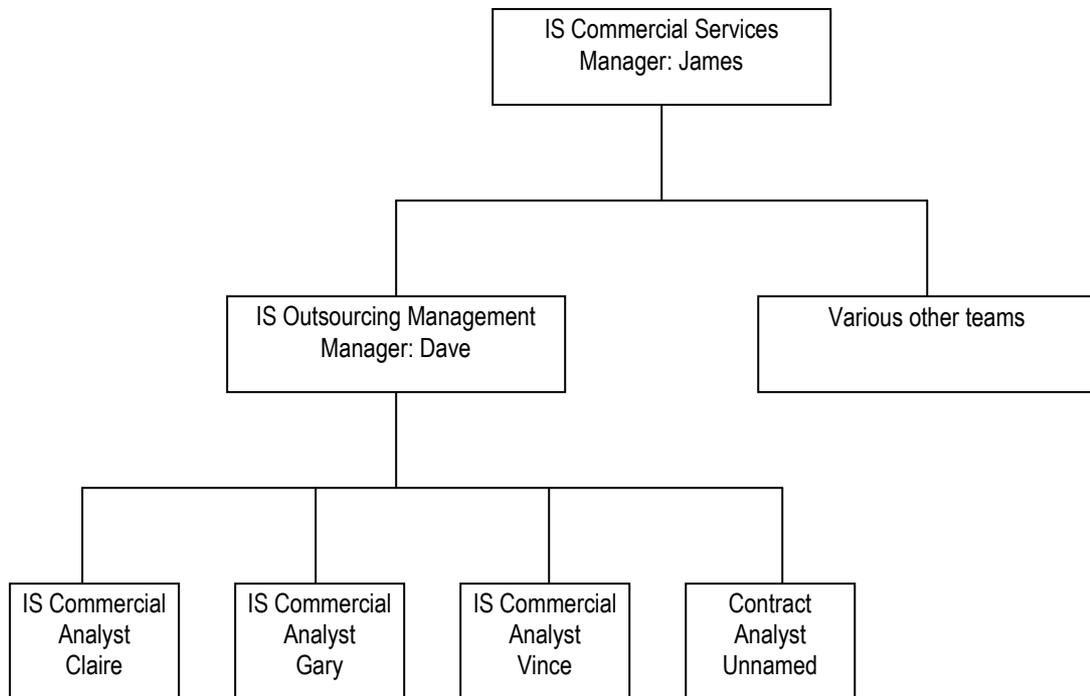
Formal measurement of business benefits was starting to be introduced into AlphaCo IS after mid-2006, by which time the ISOM database solution had been delivered:

The area that we really are working on today, what [we are] definitely focused on going forward, is benefits realisation ... [The] focus has originally been on defining the business case in a robust way that allows you then to implement a benefits realisation process. And that's coming, but, you know, to be frank, it's something that hasn't been institutionalised yet. But it's started. (Andrew, IS Project Office Manager, interview, 16 May 2006)

## 7.5 The ISOM Team

The IS Outsourcing Management (ISOM) team (Figure 7.2), part of IS Commercial Services, is responsible for governance and management of commercial aspects of the IT infrastructure outsourcing contract with InfraCo. The organisation-wide scope of the outsourcing contract within AlphaCo means that this five-person team is always busy: "There is never a shortage of things to do each day with the workloads that we have" (Dave, ISOM Manager, email, 30 May 2006). Moreover, their work is highly specialised (reflecting the specificity of the contract), to the point that, "You can't just hand it to someone and go, 'Here', because it's too complicated just to do that" (Claire, IS Commercial Analyst, project manager interview, 25 May 2005). Team members have specific roles and enjoy a high degree of responsible autonomy, reflecting their manager's confidence in them.

Figure 7.2: The IS Outsourcing Management (ISOM) team



The ISOM team is a close-knit unit who work well together, as individual team members attested on various occasions. During the course of the field work, the researcher repeatedly witnessed instances of their camaraderie (e.g. team members joking with or teasing each other,

or discussing outside activities) and did not see any evidence of conflict or negative feelings between team members. The core of the team has worked together for several years, and new team members are soon made welcome: “[It] is a fun team to work with. They’re good people ... They all seem to work well together” (Frank, Project Manager, interview, 05 December 2005). The ISOM team’s interaction is facilitated by the open plan nature of the AlphaCo IS work environment in which desks are grouped in bays of three or four, separated by one-meter high partitions. Relationships within the team, and across IS Commercial Services more generally, are fostered through team building activities held either during lunch time or after hours.

In fulfilling its operational responsibilities, the ISOM team uses a complex financial model specifically developed around the InfraCo contract and using contract-specific terminology. Within the model, IT infrastructure services are defined as *resource units*. A distinction is made between (1) the estimated cost of providing these services in-house (based on general ledger codes) and (2) the cost of InfraCo providing them (based on resource unit usage). A fixed charge is paid for baseline volumes of resource units agreed under the contract, with additional charges incurred (or credits given) for usage above (or below) the baseline volume. At the beginning of 2005, this financial model existed as two distinct Microsoft Excel spreadsheet tools – an evaluation model and a scorecard model – separated for historical reasons and because of their (large) size and purpose. Summary information about these two models is presented in Table 7.2.

Table 7.2: The ISOM models

	<b>Evaluation model</b>	<b>Scorecard model</b>
Use	Evaluation analysis & benefits reporting Scenario analysis Ad hoc reporting	Monthly reporting of performance of contract Data for IS balanced scorecard Ad hoc reporting
Developed by	Claire	Claire & others
Model complexity	Complex	Not overly complex
Direct user	Claire	Gary
Information users	ISOM team & IS Commercial Services Manager AlphaCo IS management team AlphaCo senior management & Board of Directors Individual business units	ISOM team & IS Commercial Services Manager AlphaCo IS management team AlphaCo senior management Individual business units
Frequency of use	As required	Monthly and as required

The *evaluation model* is a tool used for modelling and evaluating the InfraCo contract. It is used for evaluation analysis (comparing the total costs of outsourcing and in-house service delivery), reporting the financial benefits of the outsourcing contract, scenario analysis (analysing potential changes to the contract, such as the inclusion or exclusion of business units, growth changes in the model, changes to resource units or pricing), and ad hoc reporting:

Basically it's a tool that enables us to do like-for-like comparisons between an in-house cost and an outsourced cost, and to be able to run various scenarios off that for growth or for - what are other examples? - if we want to change the economic factors ... The evaluation model is what we're using as the business case for the entire length of the deal. So, in this case, we're projected to save xyz million dollars, and we would want to test now whether we are still within our target range. (Claire, IS Commercial Analyst, interview, 20 January 2006)

The model itself is large and complex to use and has only one direct user, Claire, the only member of the ISOM team who knows how to use it. The evaluation model is used on an as-required basis, largely to service the informational needs of the ISOM team but also other organisational members (such as AlphaCo's senior management or business units within AlphaCo). Information from the evaluation model is used to produce an annual report on the extent to which expected benefits from the outsourcing contract were achieved, which is presented to AlphaCo's Board of Directors via the CIO and AlphaCo's management team:

[The main users] are the ISOM team. On a day-to-day basis, we don't run it very often. The scorecard keeps an eye on things. Once in a while we would give it to the CIO, and occasionally it goes up to the CFO and to the AlphaCo management team, when they ask for it. (Claire, IS Commercial Analyst, interview, 20 January 2006)

The *scorecard model* is the tool used for reporting on the performance of the InfraCo contract against budgeted costs (retrieved from the evaluation model). Its main output is the monthly ISOM scorecard, which is used by the ISOM team and the IS Commercial Services Manager to monitor outsourcing costs:

The scorecard, on a monthly basis, helps us to monitor how we are going against budgeted costs. And the original basis for the budgeted costs is all the base charges and things like that, which are evaluated into the evaluation model to check that they are correct. So, they're all then loaded into the scorecard on an annual basis to monitor our budgets and things like that. (Claire, IS Commercial Analyst, interview, 20 January 2006)

The scorecard model is also used for ad hoc reporting of information requested by the ISOM team, InfraCo, or business units within AlphaCo, and contributes data to the monthly AlphaCo IS balanced scorecard, which is distributed to the CIO, his management team, and the CFO. The scorecard model is relatively simple to use. Although Gary is the only person to use it directly (being responsible for keeping it up-to-date on a monthly basis), information from it is distributed widely within AlphaCo.

The replacement of these two tools with a database solution forms the basis of the ISOM database project. In relation to project delivery, members of the ISOM team do not usually play a large role, if any, in IS projects. Their involvement in the ISOM database project is mainly as owners of the project and users of the proposed solution: "[Our] involvement in this project is because it was specifically for my team" (Dave, ISOM Manager, interview, 25 May 2006).

As the main users of these tools, Claire and Gary played a key role in the project. Claire is an experienced financial analyst, with more than twelve years of industry experience but, in her own words, “no formal qualifications” (Claire, IS Commercial Analyst, project manager interview, 13 May 2005). She has been directly involved with the outsourcing contract from its outset, first as part of the original project in 2003 to evaluate AlphaCo’s infrastructure sourcing options then as an original member of the ISOM team. Her current role involves “high level overview of the [outsourcing] contract in its entirety, the relationship between InfraCo and AlphaCo ... [and] managing new acquisitions and divestitures on behalf of the contract” (Claire, interview, 20 June 2006). Claire has a thorough knowledge of both models, acquired through her role in their development and her subsequent use of them. In contrast, Gary is a relatively inexperienced financial analyst, with only a couple of years of industry experience in addition to a university degree in finance. Gary joined the ISOM team in mid-2004, taking over responsibility of the scorecard model from Claire. While familiar with the scorecard model, Gary has no experience or knowledge of the evaluation model. Both Claire and Gary regard themselves as expert Excel spreadsheet users.

As manager of the ISOM team, a position he has held since prior to the commencement of the InfraCo contract, in early 2004, Dave also played an important role in the ISOM database project. Dave is an expert in commercial contracts management, being responsible for managing relationships with several of AlphaCo’s key suppliers, including InfraCo. While Dave uses information derived from the evaluation and scorecard models in his role as the ISOM manager, he has no knowledge or experience of using either model, relying instead on Claire or Gary, respectively.

As IS Commercial Services Manager, James is Dave’s immediate superior in the IS organisational structure. Since the ISOM database project is funded out the IS Commercial Services’ budget, James is the business owner for the project with a governance role as part of the project’s steering committee. He also has the role of project sponsor, although in practice this was often delegated to Dave (who formally took over that role in early 2006, when James was temporarily seconded to another role):

[James] is the project sponsor and I think he took a very back seat role. He just wants to see ‘a’ result at the end but he’s left it up to us to do it ... If the budget and things started going over, he would be far more involved. (Gary, IS Commercial Analyst, interview, 5 January 2006)

The ISOM database project has a personal interest for James as he was involved in building the original evaluation model. Apart from Claire, James is the only other person in AlphaCo who has a working knowledge of the evaluation model.

## 7.6 Summary

This study focuses on the ISOM database project, involving the provision of a database solution to replace the existing financial models used by AlphaCo's ISOM team to manage the InfraCo outsourcing contract. This chapter presents relevant contextual information about AlphaCo, AlphaCo IS and its IS practices, and the ISOM team, which is used in Chapters 8 to 10 to inform the case study analysis and discussion. For convenience, the AlphaCo IS teams, tools and processes relevant to the ISOM database project are summarised in Table 7.3.

Table 7.3: AlphaCo IS teams, processes and tools relevant to the ISOM database project

<b>AlphaCo IS team</b>	<b>Function</b>
IS management team	IS leadership and overview
Corporate Services Business Support team	Operational support to Corporate Services (including AlphaCo IS)
IS Architecture	Strategic oversight of AlphaCo's applications
IS Project Office	Portfolio reporting & project management support for IS projects
IS Commercial Services	Vendor, contract and commercial management
InfraCo (external provider)	IT infrastructure service and support (e.g. IS Helpdesk)
<b>Processes &amp; tools</b>	
Tracking	Organisational project management support tool
IS process documentation repository (ISPDR)	Repository of AlphaCo IS processes and documents
IS project lifecycle	High level project management framework used by AlphaCo IS
Engagement model	Defines interaction points between AlphaCo IS teams & business units
Guiding principles	Operational principles to guide IS practice
<b>ISOM database project</b>	
ISOM database project	The project at the centre of this study
ISOM team	Commercial management of InfraCo outsourcing contract and owners of the ISOM database project
Evaluation model	Tool used by ISOM team for modelling and evaluating InfraCo contract
Scorecard model	Tool used by ISOM team for reporting performance of InfraCo contract

## Chapter 8: Case Study Analysis – Episodes 0 to 5

### 8.1 Introduction

The process analysis of the longitudinal case study of IS development presented in this chapter uses three specific strategies for working with process data: narrative, temporal bracketing and visual mapping (Chapter 5). The main strategy involves the production of a detailed process narrative in order to make sense of the case study data. This is not simply a chronological description of activities and events but a theoretically informed explanation of the way the sequence of situated actions unfolded over time to produce a particular outcome. The sociotechnical model of IS development as situated action developed in Chapter 5 is used to theorise and illustrate the interpretive explanation offered by the narrative analysis. Although the model could be used to interpret any situated action discussed in the process narrative, here it is used to explicate events and actions considered to be analytically important. Temporal bracketing is used to divide the IS project investigated into eight episodes, each reflecting a degree of continuity of activities and distinguished from other episodes for analytical purposes. The eight episodes structure the detailed narrative analysis that follows.

The eight episodes also provide a temporal dimension to the visual process map shown in Figure 8.1. This process map is a graphical representation of the case study process analysis. It provides a high level picture and summary of twenty-one key overlapping activities involved in the IS project studied, relations of precedence between them, and the influence of significant events, actors and artifacts. It is necessarily a simplification of the complex interactions that occurred and is intended to support the more detailed process narrative and theoretical explanation provided in the remainder of this chapter. The graphical notation used in the process map is explained in Figure 8.1. It is adapted from that used by Langley & Truax (1994) in their process study of technology adoption, and subsequently used by Madsen et al. (2006) to depict the emergence of an IS development method in practice. A brief description and timeframe of the twenty-one key activities is given in Table 8.1, each numbered for cross-referencing with the process map in Figure 8.1. The subsequent process narrative proceeds through Episodes 0 to 7 (here and in Chapter 9), followed by consideration of the initial use of the developed solution and a discussion of the overall process analysis (Chapter 10).



Figure 8.1 continued

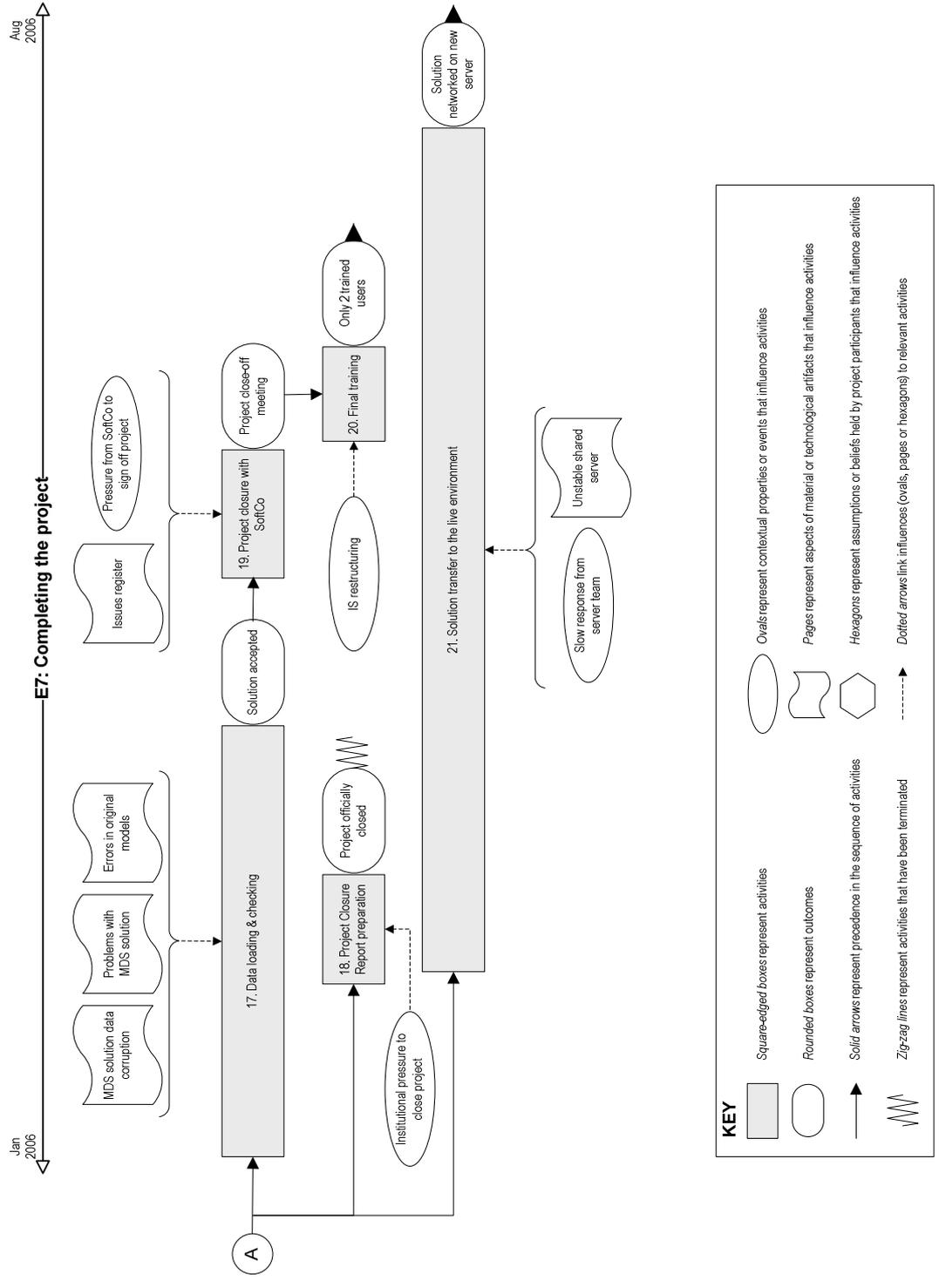


Table 8.1: Activities undertaken in the ISOM database project

Timeframe	Activity
2004	1 <i>Problem recognition</i> : During the first year of the InfraCo outsourcing contract, ISOM team members became increasingly frustrated with the spreadsheet models that had originally been developed for contract appraisal, but were now being used for ongoing contract management and performance reporting. They problematised the limitations of the spreadsheet models in such a way that migration of the models to a database solution was the obvious answer.
2004	2 <i>Problem definition</i> : As the initiative to replace the existing spreadsheet models with a database solution was perceived as relatively small and well-defined, and was owned by AlphaCo IS, the usual formal process to define and scope the business problem was not strictly followed.
2004	3 <i>Project initiation</i> : As the ISOM team became increasingly committed to developing a new database solution, the initiative was incorporated into the AlphaCo IS planning cycle and budget for the next financial year, thus acquiring formal 'project' status and becoming subject to the AlphaCo IS project lifecycle.
Feb 2005	4 <i>Concept development</i> : As part of the Concept phase of the IS project lifecycle, the initial concept behind the project was developed into a Concept Document, the formal deliverable used to evaluate whether a project should proceed to the Feasibility phase. Gating approval to proceed was granted at the beginning of March 2005.
Apr – May 2005	5 <i>Sourcing a project manager</i> : The initial intention was for Claire, a member of the ISOM team, to manage the project. However, as time passed, it became obvious that she was too busy to be able to undertake this role. In order to complete the project by the target date of Christmas 2005, and consistent with established practice within AlphaCo, it was decided to source an external project manager. Frank was appointed to this role at the end of May.
Jun 2005	6 <i>Project requirements definition</i> : Frank reviewed and documented the existing spreadsheet models. He also met with members of the ISOM team to formally establish the purpose, scope, and deliverables for the project, producing a Project Definition document.
Jun – Jul 2005	7 <i>Prototype model development</i> : As the existing spreadsheet models were regarded as too complicated for the eventual solution developers to follow, Frank developed simpler prototype models and a data file for use in solution development.
Jun 2005	8 <i>RFI preparation</i> : A RFI document was completed in June for distribution to potential vendors.
Jul – Sep 2005	9 <i>Vendor engagement</i> : The RFI document was distributed to six AlphaCo preferred suppliers. Only one vendor, Vendor3, submitted a comprehensive RFI response and undertook a product demonstration to the ISOM team. Although relatively expensive, the ISOM team believed that the Vendor3 product had the necessary functionality to meet their requirements. Negotiations proceeded with Vendor3 to reduce the cost of the proposed solution. Formal evaluation of the Vendor3 product established it as the preferred solution for the ISOM database project.
Sep 2005	10 <i>1<sup>st</sup> Feasibility Report preparation</i> : Once the decision was made to proceed with the Vendor3 product, a detailed Feasibility Report for the project was completed and lodged with the IS Project Office towards the end of September, ready for gating approval to proceed to the Planning phase of the IS project lifecycle.
Sep – Oct 2005	11 <i>Vendor evaluation revisited</i> : The inadvertent discovery of another potential vendor, SoftCo, with a product already used by BetaCo, an AlphaCo subsidiary, disrupted plans for a Vendor3 solution. SoftCo quickly submitted a comprehensive RFI response and demonstrated their MDS product. The previous Feasibility Report was put on hold, to enable the ISOM team to formally evaluate both products. The MDS product (a multi-dimensional database and OLAP engine) emerged as the preferred solution, mainly on the grounds of cost, since software licenses and a hardware server could be shared with BetaCo.
Oct 2005	12 <i>2<sup>nd</sup> Feasibility Report preparation</i> : The Feasibility Report was rewritten with SoftCo as the preferred vendor and submitted to the IS Project Office. Gating approval to proceed to the Planning phase was granted at the end of October 2005.
Nov 2005	13 <i>Project planning</i> : An initial planning meeting with SoftCo established that development was to be done onsite at AlphaCo on a standalone server supplied by SoftCo and involve considerable input from Frank and Gary, a member of the ISOM team who would be the primary user of the MDS solution. Development was to be completed by mid-December 2005. IS Project Office approval was obtained to commence development immediately, at the same time as a detailed Project Plan document was prepared for Gate 3 approval, eventually granted in mid-November.

Table 8.1 continued

Nov 2005	14 <i>Negotiation of the nature of development:</i> As solution development began, concerns over the extent of Gary's involvement in the development work arose. In the face of SoftCo's concerns about tight project costs and timeframe, the original intention to involve Gary in the solution build was abandoned. Instead, his involvement was reduced, to provide him with expertise as a solution user, but not in development using the MDS tool.
Nov – Dec 2005	15 <i>Solution development:</i> Development of the MDS solution began in early November with the SoftCo developers building the basic structure of the multi-dimensional database. Subsequent development proceeded in several overlapping and iterative stages, involving cycles of building, testing (by Frank and Gary) and amendment. Development quickly fell behind schedule, and milestones had to be revised. By Christmas 2005, the original expected completion time for the project and the departure date for the external project manager, the MDS solution was largely complete but untested and lacking documentation.
Dec 2005	16 <i>Negotiation of out-of-scope issues:</i> As the solution delivery date of mid-December approached, SoftCo became increasingly concerned over what they saw as escalating project scope and costs. The extent to which outstanding project tasks were in or out of scope was debated at a project meeting, based on differing interpretations of what constituted the project's "original spec" (resulting from SoftCo's reliance on the prototype models cf. the ISOM team's referencing of the RFI document). Some work was accepted by AlphaCo as out-of-scope, requiring additional time and payment.
Jan – May 2006	17 <i>Data loading and checking:</i> Following Frank's departure at the end of 2005, Gary assumed responsibility for the project, including getting the MDS solution tested and operational. This involved uploading and reconciling historical data files. However, in mid-January, it was discovered that base data in the MDS solution had become corrupted, requiring its re-creation (an original data file could not be located) and subsequent data reloading and checking. Testing of scenarios created in the MDS solution revealed further problems needing fixing by the SoftCo developers, now busy on other jobs. In addition, extensive checking revealed that errors in the original spreadsheet models were preventing full reconciliation with the MDS solution. By mid-May, Gary was satisfied that the MDS solution was working as intended.
Apr 2006	18 <i>Project Closure Report preparation:</i> In early April, under pressure from the IS Project Office, Gary completed the project's Closure Report despite the ongoing problems with the MDS solution.
May – Jun 2006	19 <i>Project closure with SoftCo:</i> By mid-May, satisfied with the MDS solution, Gary was ready to close the project with SoftCo. In early June, the final 'close-off' project meeting with SoftCo was held. All that remained was a final training session and transfer of the solution to the live environment.
Jun 2006	20 <i>Final training:</i> The final training session was held in mid-June, but only Gary and one other ISOM team member attended. Ongoing restructuring of AlphaCo IS had preoccupied the IS staff and made it difficult to identify appropriate people to attend.
Apr – Aug 2006	21 <i>Solution transfer to the live environment:</i> In April, Gary requested that the MDS solution be installed on the shared BetaCo server in AlphaCo's networked environment. This entailed a change request to assess whether the MDS solution would impact on the server's performance. The change request process took four months to complete (instead of the usual two weeks), mainly because of the slow response from the infrastructure support team and instability problems with server. Eventually, a new server was purchased to house both MDS applications.

## 8.2 Episode 0: Antecedent Conditions to Project

As part of the 2003 project to outsource IT infrastructure and related services, a spreadsheet model was built using Microsoft Excel to establish the total costs of delivering these resources and services in-house. The model was further developed to enable comparison of this in-house scenario with the proposed costs provided by various outsourcing vendors, and to enable comparison between vendors. Normalising adjustments were made to the various vendor cost proposals to enable comparisons to be made on an equivalent basis.

This evaluation model was developed by Claire, an IS Commercial Analyst with the ISOM team. Development of this model required identifying and assembling relevant information from multiple sources into a single location. The model grew progressively as development occurred over the year before an outsourcing contract was eventually signed at the end of 2003, requiring an enormous amount of work and eventually producing a very large, complex and cumbersome spreadsheet-based model.

“When we first did this project, it was a year-long project and it was, it was horrific. It was just 70 hour weeks. For about 12 months. It was just horrific ... It was a nightmare”  
(Claire, IS Commercial Analyst, informal project conversation, 14 December 2005)

As a result of the intensive and time-consuming development process, Claire attained a detailed knowledge of the model and became effectively the only person who knew how to operate it fully.

Once the outsourcing contract had been awarded to the successful vendor, InfraCo, focus shifted from the initial evaluation of the outsourcing proposals to ongoing evaluation and management of the outsourcing contract performance. This involved incrementally rebuilding parts of the evaluation model, refining elements of it, and adding company operating units and IT resource units. It also entailed developing a second spreadsheet model, the scorecard model, to act as a routine reporting tool on contract performance, also built by Claire with the help of others. This scorecard model continued to evolve over time. For example, changes were made in response to changes in the contract and changes in reporting requirements once Edward became CIO. With the adoption of Balanced Scorecard reporting within AlphaCo’s IS function, this scorecard model was further modified into a form that could contribute to the IS Balanced Scorecard:

I needed a tool that enabled me on a daily basis to maintain how our costs were running. So it was a reporting tool. So that, you know, ‘Where are we today? How are we doing against budget?’, given that our budget year is slightly different to our contract year ... There were many iterations of it ... And it was decided the whole IT department was moving to a Balanced Scorecard model, so we decided to move ours to a scorecard model as well ... So, it uses the same formats and the same criteria and things like that, and it's easily fed upwards. (Claire, IS Commercial Analyst, interview, 20 January 2006)

### **8.2.1 Establishing the need for change**

In 2004, the first year of the outsourcing contract, as the focus shifted from initial contract appraisal to ongoing performance evaluation and management, the spreadsheet models’ limitations, particularly in terms of modelling, analysis and reporting, became increasingly apparent to members of the ISOM team, including Dave, the ISOM Manager:

“All these spreadsheets had been built up during [the outsourcing contract negotiations] ... and they were built up for particular reasons. But ongoing, in terms of managing the outcomes of the InfraCo arrangement, they needed to do different things” (Dave, ISOM Manager, interview, 25 May 2006)

It appears that Claire and her immediate superiors, Dave and James (the IS Commercial Services Manager), had at various times discussed the perceived deficiencies of the existing spreadsheet-based models and explored possible solutions:

I know I recognised the need. I don't believe I was the only one that recognised the need ... but we did ... It was just like, 'This is what we need to do. We need to make it better, because otherwise ... (Dave, ISOM Manager, interview, 25 May 2006)

Table 8.2 outlines the ways in which these limitations were articulated, together with the envisaged solutions. The models were large and cumbersome, and comprised a large number of sheets that were not well integrated. As a consequence, the models were difficult and time-consuming to use, modify or update, and this had created data integrity and version control problems. Further, the evaluation model had not been designed to accommodate changes in AlphaCo's IT infrastructure environment. Discussions revolved around the desirability of adopting a centralised database repository that would overcome the spreadsheet-based limitations and provide the appropriate dynamic modelling, analysis and reporting functionality needed for outsourcing contract performance management in the future. Part of the problematisation of the existing spreadsheet models involved the need to capture the tacit knowledge that Claire had acquired about the models in a more explicit and usable solution. The importance placed on a potentially scalable solution that could meet future needs in terms of a wider community of users or potentially applied to other outsourcing arrangements is consistent with a guiding principle of scalability, which emphasised the desirability of scalable applications that enabled AlphaCo to be adaptable to changing business needs (IS strategy document, 2005).

In explaining the problems associated with the existing spreadsheet models to others, Claire often described the spreadsheet models as a 'beast' or 'monster'. This 'monster' metaphor, which she used repeatedly throughout the project, seemed to function as a 'transient construct' (Lanzara, 1999). One role of a transient construct is to attach a name or label to an established or obvious entity that has become problematic, and hence an object of inquiry, so that the problem is recognised and some sense can be made of the ambiguity surrounding it. In this case, the notion of a 'monster' encapsulated the various perceived limitations of the existing spreadsheet models and gave them a single point of focus. Describing the spreadsheet models as a monster enabled an understanding of them by Claire and others in the ISOM team as 'large', 'cumbersome', 'unfriendly', risky and out-of-control. It also allowed the attribution of living characteristics to these non-living objects and the use of comparative metaphors. If the existing spreadsheet models were problematised as a 'static' or 'dumb' 'monster', then the obvious solution was an 'intelligent' 'living breathing animal'. The answer to the out-of-control monster was 'to get control of it' by developing a 'dynamic' database solution.

Table 8.2: Limitations of the spreadsheet models and proposed solutions

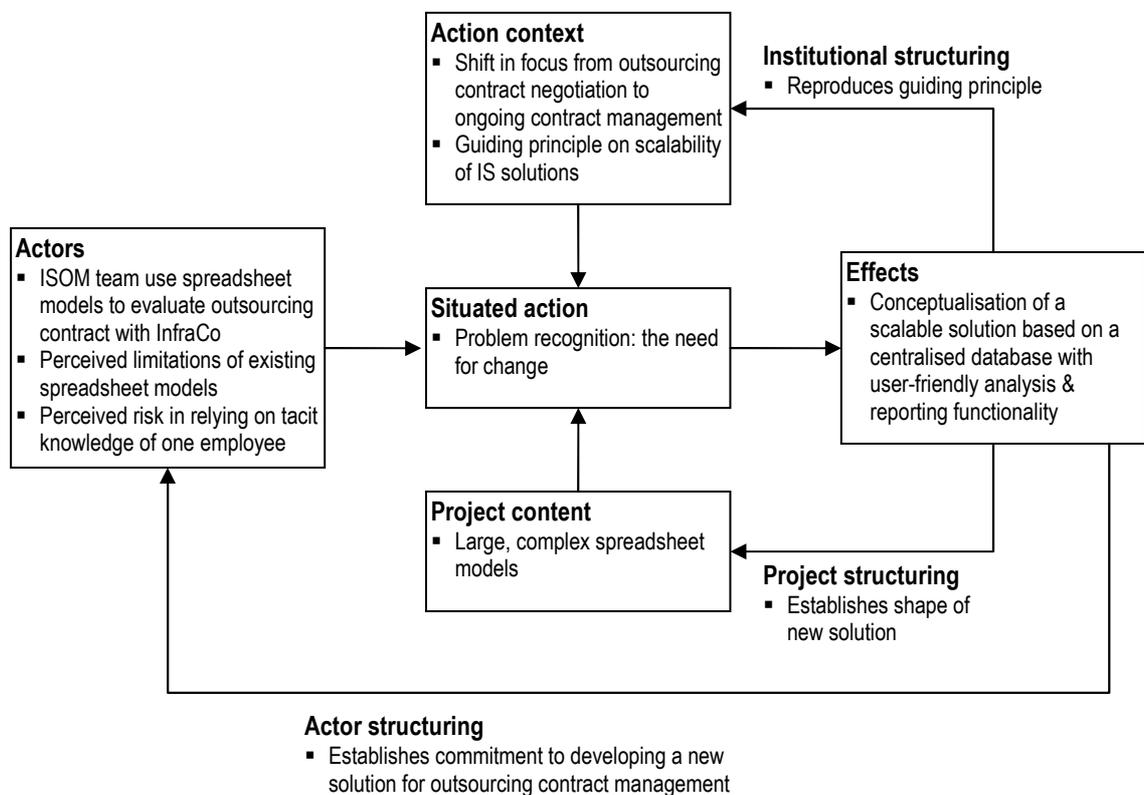
Limitation	Solution
<p>The combined models were described as large and cumbersome. The combined models were 14Gb and contained over 1 million formulae. The large amount of data was inefficiently stored across a large number of sheets that were difficult to integrate. The models were susceptible to data integrity and version control problems.</p> <ul style="list-style-type: none"> <li>• “The problem with it is it’s quite large and complex ... It’s cumbersome, because of the size of it ... So, it’s a bit of a monster really” (Claire, IS Commercial Analyst, vendor presentation, 27 September 2005)</li> <li>• “It’s a huge risk having it in those spreadsheets” (Claire, IS Commercial Analyst, interview, 23 March 2005)</li> </ul>	<p>Centralisation of all the source data in a single database repository, that facilitated data integrity and version control</p> <ul style="list-style-type: none"> <li>• “It’s just trying to bring everything together in one single place, rather than having to be reliant on Excel spreadsheets everywhere. So, it’s all about integration and simplicity” (Dave, ISOM Manager, interview, 23 March 2007)</li> </ul>
<p>Their size and complexity made the spreadsheet models difficult and time-consuming to update or modify.</p> <ul style="list-style-type: none"> <li>• “It’s not fun, not when you have to repeat a task seventy times. I’ve got really fast, but ... not a good scenario repeating that for five years” (Claire, IS Commercial Analyst, project manager interview, 25 May 2005)</li> <li>• “You end up having to update about 15 spreadsheets to get to the final model in the spreadsheets to get the answer. So, it’s a real time-consuming. It’s just a nightmare” (Frank, Project Manager, vendor presentation, 22 July 2005)</li> </ul>	<p>A database solution that reduces the complexity in maintaining and updating the models</p> <ul style="list-style-type: none"> <li>• “Enable select users to easily upload and modify data” (ISOM database project Project Definition document, 2005)</li> </ul>
<p>The size and nature of the spreadsheet models limited their capacity for analysis, modelling and reporting. The models did not provide the level of detailed analysis required and were regarded as user-unfriendly.</p> <ul style="list-style-type: none"> <li>• “It’s too big ... The spreadsheets are dumb ... No way to do reporting, no way to do forecasting ... It needs to be made intelligent ... to help business managers to do their stuff” (Dave, ISOM Manager, project manager interview, 13 May 2005)</li> <li>• “At the moment all the scenario modelling is done at the very highest level. All the components of it are at the very lowest level, but we only see the highest level, because its impossible to slice and dice it ... It’s static” (Claire, IS Commercial Analyst, vendor presentation, 27 September 2005)</li> </ul>	<p>A centralised database and user-friendly reporting function with drill-down and slice-and-dice analysis capabilities.</p> <ul style="list-style-type: none"> <li>• “Half of the purpose of putting it into a database, was to get control of it and to get the functionality that we really required out of it, that we couldn’t build into Excel” (Claire, IS Commercial Analyst, project meeting 15 December 2005)</li> <li>• “We wanted to actually put it into a database that allowed more data to be stored, different scenarios to be stored, and actually models and reports to be run, you know, to able to be run more easily ... More detailed reporting and analysis to actually be done around costings and different scenarios” (James, IS Commercial Services Manager, interview, 14 June 2006)</li> <li>• “It’ll be quicker, because the model ... will do all the calculating and everything. We just feed in what we want and it comes out ... It’s going to make things more efficient” (Dave, ISOM Manager, interview, 25 May 2006)</li> </ul>
<p>The evaluation model was not designed to account for changes in the IT infrastructure environment within AlphaCo over the life of the outsourcing contract</p> <ul style="list-style-type: none"> <li>• “We want to make a living, breathing animal ... dynamic, not static” (Claire, IS Commercial Analyst, informal project conversation, 30 June 2005).</li> <li>• “It’s a static model, and I think they don’t do updates for the change in IT environment, which they want to do” (Frank, Project Manager, vendor consultation, 22 July 2005)</li> </ul>	<p>A dynamic solution providing accurate information that reflects AlphaCo’s IT infrastructure and service use in a fluid business environment</p> <ul style="list-style-type: none"> <li>• “In terms of monitoring year on year the benefits of the outsourcing arrangement with InfraCo ... the whole outsourcing arrangement changes every year. There’s fluctuations, you know, businesses in, businesses out, volumes up, volumes down, things change. And we needed the ability to keep all those changes live and going, and be able to record the effect on the benefit output” (Dave, ISOM Manager, interview, 25 May 2006)</li> </ul>

Table 8.2 continued

<p>Only one person had a thorough understanding of the evaluation model.</p> <ul style="list-style-type: none"> <li>• “A business risk is that I’m the only one who knows how to operate it” (Claire, IS Commercial Analyst, project manager interview, 25 May 2005)</li> <li>• “Everything relied on Claire. She actually had so much of the, I suppose, the IP inside her head. Single point of failure, if anything happened” (Dave, ISOM Manager, interview, 25 May 2006)</li> </ul>	<p>Capture Claire’s tacit knowledge in a new solution and involve other people in its development</p> <ul style="list-style-type: none"> <li>• “It’s not good for any organisation to be relying for a significant function on one person” (Dave, ISOM Manager, interview, 25 May 2006)</li> </ul>
<p>The size and complexity of the spreadsheet models limited their potential for wider use.</p> <ul style="list-style-type: none"> <li>• “If it was made more usable it could have a more extensive user base. The hope is for AlphaCo to use this beast we have created” (Claire, IS Commercial Analyst, interview, 23 March 2005)</li> <li>• “There are some things going on in AlphaCo at the moment that if they go ahead ... would mean that scalability ... is a crucial factor right now ... If we do go down that path then we have to have the tool available to do it. Otherwise the whole thing’s going to have to be done in Excel again” (Claire, IS Commercial Analyst, project meeting, 19 August 2005)</li> </ul>	<p>A “future-proof” solution that was potentially scalable to a wider community of users, or to other outsourcing arrangements or business application areas</p> <ul style="list-style-type: none"> <li>• “The solution should be scalable so that users in the global environment can also perform scenario analysis and run and view evaluation reports in the future” (ISOM database project RFI document, July 2005).</li> <li>• “We needed something that was easily repeatable ... so we can apply it to other instances of outsourcing” (Dave, ISOM Manager, interview, 23 March 2007)</li> </ul>

Figure 8.2 illustrates the emergent process based around establishing the need to change the existing spreadsheet models for ongoing outsourcing contract evaluation.

Figure 8.2: Problematizing the need for change



Important influences on the problematisation were key members of the ISOM team's perceptions of their organisational role and the limitations of the existing models. Their understanding of the problem and conceptualisation of a solution were shaped by their interpretation of the changing contractual context and their understanding of a guiding principle that emphasised scalability and adaptability to change. In the process, team members reproduced and enacted this guiding principle (reinforcing its institutionalisation), established the shape of a desired solution, and became committed to a course of action that resulted in the initiation of a new IS development project.

### **8.2.2 Initiating the project**

As noted above, discussions in the ISOM team about the limitations of the existing spreadsheet models and the desirability of an improved solution ultimately resulted in an initiative to develop an enhanced model solution for outsourcing contract management:

So the driver for it was really conversations with James, conversations with Claire, saying 'Really, this is what we need to do. We need to make this better.' And from that we initiated, 'Yes, let's do it,' and Claire took it up and said 'Okay, this is what we will do.' (Dave, ISOM Manager, interview, 25 May 2006)

In fact, migrating the two spreadsheet models to a database solution seems to have been regarded as a logical progression by the ISOM team, and the development of a centralised database solution was included by James in the IS budget for the 2005 financial year as a planned capital expenditure project:

It had always been on the development path ... We always knew that it would go onto a database. It was just in the path – the next step. (Claire, IS Commercial Analyst, interview, 20 June 2006)

Within AlphaCo, the usual procedure for progressing an initiative of this nature seems to involve the business unit owning the initiative contacting their IS business support team, who log the initiative in AlphaCo's change control system (based on Microsoft ClearQuest) as a change request. This may trigger a formal requirements management process, in which members of the relevant IS business support team and IS Architecture work with the business unit to clearly define the business problem, its causes and impacts, and possible approaches to addressing it:

Business requirements, that's before, before they even get to projects. It's like, 'Is it a problem?' and 'How is it a problem?' And at some point in the problem definition, it will be, 'Ah, is it big enough to warrant a project-ised approach?' (Brenda, IS Project Office Analyst, interview, 26 April 2005)

The business need to have some idea of what the problem is they're trying to solve. Problem definition. You know, they come and talk to IS Architecture to talk about what sort of IS solutions might help out in that particular area. (Harry, IS Architect, interview, 23 September 2005)

In this case, the owners of the initiative, the ISOM team, are part of AlphaCo's Corporate Services. Consequently, as end users they are serviced by the Corporate Services Business Support team. However, the usual formal process was not strictly followed. Because it was an internal IS initiative, certain "shortcuts" were taken:

So everything, in theory, should go through [ClearQuest]. That didn't happen, because James works in IS. It's obviously easier just to shortcut the process [laughs]. And this was the problem of course. Because it's IS, you, well, it's like the engineer's – it's like the mechanic's car, if you know what I mean. When it's your process that you are dealing with, then perhaps you're not quite as formalised as you should be. (Harry, IS Architect, interview, 23 September 2005)

Further, because the initiative was considered to be relatively small by AlphaCo's standards, straightforward and stand-alone, there was less perceived need for a formal problem definition process and the involvement of Corporate Services Business Support staff:

Claire's project is considered a ... medium to small project. Secondly, it was, it was actually quite tightly scoped. It wasn't messy ... I should say it really isn't that typical, because it's one of the neater ones relatively speaking ... The problem definition part – I think the problem was very well defined already. I mean, yeah, the problem was very well defined. (Brenda, IS Project Office Analyst, interview, 16 May 2006)

Nevertheless, the proprieties were observed and the essential elements of the process were undertaken. The Corporate Services Business Support Manager was consulted by James, as the owner of the initiative, and Harry, the IS Architect for Corporate Services, became involved:

Anyway, we effectively followed the process. I mean, James went and talked to [Corporate Services Business Support Manager], and I got involved early on, to understand what it is they're trying to achieve, get some sort of problem statement out of it and then work out what sort of tools might be appropriate. (Harry, IS Architect, interview, 23 September 2005)

Analysis of the documentation related to the requirements management process also suggests that there is some flexibility in applying the process: "The process and the associated procedures provides guidance ... but relies on ... skill and experience to determine how it should be utilised in the different cases" (ISPDR requirements management document). In particular, "the scale and type of change" may determine the extent to which it is used.

### **8.3 Episode 1: Engaging the IS Project Lifecycle**

Initiatives significant enough to be formally declared a 'project' by their owners prompt the involvement of the IS Project Office and engagement of the IS project lifecycle, the formal IS project management framework and gating process used to monitor and control IS project progress at key points. As a capital expenditure project that had been predefined in the annual budget, the ISOM team's initiative was formally considered a 'project':

In Claire's project, her's is actually specified as part of the planned projects for FY05, so it's definitely a project. There's no quibble about that. And once they've decided that, they start going through the [IS project] lifecycle (Brenda, IS Project Office Analyst, interview, 26 April 2005)

### **8.3.1 Developing the concept**

The first phase of the IS project lifecycle involves preparation of a brief Concept Document, the formal deliverable used to evaluate whether the project should proceed to the next phase, a feasibility study. It consists of a high level description of the problem being addressed, the proposed solution, its benefits, resource requirements and any associated risks. At this stage, the project is logged into Tracking, AlphaCo's project management tracking and reporting tool.

At the beginning of February 2005, Claire completed a "very, very abbreviated" (Brenda, IS Project Office Analyst, interview, 26 April 2005) Concept Document. The document estimated an indicative budget of \$100,000 and a 6-month timeframe for project completion. The intention was to complete the project by December 2005, at the very latest, so that the new solution was fully operational and annual adjustments could be made before the outsourcing contract anniversary at the end of February 2006. It was not anticipated that the timeframe would be problematic as the project was perceived to be a well-defined and straightforward migration of existing spreadsheet models to a database solution.

The Concept Document was passed to the IS Project Office, who logged it into the Tracking system and submitted it to the standard approval process. In early March, the Concept Document was presented by James at a meeting of the gating team, composed of senior IS managers, where it was formally approved to proceed to the Feasibility phase (although the project's status in Tracking was not updated to Feasibility until several months later).

### **8.3.2 Sourcing a project manager**

The initial intention was for Claire to manage the project. Even though she did not have formal project management experience, she had the best understanding of the two existing spreadsheet models and what was required from any new solution. The next stage of the project, the Feasibility phase, was due to begin in mid April 2005, when it was expected that Claire's busy schedule would have cleared enough to enable her to begin working on the project on a more dedicated basis. However, as this deadline approached and passed, it became increasingly obvious to Claire and her superiors that she did not have the time available, at least in the short term, to manage the project, particularly given the end of year deadline allocated to the project. As Dave explained, the ISOM team was relatively small and highly specialised, so that releasing one member from their normal duties would be difficult:

It's always the way it is ... Any large organisation, for the last number of years, has always been rather 'lean and mean' in our, our resourcing of people. It's always absolutely bare minimum. So, to say to, say Claire or Gary, 'You run that project', who's going to do their day job? That's the reasoning ... 'Who can do what? Who has the time available?' (Dave, ISOM Manager, interview, 25 May 2006)

The decision was therefore taken to engage an external project manager to manage the project, at least through the Feasibility phase and possibly all the way through to completion of the project. Brenda, an IS Project Office analyst, took on the role of sourcing an external project manager:

I'm hoping [the external project manager] will go all the way through ... We will assess it at each phase and I'll make her [Claire] my recommendation. Because our recommendation is that you find somebody to do the Feasibility and assess the situation, because you're not going to have time. And that was the whole driver of this, was that she didn't have time. And one of the criteria has to be that of delivery before Christmas. And so we're sort of looking at the time and thinking, well, we get into Christmas wishes now [she laughs] if we delay it any further. (Brenda, IS Project Office Analyst, interview, 26 April 2005)

The use of external project managers is well established within AlphaCo. While there is no specific policy on doing so, this practice is consistent with a guiding principle on outsourcing IS delivery and support activities. Using external resources for activities such as project management is also a logical extension of the acquisition preference guiding principle:

There's no policy on that [outsourcing project management], yeah. Again, you know, there is a guiding principle of 'buy and not build' ... It's more encoded in guiding principles. (James, IS Commercial Services Manager, interview, 14 June 2006)

I think if it can be done internally, we do it internally, if someone's got the time. Otherwise we get someone in. And that's a good approach ... The culture is, 'If you haven't got the resource, buy it in'. And we've been doing that with [the external Project Manager], I guess. And, 'Get it done, and get it done quick'. (Gary, IS Commercial Analyst, interview, 5 January 2006)

The organisational history and experience of project management appears to have been an important influence in shaping the practice of using external project managers in AlphaCo. As one IS Project Office analyst put it, "We outsource our project management. We don't train in project management" (Kate, IS Project Office Analyst, informal project conversation, 23 June 2005). Earlier use of internally trained project managers had proven unsatisfactory because of the learning curve involved and their departure to other employers once they had gained useful experience in project management. Using already trained external project managers also ensured the requisite project management skills were brought to bear on a project, and matched supply to actual demand for project managers within the organisation: "We get to pick the skill set. We get to optimise that level of experience and skills" (Brenda, IS Project Office Analyst, interview, 16 May 2006). The idea that "project management is actually a specialist skill that is best brought in

externally” (Andrew, IS Project Office Manager, interview, 16 May 2006), is consistent with the notion of outsourcing non-core business functions often mobilised by AlphaCo staff in explaining various outsourcing arrangements:

I know one of the reasons [for using external project managers] was project management wasn't a core function. I mean we're a [manufacturing] company. It wasn't one of the core functionalities of what we do ... So, it just seemed like a better strategic fit ... You know it's like, 'It's not part of our core business'. Yeah, 'It's not part of our core business, so we shouldn't be doing it'. (Kate, IS Project Office Analyst, interview, 21 July 2005)

As noted in Chapter 7, references to (and applications of) outsourcing non-core business functions are a reflection of notions such as 'core competencies' and 'strategic outsourcing' prevalent in business literature and practice from the 1990s.

Using a standard template contained in the ISPDR, and working from the Concept Document and discussions with Claire, Brenda prepared a detailed position description for an external project manager. The nature of the models at the centre of the project influenced how the characteristics of an appropriate external project manager were constructed. Claire and Dave had very definite ideas about the specific skills and experience they required. They wanted someone with a business background and financial analysis skills who would be able to understand the “large scale, highly complex financial models” (External project manager position description) and converse with members of the ISOM team: “In Claire’s opinion, the project manager cannot possibly do a decent job unless they really understand what the hell she is trying to do” (Brenda, IS Project Office Analyst, interview, 26 April 2005). The external project manager also needed to have prior experience in delivering the type of solution wanted (i.e. model migration to a database), as the relevant expertise appears to have been lacking in the ISOM team:

[We] want to be able to sit down and have a conversation with you and know you'll understand ... We want to move out of the Excel model into some sort of database model. We want the project manager to come in and tell us what we want. (Claire, IS Commercial Analyst, project manager interview, 25 May 2005)

Brenda recognised the potential difficulty in obtaining someone who was strong in both financial analysis and project management. However, in this case, project management expertise was regarded as less critical because the project was considered to be relatively straightforward and project management support could be provided internally through the IS Project Office:

It's a small project as far as project management goes ... We're going to start at this date, finish at this date, and hit these targets as we go along ... The skill bit is deciding what is to be done. (Dave, ISOM Manager, project manager interview, 13 May 2005)

The position description was forwarded to a recruitment consulting firm in late April 2005. The IS Project Office had recently implemented a practice of strategic sourcing of external project

managers from preferred “people suppliers”. The intention was to establish relationships with a small number of recruitment firms and to build a “stable of project managers” (Andrew, IS Project Office Manager, interview, 16 May 2006) with ongoing experience of AlphaCo’s operating environment and systems:

If we keep using the same companies, we can get a better deal on their hourly rates or daily rates. We don't have to keep training people. They know our systems. They'll just carry on. They get to know also the business. (Kate, IS Project Office Analyst, interview, 21 July 2005)

It was difficult to find a person with the desired skills set, so that recruitment of a suitable person took some time. The first potentially suitable candidate was interviewed by Claire and Dave in mid-May. Although this person had the requisite financial experience, during the interview it emerged that he felt he had neither the experience nor confidence to evaluate the various options and deliver the type of solution envisaged.

Towards the end of May, a second candidate, Frank, was interviewed by Claire and Dave. Frank had the requisite financial, technical and solution delivery experience, and despite lacking formal project management experience (although he had studied project management at university), appeared confident that he could perform the boundary-straddling role required: “I can have a comfortable conversation with IT and with Finance” (Frank, project manager interview, 25 May 2005). Frank was appointed as Project Manager and began on 30 May 2005, to the relief of Claire, who was pleased that “things can now move forward” (Claire, IS Commercial Analyst, project manager interview, 25 May 2005). The appointment of an external project manager prompted Claire to reappraise her involvement in the project, taking a higher-level, project oversight role:

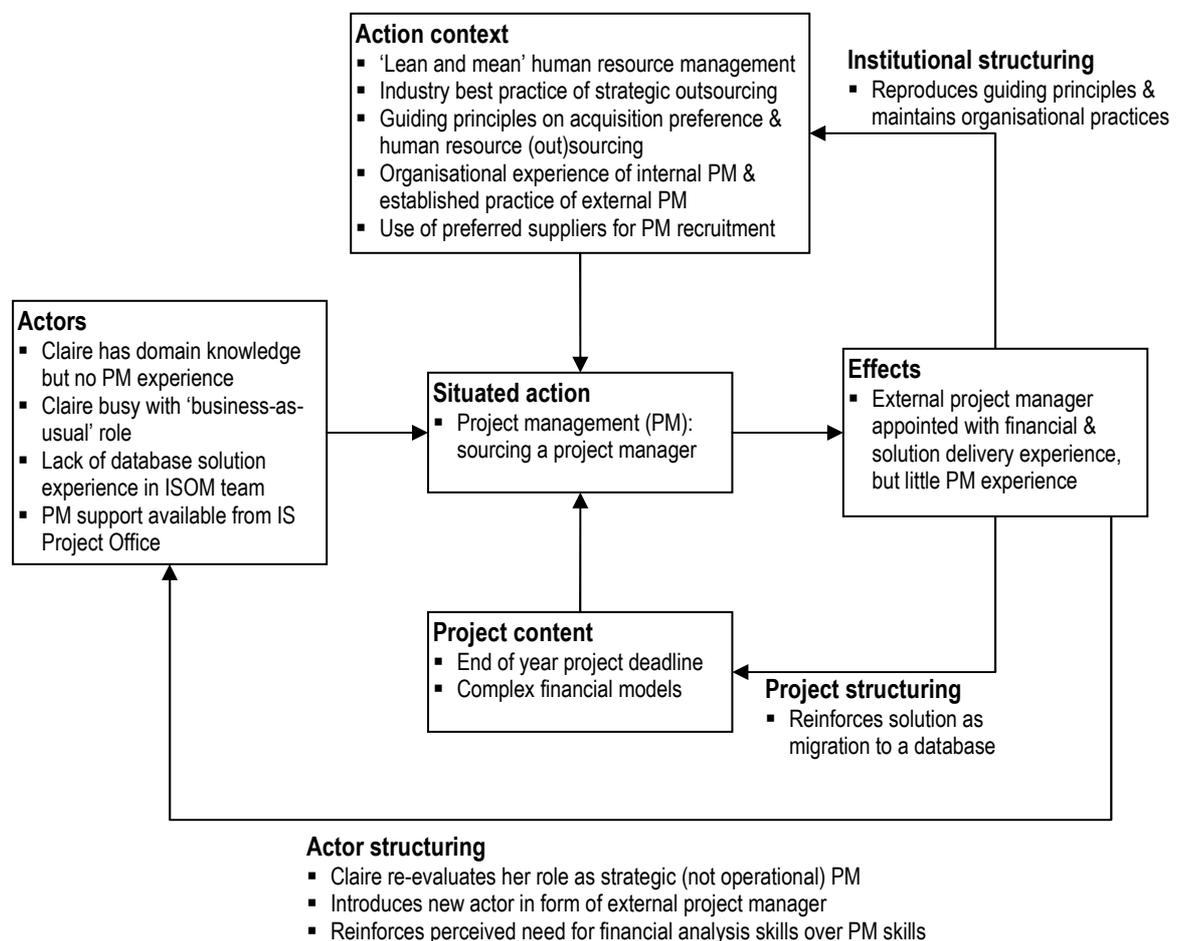
Just making sure the project was running smoothly and they were delivering everything within scope and making sure that the project team was doing what they were meant to be doing ... He [Frank] was managing it as an, on an operational perspective. I was more at a high level, strategic, perspective I guess. Yeah, so he was project manager on the ground. (Claire, IS Commercial Analyst, interview, 20 June 2006)

It is worth noting that, despite the delay caused by the appointment of an external project manager, the perceived nature of the project meant that the AlphaCo staff associated with the project did not anticipate any problems in completing the project by December 2005. Indeed, when Frank commented on this deadline, Harry joked that Frank would “have plenty of time for golf” (Harry, IS Architect, informal project conversation, 16 June 2005).

Figure 8.3 summarises the process that resulted in the appointment of Frank as Project Manager for this project. The decision to appoint an external project manager was situated within a range of organisational and industry contextual conditions, and was also influenced by the mix of skill sets available in AlphaCo’s IS resources. The project, based around the migration of

complex financial models to a database solution, shaped the perceived priorities for effective solution delivery and project management in this case. The end of year deadline established for the project, which provided added impetus for appointing an external project manager, was itself influenced by the anniversary date for the InfraCo outsourcing contract and the need for an operational solution for contract reporting. The situated action surrounding the appointment of Frank reinforced the various guiding principles and organisational practices relating to outsourcing and the use of preferred suppliers, and led to a re-evaluation of Claire's future role in the project. The appointment of an external project manager introduced a new actor, with different knowledge, skills and interests, and with the potential to shape the trajectory of the project and emergent solution.

Figure 8.3: Sourcing a project manager



## 8.4 Episode 2: Defining the Project

With the appointment of Frank, work on the project began in earnest. During the Feasibility phase of the AlphaCo IS project lifecycle, various activities need to be undertaken in order to establish the feasibility of a project so that a decision can be made on whether it should

proceed. These activities include defining the requirements, objectives and deliverables for the solution (see, 8.4.1 Scoping out the requirements), establishing the preferred solution (see, 8.5.1 Identifying and short-listing potential vendors) and estimating its costs (see, 8.5.3 Negotiating with Vendor3) and preparing a business case (the Feasibility Report) for gating approval (see, 8.5.4 Preparing the Feasibility Report). As is the case with most AlphaCo IS projects, most of this work was undertaken by the project manager, Frank, with input from the users of the models, Claire and Gary, their immediate manager, Dave, the project sponsor, James, and the IS Architect for Corporate Services, Harry. To all intents and purposes, aside from James, these people formed the project team for the duration of the project (Harry eventually left AlphaCo at the end of the Feasibility phase). Throughout the project, Frank prepared monthly progress reports on the project within the Tracking system.

During his first month at AlphaCo, Frank was given an overview of project management practices in AlphaCo IS by IS Project Office analysts (over several sessions). This instruction covered AlphaCo's project management standards, the IS project lifecycle, project initiation, project financials, how to use the Tracking system and the parts of the ISPDR related to project management. Frank was also given reference material, such as PowerPoint presentations about project management at AlphaCo IS and the Tracking training manual. As one IS Project Office Analyst noted, the rationale behind the training was so that Frank knew, at a high level, what was expected in terms of project management, where to find information about the project management practices within AlphaCo IS or, at least, who to contact to find out more about it:

That two-hour session is running through the life cycle, the background with the standards. You know, obviously not too much ... But running through, 'These are our standards. This is our terminology that we use. Don't care if you do any thing over and above this, but this is what we need ... in terms of portfolio and project reporting.' (Kate, IS Project Office Analyst, interview, 21 July 2005)

During his first month at AlphaCo, Frank was largely guided by others in terms of following AlphaCo IS project management processes and practices. Towards the end of June, Frank systematically reviewed the main project management-related processes in the ISPDR and printed out all of the available documentation, which he then collated in a project management folder, categorised by IS project lifecycle phase. Appropriate documentation was also retrieved from associated processes to do with IS acquisition (Frank, Project Manager, informal conversation, 3 August 2005). Although locating and retrieving information from the ISPDR was "not an easy process" (Frank, Project manager, interview, 21 October 2005), Frank regarded the documents themselves as useful, and over the course of the ISOM database project, he often referred to documents in his project management folder or in the ISPDR itself. In fact, Frank suggested that training in the use of the ISPDR should have occurred earlier and been more

intensive, so that he could have made greater use of the ISPDR from an earlier stage in the project:

I guess now that I understand it more, it's not so hard to navigate your way around it, but I didn't really understand how it all came together to begin with. I think I could've been trained a bit better ... That probably would have been better earlier on too, when I think about it. So, you can say, okay this is the AlphaCo process, rather than getting into the project without knowing what the AlphaCo process is. (Frank, Project Manager, interview, 12 December 2005)

#### **8.4.1 Scoping out the requirements**

During his interview for the position of project manager, Claire and Dave explained to Frank that to start with he would need to develop an understanding of the project in order to be able to scope out its requirements. Frank spent the early part of June familiarising himself with the evaluation model and, to a lesser extent, the scorecard model, basically reviewing and documenting them “to gain understanding of how the various spreadsheets pull together to construct the outcome reports and models” (ISOM database project document, June 2005). In recounting his initial experiences with the evaluation model, Frank said that Claire had given him a “45-minute overview” of the model and explained to him that “the best way to learn or understand the model is to get in there and try it for yourself” (Frank, Project manager, informal conversation, 15 December 2005).

Claire also gave Frank a document that contained diagrams depicting how the various components of the evaluation model fitted together, which he found useful. This document functioned as a mediating artifact in that it represented a translation of Claire's understanding of the evaluation model, which was drawn on by Frank in the process of his arriving at an understanding of the evaluation model. Using the document, there was supposedly less need for Frank to consult Claire with questions about how the model operated. The document became heavily annotated with notes, model component names, and arrows, added by Frank over those first few weeks. According to Frank, he used the document for working out how all the different parts of the model tied together and for navigating his way around the model. Frank obviously felt that there was some value in the document, because when the vendors chosen to deliver a solution first began working on the database he gave them a copy of the document in order to help them understand how the parts of the evaluation model fitted together.

During the first two weeks of June, Frank met individually with the “project stakeholders” (ISOM database project document, June 2005) – Claire, Gary, Dave and James – to discuss their expectations for the project. In general, most of the suggested requirements came from Claire, the person most familiar with the two models, although the various participants each forwarded similar requirements. Based on these individual meetings, Frank constructed a Project Definition

document outlining his “current understanding of the purpose, scope, and deliverables” (Frank, email, 14 June 2005) for the project at a fairly high level, including various questions that needed resolving. Frank distributed the Project Definition document to Claire, Gary, James, Dave, and Harry, who, along with Frank, participated in a formal project scoping meeting in mid-June to define and prioritise the project’s scope and deliverables, using the Project Definition document as the basis for discussion.

During the project scoping meeting, there was general support for the Project Definition document. The various questions it raised were discussed, and consensus was reached on what was required. For example, as originally envisaged, any solution needed to have the capability to provide direct access to the database to a wider community of global users, who would have limited, prescribed interactivity with the database (such as viewing specific data or reports, modelling scenarios, but not adding data to the database). The ISOM team would decide who these users would be and what access they would have. This was not a change to the functionality of the existing models, but rather an extension to their user base. Initially, Claire had talked about expanding the user base as part of the ISOM database project. However, in the project scoping meeting, it was decided to restrict the focus to the delivery of a solution that met the ISOM team’s immediate needs, and that extending access to other users was a future goal, “a 12 to 18 month plan” (Claire, IS Commercial Analyst, interview, 20 June 2006). As Claire observed, extending the user base had been “put on a list of things that could happen but somewhere it had fallen off the list of immediate priorities” (Claire, IS Commercial Analyst, informal conversation, 22 July 2005). From this point onwards, various project participants regarded extending the user base as the next stage in the project:

The basic requirement at this point is to get our evaluation and reporting tool for the InfraCo contract up-to-date, in a usable framework. And that’s within our own environment. That’s not a shared environment. And then we would look beyond that, into a second step later on ... Right now, it’s mimic what we have. (Claire, IS Commercial Analyst, vendor presentation, 12 August 2005)

As a result of the project scoping meeting, “the [project] purpose, scope and deliverables were agreed” (ISOM database project document, June 2005). Frank subsequently amended the Project Definition document to reflect decisions made at the project scoping meeting, and distributed the amended document to the meeting participants. From this point on, the project scope, goals and deliverables were considered to be clearly defined. As the project sponsor reflected, “it was very clear what the objectives on it are. They’re very clearly stated up-front” (James, IS Commercial Services Manager, 14 June 2006):

The purpose of this project is to migrate the existing [evaluation] model and [scorecard] model from Excel into an appropriate database and reporting environment. (ISOM database project Project Plan document, November 2005)

During the project scoping meeting, options were discussed on how the project should proceed. The underlying assumption was that a packaged solution would be sought, consistent with the AlphaCo's IS acquisition preference and package modification guiding principles of "buy not build" and "vanilla" implementation, respectively:

Being the type of solution that it is, we really don't want anything that's going to be customised. We want a packaged solution that is highly configurable, because it's a kind of economic modelling tool. You want something that's going to be highly configurable, and is going to be easily configurable - if that's the correct word - by the end users, who are the experts in this case, being the accountants who work for James ... You want to run a bog standard solution that's going to be implemented on some internal infrastructure. And that's really how the thing is shaping up. And that complies then well with our [guiding] principles for a solution like this, which is something standard, not customised, off-the-shelf. (Harry, IS Architect, interview, 23 September 2005)

It was also decided that an RFI (Request for Information) process would probably be adequate for the project, given its size, without the need to undertake a further, more detailed RFP (Request for Proposal) process. This was later confirmed by Harry in an email to Frank: "For an application of the type we're talking about, RFI would suffice and we probably wouldn't bother with an RFP" (Harry, IS Architect, email, 21 June 2005). Frank was set the task of preparing an RFI document. Having established the project scope, detailed functional requirements for the project needed to be developed in order to be able to complete the RFI document.

#### **8.4.2 Creating a prototype model**

As a preparatory step in migrating the financial models to a database solution (in June), Frank wrote Visual Basic scripts to extract the data from the various spreadsheets in the original evaluation model into a table format in an Excel file, which he called "database.xls". This file, which would eventually contain the data from both the evaluation and scorecard models ready for uploading into a new database solution, came to be referred to by project participants as "the database" file. Frank then also constructed a prototype evaluation model front-end in Excel that replicated the front-end of the original evaluation model. He used this prototype evaluation model front-end to validate the data in the database file against that in the original evaluation model and ensure that the data would feed properly into a database:

[I have been] stripping the data out of all the different workbooks and spreadsheets and putting it into tables. And then I've just built a prototype to sit on top of that table, so it just reports off that table. Just to get an understanding of the relationships between the data fields and also the reports and what the users are looking for ... To make sure we can feed in the database correctly ... It was my idea to build it. Plus, it also helps in terms of validating the data. I've got all this data sitting in the database [file] and I need to test that it's correct in terms of what the model - the existing model - gives me. So the easy way to do that is just to build a front-end model on top of this just to check it. (Frank, Project Manager, interview, 5 July 2005)

Although Frank uses the term “prototype” in this quote to refer specifically to the evaluation model front-end that he built, he generally used the term “prototype model” to refer to both this front-end and the database file it ran off. The term ‘prototype evaluation model’ will be used from hereon to refer to the prototype evaluation model front-end and the data it used contained in the database file.

Frank considered it important to ensure that the prototype evaluation model was correct from the outset. He distributed it to the project team and project sponsor asking for their feedback:

Attached is ... a prototype model. The prototype model runs off the database created from the evaluation model data ... Can you all please review to see if the prototype is giving you the sort of information you are looking for? Anything we pick up now will help ensure that the database is constructed with the correct data relationships. (Frank, Project Manager, email, 1 July 2005)

However, Frank only received feedback from Claire, who pointed out a few additional features she wanted to be incorporated. In fact, Claire had not looked at it in very much detail: “Not really, no. I looked at it very briefly to check that it looked alright, but that was all” (Claire, IS Commercial Analyst, interview, 20 January 2006). With respect to the other members of the project team, Frank eventually concluded that, “if I haven’t heard back by now I’ve got a feeling that I’m not going to hear back. So I’m just going to carry on” (Frank, Project Manager, interview, 5 July 2005). When asked, Gary said he had not looked at the prototype evaluation model too closely because he “thought Claire would do more of that” (Gary, IS Commercial Analyst, interview, 6 January 2006). Neither Dave nor Harry had any understanding of the original evaluation model, so they may not have felt that they could have contributed anything worthwhile.

The prototype evaluation model that Frank created was regarded by both Claire and Frank as being identical in content to the original evaluation model. They both confirmed that the data from the two models reconciled fully. According to Claire, the prototype simplified and rationalised her original model (Claire, IS Commercial Analyst, interview, 20 January 2006), and gave the correct figures when compared to it (Claire, IS Commercial Analyst, informal conversation, 12 August 2005). Frank similarly said that his prototype evaluation model replicated the original model “100%” (Frank, Project Manager, interview, 12 December 2005):

Basically, all the data’s sitting in about 20 or 30 different spreadsheets [in Claire’s model]. And I’ve just pulled it all together into one database and then just sat a front-end on that. So, that’s basically the difference. It’s exactly the same data ...same rules, same everything. (Frank, Project Manager, informal conversation, 10 November, 2005)

While the original scorecard model did not suffer the same workability issues as the evaluation model, it was still considered to be time-consuming to learn to use (Frank, Project Manager, project meeting, 26 August, 2005). In addition, scorecard data from various files

needed to be incorporated into the common data file that could be fed into the eventual solution. In July, Frank began work on a prototype form of the scorecard model. First, he wrote scripts to extract data from the original scorecard model into tables that would eventually be incorporated into "database.xls". He also constructed a prototype scorecard model front-end within Excel, which replicated some, but not all, of the pages in the original scorecard model front-end (e.g. it did not include the scorecard report summary page). This file was self-contained in that it incorporated the data needed to generate its reports. The term 'prototype scorecard model' will be used from hereon to refer to the prototype scorecard model front-end and the self-contained data that accompanied it. Part of the reason this prototype scorecard model front-end was not comprehensive was that at the time Frank was doing this work, changes were being made to the original scorecard model front-end in response to requests for additional reporting from the new CIO and another IS manager, as well as an initiative to bring it in line with the IS Balanced Scorecard format. As a result, the original scorecard model front-end continued to evolve over the next few months, before reaching a stable form at the end of September 2005. Further, it was assumed by Frank and Gary that additional pages could be added to the scorecard model front-end of any eventual solution relatively easily. Frank showed the prototype scorecard model to Gary, who looked at it, although not in great detail as he assumed that a more complete prototype scorecard model would be made available to the developers once development had begun.

When data in the two forms of the scorecard model were compared, some of the data related to the cost of outsourcing differed. The difference was traced to the use of different versions of the data. The prototype model drew on the most up-to-date version of scorecard data, while the original scorecard model needed to be updated. It was also realised at this stage that the original evaluation and scorecard models were running off different versions of data for the cost of in-house service delivery. Version control seemed to be a persistent issue throughout the project.

Frank worked on producing business rules for the envisaged model solution, about which he consulted Claire and Gary. These would enable the new solution to reflect changes in AlphaCo IT infrastructure environment over the life of the outsourcing contract. Within the original evaluation model, this appears to have been (at least partially) achievable, but a more detailed and targeted capability was desired in the new solution: "something they've always wanted to do" (Frank, Project Manager, informal conversation, 20 July 2005). Frank produced two documents detailing these rules. One of these contained complex rules and calculations related to a specific process referred to as "the resource unit update process", which dealt with reconciling resource usage above or below the baseline volume specified in the outsourcing contract.

The various design artifacts that Frank produced – the prototypes of the two models, the database file for uploading to the new solution, and the business rule documents he created – represent a particular translation of the design problem. To all intents and purposes, the main users of the original models, Claire and Gary, felt that each of the prototype models adequately resembled the respective original models they were responsible for. Further, these artifacts can be regarded as (in due course) mediating understanding between the owners of the model (the AlphaCo ISOM team), prospective vendors, and the developers eventually responsible for implementing a database solution. For example, a copy of the prototype evaluation model that Frank had prepared was later distributed to prospective vendors as part of an RFI process. At the time, one of these vendors congratulated Frank on that initiative:

I was pretty impressed with your level of skill in terms of developing that prototype in Excel. I mean, it's a really good place to start. Most other organisations we deal with really don't have a good understanding in terms of how the model's going to work. So, it's really kudos for you guys to be able to produce that. (Leon, SoftCo Director, SoftCo product demonstration, 30 September 2005)

Indeed, members of the project team were of the opinion that the unstructured, large and cumbersome Excel spreadsheet evaluation model needed to be rationalised into a more usable form for whoever would be developing the database solution:

The whole thing is formula driven. All Frank did was make it pretty, and to simplify it. I mean, [my Excel model] is enormous. It looks like a couple of pages, but in order for [developers] to be able to understand how all of the information that this makes up, gets to this form - because this is a front-end here literally - Frank needed to turn all the background information into tables ... In the format that it was in, it would've made absolutely no sense to them. It would have driven them mad trying to track it down. It drives me mad half the time. (Claire, IS Commercial Analyst, interview, 20 January 2006)

As a result of his experiences using the original evaluation model, creating the prototype evaluation model, and conversations and meetings he had with Claire, Frank developed a detailed understanding of the evaluation model, to the point where he felt that he “just about knew it by heart” (Frank, Project Manager, informal conversation, 23 November 2005):

[Did Frank develop a through understanding of the model?] I think so, yeah. We spent quite a lot of time working through it. So yes, he did understand it. There were of course elements of it that he, he was aware of, but didn't have a full understanding of. But, but we worked through those issues as we found them. (Claire, IS Commercial Analyst, interview, 20 June 2006)

He also developed an understanding of the scorecard model that, although not as detailed as his understanding of the evaluation model or Gary's understanding of the scorecard model, proved to be adequate for his lesser involvement with that aspect of the project. Members of the ISOM team implicitly showed their confidence in Frank's understanding of both models in the range of activities they delegated to him over the course of the project:

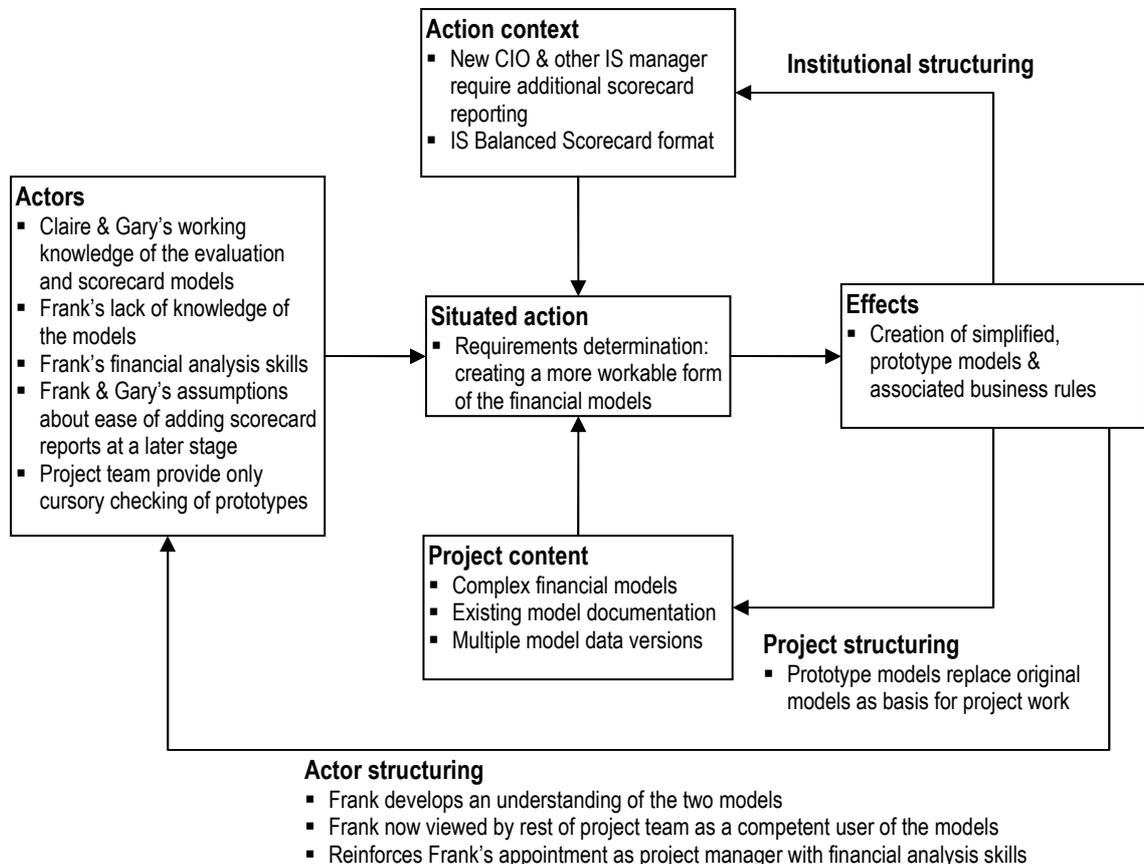
I mean, he wasn't just project managing. He was getting all the data into the right formats because he, you know, I brought him on board for his expertise in that area. (Claire, IS Commercial Analyst, interview, 20 June 2006)

I think Frank ... possibly had to do a bit more of the grunt work, which he probably shouldn't have been doing. But basically because he was, he knew it inside out, he did a bit more than he possibly thought he had to, would have had to, at the start. (Gary, IS Commercial Analyst, interview, 5 January 2006)

Moreover, at times during the course of the project when Frank was less busy, Claire treated Frank as another ISOM team resource, getting him to perform non-project tasks on both models that she or Gary were too busy to do.

Figure 8.4 summarises the process that resulted in the creation of the prototype models by Frank. As noted above, creating these prototypes established Frank's understanding of the original evaluation and scorecard models, and utilised the financial modelling skills that had made him attractive as the external project manager for this specific project. It also provided new design artifacts that would substitute for the original models as the basis of future project work. This meant that any simplifications, assumptions, limitations or errors in the prototype models had the potential to influence subsequent development of the eventual ISOM database project solution.

Figure 8.4: Creating a prototype model



### **8.4.3 Preparing the RFI document**

Frank was responsible for completing the RFI document, with some support from Harry. Using a template document obtained from the IS Contracts Analyst (in IS Commercial Services), Frank completed multiple sections of the document, including background information about the organisation and the project, the terms and conditions of the RFI process, and a detailed list of the functional requirements for the project. In talking about preparing the RFI document, Frank said that he had initially found it difficult because he was unsure about the level of detail that was required. Harry completed the non-functional requirements of the RFI document, such as technical architecture, infrastructure services, integration requirements, and post-implementation support. According to Harry, the non-functional specifications are “pretty standardised” across AlphaCo IS projects of similar size or type (Harry, IS Architect, interview, 23 September 2005). The RFI document was completed by the beginning of July. As a formal project document, it represented AlphaCo’s translation of the design problem and solution, and functioned as an important boundary object in subsequent negotiations between the project team and potential vendors.

## **8.5 Episode 3: Finding a Vendor**

In discussing the RFI process during the project scoping meeting, Dave outlined the strategy that he wanted to be followed in evaluating and selecting a vendor. Preference was first to be given to any existing packages being used in AlphaCo from existing vendors, then any other packages available from existing vendors, and finally, if necessary, packages available from other vendors. This approach combines two of the IS guiding principles: the acquisition preference principle of “buy not build” and “leveraging existing solutions”, tempered with the vendor selection principle of using “preferred suppliers”.

### **8.5.1 Identifying and short-listing potential vendors**

From very early in the project, Harry investigated whether a suitable packaged solution already existed within AlphaCo that could be leveraged in this project (ISOM database project document, May 2005). When nothing suitable was found, consideration then turned to whether a proven solution existed (consistent with their technology adoption guiding principle on using proven technologies where possible):

Frank talked to me a bit early on about how we go through identifying the right type of tools ... And then from that we had a quick look around at a long list of the sorts of solutions our incumbent suppliers might be able to provide ... as well as having a look out for obviously other applications that might be out there. (Harry, IS Architect, interview, 23 September 2005)

In doing so, Harry seems to have focused on enterprise-level applications (Harry, IS Architect, informal project conversation, 12 August 2005), which would be consistent with the AlphaCo IS guiding principle on package selection that encourages the use of a small number of enterprise-wide applications across the company.

At the beginning of July, working from a list of six AlphaCo “preferred suppliers” recommended by Harry, Frank phoned each one to discuss the proposal. Each vendor was also sent a copy of the RFI document. The deadline for responding to the RFI was set for the end of July. By later in the month, three of the vendors had contacted Frank and indicated their interest in responding to the RFI. Following a request from one of these vendors, Frank also sent the three interested vendors a version of the prototype evaluation model (that contained “dummy data” only), “so they knew what sort of thing was expected” (Frank, Project Manager, informal conversation, 29 July 2005).

During July, all three interested vendors (Vendor1, Vendor2 and Vendor3) contacted Frank on multiple occasions to ask questions about the RFI document. At all stages, Frank encouraged the three vendors to submit an RFI response, mainly because he wanted to generate competition and be able to present more than one option to the project team. As Frank received information from the vendors (e.g. their RFI responses or product information), he distributed it to the project team for their consideration. In view of their (perceived) roles in the project, Frank (as project manager), Claire (as strategic project manager) and Harry (as technical specialist) tended to review this material in detail, concerned to be as informed as possible about each product. In contrast, Dave and Gary looked at the information in part or superficially, relying instead on the expertise and advice of the others.

Representatives from Vendor1 met with Frank to discuss specific aspects of the RFI document in greater detail. One of these representatives subsequently contacted Frank, concerned that their solution would be too expensive for the small number of users involved, and that they would not be able to meet the Christmas delivery deadline. According to Frank, the Vendor1 representative described their product as “overkill” for what was required, using a striking metaphor to highlight its inappropriateness as a solution to the ISOM database problem (as seen in the following email from Frank to the project team):

Vendor1 will have something by the end of the week (although they have indicated that they think their solution may be a bit like opening a walnut with a sledgehammer). (Frank, Project Manager, email, 4 August 2005)

Consequently, Vendor1 did not submit a formal response to the RFI, but instead presented a brief five-page letter, with “nothing to it” (Frank, Project Manager, interview, 13 September 2005):

They said, 'Here's some information, but we're not responding'. And that was appropriate, because the tool they're talking about costs millions of dollars to implement and operate,

and it's not really for three people to use. You know, it's not what it's for. (Harry, IS Architect, interview, 23 September 2005)

By comparison, the Vendor2 package was smaller than the other vendors' products, although the Vendor2 representative felt that it could meet all of the project's requirements. Vendor2 also did not submit a full response to the RFI as, relative to the total cost of their solution, it was not cost effective for them to do so. Instead, they supplied Frank with some product documentation and a demonstration copy of the product. After trialling the software, Frank had concerns about the product's suitability, which were not allayed, even after meeting with the Vendor2 representative to review the product in more detail. For example, Frank felt that the product was too cheap, and "generally, the cheaper it is, the less flexible and customisable it is" (Frank, Project Manager, informal meeting, 1 August 2005). When he mentioned the cost and estimated time for delivery to Claire, she was surprised: "Five days! I had expected 5 weeks" (Claire, IS Commercial Analyst, informal project meeting, 1 August 2005). Frank, Harry and Claire, all expressed disappointment about Vendor2's overall lack of response, which they put down to the company's small size and its representative's perception that the product was unsuitable.

The representative from Vendor3, Jack, showed a keen interest in the RFI, and expressed confidence that his company could put together a package of tools that would be suitable. His response to the RFI comprised an 85 page-long document with multiple other documents to support the response. It was regarded as very professional by the project team, especially relative to the (lack of) response from the other two vendors. Jack subsequently supplied a great deal of additional product information, and was proactive in contacting various project team members in case they had any questions. In mid-August, Jack demonstrated a number of Vendor3 products to the project team (except Dave) and project sponsor (James), and presented a simple model that he had built based on the prototype evaluation model that Frank had sent him. One of the products that Jack demonstrated was a planning tool, strictly speaking beyond the immediate requirements of the project but attractive to some of the project team in the longer term. Harry interpreted this as Vendor3 taking the opportunity to present their enterprise-level corporate performance management software to AlphaCo. As Harry explained:

The problem is for Vendor3 is they can see AlphaCo sitting there as a big, fat client with regards to their corporate performance management software, which is what [Jack] was alluding to: 'Well you know, you could take an enterprise license for this suite. You don't have to use it all'. And even though I'd told him upfront, 'Look we're just interested in this kind of niche area' ... But I just don't think he could help himself. He just had to talk about it a little bit. (Harry, IS Architect, interview, 23 September 2005)

In the past year, AlphaCo had been through a process to identify and select a vendor to fulfil their application requirements in the corporate performance management area, and had

been considering products from both Vendor3 and Vendor1. Although that process was not fully resolved, it seemed that Vendor1, who was the preferred supplier for other enterprise-level applications in AlphaCo, was the most likely choice. For this reason, Harry was reluctant to see the ISOM team purchase the Vendor3 product when the company had not yet finalised which vendor to work with. From his perspective as an IS Architect, Harry preferred to align the ISOM database project solution with what the rest of the organisation was going to do (Harry, IS Architect, informal project conversation, 12 August 2005). Harry's attitude was consistent with the AlphaCo IS guiding principle on package selection, intended to rationalise the range of IS applications being used to meet business requirements across the whole company. At the time, Claire, who saw potential applicability for the use of the Vendor3 planning tool by the ISOM team, disagreed and argued that she "didn't see why they should be dictated to by an AlphaCo-wide solution", especially one that did not fit the specific requirements of the ISOM database project (Claire, IS Commercial Analyst, informal project conversation, 12 August 2005). Nevertheless, at various times, Claire and other members of the project team acknowledged that a Vendor3 solution was "overkill" for their requirements. In doing so, they often mobilised the Vendor1 metaphor to liken a Vendor3 solution to 'hitting a walnut with a sledgehammer' or using analogous alternative metaphors:

I was reading through the RFI response and I was saying to Frank before, I said, 'I'd thought of an analogy for it. It's like trying to kill a pigeon with a cannon'. So it's, it is very big, but it has all the right tools. But is it going to be overkill? (Claire, IS Commercial Analyst, Vendor3 product demonstration, 12 August 2005)

In mid-August, when the project team (excluding Harry) met to review the products from the three vendors, there was effectively only one "package remaining on the table" (Claire, IS Commercial Analyst, project meeting, 19 August 2005). James, the project sponsor, had previously ruled that Vendor1's product was too expensive and required too much training. The project team (and project sponsor) had reached the conclusion that the Vendor2 product was "just too small for our requirements" (Claire, IS Commercial Analyst, project meeting, 19 August 2005). It was perceived to be too cheap, lacking in functionality, and requiring a lot of work to make it usable. Vendor2 was considered to be too small to provide adequate support. As Frank concluded, "Six months down the track, we'd regret going for the cheapest option" (Frank, Project manager, informal conversation, 19 August 2005).

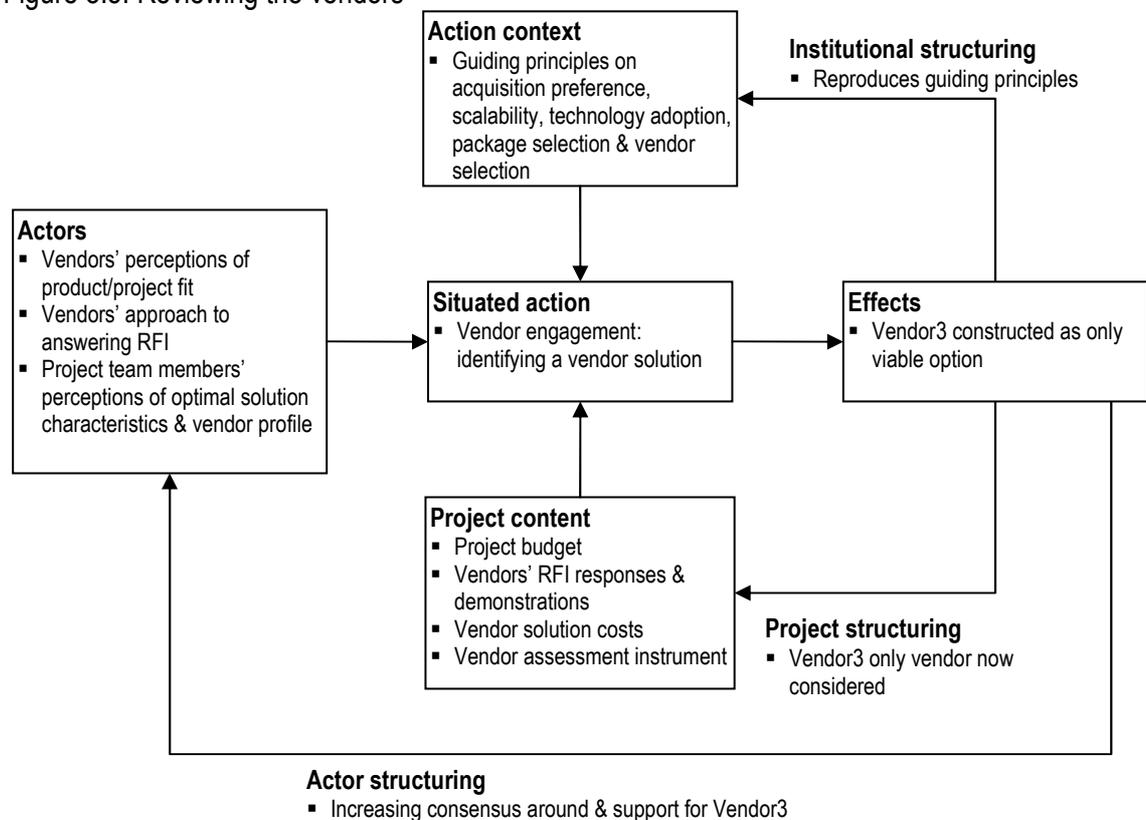
In contrast, the project team seemed favourably inclined towards the Vendor3 product as a potential solution. For example, Dave was impressed by Vendor3's professionalism:

They've been doing what we expected. And as an indication of their potential ability to deliver ... they're demonstrating all the behaviours one would expect of someone who actually has good intentions and capability ... The whole thing reads well. (Dave, ISOM Manager, project meeting, 19 August 2005)

Further, as Harry noted, Vendor3 “fits the bill quite nicely” in terms of being a proven vendor consistent with the technology adoption guiding principle: “A vendor that’s going to be solid ... [and] going to support you well ... That fits really well with our principles” (Harry, IS Architect, interview, 23 September 2005).

There were still, however, a number of reservations expressed by the project team, the main ones being the overall cost of the solution including licensing and that Vendor3’s proposed co-development approach would require more-or-less full-time participation by Gary for six weeks. Nevertheless, it seemed to be their only option, other than developing their own solution, which they were reluctant to do. During the project meeting, the team assembled various arguments to justify the Vendor3 product as a “sensible move” (Dave, ISOM Manager, project meeting, 19 August 2005). These included comparing the cost of that solution to the value of the outsourcing contract, possible savings on future staff costs, and its scalability for future needs. The team also discussed the desirability of negotiating the price down with Vendor3. At the conclusion of the meeting, it was decided to continue with the Vendor3 solution and not to pursue the other two any further. Figure 8.5 summarises the situated action surrounding the review of the three main vendors.

Figure 8.5: Reviewing the vendors



## 8.5.2 Formal vendor evaluation

Within AlphaCo IS, formal evaluation of RFI responses is part of the IS procurement process (owned by IS Commercial Services Manager, James, and documented in the ISPDR) and involves the development of a project-specific assessment instrument by establishing key criteria and assigning weightings to them. The contribution of end users in this process is regarded as an important opportunity for user participation. For example, the IS procurement process discusses the need for “considerable input from the business customer and technical review teams to set out the weightings for each requirement” (ISPDR procurement management document). As Harry noted:

We find that the development of the [assessment instrument] is one of the key, is a really good way to engage all the business, the end users. That's where you can get a lot of input, and that can bring them in ... It's really important that they go through that process themselves. There are certain things you just don't want to impose. So we normally use that as an engagement process. So we work with the business people, the stakeholders and the team, to jointly come up with the [assessment instrument]. (Harry, IS Architect, interview, 23 September 2005)

At the end of July, after discussions with Harry and viewing a recently completed example that had been used elsewhere in AlphaCo IS, Frank had created such an assessment instrument (in Excel) for the ISOM database project. To do so, Frank established key criteria (each containing a comprehensive list of requirements) based on information contained in the RFI document, and with input from Harry for the technical criteria. Frank then distributed the partially-completed instrument to the project team for their input in assigning weightings to the various criteria, stressing the importance of their participation. As time passed and they failed to respond, Frank emailed them again to request their input: “HEY GUYS - I haven't, received any responses ... Otherwise we will just end up with my criteria and weighting” (Frank, Project Manager, email, 8 August 2005). Without their input, Frank was concerned that “they may end up with a solution I like, not one they necessarily want” (Frank, Project Manager, informal conversation, 8 August 2005). When asked individually, project team members said they had been slow to respond because they were busy with their everyday roles. Eventually, by mid-August, Frank had received all their responses, which he averaged across each criterion. No individual's relative weightings seemed to stand out as being particularly different from the others. Frank then distributed the resultant assessment instrument to the project team.

At the time of the project team meeting to review the three potential vendors, a formal evaluation of RFI responses using the assessment instrument developed for the project had not taken place. The emergence of only one possible vendor solution candidate seemed to obviate the point of such a process, with Claire noting “that there had only been one real choice” (Claire, IS Commercial Analyst, informal project conversation, 19 August 2005). However, when Frank

and Claire subsequently met with James to discuss the outcome of the project team's meeting, James indicated that he wanted the formal evaluation process to be completed by all the members of the project team. He felt it would pay to take a "more objective approach" to the evaluation to make sure it met all the criteria in the different areas (James, IS Commercial Services Manager, project meeting, 22 August 2005). Frank later expressed the opinion that this reflected AlphaCo's emphasis on adhering to their established processes: "They want to make sure it's done properly" (Frank, Project Manager, interview, 21 October 2005).

Frank emailed the project team with James' request that they complete the formal evaluation of the Vendor3 solution. Although project team members were slow to provide their formal assessments, they generally did a detailed evaluation. Frank collated the individual evaluation responses and circulated Vendor3's overall score to the project team for comment, but received no further feedback:

Everyone seems to realise that they have only one packaged solution to consider and its matter of whether they want to fork out \$300K for it or develop their own solution. (Frank, Project Manager, informal conversation, 29 August 2005)

Interestingly, when asked, the project team members suggested that actually doing the formal evaluation was a worthwhile exercise in that it provided objective criteria against which to evaluate the product. As Frank summarised:

Actually they all feel it's worthwhile doing. Yeah ... James wants it done, so that makes it worthwhile [laughs] ... Just to make sure everything's ticked off and it's all done properly. Rather than a gut feel. (Frank, Project Manager, interview, 21 October 2005)

Dave suggested that, since the formal evaluation is part of an IS Commercial Services' standard process, "it was important that IS Commercial Services follow its own processes, and to be seen to be following them" (Dave, ISOM Manager, interview, 15 September 2005).

### **8.5.3 Negotiating with Vendor3**

By the beginning of September, Frank had collected the information necessary to provide initial, high level cost estimates for a Vendor3 solution (based on quotes only, without any negotiation). In preparing the cost figures, Frank was directed by Dave to identify not just the initial outlay, but also annual operating costs, in order to establish what the total cost of ownership would be for the Vendor3 solution over five years:

Let's say we build a model over our five-year period – yeah, a five-year view, say, of what it costs. Because there must be the development cost, the purchase, the license cost, the maintenance of license cost, and what sort of rates if we bring a developer back out to do anything, tweaking, that sort of thing. And we need to establish scenarios around all sorts of things that take a point of view on that, on the [total] cost of ownership. (Dave, ISOM Manager, project meeting, 19 August 2005).

Dave's suggestion conforms to the total cost of ownership guiding principle, which requires the business case for a new application to be based on both initial and full-cycle costs.

Of the two main products that Vendor3 had demonstrated, ProductA and ProductB (which included the planning tool referred to above), the project team preferred the cheaper, more basic ProductA, which they considered addressed all their needs. Rather than having Vendor3 do the implementation, the project team favoured using a cheaper third party, who had previously performed implementations of Vendor3's products for AlphaCo. Using these preferences (ProductA, alternative implementer), the initial estimated upfront cost of the Vendor3 solution was around \$230,000 (including software purchase, initial licensing, and implementation), with annual maintenance and hardware costs of around \$40,000.

Reaction within the project team was that this initial estimate was far too expensive and needed to be reduced significantly in order to be acceptable to James, the project sponsor. Concerned about the price, Dave asked Frank to organise a phone meeting with Vendor3, so that he and Claire could begin negotiations over the price. Dave asked Frank to convey to Vendor3 that, because of its high price, the project team was not fully committed to their solution. When this phone meeting eventuated, Dave emphasised to Jack (the Vendor3 representative) and his manager the need to reduce the price significantly before they could proceed with a Vendor3 solution. Dave suggested various ways to reduce costs, including Vendor3 reinstating a significant corporate discount for AlphaCo:

Get us back on this [corporate discount], and then this starts looking plausible for me ... We're close to making a commitment, other than the outrageous pricing ... It's not a project with a huge budget at this point in time, and is not seen as a real mission critical program. It's something that we need to do to make our jobs, mine, Claire's, my teams' job, easier ... To get this one over the line, I need to be very sharp. (Dave, ISOM Manager, project meeting, 8 September, 2005)

Over time, Vendor3 did reduce its prices, the biggest reduction being the corporate discount that Jack successfully obtained on behalf of the ISOM database project in mid-September. This reduced the initial upfront cost of the Vendor3 solution to around \$180,000.

Even though the project team had expressed a preference for the more basic ProductA, Jack continued to push its more sophisticated counterpart, ProductB, at increasingly reduced prices, including various combinations of elements of the two products. As noted above, Vendor3 appeared eager to use this project as a point of entry into AlphaCo for ProductB, which they seemed to consider as having wider potential within the company. Dave was well aware of this and willing to use it in negotiations over the project pricing:

[Vendor3] have been wanting, you know, for 12 or 18 months, they've been wanting to the opportunity to demonstrate ... They want to be in here. They see a future for their product. Good driver. Good motivation. And guess what? Good price reducibility! (Dave, ISOM Manager, project meeting, 19 August 2005)

The negotiations with Vendor3 occurred over a period of over a month, during which Frank often did not have a lot to do as project manager. In an effort to save time in the future, Frank continued to work with Jack to plan future logistics for the project, such as exploring alternative options for training courses and even tentatively booking a training session. This was essentially pre-empting the next stage of the project and, in mid-September, Claire told Frank to put any further discussions on hold until the project had been approved to proceed to the next phase. In order to have the project ready for gating approval at the end of September, Claire asked Frank to finalise the costs associated with the Vendor3 solution. Towards the end of September, after negotiating and refining other costs, Frank had an estimated total cost for the project using the preferred Vendor3 solution (ProductA, alternative implementer) over five years of around \$250,000. This included further reductions in the upfront solution cost (to around \$170,000) and ongoing annual maintenance and hardware costs, together with the project management cost for Frank, and estimated annual savings from using the new solution over using and maintaining the existing Excel models.

#### **8.5.4 Preparing the Feasibility Report**

Having established Vendor3 as the preferred solution for the ISOM database project and negotiated their costs as low as possible, Frank was able to work on the project Feasibility Report, ready for a gating meeting at the end of September. The final task in the Feasibility phase of the IS project lifecycle, the Feasibility Report is the formal deliverable used to evaluate whether the project should proceed to the Planning phase. It entails estimating the total project costs (over five years), completing a cost benefit analysis, reporting non-financial benefits, setting milestones, and undertaking a risk assessment. All requisite information is entered directly into Tracking by the project manager, and once complete, the Feasibility Report can be automatically generated (at the project manager's instigation).

The Feasibility Report that Frank prepared assessed the project as being of "low risk", and included a large list of non-financial benefits, including improved reporting, analysis and scenario modelling, scalability, a centralised database, improved decision-making, risk reduction, increased usability and improved job satisfaction. When the Feasibility Report was completed, Frank notified the IS Project Office, who then submitted it to the standard approval process ready for the next gating meeting.

Frank also prepared a PowerPoint presentation for James to use when presenting the ISOM database project for approval, which included a project overview, the need for change and problems addressed, the alternatives, the vendor selection process, a financial evaluation of the preferred solution, and its key benefits. The presentation was something that James liked to use

to convey additional information to the gating team who were likely to be unfamiliar with the project (Claire, IS Commercial Analyst, interview, 21 October 2005). The presentation was reviewed by Claire and James, the latter appearing happy with the project proceeding to the gating meeting (Frank, Project Manager, informal conversation, 27 September 2005). The financial evaluation used in both the Feasibility Report and the presentation was consistent with the total cost of ownership guiding principle, and the presentation also referred to the acquisition preference guiding principle in stating that the alternative of developing a solution in-house was “not aligned with IS strategy” (ISOM database project Feasibility Report, September 2005), a point that Frank had added at James’s suggestion.

At the end of September, Harry left AlphaCo. By this time, his role in the ISOM database project was complete and he had handed over responsibility for ongoing operational support to a member of the Corporate Services Business Support team.

## **8.6 Episode 4: Emergence of a New Vendor**

In talking to James, Frank learned that ProductA was being used within BetaCo, a fully-owned subsidiary of AlphaCo. When Frank contacted BetaCo to find out more about ProductA, he was surprised to find that they were in the process of replacing ProductA with another software application called MDS (a pseudonym), which they considered to be more suited to their needs. Interested in finding out more about MDS, Frank immediately contacted the company that distributes it in New Zealand, SoftCo, who were keen to learn more about the ISOM database project. Frank then sent them a copy of the RFI document and the version of the prototype evaluation model that he had sent the other vendors. After reviewing this information, SoftCo contacted Frank, believing “their product would be an ideal tool” (Frank, Project Manager, email, 26 September 2005). Even though they knew that the project team were “ninety percent on the way to choosing ProductA” (Frank, Project Manager, informal conversation, 27 September 2007), the SoftCo team wanted the opportunity to present their product to the project team.

### **8.6.1 The sales pitch**

Given the stage the project was at, Frank organised for SoftCo to give an initial presentation immediately, so that the project team could “gauge whether this is a viable solution or not” (Frank, Project Manager, email, 26 September 2005). In the last week of September, representatives from SoftCo, including Leon (a SoftCo Director), demonstrated the MDS product to the project team, using models they had developed for other clients. A few days later, the MDS product was also demonstrated to James, who had been unable to attend the first presentation.

In the product demonstrations, Leon emphasised SoftCo's prior experience in implementing similar projects in AlphaCo's industry sector.

Even though the SoftCo team had only had overnight to prepare, the project team were impressed by their demonstration and the MDS product, which they, with the exception of Frank, seemed to prefer to Vendor3's ProductA. Their initial impressions, particularly of the presentation itself, seemed to have set the foundation for their positive attitude towards SoftCo and the MDS product. For example, after the demonstration, Dave congratulated Frank on discovering the MDS product. Claire felt that the MDS product compared favourably with ProductA in terms of cost (being cheaper), usability of the tool (appearing to be easier and more intuitive to use), training (being less intensive, more flexible and cheaper), pricing structure, and local support (from Auckland rather than Australia). In particular, she perceived that MDS was "much less like taking a sledgehammer to it". She also seemed to be influenced by the fact that the MDS product was being used by someone from another organisation who she knew and respected: "They wouldn't put up with poor quality stuff" (Claire, IS Commercial Analyst, informal project conversation, 27 September 2005). Claire empathised better with the SoftCo team than with the Vendor3 representative: "Vendor3 had been holier than thou ... the SoftCo guys were less technical and more down to earth" (Claire, IS Commercial Analyst, informal project conversation, 27 September 2005). In contrast, Frank felt that comparing the two vendors, both products were comparable and, of the two, the Vendor3 presentation had been more professional:

They all favour SoftCo. Every single one of them ... They liked the presentation. SoftCo did better than the Vendor3 one, in terms of Gary and Claire thought it was a better presentation than Vendor3. I didn't actually agree with them. I thought Vendor3's better. Yeah, they thought the presentation was better. They thought it was a simpler thing to use. But the only reason it looked simpler is because he didn't go into the back-end much, whereas Vendor3 spent a lot of time showing how the calculations rules and things are set up. (Frank, Project Manager, interview, 21 October 2005)

SoftCo's presentation had immediately established the MDS product as a serious contender for the ISOM database project. In light of the project team's initial response, James told Frank to put the Feasibility Report that he had developed based on the Vendor3 ProductA, and that had been submitted for gating review, on hold until the MDS product had been evaluated.

SoftCo were given only two days to submit a response to the RFI, which they did in a 42 page-long document. The general opinion among the project team was that SoftCo had done a reasonable job of the response, especially given the very tight deadline. When, at the end of the project, the SoftCo developers were discussing with Frank and Gary about SoftCo's response to the RFI, one of them related that they "had only had about a day to put the response together, so we had to work long hours to get it done" (Nancy, SoftCo Senior Developer, informal project conversation, 8 December 2005).

Like Vendor3, SoftCo appeared keen to obtain the ISOM database project contract in order to become more firmly established as a supplier to AlphaCo:

I went back and I talked to my associates and I said, 'Look. This is AlphaCo. We want to, you know, to get this deal, obviously, we need to offer a really good support agreement. (Leon, SoftCo Director, SoftCo product demonstration, 30 September 2005)

During the product presentations, Leon came across as “terribly keen and enthusiastic” and “trying really hard to do a sell” (Gary, IS Commercial Analyst, informal project conversation, 27 September, 2005). On several occasions, he suggested that the ISOM database solution could be built in MDS in two weeks and even that the project team let SoftCo develop the solution at no upfront cost just to show that it could be done and that SoftCo was “prepared to put our money where our mouth is” (Leon, SoftCo Director, letter to Frank, 29 September 2005). He was so confident that he suggested that they set the same challenge for Vendor3 to see if they could do the same:

Two weeks to develop the application itself, and you can hold us to that. I mean, we'll build that for you, at no cost, just to prove it, because we're pretty keen obviously ... We'll build you a complete model ... Put them [Vendor3] up with the same challenge and see what it looks like. (Leon, SoftCo Director, SoftCo product demonstration, 27 September 2005)

The emphasis that Leon repeatedly placed on the solution being able to be completed within two weeks gave the project team the impression that building the solution within MDS would be a relatively straightforward process. For example, Gary felt that Leon “had shown all his cards, including his trump card” (Gary, IS Commercial Analyst, informal project conversation, 27 September, 2005). The expectation that the database solution could be built within such a short period of time would later prove to be overly optimistic, as Leon had underestimated the complexity of the project and the original models.

### **8.6.2 Formal vendor evaluation revisited**

At Claire's suggestion, Frank had contacted past clients supplied by both vendors, contacting three ProductA customers and five MDS customers with specific questions about the products, their implementation and their support. In summarising these reference checks, Frank observed that all of the people he contacted were happy with the product they had chosen, and that most people who had evaluated both products noted that MDS was a significantly cheaper option (Frank, Project Manager, ISOM database project document, October 2005). Based on what the people he had spoken to said, Frank concluded that: “you can't differentiate in terms of what the users found ... I get the general feeling that both products would do the job equally as well and both are good” (Frank, Project Manager, interview, 21 October 2005).

Frank also contacted the two vendors and asked them to critique the other vendor's product. In reply, both vendors sent him a lot of information that, on the one hand, criticised their competitor's product and, on the other, praised their own product. He also asked the vendors to comment on the information that their competitor had supplied. In the end, Frank decided that it had been a pointless exercise as much of the information was contradictory, or compared high end products of the two companies, not the products of interest. Around this time, faced with the possibility of real competition for the ISOM database project, Jack, the Vendor3 representative, seemed to realise that, in his pursuit of getting their more sophisticated ProductB into AlphaCo, he may have lost sight of what was required for the ISOM database project:

I want to redefine my relationship with AlphaCo at a higher level by demonstrating to AlphaCo how Vendor3 creates value to multi-national organisations. But perhaps I have missed what is most important for this project. (Jack, Vendor3 representative, email, 28 September 2005)

At the end of September, Frank emailed the SoftCo's RFI response to the project team for formal evaluation, along with their original evaluations of ProductA for comparison. The technical assessment of the MDS product was completed by a member of the Corporate Services Business Support team. With Harry's departure, James also wanted SoftCo's RFI response reviewed by an IS Architect to see whether it fitted with AlphaCo's overall IS strategy. The IS Architect who did the review did not identify any major technical issues with the MDS product and concluded that: "purchasing the product does not affect our IS principles or architecture models" (IS Architect, email, 7 October 2005).

Frank asked the project team to complete their evaluations of MDS promptly so that a decision could be made about which product to select but, apart from Claire, they were (again) slow to return their response. In mid-October, after collating the individual evaluation responses, Frank circulated the overall score for the two products to the project team for comment, but received no further feedback. In the formal evaluation, the two products were given very similar overall scores, the MDS product scoring slightly higher than ProductA:

There's very little difference between the two. The only thing with ProductA is that it's a bigger product. It's more well-known. It'd have more money spent in development. But then again, it is the old sledgehammer on the old walnut solution. We don't necessarily need that bigger product. (Frank, Project Manager, interview, 21 October 2005)

The repeated use of the sledgehammer/walnut metaphor in relation to the suitability of various products proposed as solutions to the ISOM database project is another example of a transient construct. The construct was adopted and used by various members of the project team to make sense of and express the relative degree of 'overkill' that these solutions represented in comparison with the perceived solution requirements. First used to rule out the Vendor1 product, it was later applied to the Vendor3 product to articulate a degree of unease about the excessive

functionality it offered. It was subsequently invoked to favourably compare the MDS product with the Vendor3 product during the formal evaluation of both products. Interestingly, its use persisted during the project to retrospectively make sense of the relative suitability of the two products: “[The Vendor3 product] was a, you know, big, big hammer to crack a little walnut, and so it’s a matter of scale” (Dave, ISOM Manager, interview, 25 May 2006).

### 8.6.3 Which product?

At the SoftCo product demonstrations, the project team were interested in the possibility of leveraging existing infrastructure and software within AlphaCo, in order to reduce the cost of the ISOM database solution (and consistent with the acquisition preference guiding principle). When asked about the possibility of sharing the MDS software used by BetaCo (and thereby avoiding the cost of software licenses), Leon said that, because BetaCo was a fully-owned subsidiary of AlphaCo, the two organisational units would probably be able to share the same MDS software. The project team also wanted to know if their MDS solution could be run on the same hardware server used by BetaCo’s MDS application. Given that both models were relatively sophisticated with complex business rules, Leon strongly recommended that the ISOM database model be given its own environment that would allow it to run without impacting on or being impacted by the other solution:

You're both trying to calculate models on the server at the same time and so demand is going to be split. Who goes first? You know, who gets all resources in terms of memory, calculations, speed? And that's why – this is a key application for AlphaCo, therefore it should be given the space it deserves to operate efficiently. (Leon, SoftCo Director, SoftCo product demonstration, 30 September 2005)

Nevertheless, Frank collected pricing information based on sharing software and hardware with BetaCo, which he used to develop the financial evaluation of the SoftCo solution. This resulted in a total cost of ownership scenario that was very attractive in relation to ProductA from Vendor3. When Frank contacted Vendor3 to inform him that the SoftCo solution was significantly cheaper, the Vendor3 representative, Jack, commented that the two solutions were not equivalent and needed to be compared on a like-for-like basis. He then supplied Frank with cost data for a ProductA solution that had components that were over and above what SoftCo was offering removed, reducing the overall cost. At the same time, Jack further reduced some of the other costs in Vendor3’s proposal, presumably to make it more competitive with SoftCo’s proposal:

They also came back and revised their pricing ... So, everything came down slightly cheaper ... The e-mail I got from Vendor3, from Jack, was saying, ‘Here’s our revised pricing schedule. Sorry about this, you know, last-minute change’. I didn’t bother questioning it. If they change the pricing, that’s fine. I’m not going to ask why he suddenly changed. (Frank, Project Manager, interview, 21 October 2005)

By the end of the second week of October, Frank had completed the comparative financial evaluation of the two products. The upfront costs (software purchase, initial licensing, and implementation) for the Vendor3 solution were around \$110,000, while those of the SoftCo solution were around \$60,000. The SoftCo solution also had a much lower implementation cost (about half that of the Vendor3 solution). Even more importantly, by sharing BetaCo's instance of the MDS software and their hardware server, software and hardware costs were eliminated, resulting in a significant saving:

The big reason SoftCo's cheaper is because we're using, we're not buying a licence, for the product ... The very fact that we have it already installed here makes it a lot cheaper. (Frank, Project Manager, interview, 21 October 2005)

When compared on an apparently equivalent basis, the total cost of ownership over five years (the upfront solution costs, together with the cost of the external project management, plus ongoing annual maintenance and hardware costs over five years, less expected annual savings over five years) showed a significant difference between \$160,000 for the revised Vendor3 solution and only around \$5,000 for the SoftCo solution.

In the formal evaluation, the project team had assessed the two products as very similar. The reference checks that Frank conducted did not highlight any issues with either product that would eliminate them from consideration. In the end, MDS was chosen as the favoured candidate by both the project team and by James, the project sponsor, because it was the cheaper solution to implement and operate over five years. According to Gary, the consensus was that the two products were more or less the same, but that "SoftCo had won out on price" (Gary, IS Commercial Analyst, informal conversation, 18 October 2005). Frank also confirmed this:

This is a very big reason [indicating the cheaper total cost of ownership for MDS]. I think that's the sole reason to be honest. I think they liked the fact that it seemed easier [to use] too. (Frank, Project Manager, interview, 21 October 2005)

Interestingly, official project documentation emphasised both the formal vendor evaluation and cost of the MDS solution:

SoftCo (MDS) was evaluated as the best fit – coming out on top as the most preferred software in the evaluation process. It was also significantly cheaper than the next best alternative, Vendor3 (ProductA). (ISOM database project Project Plan document, November 2005)

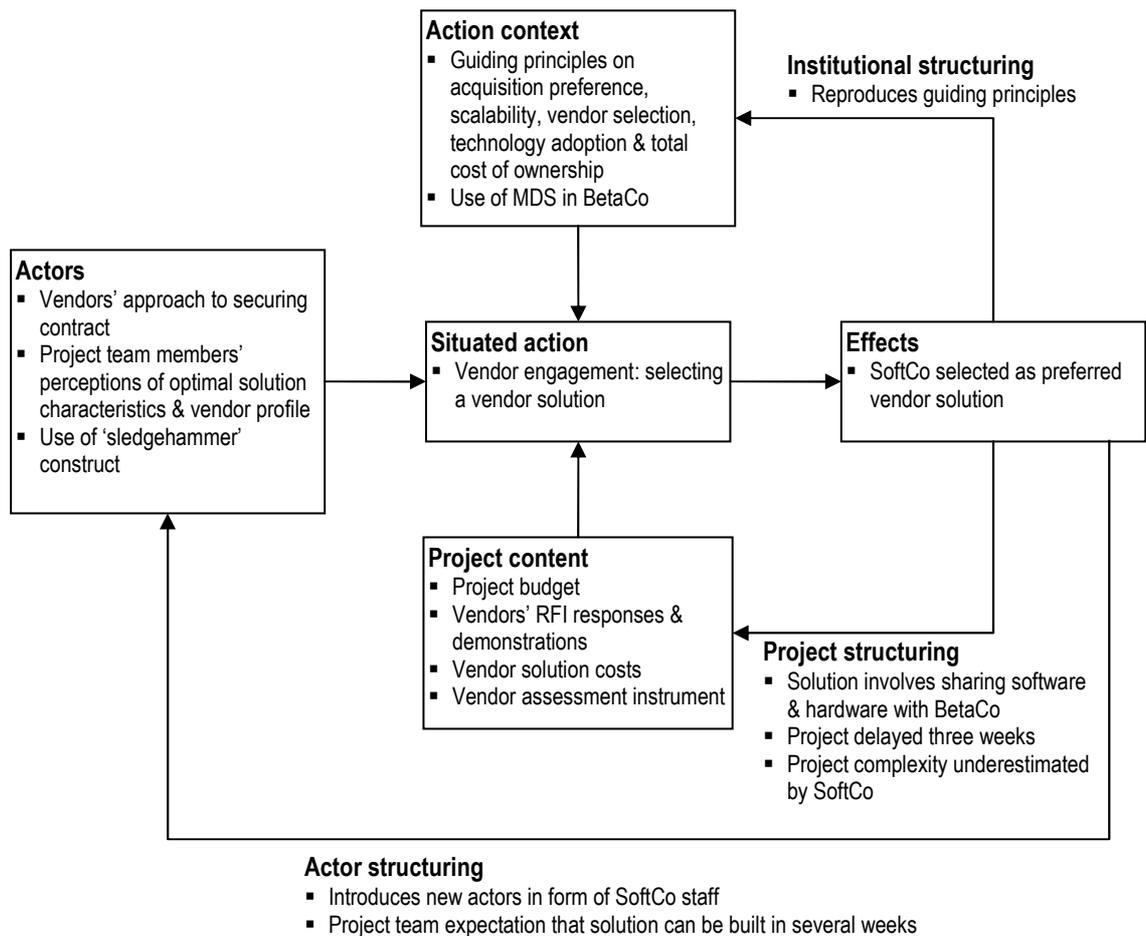
The identification of a new (and eventually successful) vendor effectively caused a three week delay in the project time scale. At various points over the course of the project, Frank and Gary speculated as to why MDS and another product had not been identified by Harry as potentially suitable products, particularly as, even though the vendors were not listed as preferred suppliers, the products were already in use elsewhere in AlphaCo:

I think when we went out to our technical blokes and said, 'Find us what's out there in the market', possibly they didn't do a great job. Because they didn't even, they didn't even highlight MDS, even though we were getting it implemented in BetaCo. (Gary, IS Commercial Analyst, interview, 5 January 2006)

Part of the problem could have been that, as noted above, Harry had focused on enterprise-level applications.

Figure 8.6 summarises the situated action surrounding the emergence of a new vendor and the decision to proceed with SoftCo as the preferred solution.

Figure 8.6: Selecting a preferred vendor solution



The project team's discovery of the use of another vendor solution, MDS, elsewhere in AlphaCo, upset their previous preference for Vendor3 and ProductA. The proposed SoftCo solution reinforced the project team's interpretation of the acquisition preference principle in that it enabled leveraging existing hardware and software within AlphaCo, as well being consistent with the company's other IS guiding principles on vendor selection, scalability and technology adoption. SoftCo's enthusiasm and sales pitch appealed to some members of the project team who compared it favourably with Vendor3's more aloof and technical presentation style. Crucially, the MDS solution conformed better to the project team's perception of what an appropriate

solution should be in terms of size and cost. Not only did it resolve their concerns over using a “sledgehammer” solution, but, using a total cost of ownership approach, they were able to show that a SoftCo solution was significantly cheaper than the Vendor3 proposal and had a very small overall cost over five years. However, the selection of MDS as the preferred solution as that cost entailed a commitment to sharing software and hardware with BetaCo, rather than running an independent MDS application, and generated an expectation that solution development would only take several weeks.

#### **8.6.4 Gate 2 approval**

In mid-October, Frank rewrote the project’s Feasibility Report and PowerPoint presentation using SoftCo as the preferred solution for the ISOM database project, ready for the gating meeting in the third week of October. A substantive difference between the new documents and those done previously for the Vendor3 solution was in the costing. The project budget, which included the initial solution cost, project management costs and a small contingency buffer, was around \$170,000.

In preparing the material for gating review, Frank was conscious of having it completed ready for the IS Project Office’s agenda deadline of Friday afternoon for consideration at the subsequent week’s meeting. As Frank had said, “If you miss it by one day, you miss out by a whole week” (Frank, Project Manager, informal conversation, 11 October 2005). When the Feasibility Report was completed and approved by James, Frank emailed the IS Project Office to notify them that the project was ready for gating approval. There was little Frank could do on the project until approval was given to continue, so he took some time off.

The following week, when Frank contacted the IS Project Office about the approval outcome, he was told that they had not received his email and that the project had not been considered at the gating meeting. Annoyed that the project had missed the gating meeting, Frank could not understand why the email had not been received by the IS Project Office, nor why James had not raised the project at the gating meeting (which he attended) anyway, given that he knew it should have been up for consideration. Claire and Dave were both concerned about the hold-up to the project and the effect it would have on completing the project by Christmas. A delay of one week meant this deadline was now eight (rather than nine) weeks away.

Claire talked to Brenda to about whether anything could be done to fast track the gating approval process, because the project had already been held up by a week just in following the usual process. However, there was little that could be done because Claire was not prepared to move on to the next stage without approval or the funds to proceed. Over the next few days, Claire tried various strategies to get the project approved early. She asked James to speak to the

CIO about expediting the approval, and also tried to get James to put the project before another meeting, but to no avail. Eventually, reconciled to the fact that the project had to follow the normal course of the approval process, Claire commented that the delay should not mean that the project would miss its scheduled deadline, as SoftCo had said that they could complete the implementation in a few weeks (Claire, IS Commercial Analyst, informal conversation, 26 October 2005).

At the end of October, the Feasibility Report was presented by James at a gating meeting and approved to proceed to the Planning phase. The gating team endorsed the project “as a ‘must do’ exercise to reduce the risk associated with managing a contract the size of the InfraCo outsourcing deal within an Excel spreadsheet” (IS Project Office memo, 27 October 2005), and approved the project budget of around \$170,000. Its status in the Tracking system was also updated to Planning. Having been unable to work on the project for a further two weeks, Frank immediately notified SoftCo to let them know that the project had been approved and was ready to proceed. He also notified the other vendors to let them know that they had been unsuccessful.

## **8.7 Episode 5: Negotiating Development**

During the Planning phase of the AlphaCo IS project lifecycle, the project manager develops a detailed time and resource plan for the rest of the project and secures the necessary resources. The end-product is the Project Plan document, the deliverable used by the gating team to decide whether the project should proceed through Gate 3. Completing the Project Plan document is intended to assist the project manager in detailed planning, including considering relevant issues and making appropriate decisions (ISPDR project management document).

At the beginning of November, an initial planning meeting was held between members of the project team, Frank, Claire and Gary, and Leon and Marie, the SoftCo Project Manager appointed for the project, in order to clarify what was required for the remainder of the project (particularly for Marie who had not previously been involved in the RFI process). It was decided that development would occur onsite at the AlphaCo premises, co-located with the ISOM team, and using a server supplied by SoftCo. The use of a separate server outside the AlphaCo’s IT infrastructure (outsourced to InfraCo) was intended to expedite uploading the MDS software and avoid possible delays due to server access and other network issues that SoftCo were experiencing in developing the BetaCo MDS application (Marie, SoftCo Project Manager, letter to Frank and Claire, 2 November 2005). After the MDS solution was complete, SoftCo would transfer it onto the BetaCo server, where ISOM staff could access it over the AlphaCo IT network. It was also decided that development of the MDS solution would be done jointly, involving

considerable input from Frank and Gary, in order to reduce the implementation costs and to enable Gary to develop a more complete understanding of both evaluation and scorecard models while becoming proficient in use of the MDS tool. The intention was that Gary would be the 'super-user' for both the MDS solution and MDS tool within the ISOM team, relieving Claire of some of her previous responsibilities.

### **8.7.1 Fast tracking the IS project lifecycle**

At the initial planning meeting with SoftCo, it was agreed that the SoftCo team would commence work on the project at the beginning of the second week in November, in order to be able to deliver the completed MDS solution by mid-December. This timeframe would give Frank about a week to close the project before Christmas. Soon after the meeting, Frank mentioned to Claire that he still had to prepare a Project Plan, which needed to be approved by the gating team before the project could proceed to the Development phase of the IS project lifecycle. Up to this point, Claire had not realised that the project would need gating approval before it could proceed any further. She had assumed that because the ISOM database project already had financial approval to proceed and the funding had been released that SoftCo could begin development when they were ready. Claire was concerned that Frank would not complete the Project Plan in time for the deadline for the next gating meeting, which would mean that this approval was another two weeks away.

Not wanting a further delay to the project, Claire approached the IS Project Office Manager, Andrew, about the possibility of SoftCo starting development the following week, even though the ISOM database project was still theoretically in the Planning phase. They decided that, because of the impact the delay would have on the project and the work of the ISOM team, and "because the project did not impact on any other project or person" (Claire, IS Commercial Analyst, informal conversation, 4 November 2005), SoftCo could begin development while Frank simultaneously prepared the Project Plan. In fact, the decision to leverage BetaCo's hardware and instance of MDS software had created an interdependency with another project and business function, a point that does not seem to be reflected in subsequent project documentation.

Claire regarded this fast-tracking as "an exception to the normal process, rather than the rule". She felt that "the Project Plan itself is still critical" even though "in this case, the actual approval is more of a formality" (Claire, IS Commercial Analyst, informal conversation, 4 November 2005). According to Andrew, the project was fast-tracked in this way for pragmatic reasons:

We accelerated [it] through. We do that sometimes, yeah ... I think ultimately you've got to be pragmatic and ... we do what we have to do sometimes, to get things through.  
(Andrew, IS Project Office Manager, interview, 16 May 2006)

ISPDR project management documents note that a request for fast-tracking a gate can be made to the IS Project Office and that “small, low-risk projects ... [could] proceed without the burden of unnecessary administrative requirements”. This reflects the view that the IS project lifecycle is a high level framework that should be applied judiciously, as required in a specific project (see Chapter 7).

### **8.7.2 Preparing the Project Plan document**

Immediately after the initial planning meeting with SoftCo, Frank began working on the Project Plan document, using a standard template document contained in the ISPDR. The Project Plan provides detailed information on the project definition (e.g. goals, scope, objectives, benefits, risks and assumptions), project organisational structure, (including roles and responsibilities, reporting to stakeholders), a detailed project plan, project milestones, staff resource requirements, and various project management processes. Frank added project-specific content to the template document, based on his knowledge of the project and using two Project Plan examples he found in the ISPDR.

The Project Plan template states that various project management processes (such as the management of subcontractors, scope, project finance, risk, issues, and requirements) will be managed using standard AlphaCo IS processes. When asked, Frank did not know what these processes were, saying he had simply copied the text from the template and example documents he had been using to construct the Project Plan for the ISOM database project. However, as what were referred to seemed fairly standard in the context in which they were being used, Frank was happy to replicate them in his Project Plan (Frank, Project Manager, informal conversation, 7 November, 2005). Frank subsequently located and retrieved documentation about these standard processes from the ISPDR, noting that many were likely to be of little relevance to the ISOM database project given its size and nature, and complaining, “Why do they always have to be bloody books?” (Frank, Project Manager, informal conversation, 15 November, 2005).

Frank’s original intention was to complete the Project Plan document by the end of the first week of November, ready for a gating meeting the following week. Although SoftCo’s RFI response had included a project schedule in the form of a Gantt chart (in Microsoft Project) of the various project activities that needed to occur, who would be involved and over what time periods, this was out-of-date (it spanned a five week period over October and November) and insufficiently detailed for Frank’s requirements. Frank requested more detailed planning information from Marie, the SoftCo Project Manager, who seemed to take longer than Frank expected to prepare the information.

At the end of the first week of November, Frank received a revised project schedule and costing information from Marie. The project schedule now spanned six and a half weeks from beginning of November to mid-December, representing a significant departure from the “two weeks” suggested by Leon in his sales pitch and reflecting Marie’s more realistic approach based on her prior experience of implementing MDS projects.

At the time he [Leon] did the negotiation I was overseas. So, he had to do the agreement, everything, without me having any involvement. And usually I never want to start a project unless I’ve signed off the budget and the timeframes. And in this particular one when he gave me the information, I said, ‘Can’t be done in four weeks. It can’t be done in the time, or the budget. They can do at the closest, six weeks’. And it’s going to cost ... double the price they had. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Marie had also revised the project development costs upwards to reflect a greater commitment by SoftCo developers, which she felt was needed to complete the project. In addition, the cost of upgrading BetaCo’s existing MDS software licenses to accommodate the ISOM database solution had apparently been underestimated in SoftCo’s RFI response. Both Dave and Claire told Frank that the increased costs were not acceptable:

Just give them our price. There is no disagreement. Tell these guys to commit. They all change their mind once they've got the sale ... Just be firm and hard and practice the word no. (Dave, ISOM Manager, informal project conversation, 7 November 2005)

Marie eventually accepted AlphaCo’s position and submitted a further revision of the project costs, which reverted back to software license costs quoted in the RFI response and maintained the revised development resource allocations by providing a discount that reduced the development costs back to their original quoted amount.

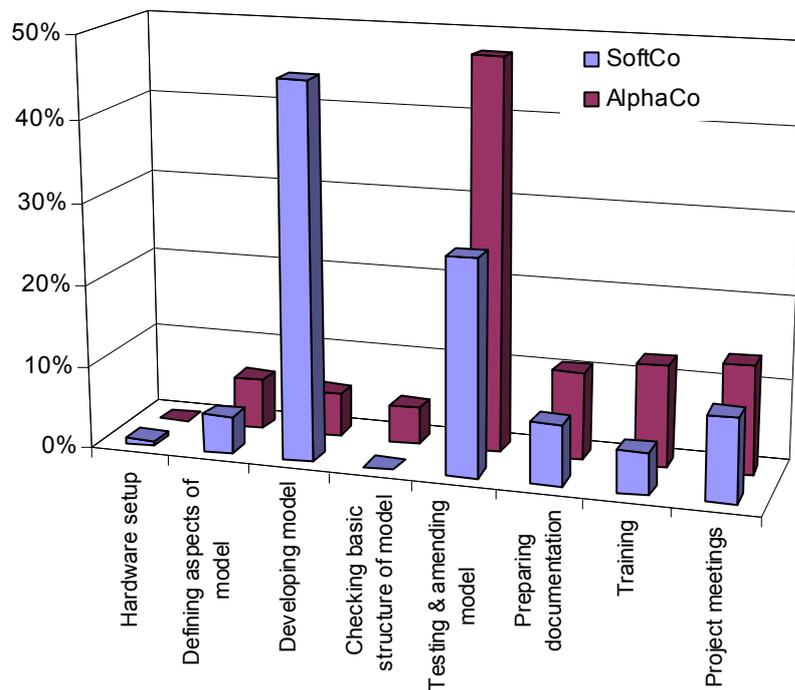
Reflecting back on the project, Marie noted that accepting a timeframe (and consequent costs) she had not negotiated was not her normal practice and that the importance of AlphaCo as a client had been an overriding factor:

You make the call, you know, are you going to try and achieve it or not? I mean that was a Board decision, ‘Yes, to do it’, because obviously AlphaCo’s is a good client, so you want to have that on your books. Because, for us, our goal is in the next two years to have 100% of the top 100 companies as customers ... Usually I would have stuck to my guns and said, ‘No, I am not doing this ... I’m not even going to try and put my staff through stress to get that done’ ... Usually I’d stick to my guns on timeframe if I don’t agree that I can deliver it on the time. (Marie, SoftCo Project Manager, interview, 21 December 2005).

However, Marie was concerned not to allow project costs to escalate: “Obviously we’re going to lose money on this project, and I just want to cap that” (Marie, SoftCo Project Manager, project meeting, 15 December 2005).

Based on her revised project schedule, Marie then prepared a detailed task allocation plan, listing the daily project tasks and activities that needed to be done, by whom and for how long. Figure 8.7 illustrates the proposed relative proportion of each company's total effort spent on various project tasks over the course of SoftCo's involvement in the ISOM database project. SoftCo's proposed approach in creating the MDS solution was to have the bulk of the model development and amendment performed by SoftCo developers, who would build each part of the model and then train Frank and Gary so that they could check what the developers had built in terms of model structure and data.

Figure 8.7: Proposed relative proportion of SoftCo and AlphaCo staff involvement in project tasks



The task allocation plan created by Marie represented her translation of and solution to the problem of completing the project within the very tight timeframe and project budget she had inherited. As will be seen below, it functioned as a boundary object in the negotiation that surrounded Marie's and Frank's differing interpretations of the purpose, nature and extent of involving Gary in the development of the MDS solution.

### 8.7.3 The super-user

When Frank reviewed the task allocation plan provided by Marie (in which Gary would not be directly involved in constructing the model), he had concerns about the timing and nature of Gary's participation and whether it would be sufficient to enable Gary to acquire the level of knowledge and experience necessary for him to become a super-user of the MDS tool as well as the MDS database solution. This super-user role for Gary seems to have been constructed within

the project team from early on in the project. In part, its origin seemed to lie in a desire by Claire, the architect and original user of the evaluation and scorecard models, to “move away from the database work and return more to the financial side of things” (Claire, IS Commercial Analyst, initial meeting, 23 March 2005). Claire had already handed over responsibility for operating the scorecard model to Gary on his appointment, and saw the ISOM database project as an opportunity for Gary to take over her role in relation to the evaluation model as well. As the designated new main user for the two models in the new database solution, Gary would also be responsible for administering the database and maintaining it (ISOM database project RFI document, July 2005). Around the same time, Frank mentioned that they would “probably use the idea of a super-user”, and that Gary would be that person (Frank, Project Manager, informal conversation, 20 July 2005).

In order for Gary to perform such a role, he needed to develop an in-depth understanding of both the financial models and the application tool used to develop the new solution. Having Gary participate in the development of the database solution seemed to be accepted within the project team as the most appropriate way to achieve this understanding. At various times, Claire, Frank and Gary all referred to it in project conversations. For example, in reflecting on the relative participation of Claire and Gary in the development of SoftCo’s database solution, Frank comments:

I guess Claire has been pretty uninvolved, but I think that's possibly what she wanted from the start. Gary's obviously had to get involved, because he's needed to be, to understand. He's going to be the one using it. (Frank, Project Manager, interview, 12 December 2005)

Similarly, Claire noted that she had left Gary to undertake the majority of the testing of the developing solution, “because that’s best fit with his role” (Claire, IS Commercial Analyst, interview, 20 June 2006). Gary also appeared to accept the necessity of being intimately involved in the development side of the project: “I’m going to have to get to know it. There’s no question of that!” (Gary, IS Commercial Analyst, project meeting, 28 November 2005)

The notion of involving a super-user in the development of the ISOM database project solution was reinforced by the development approaches proposed by various vendors. For example, in their RFI response, Vendor3 proposed a “co-development” approach involving a “50:50 partnership” between the vendor and the AlphaCo project team, with AlphaCo project staff performing a major part of the application development work:

It is important to Vendor3 that when our consultants are on-site, they have the opportunity to work with your staff to transfer additional knowledge about Vendor3 products. Through this process, and hands-on experience in building the application, your staff will be empowered to assume ownership of the applications in the future. (Vendor3 RFI response, July 2005)

In particular, Gary would be required to be six week's full-time in this role in order to become "self-sufficient" in using Vendor3's ProductA tool (Jack, Vendor3 representative, vendor presentation, 12 August 2005), a length of time both Claire and Dave expressed concern over given the need to maintain Gary's regular work. In their RFI response, SoftCo also recommended that a business analyst "be heavily involved in the model build in order to retain the knowledge to build further applications and support if necessary" (SoftCo RFI response, September 2005). In one of the SoftCo product demonstrations, Leon emphasised the need for joint development in order to transfer knowledge of the MDS tool:

You need to have people available, resources available, to help us build your model. And therefore you retain ownership, with an understanding of the build, how to maintain it, how to support it. (Leon, SoftCo representative, vendor presentation, 27 September 2005)

After reviewing her proposed task allocation plan, Frank emailed Marie about his concerns about the level of Gary's participation:

It looks like SoftCo will build the model (dimensions, cubes, rules, front end) and myself and Gary will be used to check the model. I understand that this is probably the quickest way to do it, but have concerns about the transfer of knowledge to Gary if he is not involved in seeing how you go about constructing the model ... Will the training be sufficient without any hands on involvement in the build process from Gary to transfer the knowledge? A key part of this project for us is ensuring that Gary becomes the expert user - capable of maintaining and modifying the existing model ... and being able to build new models from the ground up. (Frank, Project Manager, email, 9 November 2005)

As his email shows, Frank constructed Gary's super-user role as including the ability to "build new models from the ground up". This is consistent with the level of ability envisaged in SoftCo's RFI response (see above), but represents a level beyond the proficiency required to simply use and maintain an MDS solution.

In response to Frank's email, Marie suggested that Gary would need additional training in order to increase his participation in the MDS solution development, and that she would revise the task allocation plan to reflect his greater involvement. However, when Frank inspected the revised plan the next day, he could not identify where Gary's involvement had been increased. In fact, Gary's total hours on the project had been reduced, mostly because Frank was allocated more of the solution testing. Frank continued discussing his concerns with Marie in a subsequent conversation. When Frank reiterated the need for Gary to be more actively involved in the project, Marie argued that a greater level of participation of Gary in the way that Frank envisaged could not be accommodated within the current project deadline of mid-December 2005. The nature of the MDS tool meant that while building the basic structure of an MDS solution was relatively straightforward and could be achieved with minimal training and experience, the construction of rules and data upload processes was more complicated, requiring an intensive two-day training

course and considerable experience. Increasing Gary's participation to the extent that he would be able to do these more complex tasks would extend the project timeframe significantly. To emphasise this, Marie pointed out that she had deliberately not involved a SoftCo junior developer, who had received the intensive training and had worked for SoftCo for several months, in the project beyond building the basic structure of the solution, because she did not think he had sufficient experience with rules and she did not want to put any more pressure on the project deadline. Instead, she was proposing to use two senior developers to do the main development of the MDS solution.

In a project meeting later that day, Claire and Gary also became involved in the consideration of Gary's role in the MDS solution development. Despite Frank's concern that Gary would not gain the skills necessary to build new models or applications in MDS, Claire accepted Marie's argument in terms of the project timeframe, suggesting that so long as Gary participated enough to be able to run the MDS solution, extended training could be provided to him after the project's completion. Interestingly, Gary seized the opportunity to assert his reluctance to acquire the higher level of technical skills in using MDS:

I don't know if I'd ever really want to be able to program ... I don't know if I want to have the skill ... Because I'm not sure I even want to know how to write a rule that's in any code, MDS code. (Gary, IS Commercial Analyst, project meeting, 10 November 2006)

To resist this technical role, Gary even mobilised the AlphaCo IS guiding principle around "buy not build", asking rhetorically, "Is it going to be our intention to build models? Or, is it to get people to build them for us?" (Gary, IS Commercial Analyst, project meeting, 10 November 2006). Claire seemed to agree:

It's not the sort of skills set that we envisage having in our own team ... Because I'm sitting here thinking I don't want to know it either. But we need to know to how to use this [MDS solution]. (Claire, IS Commercial Analyst, project meeting, 10 November 2006)

Gary was also concerned that a high level of participation in actually learning to build the MDS solution would interfere with his regular business role within AlphaCo. He tried to assert this while simultaneously maintaining a commitment to being "heavily involved" in the project:

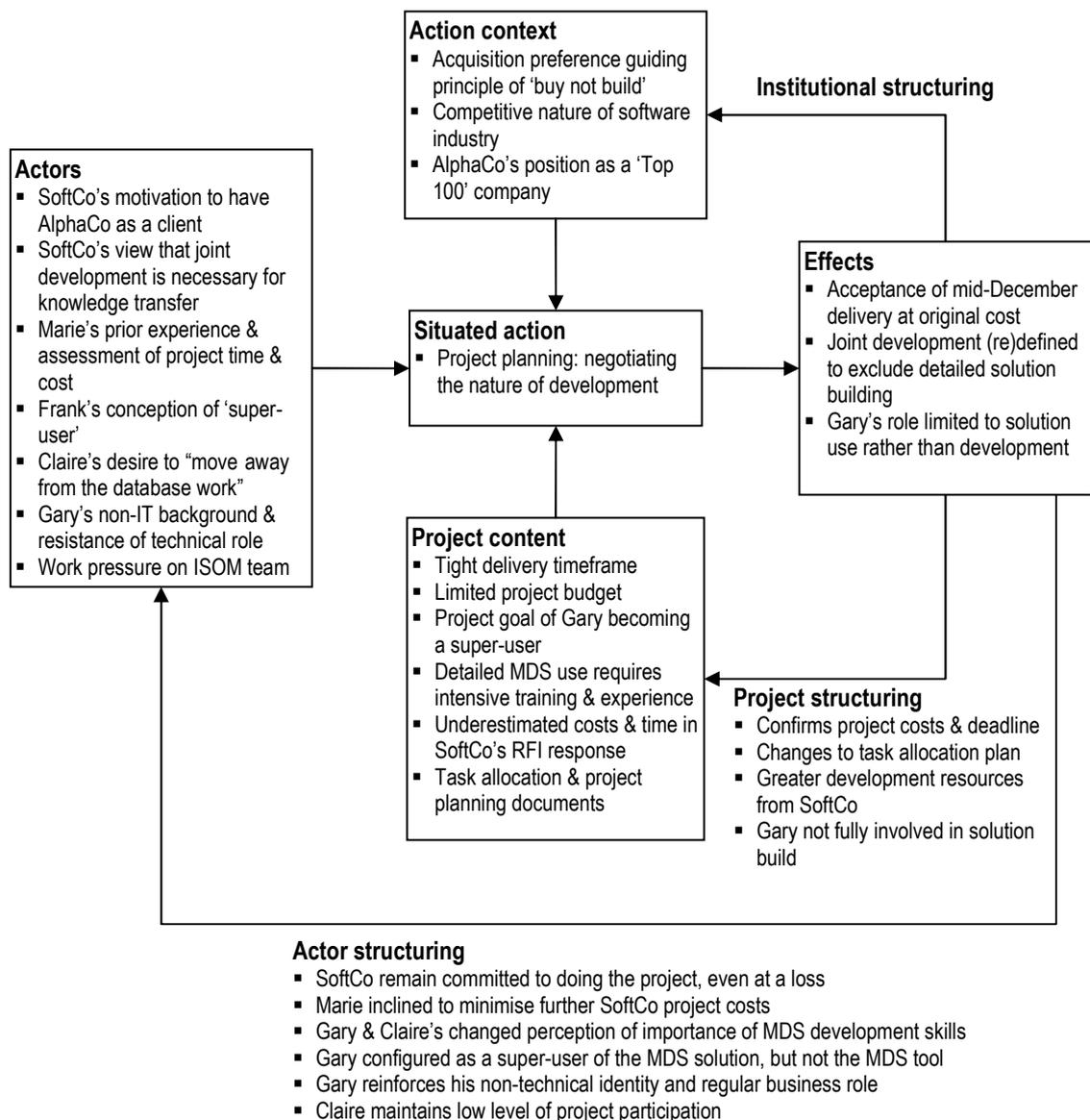
I do want to be heavily involved in this. I've got a bit of other stuff to do, so maybe at some point my boss will come and say, 'Hey, you've got to do this now', and then I'll have to drop it, but. So, yeah, I do have a full-time job and this, but I do want to spend a lot of time on this. (Gary, IS Commercial Analyst, project meeting, 10 November 2006)

In the end, it was agreed that, in order to meet the current project deadline, Gary would "be involved ... as much as possible" (Marie, SoftCo Project Manager, project meeting, 10 November 2005) in order to become familiar with using the MDS solution, but "won't get involved in the actual writing code" (Claire, IS Commercial Analyst, project meeting, 10 November 2006). As Marie later instructed her two senior developers:

You need to involve Gary as much as possible. If there's little bits and pieces that Gary can do for us, you know – look at this, populate this, give it all to Gary to do. Keep him involved in it ... We'll build the main structure, keep Gary involved in doing bits and pieces, so he can understand the model, how it fits together and work the model. (Marie, SoftCo Project Manager, project meeting, 10 November 2005)

Figure 8.8 summarises the situated action surrounding the negotiation that occurred between AlphaCo and SoftCo over the nature of the development of the ISOM database solution. As the incoming SoftCo project manager, Marie was concerned that the project would not be achievable within the cost and time estimates used by Leon in the RFI response. Her attempt to introduce more realistic costs was resisted by AlphaCo, who insisted the original agreement be honoured. Given the importance of AlphaCo as a potential client, Marie and her company directors decided to proceed with the project even if it meant incurring a loss. Marie did revise the project timeframe to encompass a mid-December delivery deadline, which AlphaCo accepted.

Figure 8.8: Negotiating the nature of development



The original intention had been for the project to involve joint development between SoftCo and AlphaCo staff. In particular, Gary was to be heavily involved in building the MDS solution so that he (a) became familiar with both financial models as their intended main user, (b) acquired experience in using the MDS solution and maintaining it as the database administrator, and (c) developed sufficient skills in using the MDS tool to be able to build new models or applications if required. The latter reflected SoftCo's typical approach for MDS knowledge transfer to clients, and was supported by AlphaCo's external project manager, Frank. However, concerned about the already underestimated project costs and timeframe, Marie resisted heavily involving Gary in the actual building of the MDS solution. Gary also resisted this level of involvement and technical role, successfully enlisting Claire's support. Eventually, it was decided that Gary would be "heavily involved" during the construction of the MDS solution but would not undertake detailed development work. This compromise over the meaning of "heavily involved" effectively redefined the nature and level of Gary's participation in the MDS solution development, the meaning of joint development in this project, and the scope of his role as a super-user of the resultant solution, rather than the MDS tool itself. As Frank pragmatically observed:

The timeframe dictated that [Gary] can't get involved as much as you would probably like in terms of development. So, that's just a call that had to be made. (Frank, Project Manager, interview, 12 December 2005)

#### **8.7.4 Gate 3 approval**

Marie made further revisions to the task allocation plan and the project schedule to reflect the outcomes of the various discussions with the project team. However, the two plans contained inaccuracies and were not consistent with each other. Even though Frank asked on several occasions for them to be brought into alignment, they were not, leaving him with the impression that SoftCo had a problem with a lack of attention to detail (Frank, Project Manager, informal conversation, 24 November 2005). Frank completed the Project Plan document based on early versions of the two plans.

The Project Plan document defined a steering committee, comprising Dave, Claire, Gary, and Frank, who were to meet weekly to review the project status. Of the AlphaCo staff, Gary had the greatest number of hours participation (>100 hours from mid-November to mid-December), including training, development, and testing. The "availability of internal resources to help in the creation of the model, reports, and testing" was identified by Frank as a potential risk to the project. As the key users of the MDS solution, Claire and Gary had sign-off responsibility for it based on eight criteria, including their satisfaction with the solution and that it delivered all the functional specifications. The final project deadline, including delivery of the solution, testing, documentation and transfer to the live environment, was set at 16 December 2005.

In the second week of November, Frank emailed the completed Project Plan document to the project team and project sponsor for comment, and highlighting the need for them to “pay special attention to the resource requirements for Gary. Basically by agreeing to the plan we are agreeing to commit these resources” (Frank, Project Manager, email, 10 November 2005). According to Frank, the team all seemed happy with the Project Plan, although Dave remarked on Gary's level of involvement and the need for him to perform his regular duties: “Gary will just have to work 18-hour days!” (Dave, ISOM Manager, informal project conversation, 10 November, 2005). Frank commented that the project team had provided little feedback about the Project Plan and suggested that “they want a solution but they don't want to spend much time in getting it” (Frank, Project manager, informal conversation, 14 November 2005).

James told Frank that the Project Plan could be submitted for gating approval, which Frank did in mid-November. The Project Plan was reviewed by Andrew who raised several questions, resulting in minor amendments being made by Frank. Andrew expressed concern over whether “there is sufficient time for testing and (more importantly) remediation of problems found during testing” (Andrew, IS Project Office manager, email, 14 November 2005). Frank reassured him that there was over a week of remediation work included in the plan as well the opportunity for remediation while the model was being built, and that the fixed-price contract allowed for a 20% retention of the fee after sign off until the project team were satisfied with the solution (Frank, Project manager, email, 14 November 2005). The Project Plan was presented by James at a meeting of the gating team in the third week of November, where it was formally approved to proceed to completion. The project's status in the Tracking system was updated to Development, at the beginning of December.

Several legal documents were prepared during the Planning phase. SoftCo staff who would be working on the project signed a standard AlphaCo confidentiality agreement in the beginning of November. Under Dave's guidance, Frank completed a service agreement document for the services being provided by SoftCo in creating the ISOM database solution. This entailed adding information to a standard template document that Dave gave him. Once the document was complete and accepted by Dave, he forwarded it to Leon, who requested a minor change. The revised document was eventually signed by both parties in mid-December. In mid-November, Leon also sent Frank a copy of SoftCo's software license agreement, which after some negotiation between Dave and Leon, was finally signed before Christmas.

## **8.8 Summary**

This chapter introduces the process analysis of the ISOM database project and presents the process narrative for Episodes 0 to 5. Episodes 6 to 7 are the subject of next chapter.

## Chapter 9: Case Study Analysis – Episodes 6 to 7

### 9.1 Episode 6: Building the Solution

The Development phase of the AlphaCo IS project lifecycle involves the design, development and testing of the desired solution. The project manager monitors progress and costs against the Project Plan, allocates tasks amongst the project team, monitors any issues or risks that emerge, and manages any scope changes (ISPDR project management document). During this phase of the ISOM database project, the SoftCo Project Manager, Marie, was largely responsible for scheduling resources, organising and documenting weekly project meetings, and managing any issues with the MDS solution. On a day-to-day basis, the SoftCo developers were responsible for managing their own workloads. Frank was the liaison point between the two project teams, and apart from preparing the monthly progress reports in Tracking, his role was less to do with project management and more based around testing and data preparation. As Frank explained,

They [SoftCo] are managing the implementation of the software, so it's their responsibility to make sure it's implemented in their timeframe. It's their project plan. It's their everything. So they're managing that whole process. I'm the liaison. (Frank, Project Manager, informal conversation, 7 December 2005)

For the duration of their engagement in the project, the SoftCo team formally reported to Claire, rather than Frank because, as Dave put it, "it's not really appropriate for one contractor to report to another" (Dave, ISOM Manager, informal project conversation, 7 November 2005).

#### 9.1.1 Work on the MDS solution

The MDS tool is a multi-dimensional database (in which pre-summarised multi-dimensional data are stored in cubes) and OLAP (online analytical processing) engine. In this project, it was integrated with an Excel front-end and Visual Basic navigational system. The main development of the MDS solution spanned seven weeks between 7 November and 23 December 2005, at which point work on the solution was largely complete, although lacking documentation, a substantial amount of testing, transfer to the live environment and final training.

At the beginning of November, Frank supplied SoftCo with the prototype evaluation model, the database file with the actual InfraCo outsourcing contract data, the prototype scorecard model, and a copy of the business rules associated with the evaluation and scorecard models. As noted earlier, the prototype scorecard model was an abridged representation of the more comprehensive and continually evolving actual scorecard model being used by AlphaCo. SoftCo were only given a copy of the complete and most up-to-date version of the scorecard model front-end on 8 December.

The particular circumstances and nature of the ISOM database project influenced how SoftCo proceeded to solution development. The perception of a well-defined, spreadsheet to database migration project and the availability of the prototype models meant that the AlphaCo project team did not see the need for SoftCo to perform a detailed project definition. This, together with the constraints of tight project timeframe and budget, meant that SoftCo started building the MDS solution immediately, rather than obtaining an understanding of the client's requirements and spending time modelling and designing an appropriate solution as they had done in other projects:

With BetaCo, for example, we spent six months designing the model ... All paper-based modelling, but they, the client, paid for that. They wanted to see the whole design, the whole dynamics, make sure it can work, before we go and start building it. Whereas this one was, 'Here's the RFI. Start on Monday. Start building, sort of thing'. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Development of the MDS solution occurred over several overlapping and iterative stages, involving building the basic structure of the model within MDS (cubes and dimensions), creating automatic data upload processes, uploading data, applying business rules from the financial models, building a scenario copying capability to facilitate the creation of new scenarios, and creating the front-ends for the solution. In addition, SoftCo were responsible for training, and documentation of the MDS solution (Table 9.1). Project tasks were undertaken by different members of the SoftCo team, depending on the level of expertise required. Initially, development was undertaken by Marie and a junior developer, Peter, both of whom had limited expertise in using the MDS tool. From 10 November, two senior developers became involved in the project: Nancy (who had worked for SoftCo for more than five years) and Ross (who worked for them for nearly a year). At the time, Nancy and Ross were "busy on other projects" for other SoftCo clients, but Marie "pull[ed] them off that" onto the ISOM database project (Marie, SoftCo Project Manager, project meeting, 24 November 2005), in order to "to get the best people on the job" (Marie, SoftCo Project Manager, email, 23 November 2005) and thereby ensure that the MDS solution was delivered on time. From this point onwards, Ross and Nancy assumed responsibility for developing the MDS solution, although Peter later built the scorecard model front-end. Marie's involvement was largely in project management.

Development proceeded through an iterative process of SoftCo building various elements of the solution in MDS, their testing by members of the AlphaCo project team, with subsequent necessary amendments made by the SoftCo developers. For example, once the basic structure of the solution was in place, it was reviewed by Frank and Gary to check that the developers had interpreted the prototype models correctly and "were on the right track":

The main thing is just to make sure we've got the structures right ... Because we've taken your model and said, 'They need to see this, this, this, this, this, and this'. So we might be

missing something major. We might not have, you know, the colour of the particular things in there. You [might] want to see that as a dimension. (Marie, SoftCo Project Manager, project meeting, 10 November 2005)

Over the next few weeks, Frank continued to check the basic structure of the model on a regular basis, discussing any potential problems with the developers, who subsequently amended the MDS solution as required.

Table 9.1: Tasks undertaken during the development of the MDS solution

Project task	Duration†	SoftCo staff	AlphaCo staff
Setting up the on-site server and MDS software	7/11	Peter	–
Keeping the MDS solution on-site up-to-date	18/11-23/12	Nancy, Ross, Peter	–
Basic structure <ul style="list-style-type: none"> <li>Initial building</li> <li>Testing cubes &amp; dimensions</li> <li>Additions &amp; amendments</li> </ul>	08/11-11/11 14/11-25/11 20/11-09/12	Peter, Marie – Nancy, Ross	– Frank, Gary –
Implementing rules <ul style="list-style-type: none"> <li>Defining the rules</li> <li>Writing the rules</li> <li>Testing the rules</li> <li>Amendments to rules</li> </ul>	10/11-25/11 11/11-25/11 28/11-22/12 01/12-22/12	Nancy, Ross Nancy, Ross – Nancy, Ross	Frank, Gary – Frank, Gary –
Data uploading <ul style="list-style-type: none"> <li>Writing automatic data upload processes</li> <li>Preparing data upload files</li> <li>Importing data from database.xls</li> <li>Uploading monthly data files</li> <li>Testing data</li> <li>Amendments</li> </ul>	09/11-22/12 07/11-22/12 09/11-02/12 08/12-22/12 28/11-22/12 08/12-22/12	Nancy, Ross – Nancy, Ross, Peter Ross – Ross	– Gary – Gary Frank, Gary –
The front-ends <ul style="list-style-type: none"> <li>Constructing evaluation model front-end</li> <li>Constructing scorecard model front-end</li> <li>Testing front-ends</li> <li>Amendments to front-ends</li> </ul>	29/11-09/12 09/12-23/12 09/12-23/12 09/12-23/12	Nancy Peter – Nancy, Peter	– – Frank, Gary –
Scenario copying capability <ul style="list-style-type: none"> <li>Constructing capability</li> <li>Testing</li> <li>Amendments</li> </ul>	02/12-09/12 14/12-22/12 15/12-22/12	Nancy – Nancy	– Gary, Claire –
Documentation	19/12-25/01	Nancy	–
Training <ul style="list-style-type: none"> <li>Basic</li> <li>Other</li> </ul>	10/11, 14/11 16/11, 07/12	Marie Nancy, Ross	Frank, Gary, Claire Frank, Gary, Claire

† From start of task to when task was largely complete (e.g. >90% as reported by Nancy at weekly project meetings)

As the MDS solution emerged over the course of development, it became an important boundary object, used for discussing and negotiating the validity of the SoftCo developers' translation of the design artifacts: "Trial and error. Just showing Frank what we'd built, I guess. And then he'd go, 'Yes, that's what we want', 'No, that's not what we want'" (Ross, SoftCo Senior Developer, interview, 22 December 2005). In this way, the SoftCo developers relied on members of the AlphaCo project team to clarify and validate their work on the emerging solution, and to provide the contextual business knowledge specific to the problem domain that they lacked: "If

you can tell us how it is supposed to be, we can change it” (Nancy, SoftCo Senior Developer, project meeting, 27 January 2006). Conversely, the AlphaCo project team relied on the SoftCo developers’ expertise and knowledge of the MDS tool in the negotiation and decisions surrounding the emerging MDS solution: “You’re the expert. You tell us how we should do it and we’ll do that” (Gary, IS Commercial Analyst, informal project conversation, 8 December 2005).

As noted, Frank and Gary’s role during this development period largely involved checking the basic structure of the MDS solution, and testing aspects of it by reconciling data in the MDS solution either with data in the ‘database.xls’ file that Frank created or against the original scorecard model files. Frank spent most of his time testing the MDS solution and over time he became proficient at using it. Gary spent considerably less time working on the ISOM database project than Frank. At various points, Ross and Nancy showed Gary aspects of the MDS solution they were working on and involved him in tasks that he needed to be able to perform to maintain the MDS solution after it was complete, such as preparing monthly upload files and uploading them. Claire had little exposure to the MDS solution prior to Christmas (that mainly through training), and did not acquire familiarity in using it. The original intention had been for her to participate in final testing and sign-off of the MDS solution, particularly the evaluation model side of it, which Gary did not have an in-depth knowledge of. However, due to late delivery of the MDS solution, Claire did no substantial testing until the following year.

In performing the day-to-day checking and testing of the MDS solution (based initially on a test plan provided by Nancy), Frank and Gary recorded any changes or issues they had in various testing sign-off sheets and spreadsheet documents. Once the evaluation model front-end of the MDS solution became operational from 9 December, Nancy created a formal issues register that Frank and Gary then used to record any issues identified during testing. Issues were subsequently fixed by the SoftCo developers, ready for retesting, and remained open until Frank or Gary was satisfied they were fixed. For auditing purposes, Claire also wanted Frank to keep a record of the formal testing sign-off:

Just so that if an auditor comes back in the future and says, ‘Did you test?’, we can go, ‘Well, here’s the list’ ... It’s also for my personal peace of mind ... It’s just me being pedantic. I’ve been caught before. Well, not caught before, but auditors coming along and saying, ‘Where did you get this from? How did that?’, and it’s like, ‘What?’ (Claire, IS Commercial Analyst, informal project conversation, 14 December 2005)

Accordingly, Frank created a multi-page ‘Testing and Quality Control Sign-off’ document, which incorporated the issues register. There were sign-off sheets for detailed testing of various aspects of the MDS solution, as well as a quality assurance sign-off sheet in which Claire and Gary were to assess the quality of the MDS solution against eight criteria specified in the Project Plan (see above). However, apart from a small amount of sign-off that was done by Claire or Gary prior to

Christmas, most of the sign-off sheets, including that for quality assurance, were never actually used.

From the time the MDS solution began to be developed until its transfer into the AlphaCo live environment, SoftCo provided a standalone server (a work station comprising a hard drive, keyboard and screen) to remain on-site at AlphaCo, on which a copy of the emerging MDS solution resided for the AlphaCo project team to access. Members of the AlphaCo project team worked directly on this server when uploading data or testing the MDS solution, although access was limited to one user at any one time. The decision not to use a networked server (primarily due to anticipated delays in negotiating uploading the MDS software onto AlphaCo's InfraCo-managed IT infrastructure) meant that the SoftCo developers, who performed their development work on laptop computers, had to upload files they had created or changed to the on-site server daily using USB flash drives, so as to keep up-to-date the emerging MDS solution. The SoftCo developers also regularly backed their files up to a server back at the SoftCo office.

In working on the ISOM database project during November and December, SoftCo staff spent some 225 hours on-site at AlphaCo, as well as an unrecorded amount of time off-site. Typically, SoftCo developers are encouraged, where possible (depending on the client's available facilities), to work "on-site more than off-site" (Nancy, SoftCo Senior Developer, interview, 21 December 2005):

I always prefer on-site development ... You start creating that rapport with the client, because obviously you want to build a relationship with a client. If you're on-site, they can see what you are doing. They can see where you are ... Plus also they're there to ask questions, so you're building up that relationship. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Ironically, given the tight project timeframe and the continued demands being made on their time by the AlphaCo project team, the SoftCo developers deliberately spent less time on-site in the ISOM database than was typical:

With this particular one, we had to pull off-site a little bit because things kept changing. Because you're here [AlphaCo staff ask], 'Oh by the way, can you just change this?', or 'Can you just look at that?', 'Can you just do that?' In view of the timeframes, we've had to pull off-site so that we are not there as a convenience ... So, time slippages. (Marie, SoftCo Project Manager, interview, 21 December 2005)

It's been really hard with this shorter timeframe because a lot of things had to, I mean, you can't afford to be sitting there with them, you know, doing quick changes ... I mean, everything's started to be pushed back and back because there's always been these quick changes and stuff. (Nancy, SoftCo senior developer, interview, 21 December 2005)

While both Frank and Gary acknowledged the practicalities of why this did not occur, as novice users of both the MDS tool and the MDS solution, they considered that having continuous direct and immediate access to the SoftCo developers on-site would have been optimal. For

example, Frank commented: "It'd go a lot smoother if they were all standing here everyday, doing development here everyday, because then you'd have access to them all the time" (Frank, Project Manager, informal conversation, 7 December 2005). They also felt that the developers themselves would have benefited from more on-site development:

I think probably the best way to do it would be to have them here the whole time developing on-site with us so they can ask us questions as they come to the schedule in developing, so they can solve the problems right there and then. (Frank, Project Manager, interview, 16 December 2005)

The use of a non-networked development environment proved to be problematic. For example, it encouraged the SoftCo developers to work off-site when possible: "We've tried to work as much we could off-site, because we can't get any emails or anything here and we're quite isolated" (Ross, SoftCo senior developer, interview, 22 December 2005). Together with the combination of on-site and off-site development, it also meant that there was not a single version of the MDS solution on which the developers could simultaneously work:

The only problem with us developing on-site and off-site is that there's nowhere where we've got a current live version, which gives you a problem with your version control and stuff. So we have stuff there and you've got stuff over here. I mean, it probably would've been better if we'd developed fully off-site, because then all of us [SoftCo developers] could have been working on the same model. However then you've got issue of the clients testing it. (Nancy, SoftCo senior developer, interview, 21 December 2005)

Rather than using any formal version control process, the SoftCo developers relied on coordinating the different versions of the MDS solution amongst themselves, which resulted in problems with version control, data integrity, and loss of development work:

The problems with pen-drives and copying the data over has so many problems ... It is better to be on-site working on the model and not transferring everything around, because you'll find someone will change one file, someone'll change the other one, and you merge them and you lose everyone's changes. So at AlphaCo, I don't think it worked as well as it should have. (Ross, SoftCo senior developer, interview, 22 December 2005)

As problems with data in the MDS solution emerged during the project, the AlphaCo project team questioned the effectiveness of how the SoftCo developers were managing the different versions of the MDS solution and the different versions of the upload files they had been given. This led to a perception amongst the AlphaCo staff that the SoftCo developers were somewhat unprofessional in failing to adhere to formal project management practices – "a bit casual to be honest, in their whole approach to getting things done" (Frank, Project Manager, interview, 12 December 2005), possibly because of the time pressure they were under:

I think they were a little bit haphazard in the way they approached it ... I don't think they fully understood the complexity of it. I think they thought it was a bit easier and then it got to a stage where they were just fighting fires a lot of the time, rather than constructively building it. (Gary, IS Commercial Analyst, interview, 21 April 2006)

They just seem to be sort of doing a lot of stuff ad hoc ... They do seem to be sort of having a few sort of issues with keeping track of things, and maybe not sticking with their processes and things like that, because they're in a rush. (Gary, IS Commercial Analyst, informal conversation, 6 December 2005)

Interestingly, members of the AlphaCo project team became quite normative in their discussion of SoftCo's perceived shortcomings, often contrasting SoftCo's approach to their own or that prescribed within AlphaCo:

Frank (Project Manager): It's just a bit unorganised, I think, in terms of managing the whole version thing.

Gary (IS Commercial Analyst): That's why I kind of wondered, when I ask them a question and they go 'chh, chh' and start copying stuff, they're not really even taking note of this, of what they're doing ... It's the sort of thing that I do.

Frank: The old small company syndrome ... Sort of forget about processes.

Gary: Yeah. They always seem to be in a rush to do it, given that you should be using a process, then you can go back and say, 'Ah, when I did that ...' (Informal project conversation, 5 December 2005)

### **9.1.2 Developing an understanding**

The use of external developers in the ISOM database project was consistent with AlphaCo's organisational policies and practices concerning IS development. As James, the IS Commercial Services Manager, pointed out:

We wouldn't have capability or skill sets to implement that tool set [MDS] internally ... So we had to engage a third party to do it. I mean, they're specialists in that product and they're the most appropriate people to implement. We have a guiding principle, as part of the AlphaCo IS strategy, to 'buy not build'. And to do it and build it ourselves would be in conflict with that. So, we minded that [principle], bought a tool, third party expertise implemented. (James, IS Commercial Services Manager, interview, 14 June 2006)

A consequence of outsourcing development was that the external developers, SoftCo, depended on knowledge sharing with the AlphaCo project team to understand the problem domain, development goals, existing spreadsheet models and any additional features they were to implement:

Without the external party quite understanding the complexities of the model, [the AlphaCo project team] were required to also impart some of that, you know, requirements and business process knowledge across to those external parties. (James, IS Commercial Services Manager, interview, 14 June 2006)

In developing their understanding, the SoftCo staff asked questions of and sought clarification from the members of the AlphaCo project team, especially Frank and Gary, in informal interactions and during formal project meetings and training sessions. They also drew on various project artifacts provided to them, including the prototype models, the database file, business rule documents and RFI document. For example, Nancy commented that she arrived at her understanding:

By spending a lot of time in the prototype evaluation model that I was given ... and trying to map that back to the database file that Frank gave us. And also after asking Frank heaps of questions to start with. And also looking at the RFI as well, trying to understand that. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

In particular, the developers relied heavily on the prototype models. In Marie's view:

If you get given an Excel sheet and [they] say, 'I'd like you to replicate that', then you can follow through how things fit together ... If you give me something, I can see that ... It's always best just to have it there. (Marie, SoftCo Project Manager, interview, 21 December 2005)

This reliance on the prototype models and other project artifacts was made more significant given the circumstances surrounding the ISOM database project, which meant that SoftCo commenced solution development without undertaking the detailed project definition that they often did in other projects. Arguably, given time, a thorough project definition exercise by SoftCo may have uncovered many of the problems and issues with the interpretation of the original models and the operation of the emerging MDS solution that subsequently arose. As Frank speculated, "I think they're using the RFI and the [prototype models] as defining the project, but they're still asking questions that if you did a full definition you'd understand" (Frank, Project Manager, informal conversation, 6 December 2005). Marie also seemed to acknowledge the adverse consequences of not performing a project definition: "A lot of things that we're redoing now are due to the fact that we didn't sit down and do a lot more planning" (Marie, SoftCo Project Manager, interview, 21 December 2005).

The delayed entry into the project of the principal SoftCo developers, Nancy and Ross, meant that they lacked familiarity with the project specifications and solution design. They also were not provided with the RFI document, which contained much relevant information, until several days after they started. In particular, they felt they should have been involved in the initial planning meeting between SoftCo and the AlphaCo project team at the beginning of November as they were pessimistic about the effectiveness of Marie and Leon to 'translate' and pass on what the developers needed to know:

We should've been involved in that initial planning meeting ... It was what we had to do over the [project], and we should've been in that. Marie and Leon did it themselves. And I don't quite understand the logic behind that because they didn't pass on any information, and it would have been lost in translation anyway ... We came in three days after the project started and had to build the thing, not really knowing much about it. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

As a consequence, Nancy and Ross incrementally acquired their understanding of the original models and what was required in translating the original spreadsheet models into MDS as they undertook the development:

I think that [their understanding] developed late ... I don't think they really had a good grasp of the model when they started developing. I think, if you had more time, you'd spend more time understanding the model ... As they developed, they've not really understood how the model came together ... It's such a tight deliverable, you just can't spend that time. They had to start developing straight away, basically. (Frank, Project Manager, interview, 12 December 2005)

This understanding was inhibited by the nature of the original models, which were different from the sort of models the developers usually encountered and involved a lot of terminology specific to AlphaCo's outsourcing contract:

AlphaCo's whole thing is new ... I remember the first meeting I got brought into after I came back from Australia. They were talking about [various technical components of the models] and I was just like totally blown away. I had no idea what anyone was talking about. I mean, I think it still gets confusing and I think that, in part, is causing a lot of the problems. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

There was a lot of, I guess, terminology and naming that wasn't quite intuitive ... It wasn't a normal standard accounting application/budgeting forecast ... It wasn't what we usually do ... We kind of lost the week on that, I would reckon, trying to get our heads around the terminology and what they actually wanted. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

It is worth noting that some of this terminology was also confusing to Frank when he first encountered the spreadsheet models:

I think it's confusing, very confusing, the terms the ISOM team use. I think it'd be a lot easier to use more generic terms ... I think they've picked those terms early on when they were using it [the original models], and they're comfortable using those terms and they don't want use any other ones. (Frank, Project Manager, interview, 12 December 2005)

Even Gary had found the models difficult to understand initially because of their terminology: "It's definitely difficult. It's terms that just aren't used anywhere else ... I can't think of anything that confuses me now in our terminology, but at the start it certainly did" (Gary, IS Commercial Analyst, interview, 5 January 2006). In fact, early in the project, Claire had discussed this issue with Gary and Frank, to "ensure we are all reading from the same page" (Claire, IS Commercial Analyst, informal project conversation, 18 July 2005). She even briefly considered changing some of the most confusing terms, but no suitable alternatives were agreed on.

In building the MDS solution, the SoftCo developers generally tried to replicate the terminology used in the prototype models with which they had been provided (created by Frank using the same terminology as the original spreadsheet models on which they were based). However, it was often necessary to create and name new elements as part of the way the models were structured in MDS. Although the developers tried to use terminology that was consistent with their understanding of the prototype models, they sometimes misunderstood what specific terms represented or used new terms that were confusing to the ISOM team: "Sometimes I think

it's a bit bizarre with the naming convention [the developers used]... It just doesn't make intuitive sense to me" (Gary, IS Commercial Analyst, interview, 27 October 2006). In one example, the developers included standard financial modelling nomenclature in a series of element names, but in a way that conflicted with how such terms had been utilised in the original models. At another point, an ongoing sequence of name changes impeded solution delivery as the working of the solution front-ends required finalisation of the element names used in the solution back-end:

It's hard to understand what the model is. So, therefore, when you get element names, it's hard to understand how that features through the model until you're working with it. So, we're having where elements are changing name and then changing back and then changing again. We've got to get those things finalised ... because the front-end won't work if you keep changing elements. (Marie, SoftCo Project Manager, project meeting, 2 December 2005)

Throughout, Frank was concerned to ensure that the element names would be familiar or make sense to potential users of the MDS solution in the context of monitoring and evaluating the outsourcing contract. As Frank explained:

As we're testing the cubes, we're saying, 'OK, does that make sense, that new name?'. Or, 'Is that how we expect to read a cube?' for them [the users] looking at the cube now [for this purpose]: 'Oh no, that doesn't make any sense when you're looking at it [for this purpose]', so we need to change the name. (Frank, Project Manager, project meeting, 2 December 2005)

In many respects, Frank was an intermediary between SoftCo and Claire, the creator of the original models, who was occupied with other organisational responsibilities and had chosen to limit her participation in the project during the main period of development. It was Frank's understanding and interpretation of the original models and any additional functionality that the SoftCo developers were primarily relying on, both in terms of the project artifacts he had created and his ongoing interaction with the developers:

I'm checking the MDS solution every morning when I go in there, to see what changes they've made in terms of dimensions and that. To make sure it makes sense in terms of *my understanding* of how the model should work. (Frank, Project Manager, project meeting, 24 November 2005, emphasis added)

Although the prototype models were regarded by Claire and Frank as an accurate translation of the original models, the SoftCo staff came to realise there were differences between the two versions:

There have been areas where Frank has understood it differently and Claire has understood it differently. Because what happened, as we only found out later on, was Claire did a model and then Frank did his interpretation and rebuilt the model. And that's the one we got ... We think that there's little differences. I mean, Frank and Claire say they're not [different]. (Marie, SoftCo Project Manager, interview, 21 December 2005)

The differences between the original and prototype models included some omissions and oversights on Frank's part, additional functionality not in the original models, incorrect or not fully defined business rules, and an abridged prototype scorecard model front-end. As a consequence of these differences, the SoftCo developers felt that they would have developed a fuller understanding of the solution requirements if they had had direct access to the original spreadsheet models and their creator, Claire, who had little involvement in the development of the MDS solution:

Having the model that was being used by Claire, so that we could see exactly what she was having instead of something that Frank created for us to make it easier, and having someone on the project that knew exactly what was going on, would have made it more clear. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

Nancy suggested that Claire's intimate knowledge of the original models would have enabled her to highlight "all the quirks and all the problems" inherent in the historical development of the model, as well as reducing the level of "hand-holding" that Nancy felt she had to do with Gary because of his lack of knowledge of the evaluation model:

You really need someone that knows, lives and breathes it, so that you know the problems ... I think it would have gone a lot better [if Claire had been involved] because she would have known a lot of the issues that she's come across in her history that she could bring out right from the start ... Those are the things that we need to try and avoid. And I don't think that that was discussed enough. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

Gary formed a similar opinion about the level of Claire's involvement in the project during solution development, suggesting that much of the confusion that subsequently occurred over aspects of the evaluation model could have been avoided if Claire had been more actively involved in the project. For example, a number of the omissions and oversights made by Frank in developing the project artifacts provided to the developers seemed to be a result of his lack of detailed knowledge of the original spreadsheet models and their history. Gary was able to provide this knowledge of the scorecard model, but only Claire was in a position to remember and understand why specific changes or amendments to the original evaluation model had been made:

I don't think Claire gave it as much, enough attention, because the evaluation model was her puppy. I don't really understand it, but yet I was sort of giving my input back to Frank, who was giving his, and that was sort of it. Whereas Claire should've been more hands on, making sure it worked, rather than doing the odd bit of reconciliation six months later. (Gary, IS Commercial Analyst, interview, 12 March 2007)

Despite the intention for Gary to develop a thorough understanding how the MDS solution worked through his participation in this part of the project, his knowledge of the evaluation model side of the MDS solution remained limited:

The evaluation model I've had very little to do with, and I don't fully understand exactly how it works. To me, it works a bit strangely ... I may need someone explain it to me how it works. I think it could've been done a bit differently. (Gary, IS Commercial Analyst, interview, 5 January 2006)

The SoftCo developers also appeared frustrated that they did not have all of the information they needed from the outset. This was reflected in their accounts of how the understanding they did achieve during development was incomplete or incrementally attained:

I think the problem from our end was that we'd come to an understanding, but it wasn't quite right. We'd understand what we had to do, but it wasn't quite right when we got further down the line ... There was just little, little niggly bits that were left out. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

With some of the stuff that Frank has given us, it's coming in little dribs and drabs. So it's like you think you have an understanding, but then there's more. You get this next piece and it's like, 'Okay, maybe if I had that a bit earlier I might've understood the whole bit of the model' kind of thing. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

Part of the problem was that some of the new business rules developed by Frank did not operate as intended and had to be amended a number of times through trial and error:

We're redoing [something] the fourth time now because AlphaCo didn't understand the system. We thought we understood what they wanted, their logic, but it's not working. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Everyone seemed to think that it was going to be very structured. You know, we'll build this cube, 'That's it, it's never going to change', and we'll walk away ... But it wasn't 100% quite there. Everyone thought that was it, 'We do that rule and that's it'. It would never change ... Now all those rules are completely gone and they're complete new ones. (Ross, SoftCo Senior Developer, interview, 22 December 2005).

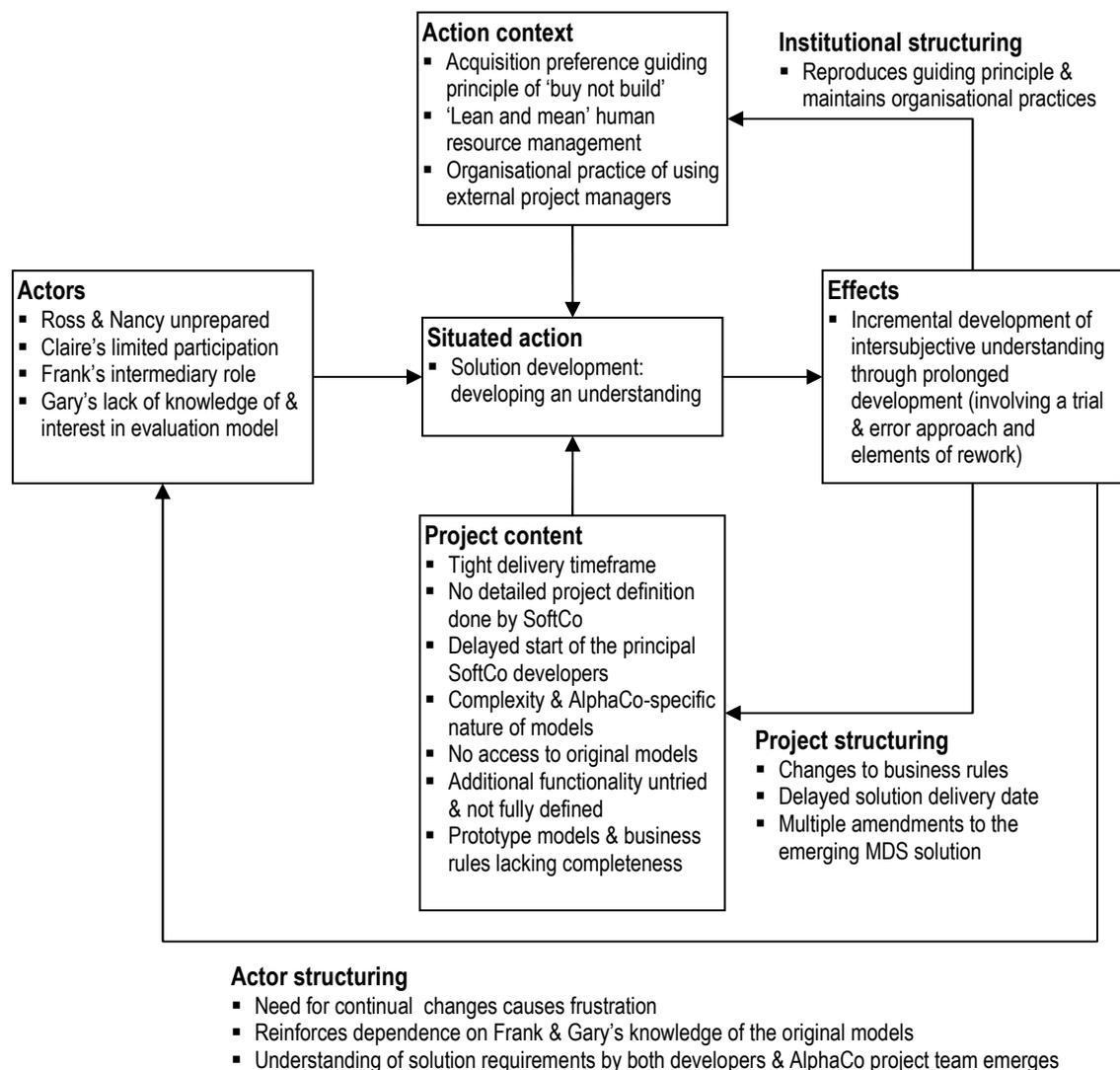
The SoftCo developers saw this as evidence that, despite the unproblematic, "structured" approach to development assumed by the AlphaCo project team (and indeed Marie, who was focused on timely project completion), aspects of the project were "very unstructured and [were] going to take time" (Ross, SoftCo Senior Developer, project meeting, 15 December 2005) – "how we get there is not like clear steps" (Ross, SoftCo Senior Developer, interview, 22 December 2005). Allowing time for 'learning through doing' (cf. Gasson, 1999) seems to have been consistent with the SoftCo developers' preferred approach to development, and one they had followed in other projects: "MDS is an undeveloped tool, you just build it yourself and try and learn from the thing. It's not a very structured thing ... It's just the way it works" (Nancy, SoftCo Senior Developer, interview, 21 December 2005).

The SoftCo developers' comments also reflect the untried nature of the additional functionality, the operation of which required a substantially completed MDS solution before it could be tested: "They couldn't really test it because they didn't understand ... We didn't have the data to check what was going on" (Ross, SoftCo Senior Developer, interview, 22 December

2005). That is, some aspects of the project did not solely involve the developers attaining an understanding of what was required, but “actually coming to that point of *everyone* knowing exactly how it’s supposed to work” (Nancy, SoftCo Senior Developer, interview, 21 December 2005, emphasis added).

In order to be able to deliver an appropriate solution, the SoftCo developers and the AlphaCo project team needed to develop an intersubjective understanding of what was required. This shared understanding was not established prescriptively at the commencement of SoftCo’s involvement in the project, but evolved over the course of the solution development, converging only relatively late in the development timeframe. Figure 9.1 summarises the influences on how this understanding developed and the intended and unintended effects of this situated action.

Figure 9.1: Developing an understanding



### 9.1.3 Delivering the MDS solution

In negotiating the terms of the project delivery, SoftCo had agreed to three project milestones:

1. Completing the “back-end”, including building and testing the cubes and rules in the MDS database, by 18 November.
2. Model delivery, including building and testing the front-end, and final training by 9 December.
3. Project completion, including documentation and any amendments to the solution, by 16 December.

Both the AlphaCo project team and the SoftCo team perceived that delivering a completed solution within the specified timeframe would be difficult, often referring to the “tight” timeframe or deadline. As Marie commented, “It was a bit rushed. Like, I would have loved to have seen six to eight weeks for the project to, you know, do it well” (Marie, SoftCo Project Manager, interview, 21 December 2005). The tight project timeframe, together with the difficulty of releasing Claire and Gary from their other duties, meant that Claire, in particular, was concerned about any possible delays to the project. From the outset, she stressed the importance of her being kept informed of any potential slippage, and later suggested that the project had the interest of her managers, James and Dave:

It's got a lot of focus from our end, as in by us and our leadership. They are asking us, or me, almost daily, how it's going and what the progress is, and things like that. So, we try and make sure that it's still on track. (Claire, IS Commercial Analyst, project meeting, 25 November 2005)

Unfortunately, SoftCo did not get off to a good start, appearing disorganised and ill-prepared at some of the scheduled training sessions and cancelling an early project meeting because Marie was away. This prompted an angry reaction from Claire, who wanted SoftCo to “up the ante ... and be more professional”:

There will be two weeks between the last project meeting we had and the next one. The project is too short for that. I have no idea of 'Are we good?' or 'Are we bad?' I just don't know what the [project] status is. (Claire, IS Commercial Analyst, informal project conversation, 18 November 2005)

As the liaison between AlphaCo and the SoftCo team, Frank emailed Marie and Leon to inform them of the “little bit of concern building about the casualness of the approach we have had from SoftCo so far” (Frank, Project Manager, email, 18 November 2005). As he subsequently explained to Marie,

Because they've [AlphaCo] got such a tight deadline, they want to make sure it runs smoothly. And their time is pretty scarce, and they don't want to be mucking around, to be honest with you. (Frank, Project Manager, project meeting, 24 November 2005)

Frank's email produced a visit to Frank from the SoftCo CEO who stressed the importance that SoftCo placed on the AlphaCo project. On her return, Marie emailed Frank, responding to the concerns he had raised about SoftCo's approach to the project and noting:

We have had to move a lot of work around to accommodate your tight deadline and we are doing the best we can to make sure all deadlines are achieved. (Marie, SoftCo Project Manager, email, 22 November 2005)

On 18 November, the date of the first project milestone, Frank and Gary estimated that SoftCo was about two days behind schedule. On 21 November, Nancy and Ross, the SoftCo senior developers, met with Frank to discuss revising the project schedule. Nancy and Ross wanted to delay the scheduled building of the scenario copying capability and solution front-ends so that they could concentrate on completing the back-end of the solution. They had not had any input into the initial project schedule developed by Marie, and argued that too much time had been allocated to the front-end development (and, by implication, not enough for the back-end development). They were confident that the changes would not threaten project delivery:

We're still going to be able to deliver on the 9<sup>th</sup> [December]. It's just that we're moving a few things around ... The thing is, the front-end, when the project schedule was done, the front-end was more considered as something that might be bigger than it actually is ... It's just a more simple one ... We're still going to have enough time to do it anyway ... We feel that we're on track. (Nancy, SoftCo senior developer, project meeting, 21 November 2005)

Frank had no objection to the proposed changes and it was decided to defer the date for delivery of the first milestone to 28 November. While they had some concern about the missed milestone, Claire and Gary agreed to the revised schedule provided that it did not affect the project deadline and delivery of the MDS solution.

By 25 November, SoftCo were confident that the revised first milestone, when all the cubes, dimensions and rules were to be completed and tested by SoftCo, would be met:

"We're about 90% on track for finishing the backend ... Everything's going well. Ross and Nancy are quite pleased with it so far. The hardest bit was putting the back-end together, because this forms the basis of everything else. Everything we can do from here is the easy bit – the easier bits. (Marie, SoftCo Project Manager, project meeting, 25 November 2005)

However, by 30 November, when Claire queried progress on the project, Frank was only able to say, "We're getting there" (Frank, Project Manager, informal project conversation, 30 November 2005). Concerned about this further project slippage, Claire replied, "It'll be the 23rd of December the way its going. It better not be!" (Claire, IS Commercial Analyst, informal project conversation, 30 November 2005). It was not until 2 December that Nancy was able to report that all the database cubes had been built.

At a project meeting on 2 December, SoftCo also reported that they had finished building the front-end for the evaluation model part of the MDS solution, and that they were on track for delivery on 9 December: "It's going to be tight, but these guys [Nancy and Ross] are confident" (Marie, SoftCo Project Manager, project meeting, 2 December 2005). Both Nancy and Marie emphasised the need to finalise aspects of the MDS solution, such as versions of data and model elements names, so that the model could be delivered on time. In addition, the scorecard model front-end could only be completed once the developers received a final version of it from Gary:

It's important that we get now final versions and things don't change, because it affects a lot of things in these front-ends. We can't finish the front-end unless we have, 'This is the final version'. You guys have got to decide what it is and give it to us. (Marie, SoftCo Project Manager, project meeting, 2 December 2005)

On 2 and 5 December, testing of the MDS solution by Frank revealed missing data or data that did not reconcile with that in the database.xls file, even after the correct data had been reloaded into the MDS solution. Identifying the source of the problems, which turned out to be minor discrepancies between currency rates in the database.xls file and the data SoftCo had been given to upload, took Nancy and Ross most of those two days (as well as part of the intervening weekend). This delayed their work on completing the main deliverables and prevented Gary and Frank from conducting further testing. With the expected delivery of the main solution due on 9 December, the loss of two days from the project schedule concerned Claire. The following week had been scheduled for testing, and the week after that for Frank to hand over the project before he left on 23 December.

We agreed only as late as what 3'oclock on Friday [2 December] that everything was on track for delivery for this Friday [9 December] ... That'd give us this week to run tests ... At this stage it's looking like its two days late. But I sort of wanted enough time at the end – I mean realistically, I mean I know that you want to finish [talking to Frank] ... And I don't sort of want that to end up being the 23rd of December at 4 o'clock ... We need a week with you at the end to be able to hand everything back ... to make sure it is 100% finished. And if they're not going to deliver it until, realistically, it looks like mid-next week? (Claire, IS Commercial Analyst, informal project conversation, 5 December 2005)

From this point, testing of the MDS solution by Frank and Gary continued to reveal issues with the data in the MDS solution, that were traced back to quirks in the original financial models used by the ISOM team, data upload processes in the MDS solution, and source data from InfraCo. These data problems were frustrating for the testers, who had to repeatedly retest data, and time-consuming for both the testers and developers to locate and resolve. As Frank commented on a number of occasions: "I'm just sick of trying to verify data I've already verified. It's so time-consuming" (Frank, Project Manager, informal conversation, 16 December 2005), and "It's a case of one step forward and a couple back at the moment" (Frank, Project Manager, informal conversation, 21 December 2005).

By the 9 December milestone, SoftCo had completed building the evaluation model front-end and back-end and the scenario copying capability, and estimated that the scorecard model back-end and front-end were 75% and 50% complete, respectively (SoftCo progress report, 9 December 2005). Progress on the scorecard model part of the MDS solution had been constrained by the unavailability of data upload files prepared by Gary, the incomplete version of the scorecard model front-end that was incorporated in the prototype scorecard model and initially provided to the developers, and subsequent changes made to the scorecard model front-end format by AlphaCo IS. Gary had provided the developers with the final version of the scorecard model front-end only on 8 December:

I think we had a lot of little curve balls in there, yeah ... It's understandable, because it's not quite as simple as every little single thing doesn't have exactly the same layout, which would have made it quite quick. And I think because we'd sort of got them to build it on the old one that Frank had, and there's actually been quite a lot of updates that have been driven through ... So, there's actually a whole lot more detail to it. (Gary, IS Commercial Analyst, project meeting, 9 December 2005)

The expectation was that the scorecard model part of the MDS solution would be complete by 13 December, ready for testing. All testing and documentation would then be completed by the final project milestone of 16 December.

On 13 December, the emergence of a number of problems during testing made project completion on 16 December seem overly optimistic. Testing performed by Frank on the scenario copying capability produced the need for further rule changes or corrections. In addition, provision of data upload files to the SoftCo developers revealed a misunderstanding between the SoftCo developers and the AlphaCo project team over the nature of the formatting of those files and the complexity of how certain elements of the financial models operated, which necessitated the creation of further data upload processes within the MDS solution. Concerned that some of the required changes fell outside the scope of the project as originally agreed, Nancy contacted Marie. The day before, Marie had begun classifying open issues in the newly created issues register as either in-scope fixes or out-of-scope new work, the latter being items that were allegedly not specified in the original requirements. Marie arranged an impromptu meeting with Frank and Gary, during which she queried whether the requested changes were in fact new work rather than necessary corrections or amendments, a point Frank disputed by mobilising the RFI document:

Marie (SoftCo Project Manager): How much more of these actual changes are we going to get? ... All I'm worried about, Frank, is this dragging ... It's just we've got a deadline to deliver ... As long as you guys are happy, we can keep working. We can keep changing. That's fine. But I just don't want to reflect on us, 'It was never finished' and those sorts of things. So, that's why I'm just saying let's get in concrete, 'What is the changes, what is the things we still need to do?'

Frank (Project Manager): I think we should be clear. They're not changes at all. These things were always part of the original spec we wanted done ... I can show you it in the RFI. It's specified in the RFI. (Informal project conversation, 13 December 2005)

Marie accepted the relevance of these changes, and those changes needed to enable Claire to test the evaluation model part of the MDS solution on 14 December were made. However, testing on that day revealed further problems with the scenario copying capability and with the application of the business rules used in the original financial models, which had previously appeared to operate correctly. As the impending solution delivery deadline of 16 December increased pressure on SoftCo, the issue of out-of-scope work was revisited at a scheduled project meeting on 15 December.

#### **9.1.4 The 'out-of-scope' project meeting**

In preparation for the project meeting on 15 December, Frank emailed Marie a list of tasks that had yet to be completed, as well as the most recent copy of the issues register. This outstanding work occupied most of the discussion at the meeting later that day. At the beginning of the meeting, Marie suggested working through the list of outstanding tasks that Frank had compiled. She mentioned that she was "pretty much in agreement" with the list, but she obviously had concerns about some of the items with respect to the project scope. In the ensuing discussion, various actors mobilised different arguments in negotiating whether particular outstanding project work was defined as 'in-scope' or 'out-of-scope'. The discussion and negotiation around a number of the outstanding items are analysed below to illustrate the range of arguments marshalled by both parties, the use of project artifacts as boundary objects, and the means by which resolution of the contested issues was achieved.

##### *9.1.4.1 The scorecard model front-end*

The first item discussed involved the completion of the scorecard model front-end in the MDS solution. As noted above, the complete and final version of the scorecard model front-end was only provided to the developers on 8 December. Although the developers had been aware that the prototype scorecard model was not the final form of the scorecard model front-end, the complete scorecard model front-end they had just received was considerably larger and required more complicated changes than they had expected. It comprised separate reports for some thirty business measures, as opposed to the eight contained in the earlier prototype version. Rather than the relatively straightforward "add-on" that SoftCo had envisaged, the actual scorecard model front-end was "a model in itself":

We've got a bit of an issue with the scorecard. I'll tell you why. With the original spec, we got a one-pager. And you guys said, that first day, 'There's going to be changes in the layout'. That's fine. We have, at the moment, a thirty page [spreadsheet] document.

That's a big – it's a model in itself ... Now, I'm happy to say, yeah, we can finish the one that we got originally, where there was like eight KPIs. Now we've got about thirty KPIs. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Marie argued that the amount of work required to create the new scorecard model front-end was not the format changes SoftCo had expected, but rather a major addition to an already tightly constrained project and difficult to “push through very quickly” in the context of “a four-week project – a small, little project. For me, that's not the same” (Marie, SoftCo Project Manager, project meeting, 15 December 2005). Confronted with this perspective, Gary seemed to sympathise:

I can see what they're saying, because there is a - the version that ... we gave them last week, is a lot bigger than the original [prototype] version. So, I can agree with that ... I'd rather you slow down and got it done correctly ... It took us bloody months. It took someone months to create it. So that's what [you're saying], you're recreating it in a week ... Yeah, I can see how that would put us behind a bit. I know, when we've pretty much said, 'You'll see the [final] scorecard tomorrow, tomorrow, tomorrow, tomorrow'. Basically, it's just a lot bigger than everybody expected. (Gary, IS Commercial Analyst, project meeting, 15 December 2005)

Prior to this, Gary and Frank had misunderstood the amount of work involved in adding the additional reports to the scorecard model front-end in the MDS solution:

Gary (IS Commercial Analyst): To me, a lot of those sheets are sort of just copies of another sheet, so I wouldn't have thought it was super hard ...

Frank (Project Manager): I thought it would be easier to replicate all those sheets, as well. (Project meeting, 15 December 2005)

However, as Marie and Nancy explained, creating each additional report was more complicated than simply copying a page in the Excel-based front-end, and required a time-consuming amount of code to be written in order to access the relevant data in the MDS solution cubes. Further, the SoftCo developers seemed to have misunderstood how data fed into the scorecard model. The prototype scorecard model front-end had included a number of graphs based on summary data rather than the detailed data the summaries were constructed from. The AlphaCo project team seem to have expected the developers to realise that the summary graphs needed to be constructed from the detailed data itself, whereas Nancy had simply assumed that that part of the scorecard model front-end used consolidated data:

The thing that's different between the [prototype] scorecard reporting and the one that we got now is all the data that's below it. Like, in the one that we got to start with, it was just the little summary graph - a summary amount and graph. There was not all the data below it that you wanted. And that's what's taking the time, is to get all that data in there ... We just thought that it was consolidated. (Nancy, SoftCo Senior Developer, project meeting, 15 December 2005)

Marie proposed that either SoftCo delivered the restricted, partial scorecard model based on the prototype scorecard model, or that both parties “agree on some more time, some out-of-

scope work” (Marie, SoftCo Project Manager, project meeting, 15 December 2005). However, Frank was wary about defining this work as out-of-scope:

I think we've got to be careful when we're talking out-of-scope ... We knew that the [actual] version of Gary's scorecard report that we were going to load up was going to be different from the one you guys [saw in the specification]. That was known right from the word go, as part of the project. So, when you talk of out-of-scope in terms of actual pricing, I'm uncomfortable with that, because I think it's all part of the same, the original spec of what we wanted to achieve. (Frank, Project Manager, project meeting, 15 December 2005)

When Frank queried what Marie meant by out-of-scope, Marie revealed (mixing her metaphors) the dilemma she faced in both delivering a solution on time so as to create a good impression with AlphaCo, while containing the costs SoftCo were incurring on a project that was, in effect, a loss leader:

We've got an agreed price with you ... And we all know we're going to be over [budget]. We said that from day one. We know that and we're taking that, I mean for future investment. That's fine. But ... this project will grow and grow and grow. So, I've got to put my foot in the sand, to say, 'Look, I can deliver what you wanted, or we can do something better'. So, what I'll do is, we'll have to come to an arrangement: 'This is the estimated time [to complete the scorecard model front-end]. So much is due to the project before' ... [and so much is out-of-scope work]. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Claire seemed to accept the inevitability of the extra work and time needed to build and deliver the complete scorecard model front-end AlphaCo required: “We're just going to have to do it, so tell us what the cost is going to be and I'm just going to have to talk nicely to a couple of people” (Claire, IS Commercial Analyst, project meeting, 15 December 2005). SoftCo's progress report of the following day reemphasised Marie's view that: “This is a model in itself. SoftCo believe this is extra work” (SoftCo progress report, 16 December 2005). Marie estimated seven days work was involved, and offered to split the extra cost between the two companies, an offer that Claire subsequently accepted.

#### 9.1.4.2 *The resource unit update process*

A second item of outstanding project work that was contested in the meeting was the implementation of the complex business rules associated with the resource unit update process in the MDS solution that Frank had prepared when building the prototype models. Work on this process had ostensibly been completed, tested by Frank and Gary, and signed off in the issues register. However, the testing had occurred when only a limited time period of contract data had been loaded in to the MDS solution. Once the remaining data had been uploaded, testing of this data revealed that the rules underlying the process did not work for this data. Marie's position was

that the consequent request to get the process functioning correctly represented out-of-scope work:

Now the resource unit update rule. What's happening with being here is things change. Not because of our fault or your fault. It's just things. How it was interpreted. We've asked, 'Is this right?', and then you guys have said, 'Yes', and then realised the way it works, it's not turning out. So, this is one of those things that has to be re-changed again, these things. So I want to put this one out-of-scope as well. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Throughout the discussion, Marie constructed the necessary work to fix the rules underlying the resource unit update process as “changes”, reinforcing her claim that this was additional work and hence out-of-scope. Her emphasis on the perceived continual changes occurring in the project reflected her twin concerns with delivering the solution in a tight timeframe and containing the project costs SoftCo were incurring:

I can see that this is dragging, dragging, dragging, changing, changing ... I don't want to be here until February, and you're saying, 'Oh, come and change this rule. Yeah, we thought it was right, but it's not' ... I just don't want this thing to drag. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

The AlphaCo project team's perspective was that the necessary changes were in fact corrections that emerged from the solution testing process. The full desired functionality, although recognised as a complex task, had always been part of the solution requirements, and was thus in-scope:

No, that one's always been in scope, that one ... We got a one year view of it, and a one year only view of it, and that looked fine. And then when you saw how it was projecting forward over the seven years, that's when, and only then, they realised that, 'No, the rule's not working'. I mean, that's part of testing ... Is it changing because it's different? Or is it changing because it's not working right? And we're only finding out that now that we have a model, and we're testing a model. (Claire, IS Commercial Analyst, project meeting, 15 December 2005)

It is a very complex part of the model. We always knew that. And trying to get it right is just a matter of testing ... We always expected that as part of the project. That this would be the most complex part of the whole project. (Frank, Project Manager, project meeting, 15 December 2005)

It is quite a complex thing to understand ... Though I would have thought it would have been in the scope to try and understand exactly how it worked. (Gary, IS Commercial Analyst, project meeting, 15 December 2005)

Part of the problem may have involved a miscommunication over key terminology in the project. When the AlphaCo project team staff referred to the 'evaluation model' part of the MDS solution, they were referring only to the part that replicated the original (static) evaluation model, whereas the SoftCo staff understood this to also include the resource unit update process, as can be seen in the following exchange during the project meeting:

Frank (Project Manager): The evaluation model works 100% ...

Nancy (SoftCo Senior Developer): When you say 'evaluation model', I just usually expect that includes resource units. But obviously when you say that, it's not actually including resource units.

Frank: Oh, I'm talking about the static model ...

Nancy: That's cool [laughs]. It was because I get excited and say, 'Oh yeah, cool. That's working'. (Project meeting, 15 December 2005)

Ironically, when Marie asked Ross for an estimate of the time required to fix the problem, he finally pointed out that it had already been fixed the day before. Marie accepted the issue as in-scope.

#### 9.1.4.3 *The scenario copying capability*

Several items of outstanding project work contested in the meeting related to the scenario copying capability. For example, in order for scenario copying to function as envisaged, the evaluation model part of the MDS solution needed to utilise scale factor rate data contained in the database file that Frank had prepared, but which had not yet been added to the MDS solution. It appeared that Ross and Nancy had not understood the significance of some of the sheets in the database file that Frank had given them, and consequently had not realised the need to add all of the data into the MDS solution:

Like especially when we got that database file and there was all those different sheets. I mean, I still don't know what [a particular sheet] does, even though the data is in the cube and it's sitting there. It's in the [MDS] model, but I still don't know what it does. And the scale factor rates and that kind of thing. Like we were given this main sheet and we loaded all that data into a cube. And then as far as we were aware, that was it. We weren't aware of the scale factor rates. I mean, the final rates were in that main sheet so we thought, 'Yeah, they're in there. So it's great' ... But they're actually derived from the other sheets, which would have been nice to know back then, and we would have put that in straight away. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

Frank reiterated that "all the data in that [prototype] evaluation model needs to feed through into this MDS solution model. It forms the basis of how it works" (Frank, Project Manager, project meeting, 15 December 2005), and that the scale factor rate data still needed to be added.

Since SoftCo had begun creating the MDS solution, Frank had decided that adding the ability to calculate (and hence modify) these scale factor rates would provide greater flexibility in scenario copying. On 2 December, he had supplied SoftCo with a twenty page document containing the necessary data and business rules to enable these rates to be calculated. At the current project meeting, Marie questioned whether this work was in or out of scope, using the prototype evaluation model as evidence that the relevant calculations were not included:

Calculating those [scale factor rates] – it's a grey area, whether that was in the spec or not. Because, I tell you, in the [prototype] evaluation model, it gives you the rates, but I

can't see in the [prototype] evaluation model, where those rates are calculated. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Nancy, who acknowledged that the scale factor rate data had not been added to the MDS solution, similarly questioned whether implementing the rules to calculate the various scale factor rates was part of the original specifications:

Basically, what we're trying to say is that, yeah, there's some of the stuff hasn't been done, but there's also stuff that sort of joins it together that wasn't really what we were expecting by the specs. So it's kind of like a half and half, I suppose, is what we're saying. (Nancy, SoftCo Senior Developer, project meeting, 15 December 2005)

In trying to clarify the situation for both the SoftCo staff and Claire during the discussion, Frank eventually came to an understanding of the problem in relation to the database file he had created and what it did (and did not) include:

The calculation of the initial factors, that wasn't given in part of the database [file] ... Whether you load it in as a calculated field or you load it in as hard data? I think in hindsight, it would be best loaded in as a calculated field ... And that's right. That is additional functionality and that is my fault. (Frank, Project Manager, project meeting, 15 December 2005)

As a consequence, it was agreed that SoftCo would add another data cube to the MDS solution to include the missing scale factor rates, but that creating the functionality to calculate those rates would be paid for by AlphaCo as out-of-scope work.

A further problem with the scenario copying capability was traced to another omission from the prototype evaluation model, which Frank had belatedly realised:

I explained the changes to Nancy yesterday ... The [prototype] evaluation model I gave them only had the [calculations for the in-house costs] I think. It didn't have how to calculate the [outsourced costs]. I meant all along to tell them at the start. It's just I'd forgotten about it. (Frank, Project Manager, project meeting, 15 December 2005)

When Marie queried whether the required functionality was in the RFI document, Frank reassured her that it was, although noting that the RFI document had not specified the details of how it was performed. In this case, as in others discussed at the meeting, Marie accepted the necessary changes as in-scope work on this basis: "If it's part of the RFI, then we have to do it. That's fine" (Marie, SoftCo Project Manager, project meeting, 15 December 2005).

#### 9.1.4.4 *The issues register*

Frank had included the open issues in the issues register in his list of outstanding items. During the meeting, Marie explained how she was classifying the issues in the issues register as in or out of scope:

I also bought the Issues Register ... I just want to run down ... And I do want to make you aware, Claire, that there've been some out-of-scope spend ... I just want to make sure that you're aware of that ... We're updating in-scope and out-of-scope, and then it's up to

you guys to say whether you want it done or not, or argue whether it should have been in there. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

The out-of-scope spend Marie referred to involved the addition of a minor function to the evaluation model front-end that Frank had requested. It had arisen as an unforeseen consequence of incorporating planned functionality enhancements into a database solution. Frank questioned SoftCo's classification of this work as out-of-scope: "I guess, again, it's how you define out of scope" (Frank, Project Manager, project meeting, 15 December 2005). The requested function had not been part of the prototype evaluation model front-end, and Nancy referenced this in her justification for the classification:

The reason why we said it was out of scope was because we asked you what you guys wanted in the front-end and you said, 'Exactly like the [prototype] evaluation model'. And that's how we basically defined it from there. (Nancy, SoftCo Senior Developer, project meeting, 15 December 2005)

As had happened in other parts of the discussion of out-of-scope issues, the prototype evaluation model functioned as a boundary object, used here by Nancy as a basis for negotiation. Acceptance that the requested function had not been part of the prototype seemed to enable Frank to accept SoftCo's perspective on this issue. Marie took the opportunity to reiterate her position on cost containment, and the issue remained defined as out-of-scope:

If we had unlimited budget and eight weeks, I'd be smiling. I'd say, 'Let's change all of it'. But unfortunately we don't. So that's why I've got to be quite strict, and say yes, no. Some of it we're going to argue on, and some of it we've just got to fix. If it's clear, we'll fix it. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Another issue in the issues register that SoftCo had classified as out-of-scope involved the addition of a drop-down list of reports to the evaluation model front-end for ease of navigation. The way the SoftCo developers had implemented the evaluation model front-end involved a hierarchy of submenus that made movement between reports difficult. The AlphaCo project team wanted the flexibility to be able to move between reports without having to return to the top menu and work their way down through the hierarchy. This issue had been identified by Claire during her recent testing of the evaluation model part of the MDS solution, and she seemed to take exception to this being classified as out-of-scope:

I think I need to take this out-of-scope stuff away and have a think about it, because some of it, these things up here, like 'out-of-scope' has been put on things. It almost appears like it gets built one way and then if we don't like how it's built, it's out-of-scope work. (Claire, IS Commercial Analyst, project meeting, 15 December 2005)

In response, Marie referenced the prototype evaluation model, asking: "Where was that in the original spec?" (Marie, SoftCo Project Manager, project meeting, 15 December 2005). Frank then took up the argument, pointing out that the way the submenus now operated had not been part of

his prototype front-end either, and that ease of navigation was expected functionality in any prospective solution that had emerged as an issue as part of the normal testing process:

When you're developing a front-end, it's always going to look different in different products. Whether you call that out of scope or not? ... We're testing the front-end now and saying we don't like the way it looks and we want this to change ... We're just saying when we navigate these reports, we'd like to move between sheets like this, instead of going right back to the front menu. And you're saying, 'Well, if you make that change, that's out of scope'. (Frank, Project Manager, project meeting, 15 December 2005)

Apparently influenced by the escalating project costs SoftCo were incurring, Marie defined this functionality as "a nice-to-have":

You see our point is just these things are nice-to-have. We are over budget. These guys are working around the clock for nothing. So, that's the whole thing. If there's extra nice-to-have, then we'd like you to pay for it. That's what it comes down to. (Marie, SoftCo Project Manager, project meeting, 15 December 2005)

Obviously concerned at the potential for further requests, Marie speciously suggested other functionality that could be incorporated into a front-end as "nice-to-have". By constructing the requested functionality as "nice-to-have", Marie was able to define it as extra work outside the agreed project scope and contract price. However, both Frank and Claire rejected this construction, preferring to construct it as necessary functionality: "To me, it's, 'I need to have it'" (Claire, IS Commercial Analyst, project meeting, 15 December 2005). Frank felt that delivering usable functionality was within the scope of the solution, and that the project costs were a separate issue:

In delivering a front-end that we can use, that's got to have functionality that's useful. If it's hard to use, then it's not really appropriate. I guess, the whole money issue, the doing it on time, is two separate issues ... That's not necessarily our problem, whether you have the time and money, or not ... I think that you'd agree, this is just normal functionality you'd get with a front-end ... I'm not asking for something out of the ordinary here. (Frank, Project Manager, project meeting, 15 December 2005)

In the end, Marie seemed to concede the point and the change was eventually made.

Claire reviewed other 'out-of-scope' issues in the issues register, discussing each with Frank in turn. She deleted those issues she regarded as non-essential, suggesting that Gary could fix them once the project was complete:

Some of it's fairly obvious. I'm going to draw a line through it - don't do it ... Gary can learn how to build it next year. I'll put a line through that one [issue 24] ... We'll can 21. We won't do that. 24, we'll can. Also, by can, I mean Gary'll do them. (Claire, IS Commercial Analyst, project meeting, 15 December 2005)

Gary was quite happy to learn how to make such changes: "These are the kind of things I actually want to, am willing to learn" (Gary, IS Commercial Analyst, project meeting, 15 December 2005).

#### 9.1.4.5 *Resolving the issues*

Unlike previous project meetings, the 'out-of-scope' project meeting was characterised by a degree of tension between the SoftCo and AlphaCo staff. At different times, Frank, Claire, Nancy and Marie sounded defensive, and there were also several prolonged pauses in the conversation. In addition, the normal level of joking and humour between individuals was absent, although it was noticeable that, by the end of the meeting, normal working relations had been restored. As a sequence of discussions over various potentially contentious issues, the project meeting provides an opportunity to examine the process of communication, understanding and negotiation that occurred in the situated interactions comprising development of the MDS solution, and the role that project artifacts playing in mediating this process.

Marie had inherited a project in which the development cost and timeframe had originally been significantly underestimated. Conscious of this, Marie implemented various approaches to minimise the risk of not delivering on time, such as assigning her most experienced developers to the project:

They're working real hard. And, I mean, they'll work on weekends, just to get things done. I've incentivised them to make sure this gets done on time. (Marie, SoftCo Project Manager, project meeting, 24 November 2005)

Nevertheless, aware that the project would lose SoftCo money, Marie attempted to contain what she saw as additional project costs as much as possible. Identifying outstanding project tasks that could be constructed as "changes", "extra work", "nice-to-have" or not in the "original spec", and hence, "out-of-scope", was one approach she adopted:

But also to realise in the end, I'm not going to let them walk over me. Because, I think what's happening is, it's 'nice-to-have'. So it's easy to say, 'Oh yeah, they'll do it, because they can', because we'll oblige and get it done. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Claire was also conscious of the need to contain the cost of the MDS solution to AlphaCo, particularly as "the entire organisation [was] in cost reduction mode" in an attempt to achieve the level of return shareholders wanted (Gary, IS Commercial Analyst, informal conversation, 15 December 2005). Hence, she did not want out-of-scope work completed without her prior approval: "If there is out-of-scope of work at all to be done, it'll be passed through me first" (Claire, IS Commercial Analyst, project meeting, 15 December 2005). In contrast to Marie, Claire viewed some of the outstanding project tasks as "part of testing", "need to have it" functionality, or "always been in the RFI" and hence, "in-scope". As Gary subsequently summarised, "I think SoftCo were a little bit worried about the cost overruns and stuff, and AlphaCo didn't want to pay any more" (Gary, IS Commercial Analyst, interview, 5 January 2006).

Marie's construction of 'out-of-scope' project work resembles Lanzara's (1999) notion of a transient construct. The definition of outstanding project work as out-of-scope or in-scope provided a way of understanding and making sense of problematic aspects of the project. It enabled the negotiation of what tasks were legitimate demands on the developers' time and how project costs would be allocated. It also meant that Marie could construct SoftCo's project performance as still within an acceptable timeframe and impose bounds on what she perceived as escalating user requirements. The 'out-of-scope' construct acquired a degree of persistence in that it became inscribed in the issues register originally constructed by SoftCo to record and track emergent problems and amendments to the developing MDS solution.

The issues register itself functioned as a boundary object, sharing knowledge and facilitating coordination between the developers and the AlphaCo project team. It had a common identity across both parties, but was sufficiently flexible to meet the informational needs of each. For example, for Frank and Gary, it was an artifact of the testing process, a place to record required corrections and amendments to the developing solution. Frank also used it as part of his 'Testing and Quality Control Sign-off' document. The SoftCo developers used the issues register as a reference point on necessary changes, the priority given to them by Frank and Gary, and eventual completion: "To track all the things that we have ... Just so we know where we are" (Nancy, SoftCo Senior Developer, project meeting, 7 December 2005). Marie used it in a contractual role, to define outstanding project issues and who would pay for them. One outcome of the 'out-of-scope' project meeting was that Marie insisted that the issues register be used as a formal project record. All requests for changes to the MDS solution were to be documented in writing and logged through the issues register. In this way, the issues register would act as mediating artifact between Marie, who was not always on-site, and Claire, who was to check the issues register on a daily basis:

From now on, if we can just have all changes in writing, if you guys don't mind ... And I think this issues register, everything should go through here. So we know what's changing. If that's okay? ... I think, Claire, you should get a daily update of this issues register ... Everything should go through the issues register, because I'm not here all the time to know what's going on. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Other boundary objects that played a role in the 'out-of-scope' discussions included the RFI document and prototype design artifacts created by Frank and provided to SoftCo. As common reference points in the negotiation of out-of-scope issues, they were mobilised by participants from both companies without necessarily possessing a particular shared meaning. This can be illustrated in the way these boundary objects were implicated in various references made by participants to the "original spec [specification]" of the project. For the AlphaCo project team, the "original spec" tended to refer to the functionality they envisaged in the database

solution and which they understood as being encapsulated in the user requirements specified in the project's RFI document. For example, during the project meeting Gary commented: "I want to get this finished to the original spec. So, all the functionality that we originally required in it" (Gary, IS Commercial Analyst, project meeting, 15 December 2005). Similarly, Claire stated: "That's always been in the RFI ... it's always had the functionality" (Claire, IS Commercial Analyst, project meeting, 15 December 2005), and Frank referred to "the original spec of what we wanted to achieve" (Frank, Project Manager, project meeting, 15 December 2005).

In contrast, SoftCo staff used the "original spec" with reference to the various prototype design artifacts they had been given. For example, in discussing the scorecard model front-end for the MDS solution, Marie offered to "slap together the original spec", meaning the initial prototype scorecard model front-end that Frank had provided, rather than the more comprehensive final version Gary delivered late in the project. Similarly, as described above in Section 9.2.4.4, Nancy pointed out to Frank that the reason SoftCo had classified a particular item in the issues register as 'out-of-scope' was because they had been instructed to produce an evaluation model front-end: "Exactly like the [prototype] evaluation model'. And that's how we basically defined it from there" (Nancy, SoftCo Senior Developer, project meeting, 15 December 2005). The difference in meaning of "original spec", and its associated boundary objects, is highlighted in the following exchange between Marie and Frank in debating the addition of a drop-down list of reports to the evaluation model front-end for ease of navigation:

Marie (SoftCo Project Manager): Well, all I can say is, if it was not in the original spec, we're not doing it ...

Frank (Project Manager): How can you spec the way your front-end looks and functions?

Marie: Because, you've given us [this] to say this is how it should look. (Project meeting, 15 December 2005)

The understanding of "original spec" held by the SoftCo staff seemed to result partly from their perceived role as replicating the prototype models, and partly from Marie's reliance on the prototypes as contractual reference points:

You've got to be a bit hard because the RFI, in some instances, was very vague ...

Looking at the actual [prototype] model that we had to replicate ... You'll see it's going to get more and more used as, like, we get requested, 'Oh, change this', but in fact, 'No, the model you gave us does not have that in there'. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Despite their differences in opinions on the status of the various issues Marie had labelled as out-of-scope, both parties appeared conscious that they would need to continue working with each other, both during the remainder of the project and after delivery of a solution. Given that AlphaCo would be using SoftCo to maintain the MDS solution and that they intended to build any future applications of this nature in MDS, the ISOM team wanted to maintain a

working relationship with the SoftCo staff: "With them being just down the road, and seemingly always available, it's one of the reasons why we chose SoftCo" (Claire, IS Commercial Analyst, interview, 20 June 2006). SoftCo's overriding goal for the project was to use the successful delivery of the MDS solution as an opportunity to establish an ongoing relationship with AlphaCo:

You want to keep the relationship going. And, I think, I'm hoping that they see that we can deliver, you know, we're going to do what it takes to get it done. (Marie, SoftCo Project Manager, interview, 21 December 2005)

A number of communication behaviours can be identified as contributing to this process of relationship management. Even when in disagreement, participants in the meeting were careful not to apportion blame in talking about contentious issues, a supportive behaviour used in 'establishing rapport' (Tan, 1994) between the parties. For example, in discussing the resource unit update process, Marie prefaced her remarks with a pragmatic acknowledgement that: "Things change. Not because of our fault or your fault. It's just things" (Marie, SoftCo Project Manager, project meeting, 15 December 2005). At another point in the discussion, she reiterated this point, which was subsequently taken up and used by both Gary: "I know there are problems on both sides. And, I mean, it's nobody's fault" (Gary, IS Commercial Analyst, project meeting, 15 December 2005), and Claire:

And it isn't any one's fault. It's just, you know, our understanding of what's going on in Excel, and you know how the inside workings of MDS work, and it's trying to come to the happy place on that. (Claire, IS Commercial Analyst, project meeting, 15 December 2005).

The "happy place" Claire referred to in the above quote seemed to represent the idea of a realistic compromise that would satisfy both parties. This idea appealed to Marie, who immediately agreed with Claire, saying "Yeah, that's where I want to get to" (Marie, SoftCo Project Manager, project meeting, 15 December 2005). In this sense, the idea of a "happy place" is another example of a transient construct, in that it represented a new way of thinking about and accommodating the interests of each party. By saying, "Yes, I know we need to get to a happy place. I mean, my happy place is to have an evaluation model that works. And Gary's happy place is to have a scorecard that works" (Claire, IS Commercial Analyst, project meeting, 15 December 2005), Claire acknowledged that different members of the project team (and, by implication, SoftCo staff) had different, but equally valid, objectives or desired outcomes for the project. By offering a mutually acceptable cognitive end-state, the "happy place" construct served as a vehicle to allow potentially contradictory interests to co-exist and a compromise to be reached so that the project could continue. Although transient, this concept nevertheless displayed a degree of persistence, extending beyond the project meeting itself. When later reflecting on the negotiation that occurred around the 'out-of-scope' issues, Marie commented:

Those sorts of things, you've got to be quite firm on. And luckily Claire, who's running the project, is quite amicable in those regards. She could have been terrible, you know, stuck her heels in. But then you get nowhere. Like she said, we've all got to get to a happy place. (Marie, SoftCo Project Manager, interview, 21 December 2005)

Another communication behaviour that could be identified in the meeting involved an attempt by the AlphaCo project team members to relate to SoftCo's situation. This recognition of another's perspective often occurred in response to justifications made by SoftCo staff for the current state of outstanding work on the project, and acted to establish an empathy with the other's argument. For example, at one point in the meeting when Marie explained her dilemma in delivering a solution under extreme cost and time constraints, Frank interjects with: "Oh yeah, I understand where you're coming from" (Frank, Project Manager, project meeting, 15 December 2005). In responding to Marie on the same point later in the meeting, Claire, sounding sympathetic, said: "Oh, no, no, I know. Yeah, I know what you're trying to ... I know what's going on. I can see your point" (Claire, IS Commercial Analyst, project meeting, 15 December 2005). In discussing the larger than anticipated final scorecard model front-end that the SoftCo developers had received late in project (see Section 9.2.4.1 above), Gary indicates his understanding of the demands being placed on the SoftCo developers:

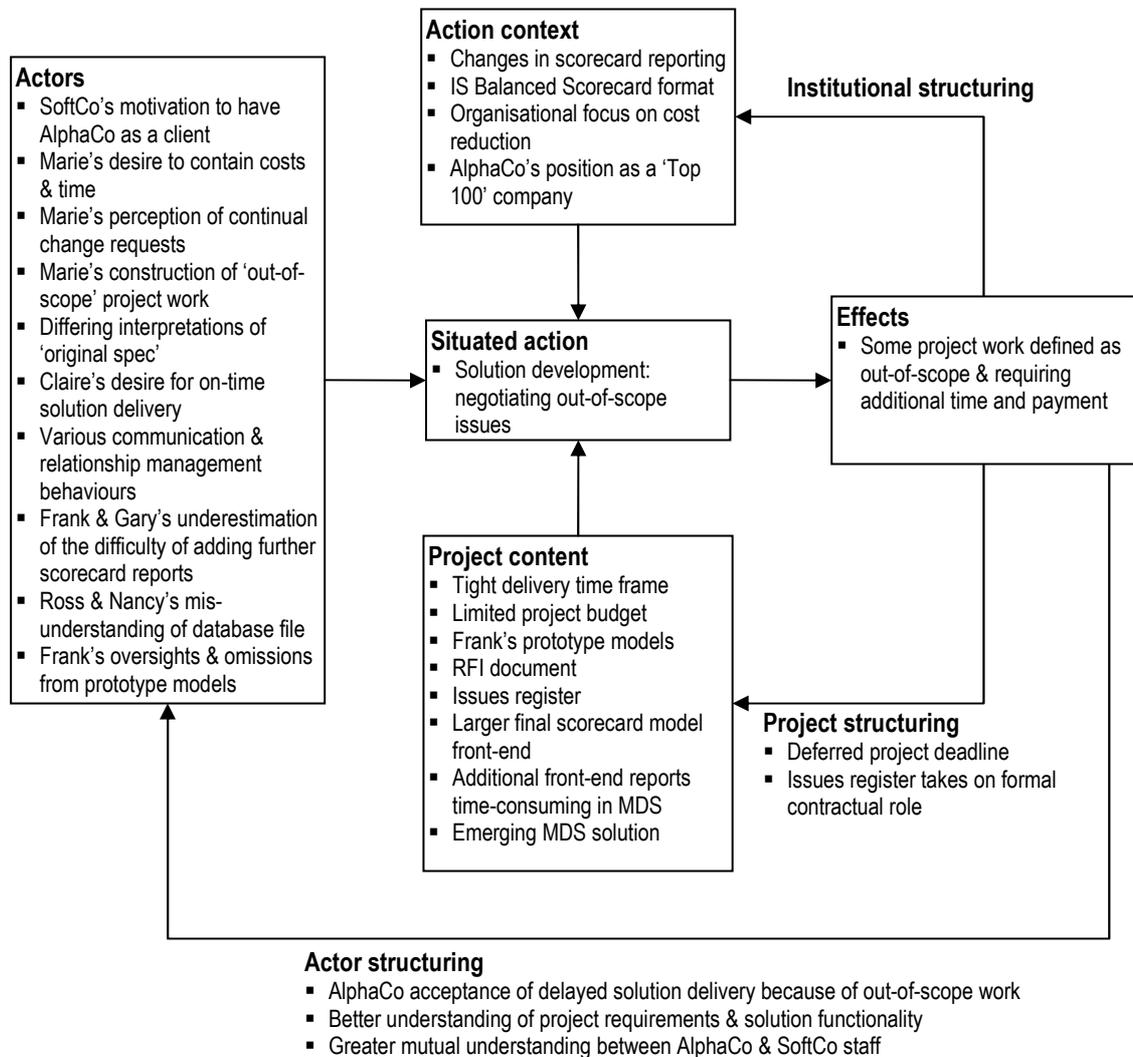
I can see what they're saying ... So, I can agree with that ... It took someone months to create it ... [and] you're recreating it in a week ... I can see how that would put us behind a bit. (Gary, IS Commercial Analyst, project meeting, 15 December 2005)

These examples of recognition of another's perspective are consistent with the concept of 'shifting perspective' described by Tan (1994). This is an accommodative behaviour that helps acceptance of and adjustment to differing perspectives so that tensions are resolved and decisions to be made on future project actions.

Figure 9.2 summarises the situated action surrounding the negotiation that occurred between AlphaCo and SoftCo over some of the outstanding project tasks and who was financially responsible for them. Through the discussion of these contentious tasks (in which they mobilised competing arguments to justify their positions), both parties revealed their different interests, assumptions, and expectations of what the project scope entailed. As the SoftCo project manager, Marie wanted the project completed as soon as possible, so that it did not reflect badly on SoftCo and to minimise SoftCo's financial losses. She sought to limit SoftCo's remaining obligations by placing bounds around the project in the face of what she regarded as escalating user requirements. Her understanding of SoftCo's expected project deliverables was based around SoftCo replicating the existing models in the MDS tool, using the prototype models that they had been given. From Marie's perspective, the contentious tasks were "out-of-scope", not in the "original spec" (which she related to the prototype models). The AlphaCo project team

countered SoftCo's claims, arguing that the tasks were "in-scope" (with two exceptions that had been AlphaCo's responsibility). They expected SoftCo to deliver a solution that met the user requirements defined in the project's RFI document – no more, no less – and knew that any additional expenditure was going to be hard to justify in AlphaCo's current financial climate.

Figure 9.2: Negotiating out-of-scope issues



### 9.1.5 The Christmas deadline

One outcome of the project meeting on 15 December was that it was assumed that the project completion milestone of 16 December would not be met. Instead, priority would be given to completing model development tasks and outstanding issues in the issues register so that they could be tested by Frank and Gary, and a completed solution delivered by 23 December, the last working day before Christmas. Claire commented, "I mean, it's so nearly there. It is so nearly there" (Claire, IS Commercial Analyst, project meeting, 15 December 2005), although Frank

appeared less optimistic: "I'm starting to think that Christmas is going to be a pretty close call" (Frank, Project Manager, informal conversation, 16 December 2005).

In a project meeting on the morning of 23 December, Marie was able to announce that all but two of the outstanding items for the project were complete or would be completed by later that day. The remaining development task (related to the scenario copying capability) and documentation of the solution would have to be completed by mid-January 2006, when the SoftCo developers returned from their Christmas break. The on-site server used to house the emerging MDS solution would be stored by SoftCo at their premises over Christmas until Gary retrieved it at the beginning of January, so that he could finish testing the MDS solution, including the recently completed components.

With the original expectation that the ISOM database project would be completed by Christmas 2005 at the latest, Frank had organised another job, which he was due to start in the New Year. Despite working long hours, the problems with delivery of a completed MDS solution meant that Frank had not been able to fully test the solution and sign off the project before his departure on 23 December. As a result, he was unable to "hand everything back ... to make sure it is 100% finished" (Claire, IS Commercial Analyst, informal project conversation, 5 December 2005), as Claire had wanted. Following Frank's departure, responsibility for operational project management devolved to Gary, who was less familiar with the MDS tool and the evaluation model side of the new solution. From Christmas onwards, apart from a very small amount of testing done by Claire, Gary was the only AlphaCo staff member to work on the ISOM database project.

## **9.2 Episode 7: Completing the Project**

When Gary assumed project management responsibility, the project was at or near the end of the Development phase, the third to last phase of the formal AlphaCo IS project lifecycle. Only two other phases remained: Implementation, in which project deliverables produced during Development are transferred to business units, and Completion, in which the project is formally closed. According to project management documentation contained in the ISPDR, there are gates at the end of each of the last three lifecycle phases, with specific documents required for approval at each gate (Table 9.2). At the time the ISOM database project was being undertaken, administration of Gate 4 and Business Acceptance was by a project's governance group, rather than IS Project Office (who administered the earlier IS project lifecycle gates), and within the ISPDR there were no formal guidelines or requirements as to the form of the key approval documents for these two gates. In effect, this meant that the nature and form of approval for these two gates depended entirely on the project's steering group, Dave, Claire, and Gary. The

final gate, Gate 5, was also administered by the steering group, although the IS Project Office would often informally check that the Closure Report had been completed and the project status closed in Tracking, AlphaCo's project management tracking and reporting tool.

Table 9.2: Gates documented in the IS project lifecycle

Gate	IS lifecycle phase	Key document for approval	Form of document	Administered by
4	End of Development	Testing sign-off	Unspecified	Steering group
Business Acceptance	End of Implementation	Business acceptance	Unspecified	Steering group
5	End of Completion	Closure Report	Specified in Tracking	Steering group

In early January 2006, Frank returned briefly to the AlphaCo offices to formally hand over project management responsibility to Gary. They discussed the outstanding project management tasks that still needed to be completed. Frank explained how to complete progress reports, close the project in Tracking, and what was required in terms of formal testing sign-off, directing Gary to the 'Testing and Quality Control Sign-off' document he had created earlier specifically for this purpose. Frank also showed Gary the various (electronic and paper) records he had created over the course of the ISOM database project. These included the project management folder in which Frank had collated all of AlphaCo IS's project management documentation contained in the ISPDR, a folder containing information about the original financial models and the prototype models he had created, and a folder containing the data from original financial models for reconciling the MDS solution against. Over the remainder of the project, Gary did not consult any of these records, although several times he referred to the need to complete the 'Testing and Quality Control Sign-off' document Frank had created. Throughout the remainder of the project, Gary's main concern was to test the MDS solution and get it operational in AlphaCo's networked IT environment, so that SoftCo's involvement with the project could be formally signed off and the new solution used by the ISOM team.

### 9.2.1 Checking the MDS solution

On 5 January 2006, Gary retrieved the server housing the latest version of the MDS solution and attempted to set it up ready to use in uploading and testing data. However, this took the entire day due to a combination of his inexperience with the MDS tool and SoftCo's failure to manage the hand over in an efficient way. For example, it transpired that AlphaCo's MDS license had expired at the end of the previous month. When Gary requested a new license, he was initially sent an incorrect one. Even when he was subsequently able to open the MDS tool, it was not pointing to the latest version of the data files.

Beginning the next day, Gary progressively uploaded the monthly data files needed to populate the scorecard model side of the MDS solution, which ended up taking up most of his

effort on the project during January. This time-consuming task required extensive formatting of each data file, and was made even longer by a succession of problems that Gary experienced with various data upload processes associated with the MDS solution, which resulted in missing or incorrect data. Each problem needed to be corrected by the SoftCo developers, Nancy and Ross, who were now off-site and had limited availability because of their commitment to other clients. Further, Gary could only devote limited time to the project given the need to perform his regular AlphaCo role, so that altogether progress towards completing the MDS solution slowed considerably:

It is a pain. I mean, they keep thinking they're waiting for me, which they are, because my job gets in the way. But then every time I need them to do something, it doesn't happen straight away, so I'm waiting for them. So, whenever something happens, it happens slowly ... They should be coming in and sitting down and ripping into it. But they've got other things on. I guess it's just a staff issue with them ... [And] it's hard for me to put pressure on them to come in straight away when it takes me a week to get back to them. (Gary, IS Commercial Analyst, interview, 21 April 2006)

During January, Gary also tested the scorecard model data in the MDS solution, making sure that it reconciled with that in the original scorecard model.

At a project meeting on 16 January, Marie was able to announce that Nancy and Ross had completed all of the outstanding tasks on the MDS solution and that SoftCo's documentation of the solution would be completed in the next few days. All that remained to be done were any amendments or fixes emerging from subsequent testing by the AlphaCo staff. At this stage, both SoftCo and AlphaCo staff anticipated that only minor issues would arise, and submitting final invoices (by SoftCo) and closing off the project (by AlphaCo) by the end of that week were mentioned. As Claire summarised:

Oh, well, it's this close [referring to a small space between her fingers]. Just testing! That's it. Fantastic ... Gary's had almost a smile on his face for the last day and a half ... Almost a smile. (Claire, IS Commercial Analyst, project meeting, 16 January 2006)

However, on 18 January, when Claire and Gary started testing the evaluation model data in the MDS solution, they immediately encountered a problem with the creation and maintenance of scenarios within the MDS solution. Data relating to the 'base scenario' – representing the initial outsourcing contract negotiation – that had been signed off as reconciled and correct in mid-December by AlphaCo staff, now appeared to have been overwritten by subsequent data uploads. It was never clearly established what had caused this problem, but discussions amongst the various SoftCo and AlphaCo staff revealed a degree of conceptual confusion, miscommunication and misunderstanding over how this aspect of the MDS solution should work. Solving the problem was complicated by the absence of Frank, the project manager, who could have potentially clarified the situation, and the lack of documentation recording decisions and

changes made to the emerging MDS solution. As Claire noted, in discussing with Nancy and Ross, the SoftCo developers, what might have happened:

I think there's been too many changes to other things. I don't know, is it? Because I don't know. Sort of, in the last couple of weeks of December, did you guys make any changes to the evaluation model in itself? You see, I can't remember and you can't remember. (Claire, IS Commercial Analyst, informal project conversation, 20 January 2006)

Eventually, it was decided to reload the source data for the 'base scenario'. However, despite significant efforts to do so, neither AlphaCo nor SoftCo staff could locate a database file containing this data. Instead, the SoftCo developers had to recreate the 'base scenario' dataset by integrating data from a number of partially correct scenarios that had earlier been created in the MDS solution. This task was not completed until the end of January, and revealed further problems with the scenario copying capability of the MDS solution that required fixing. Recreation of the 'base scenario' dataset meant that Gary had to reload and check data into the scorecard model side of the MDS solution, which he did during February and March. Progress on this was slow, as Gary seemed to find it difficult to devote time to the ISOM database project because of his regular AlphaCo duties. During February, Gary also worked through the issues register, checking and signing off the various amendments that the SoftCo developers had made to the MDS solution.

Despite Marie's expectation that SoftCo's documentation of the MDS solution would be ready soon after the 16 January project meeting, it did not arrive at AlphaCo until the end of that month. This documentation was in addition to the electronic help function that the SoftCo developers had incorporated into the MDS solution and the MDS user manuals provided to AlphaCo. The documentation was intended by SoftCo to cover the basic structure of the MDS solution (dimensions and cubes) and data upload processes. SoftCo expected that the AlphaCo project team would add further documentation on actually using the MDS solution, including specific aspects they considered important or useful for users to know:

The documentation will only cover, 'This is the model. This is how it works. These are the cubes. These are the data upload processes and this is what it does'. Once you start running it, you might want to add some of your own flavours: 'Don't use this because ...' You know, 'This is how to do these things'. It's a bit hard to know, for now, to know, but there will be things that you'll have to add. That makes more [sense]. It's better for you guys [to do that]. (Marie, SoftCo Project Manager, project meeting, 23 December 2005)

Despite the AlphaCo project team's implicit acceptance of this approach, no further documentation of the MDS solution was produced by AlphaCo staff. Gary, who had been delegated this role, apparently found it difficult to devote time to working on the documentation:

I have the best intentions to do it some time, but it may or may not get done. It's just a matter of getting time to do it. I mean, it's that problem where you have, someone says, 'This is part of your role'. Well, it is, but it's a pretty small part of my role, and I've got all

this other stuff to do. And it just gets, it just gets bottom priority, documentation. And that will really hurt them [AlphaCo] if I leave, because I'll have full knowledge and nothing will be documented. But, if you don't get time to do it, it's their business risk. (Gary, IS Commercial Analyst, interview, 27 October 2006)

### **9.2.2 A testing time**

In February, Gary began testing the amended scenario copying capability in the MDS solution, using it to create various scenarios off the 'base scenario', which he then compared to scenarios in the original financial models, making sure that the data in the respective scenarios reconciled. Reconciling the data proved to be frustrating and time-consuming for two main reasons. First, there was a succession of minor problems with the scenario copying capability that required SoftCo to fix. However, as noted above, Nancy and Ross, the SoftCo developers, were heavily committed to other contracts and were thus difficult to contact and often unable to work on the AlphaCo project in a timely manner. Further, when fixes were made, these were sometimes incomplete or incorrect, the SoftCo developers being either unable or unwilling to test them. This meant that these problems with the fixes were not detected until Gary attempted to reconcile the scenario data at a later stage. The problem was exacerbated by the limited availability of SoftCo developers to work alongside Gary, on-site at AlphaCo. This led to large time delays as files were passed back and forth between Gary and the SoftCo developers in a "cycle of fix, check, fix, check" (Gary, IS Commercial Analyst, informal conversation, 4 May 2006), continuing through March and April 2006.

The second source of scenario data reconciliation problems related to a number of unrelated manual adjustments that had been made to spreadsheets in parts of the original evaluation model at various times prior to commencement of the ISOM database project. Frank had previously identified one such problem in December 2005: "It's just an error someone's hard coded. It's probably Excel – typed over a bloody formula. It's just stayed that way" (Frank, Project Manager, informal project conversation, 23 December 2005). At the time, Frank and Claire had discussed how best to address the problem, Claire commenting "we'll know that fault is in there" (Claire, IS Commercial Analyst, informal project conversation, 23 December 2005). Frank then discussed with Nancy how she would deal with the problem within the MDS solution. However, no record of the change appears to have been made, and Claire subsequently failed to recall her conversation with Frank when she and Gary 're-discovered' the problem during testing of the MDS solution in January 2006.

Gary referred to similar spreadsheet errors or adjustments to the original evaluation model during testing from February onwards, noting that they were time-consuming to identify and made the continuing problems with scenario copying difficult to attribute to SoftCo:

Well, it's hard, because I can't just ring up SoftCo and say, 'Hey, this isn't working', because with my last two reconciliations, there was a problem in our initial scenarios. So it was something weird, like a missed file reference, a cell reference was one, was the difference in the whole thing ... So we go through and go through and go through and go, 'Well, actually MDS is correct, the original version's slightly incorrect' ... So, I'm not only checking that it works exactly as Frank did, I have a reason for checking everything in the MDS solution. (Gary, IS Commercial Analyst, informal conversation, 23 March 2006)

By May 2006, Gary had concluded that any remaining scenario data reconciliation problems were likely to be because of these original spreadsheet errors:

We can't get it [the MDS solution] to reconcile with our model but I'm not, I don't think that's because of the MDS solution not calculating correctly. I think it's because of errors in our model, being a static model, and basically being thrown together in late nights and a hurried sort of way. So, I think the SoftCo piece of work is actually working really well. (Gary, IS Commercial Analyst, informal conversation, 12 May 2006)

Gary had spent "literally months" (Gary, IS Commercial Analyst, informal conversation, 16 June 2006) reconciling the MDS solution and the original evaluation model, exacerbated by the difficulty he had in finding time away from his regular duties to work on the ISOM database project and his lack of familiarity with the evaluation model. On a number of occasions, Gary commented on the latter, noting that: "It was hard for me, because I didn't really understand exactly how it was working" (Gary, IS Commercial Analyst, informal conversation, 23 March 2006). This situation would have been alleviated by Claire's greater involvement in checking and reconciling the two models, but this did not occur. Similar to Gary, Claire was under pressure from her other work commitments, and indeed was even performing some of Gary's everyday tasks, in order to release him to work on the project. AlphaCo's 'lean and mean' approach to staffing and the difficulty in covering ('back-filling') specialised internal roles when such staff are seconded to other projects contributed to the time pressure on Gary and Claire's general unavailability for ISOM database project work.

[Having Claire more involved] would've been ideal, but we're just resource – we just don't have that resource, I don't think. I think generally AlphaCo has more money than human resource ... It's been sort of quite hard, because you don't get back-filled ... I guess because we're dealing with such specific sorts of things ... the specificity of the InfraCo contract, it's hard to just drag someone in and get them up to speed. So it's, so that's quite hard. So, you're still doing your day job ... You're really expected to deliver, even though you're off-site doing something else. (Gary, IS Commercial Analyst, interview, 5 January 2006)

The lack of availability of a full-time project manager after Frank had left also contributed to the pressure on Gary and the delay in completing the project:

[Releasing] the external project manager ... does demand a lot of time on other people, who actually have two jobs; obviously one job on the project and one job in terms of their day to day [work] ... Maybe that's contributed to the fact that it's taken a lot longer than expected. It hasn't had that drive and that, you know, that day to day focus from a project

management perspective. (James, IS Commercial Services Manager, interview, 14 June 2006)

Another reason for Claire's unavailability for testing the MDS solution was her deliberate delegation of that task to Gary, "because that's best fit with his role" (Claire, IS Commercial Analyst, interview, 20 June 2006), consistent with her intention to construct Gary as the 'super-user' of the MDS solution (see Section 8.7.3) and enabling her to concentrate on other activities. Interestingly, Gary had a different perspective on this issue, feeling somewhat abandoned and believing that:

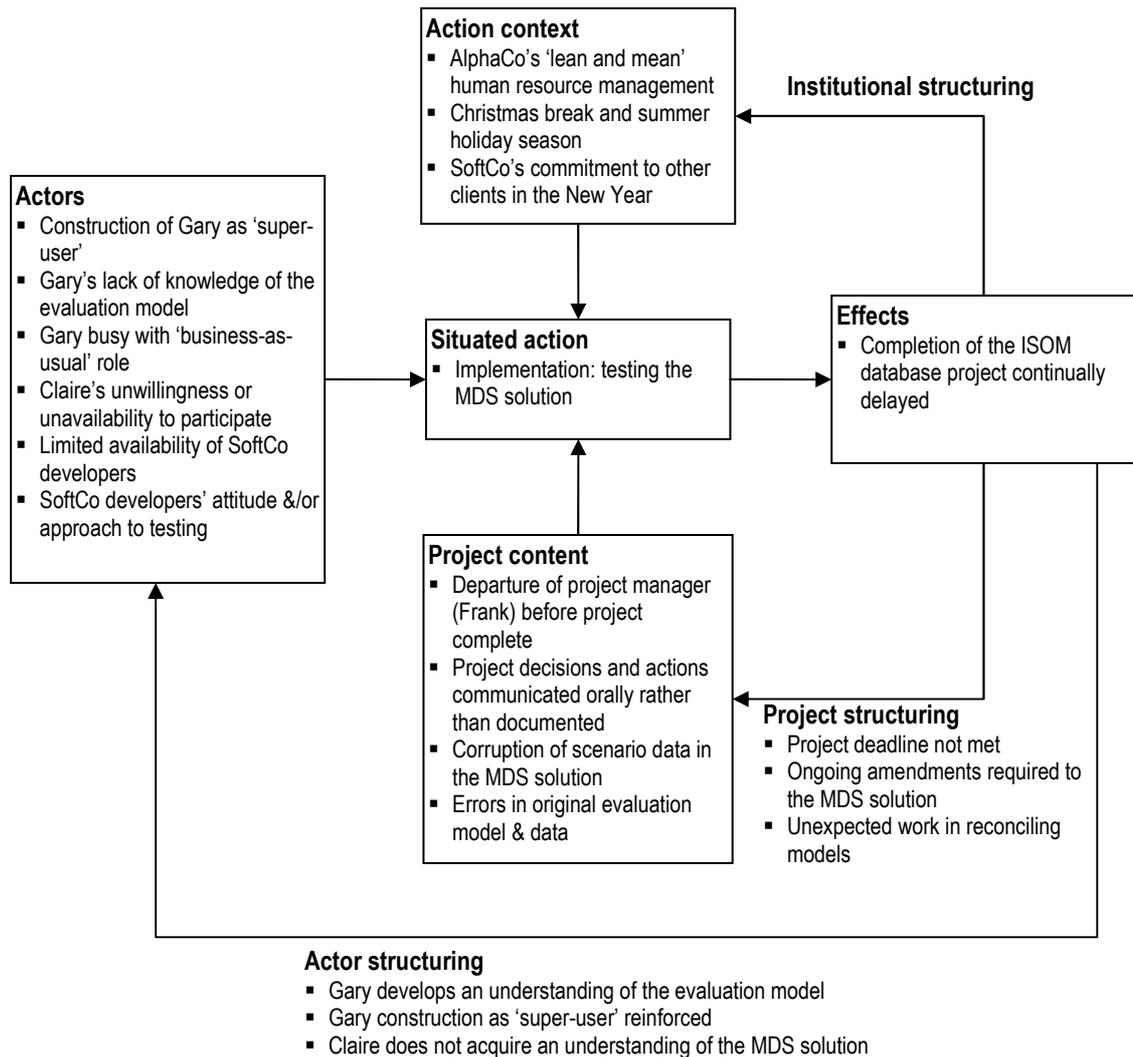
She should have been far more involved, yeah. I think it's one of those things. She wanted a better solution, but she wanted it to just happen. And she had other stuff to do, and wasn't really interested in learning how to use it [the MDS solution]. So, I got sort of lumbered with it, a wee bit. But I think she should have taken a far more hands-on approach. She didn't do any scenario copying and testing, and all that sort of thing. I had to do it ... I thought her and Dave were fairly poor in ... their attitude. I mean, they should have got into it. (Gary, IS Commercial Analyst, interview, 16 July 2007)

One consequence of the number of errors in the original evaluation model and data, and Gary's lack of familiarity with the evaluation model, was that he relied to a greater extent than he perhaps needed to on the SoftCo developers to assist in identifying the source of data reconciliation problems. As a result, SoftCo billed AlphaCo for the "many extra hours trying to reconcile the new model to the existing model ... [when] the errors were not in the MDS model, but in AlphaCo's original model and data" (ISOM internal memo, 17 July 2006), time for which they were subsequently paid.

Figure 9.3 summarises the situated action surrounding the testing of the MDS solution and the subsequent delays to completion of the ISOM database project, which – despite the initial optimism of both SoftCo and AlphaCo staff - continued to "drag on" in the absence of Frank, the external project manager:

"It dragged on. The project manager should've driven, finished – the whole thing should've been perfect – and done the post-implementation review, I would have thought. Frank should've completed it. They shouldn't have let Frank go beforehand. (Gary, IS Commercial Analyst, interview, 13 June 2007)

Figure 9.3: Testing the MDS solution



### 9.2.3 Getting some sort of closure

During March, Gary came under increasing pressure from various parties to complete and close off the ISOM database project. Claire summarised the frustrations and increasing urgency to have an operational MDS solution:

We've got to get the damn thing working. It's really frustrating ... It has to be working. We've got to get it working. So, we've got to get it done this week ... The problem has been keeping focused ... Busy, busy, busy. (Claire, IS Commercial Analyst, informal conversation, 23 March 2006)

Dave also acknowledged that an operational MDS solution would be useful in performing the ISOM team's role, as well as emphasising the need to demonstrate the project's completion and benefit at an organisational level:

This is like a long sunset, isn't it? ... I've put the pressure on Gary to get that thing finished. I want it finished ... We're getting things that we'd be able to use it for. Plus, we need to be able to demonstrate to the Finance people that, 'Yeah, look. We spent the money and it's finished. And here's the benefit we're getting'. Otherwise what we're doing

is saying, 'Look, we've spent one hundred grand [\$100,000] on it, and, yeah, it's sitting there and it's not working' [laughs.] ... We've got to demonstrate that we have finished, we're using it and the benefits promised are being realised. (Dave, ISOM Manager, informal conversation, 23 March 2006)

In addition, the IS Project Office were pushing Gary to close the project in Tracking by completing a brief Closure Report in the system. The Closure Report is intended to formally end the final, Completion phase of the IS project lifecycle, information from it being required to fulfil portfolio management reporting to the CIO and individual IS Managers. In this project, although the formal Development and Implementation phases had not yet been completed (and the project's status in Tracking was still Development, to which it had been set in December 2005), institutional pressures were applied to formally close the project with respect to organisational systems, in order to capitalise the project and avoid it registering as a 'red light' on the AlphaCo IS balanced scorecard (Gary, IS Commercial Analyst, informal conversation, 11 April 2006). During February, Gary had revised the forecast project completion date in Tracking from 24 December 2005 to 17 February 2006, and then subsequently recorded the actual project completion date as 28 February 2006 (ISOM database project document, March 2006). Gary completed the Closure Report for the project on 3 April and, the following day, Brenda updated the project's status in Tracking to 'Complete'. One consequence of this action was that the project accounts began to be closed, which subsequently caused Gary some difficulties in arranging for outstanding SoftCo invoices to be paid.

In spite of the guidelines contained in the AlphaCo IS project lifecycle for project Development and Implementation, in this project these phases seemed to overlap and the boundary between them (and indeed the Completion phase) blurred. The lack of IS Project Office oversight of these phases, the relatively small size of the project, its nature as an internal IS initiative (so that the business owners were IS), and an apparent lack of awareness or interest in following the guidelines of the IS project lifecycle by the AlphaCo project team, all seemed to contribute to this situation. Gary never completed the 'Testing and Quality Control Sign-off' document Frank had created for formal testing sign-off at Gate 4, considering the closing and signing off of all of the outstanding issues in the issues register as testing sign-off. Further, no formal Business Acceptance process appears to have taken place. The focus of the AlphaCo project team was on obtaining 'sign-off' on the MDS solution with SoftCo.

As early as February, Marie had "the [SoftCo] Board on [her] back about the outstanding invoices" (Marie, SoftCo Project Manager, email, 7 February 2006) yet to be paid by AlphaCo and, as the project increasingly dragged on, exerted pressure on Gary to pay these and sign off on the project. By April, she was requesting the return of SoftCo's server, threatening to charge AlphaCo for its continued use – a move Gary interpreted as encouraging him to sign off the

project (Gary, IS Commercial Analyst, interview, 12 May 2006). As noted above, by mid-May, Gary regarded the MDS solution as “essentially complete”. Other than some remaining reconciliation problems that originated from the original AlphaCo evaluation model and data, SoftCo’s MDS solution functioned correctly, and Gary was keen to arrange a final “close-off” meeting with SoftCo:

The project, in my mind, is essentially complete ... I’m going to get a buy-in from the powers that be that it can’t be reconciled ... Accept it and move on. So, as far as I’m concerned, it’s happening as soon as I have some sign-off from Claire, Dave and a few others. I want to tick it off and ring SoftCo and have a final sign-off meeting. (Gary, IS Commercial Analyst, interview, 12 May 2006)

The final meeting between SoftCo and the AlphaCo project team occurred on 2 June, and was intended to address any remaining issues for either party about the project. Discussion focused on two outstanding projects tasks: organising a final training session for potential users of the MDS solution and transferring it to the live environment. In many ways, at least for members of the AlphaCo project team, this meeting represented some sort of closure in terms of the ISOM database project:

Fabulous. I think we’re cooked. Awesome. Thank you very much. Long time coming, but we’re there. We’re there. (Claire, IS Commercial Analyst, project meeting, 2 June 2006)

A final full-day training session run by SoftCo was held a fortnight later. From SoftCo management’s perspective, such a training session seemed to represent a final hand-over of the MDS solution:

What we need to do is sit down and do like half a day. Just run through the model, run through training, how do we do this, how do we that, and just those sort of steps associated with it. And that should be part of the closure ... It’s very important just to make sure things get closed, rather than just the guys finishing and going ‘It’s done. See you later’. (Leon, SoftCo representative, informal project conversation, 20 January 2006)

The training was intended to provide an initial overview of the MDS solution for as many potential users as possible, followed by more specific training in aspects of the solution to enable Gary to better utilise the full potential of the MDS solution. Claire and Gary saw the training session as an opportunity to raise awareness of the MDS solution with a wider audience in AlphaCo IS, including other members of the ISOM team, other users of information produced by the MDS solution and potential users of other MDS applications.

In the end, the training session was attended by only Gary and Vince, the third IS Commercial Analyst in the ISOM team. Others who had been approached about attending were apparently unable to, due to the demands of their regular work duties. The “One AlphaCo IS” organisational restructuring, which took place in the first half of 2006, increased work pressure on

AlphaCo IS staff and also made it difficult to identify appropriate people to attend the training session.

I needed a bit of a refresh, but really I needed like an hour or two of stuff, to be shown specific stuff. But really, Vince, Claire and [an IS performance reporting analyst] needed to be brought up to speed on how the whole thing worked. But only Vince was interested. And you can lead your horse to water, but ... So, only Vince went. It would've been far better if Claire and [the IS performance reporting analyst], perhaps Dave, had gone along. But everyone always gets pushed for time. But their push for time means that I have to do it all, and I'll be pushed for time. (Gary, IS Commercial Analyst, interview, 27 October 2006)

Ironically, Vince, the only other trained user of the MDS solution, was seconded overseas in September 2006, and was subsequently made redundant. In a sense, the business risk of having only one person with a thorough understanding of the original spreadsheet models, originally identified as a reason for the ISOM database project, was simply transferred to the new MDS solution. As Gary noted, "We're back to the same risk. You know, where I'm the only person who knows how to use it" (Gary, IS Commercial Analyst, interview, 27 October 2006).

According to AlphaCo IS project management documentation, the IS Project Office is supposed to instigate a project closeout review once the project is complete. The form of this review can vary depending on the size, subject, scope or level of complexity of the project. From the time the ISOM database project status was shown as 'Complete' in Tracking (April 2006), Gary expected a closeout review to occur (although he was unsure of the form it would take) and was waiting for Brenda, an IS Project Office Analyst, to organise it. However, under the One AlphaCo IS restructuring occurring at this time, the IS Project Office merged with another AlphaCo project office, with an expanded company-wide scope. In the consequent "upheaval and change" (Gary, IS Commercial Analyst, interview, 13 June 2007), a closeout review was never undertaken:

Because we had a restructure, we lost that – a whole lot of post-implementation review and all that stuff that was going to happen. But I'm not going to put my hand up and ask for someone to do it ... Someone may put their hand up and say, 'Hey, look, we should've done this', but I don't think so. There's bigger priorities. (Gary, IS Commercial Analyst, interview, 12 March 2007)

This may not have been an isolated occurrence, as James indicated that the One AlphaCo IS restructuring had disrupted a number of IS projects (James, IS Commercial Services Manager, informal conversation, 14 June 2006).

#### **9.2.4 Transfer to the live environment**

Once the MDS solution was completed, it needed to be transferred from the SoftCo development server to the BetaCo server, which held the licensed MDS software that the ISOM

would share. Once in the live environment, the MDS solution would be accessible to the ISOM team to use from their networked computers. Typically, delivery of a project solution to the live environment, and its testing in that environment, is supposed to occur in the Implementation phase of the AlphaCo IS project lifecycle. However, in this project, this did not occur until well after the project had been formally closed in Tracking (April 2006) and the final “close-off” meeting with SoftCo (June 2006).

It was assumed by members of the AlphaCo and SoftCo project teams that uploading the completed MDS solution would simply entail an AlphaCo staff member (Gary) obtaining access rights to the BetaCo server. Accordingly, in November 2005, Frank had organised for this to happen and by the end of that month Gary had local admin rights for the BetaCo server. Originally, the intention had been to transfer the emerging MDS solution to the BetaCo server in early December 2005 and complete any solution testing and amendments in the live environment. However, as the project became progressively delayed, the AlphaCo project team decided to postpone the transfer until after the MDS solution was complete, in order to minimise disruptions to the BetaCo MDS application users through repeated stopping and re-starting of the BetaCo server as successive amendments to the MDS solution were made.

I expected it to be put on the BetaCo server a bit quicker, but I’m quite glad it wasn’t now, because we’ve stopped and started that [SoftCo development] server a whole lot of times, and it would’ve frustrated BetaCo. (Gary, IS Commercial Analyst, interview, 5 January 2006)

It was not until the beginning of April 2006 that Gary felt that the MDS solution was ready to be transferred to the BetaCo server.

On 11 April, Gary made a courtesy call to BetaCo to let them know that the MDS solution was about to be uploaded onto the BetaCo server. However, BetaCo staff were concerned at the potential impact of the MDS solution on the running of their MDS application, and requested that Gary complete a change request so that the InfraCo team responsible for the company’s servers could assess the impact on server performance and determine if the BetaCo server was capable of running both applications. Gary appeared not to have realised until then that following this particular organisational process was necessary:

I thought it was a formality. I thought once we had access to the server we could just put it on there ... It seems obvious now that you should have to do something like that, to not impact the running of the server. But I don’t know, it’s not really my area of expertise. (Gary, IS Commercial Analyst, interview, 21 April 2006)

On 12 April, Gary arranged for the appropriate change request to be submitted, including information supplied by SoftCo on the size, loading time and memory requirements of the MDS solution. Although change requests of this nature were supposed to be completed within two weeks under the service level agreement (SLA) with InfraCo, in this case the process became “a

fiasco” and “a debacle” (Gary, IS Commercial Analyst, informal conversation, 26 May 2006), eventually taking over four months before the MDS solution was transferred to the live environment. Interestingly, prior to their experiences on this project, members of the ISOM team (who monitored InfraCo’s performance of its SLAs as part of the monthly ISOM scorecard) seemed unaware of any difficulties in the timely delivery of servers by InfraCo experienced elsewhere in AlphaCo. In fact, in July 2005, Claire had laughed at the suggestion that it could take InfraCo two months to deliver a server, when told by Frank of Vendor1’s prior experiences of this effect (Claire, IS Commercial Analyst, informal project conversation, 22 July 2005).

During this time, continual delays by InfraCo in responding to the change request, as well their requests to extend the task completion date, frustrated Gary and led him to engage in a series of email exchanges with InfraCo:

This seems to be an ongoing saga. I would have thought this sort of thing was reasonably common? My initial request to the helpdesk was on the 12th of April. I hope you understand that I am a little frustrated by the whole process. (Gary, IS Commercial Analyst, email, 12 May 2006)

In a subsequent email to InfraCo, Gary emphasised that the project sponsor was the IS Commercial Services Manager, who was also responsible for the InfraCo outsourcing contract, making this “a very visible case”, and suggesting “can we not disappoint him further?” (Gary, IS Commercial Analyst, email, 24 May 2006).

After a series of requests for further information about the MDS solution, in May InfraCo decided to monitor the performance of the BetaCo server. By 23 May, performance monitoring was complete and InfraCo indicated that the MDS solution could be transferred to the BetaCo server at the beginning of June. However, it soon became apparent to InfraCo that the BetaCo server was unstable, and the transfer was put on hold while the server’s performance problems were investigated. In addition, BetaCo had recently added additional MDS models to their MDS application, significantly increasing its size and putting further strain on the capacity and performance of the unstable server. Further complicating the situation was the timing of the June financial year-end, which increased demand on the BetaCo MDS application and made them reluctant to make changes to the BetaCo server. InfraCo decided to explore whether additional memory could be added to the BetaCo server in order to accommodate the MDS solution, or whether a new server was required.

In early June, InfraCo finally decided that the BetaCo server was running at maximum capacity and could not accommodate any further MDS applications. They recommended that a new server be purchased to host the ISOM MDS solution. This recommendation was consistent with SoftCo’s ongoing preference for the ISOM and BetaCo MDS applications to run on separate servers. In mid-July, Dave, the ISOM Manager, requested funding for the use of a new server,

acknowledging that this represented an additional project cost to that originally budgeted, but noting that BetaCo would be able to at least partially utilise the server as well. A separate server would also require the purchase of additional MDS licenses from SoftCo, further increasing the project cost. By mid-August 2006, a suitable server had been acquired and the MDS solution was finally transferred to the live environment. Despite SoftCo's preference for separate servers, the BetaCo MDS application was also uploaded to the same (new) server, saving AlphaCo some \$50,000 in licensing costs:

We bought a new server and put both the BetaCo model and our model onto that. We went through a bit of, a big sort of a hoo-hah because SoftCo weren't very keen on us having both models on the same server ... But, [BetaCo manager] just said, 'No, this is stupid. Let's put it onto one. Give it a two-month trial, and if it falls over a lot, maybe we'll separate the two. Let's just give it a crack on one'. Which SoftCo weren't very happy with at all ... But we put it onto one [server] and it seems to be running fine. (Gary, IS Commercial Analyst, interview, 27 October 2006)

Nevertheless, an additional \$10,000 was eventually paid to SoftCo to upload both MDS applications onto the new server and provide an additional MDS admin license for Gary. The latter had not been included in the original project planning provided by SoftCo, and caused Gary some annoyance:

It's not knowing what the costs [are] ... just always, like, changing ... If it had been one cost, one extra cost, once, that would've been fine. But we've gone back once, got some extra costs signed off, and now I'm going back again and getting more costs signed off. And it makes me look like a monkey, because I didn't know about that cost. It's like SoftCo just sort of don't disclose the full cost of things ... I cannot find anywhere in the original [costing] where it says ... it doesn't say anywhere that we'll need our own Admin licence. (Gary, IS Commercial Analyst, interview, 27 October 2006)

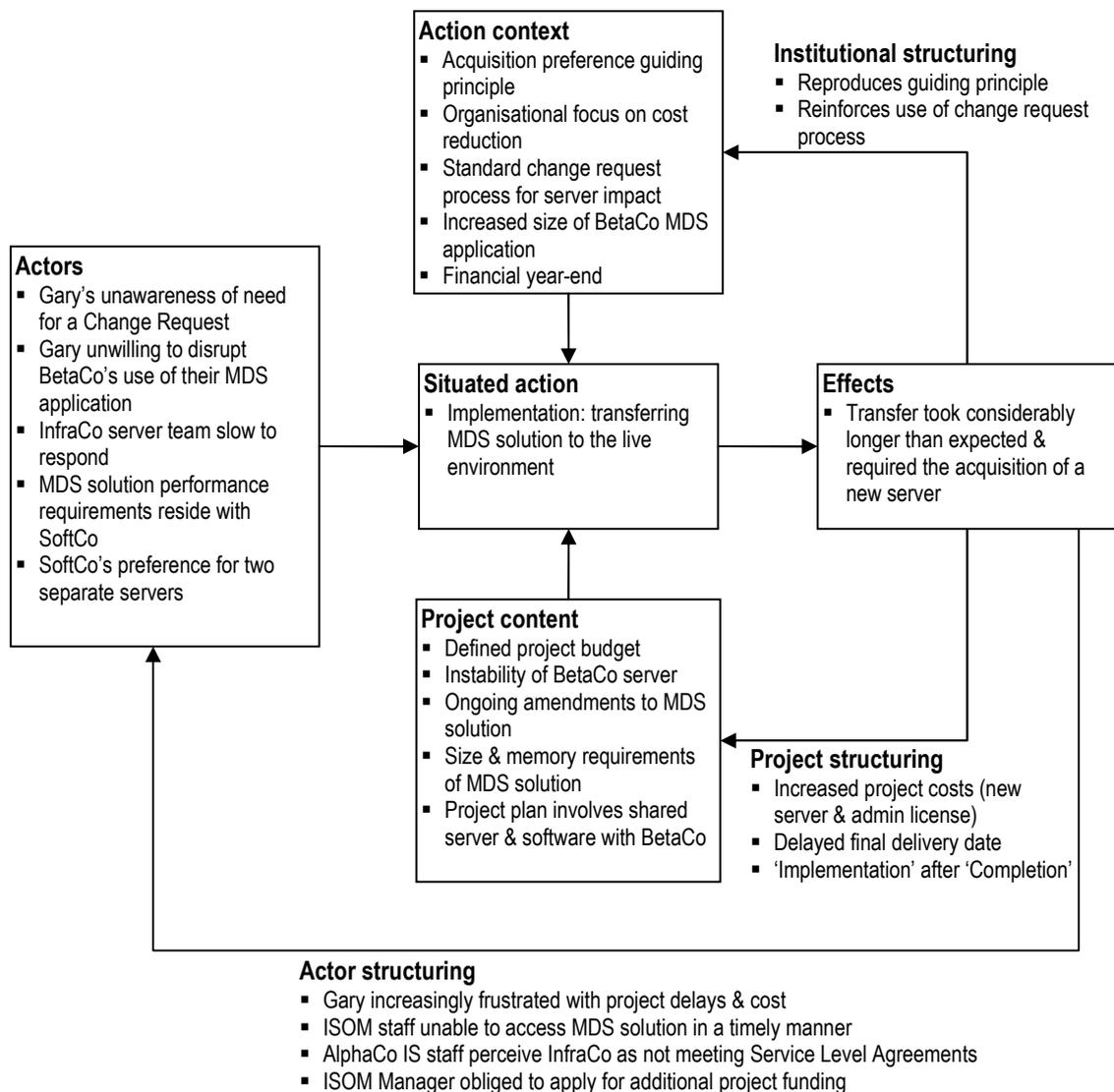
Figure 9.4 illustrates the situated action surrounding the transfer of the MDS solution to the live environment. Competing visions of how the MDS solution would be made part of AlphaCo's networked environment existed. While SoftCo had consistently argued for a separate server and licensing arrangement for the optimal use of the MDS solution, strong institutional pressure to leverage existing infrastructure and software within AlphaCo, combined with the need to reduce overall costs within AlphaCo IS, meant that the AlphaCo project team favoured sharing software, licenses and a server with BetaCo. Concerned with their burgeoning MDS application and financial year-end processes, BetaCo were cautious about any changes to their server and insisted that the impact of the MDS solution on the server be assessed through the formal change request process. In the end, instability of the BetaCo server, combined with the capacity requirements of both MDS applications, led InfraCo (eventually) to recommend the use of a new server for the MDS solution, which seemed to favour SoftCo's vision of two servers. Instead, the ISOM database project team and BetaCo preferred to share the single new server and software instance, reproducing and reinforcing an organisational structure of leveraging existing

infrastructure and software (articulated in the acquisition preference IS guiding principle).

However, this decision was not without unforeseen complications and consequences:

One of the decisions was to try and leverage off other infrastructure that we had to run it off. And, you know, that potentially has created some further complexities and issues. I mean, it's absolutely again, 'We only leverage infrastructure, common systems, similar tool sets that other parts of business are using. Leverage off their infrastructure'. But as soon as you have other systems on other hardware or infrastructure ... there's some other dependencies that you need to take into account, and ... it does take a little more coordination and managing into production. (James, IS Commercial Services Manager, interview, 14 June 2006)

Figure 9.4: Transferring the MDS solution to the live environment



### 9.3 Summary

This chapter continues the process analysis of the ISOM database project and presents the process narrative for Episodes 6 to 7. The next chapter discusses the extent to which the new MDS solution was used and key themes that emerged from the process analysis.

## Chapter 10: Case Study Discussion

### 10.1 Introduction

This chapter discusses the extent to which the new MDS solution was used in the year following project completion. This is followed by an evaluation of the project outcome and a discussion of a number of key insights that emerged from the case study and the process analysis.

### 10.2 Use of the MDS Solution

Prior to the ISOM database project, use of the original Excel spreadsheet models involved monthly scorecard reporting of the outsourcing contract performance and the supply of data for the IS balanced scorecard (from the scorecard model), and, as required, evaluation analysis, benefits reporting and scenario analysis (from the evaluation model). Both spreadsheet models were also used for ad hoc reporting. This situation continued up until the end of 2005, when the One AlphaCo IS restructuring was announced, which changed reporting requirements and generally disrupted standard operations within AlphaCo IS.

The restructuring was implemented during the first five months of 2006, starting with the AlphaCo IS senior management team and moving progressively outwards to their (restructured) teams, although staffing changes continued throughout 2006. Under the restructuring, the ISOM team, which had focused on the InfraCo outsourcing contract, was reformed into a new team, still reporting to the IS Commercial Services Manager but with wider responsibilities for financial management and performance reporting across the whole of AlphaCo IS. However, in March 2006, James was seconded to a strategically important organisational project and was eventually replaced by a new IS Commercial Services Manager, Stuart. With James's departure, interest outside the ISOM team in the monthly scorecard reporting (of which James was the main user) seemed to cease:

No one has really been viewing it [the scorecard], because there's been such disruption outside. But I'm going to have to start getting out there and say, 'Look. Who owns this report? Who wants this report?' and 'Let's use it'. I mean, it's a good report. It shows us a lot of things. (Gary, IS Commercial Analyst, interview, 21 April 2006)

Although Gary continued to produce monthly scorecard reports until July 2006, these were not published for external consumption. During this time, he continued to upload monthly scorecard data into both his original spreadsheet model and the MDS solution, the scorecard model side of which had been essentially working and usable from around February 2006:

Actually, both were getting updated. The MDS one has never actually been publicised, published even ... All the reports are exactly the same ... They were being produced in

both [systems], just so we could reconcile them as much as anything. But then nothing was being published. [Laurie (the researcher): Nobody asked for information?] No ... A few of the things were driven into the IS balanced scorecard, but they probably came out of Excel rather than MDS. (Gary, IS Commercial Analyst, interview, 12 March 2007)

From June 2006, Stuart (the new IS Commercial Services Manager) instigated a new type of monthly report, based around cost centres across AlphaCo IS: "A monthly report of all the cost centres, what budgets were, what's the expenditure, what are the variances" (Dave, ISOM Manager, interview, 23 March 2007). This new monthly reporting was consistent with an emphasis on cost management within IS introduced by Ian, the new CIO, who was appointed in March 2006 (Edward, the previous CIO shifting to another role within the company):

Ian is now the CIO. And now we've got yet another quick change in direction, a completely different focus ... A lot more on cost, a lot more on getting things done, rather than actually the detail. (Gary, IS Commercial Analyst, interview, 12 May 2006)

In this new reporting climate, the outsourcing contract scorecard report, and even the IS balanced scorecard, lost much of their currency:

We got Stuart who would've got all our reporting, and he wasn't interested in that reporting ... He had a completely different perception of what we should be doing. And this perception was a whole lot of cost centre management reporting IS-wide. So, he said, 'Right. These are your priorities'. And the priorities weren't the scorecard. (Gary, IS Commercial Analyst, interview, 12 March 2007)

As noted earlier, the evaluation model side of the MDS solution required testing and amendments until mid-May 2006. Although it was available for reporting from June 2006 (albeit for only a single user via the SoftCo development server), throughout all of 2006, no analysis and reporting from the evaluation model was performed, presumably a consequence of the disruption arising from the One AlphaCo IS restructuring. From June to December 2006, the MDS solution was only used by Gary, Claire and Vince, to retrieve resource unit volume-related data for ad hoc tasks:

I haven't really used the MDS solution heaps. I mainly use it for volumes and things like that ... I haven't used it for the scorecard ... Just using it as a database, more than a reporting tool ... It's quite handy in that regard, because it has volumes going back, right to the beginning, which semi-reconcile. (Gary, IS Commercial Analyst, interview, 27 October 2006)

The full potential of the MDS solution may, in part, not have been realised because of Gary's relative lack of knowledge of the evaluation model side of the MDS solution:

I think it's only limited by our lack of knowledge on how to use it, our lack of training. I mean, that's the only thing holding us back from using it for a myriad of different things. (Gary, IS Commercial Analyst, interview, 21 April 2006)

This situation persisted, even after the final training session in June 2006, with Gary noting that: "It's just limited by my knowledge of how it works" (Gary, IS Commercial Analyst, interview, 12

March 2007). Further, other uses of the MDS solution, which could have been achieved by expanding its functionality, and the goal of extending the user base of the MDS solution at some stage in the future, had not eventuated by mid-2007:

There's lots of things that it could be used for. I mean, if we were proactive, there's loads of things ... It's just we're just not very proactive at the moment ... It will be useful, but we just, I don't think we've got the amount of staff to actually start doing the proactive stuff which the evaluation model allows you to do. (Gary, IS Commercial Analyst, interview, 12 March 2007)

The restructuring that had widened the responsibility of the ISOM team was accompanied by a reduction in staff numbers. During the second half of 2006, two members of the original ISOM team left and Claire worked exclusively on renegotiation of aspects of the InfraCo outsourcing contract (before eventually taking a different position in the company), increasing the day-to-day workload of those remaining, Dave and Gary:

Since then [June 2006], we've had sort of a massive focus on monthly, on reporting and reconciliation and getting good control of our cost centres. And so, I've just been flat out doing other stuff. Because obviously the pool [of staff] has shrunk. There's a lot more stuff to do ... I've been basically doing a whole lot more financial analysis and a whole lot less InfraCo contract stuff. (Gary, IS Commercial Analyst, interview, 27 October 2006)

Interestingly, in working on the outsourcing contract renegotiation, Claire resorted to modelling using Excel and her original spreadsheet models, rather than the new MDS solution, because of "her comfort level" (Dave, ISOM Manager, interview, 23 March 2007). In Gary's view:

She should have been developing her new model for the contract extension in MDS. She should have known how to use it [MDS], rather than doing it in Excel because that's what she knew – which was quicker, but in the long term someone's going to have to eventually do it in MDS. (Gary, IS Commercial Analyst, interview, 16 July 2007)

In effect, the restructuring of the ISOM team, removed an important source of organisational legitimacy for their prior reporting on the outsourcing contract:

Previously, we were the ISOM team and we reported the outsourced agreement. But there's no ISOM team any more and so we were doing reporting for a team that doesn't sort of exist. So, they're all sort of legacy reports ... You can't produce a report for a team that doesn't exist. (Gary, IS Commercial Analyst, interview, 27 October 2006)

Nevertheless, Gary believed that the functionality provided by the MDS solution would still be beneficial to the company when the disruption caused by the restructuring settled down:

We've now got to work out, going forward, what reports we need and who needs to see them ... The team the MDS solution was built for is pretty much defunct, but a lot of, it's envisaged that all of the functionality will be used. But no one's, no one's really asked for it yet ... In about two months, someone is going to say, 'Hey, how's InfraCo tracking against what we expected it to track?' And they're going to look and they're going to go, 'Who's supposed to be providing that report?' And that's when they're going to come to us and say, 'Where is it?' And we're going to have to have something. And that's where it will be useful. (Gary, IS Commercial Analyst, interview, 27 October 2006)

Despite Gary's prediction, the MDS solution remained essentially unused up until at least July 2007, the end of the research period. No scorecard reporting was done and neither was the evaluation model side of the MDS solution used. Gary was the only user, occasionally finding it useful in his day-to-day tasks for retrieving volume-related or costing data, although this was only one of its intended functions:

The MDS solution hasn't been used at all really. I use it for the odd times to spit out some volumes and things like that. It's a good repository, but we could've done that in an Access database, I guess ... I use it for the odd thing, but that's when I get a chance. (Gary, IS Commercial Analyst, interview, 12 March 2007)

A new IS Commercial Analyst, appointed in February 2007 to replace Claire, had been trained by a SoftCo developer in using the MDS solution, but as at July 2007 had yet to use it. Dave suggested that the relatively small size of the ISOM database project had meant that the MDS solution "fell off the radar when the restructuring occurred" (Dave, ISOM Manager, informal conversation, 23 March 2007), while larger projects, particularly enterprise-wide ones, had had sufficient staff to manage them through the restructuring. In addition, the origin of the project in a support service, rather than a business unit, may have influenced the priority and resources given to it:

There's always competing priorities on resourcing and management focus ... You're implementing a tool that's kind of part of a support function, when there's other projects that are on that ... are actually deriving direct business value ... I think that that also is one of the areas that's probably contributed to not getting some of the drive in that area. (James, IS Commercial Services Manager, interview, 14 June 2006)

Between March and June 2007, Gary also uploaded monthly data files from InfraCo into the MDS solution. He experienced some difficulty in doing so as his sporadic use of the MDS solution since June 2006 meant he lacked familiarity with parts of it. Prior to this point, the MDS solution had not been updated since July 2006, for a variety of reasons, including work pressure and other priorities, a delay in obtaining the necessary admin license from SoftCo, delays in receiving data files from InfraCo (which was itself undergoing a restructuring), and a lack of demand for the reports that the MDS solution was intended to produce:

If there's no one wants to see it, why do it? ... No one's screaming for it, so it can just sit there ... I mean, there's no direction from up top to get this information out and we're not resourced to do it. So I'm not going to bust a gut on something that's fairly low on their priority list, when they've got other things they're screaming at us, saying, 'You've got to do this. You've got to do that.' And it's like, 'Okay, let's drop the lowest [priority] one.' This is sort of the last cab off the rank, at the moment, I guess. (Gary, IS Commercial Analyst, interview, 16 July 2007)

Gary's updating of the MDS solution from March 2007 onwards was at the instigation of Dave. Dave felt that, following the disruption caused by the One AlphaCo IS restructuring, "things are starting to settle down again" (Dave, ISOM Manager, interview, 23 March 2007), and that the

relevance of the outsourcing contract reporting from the MDS solution would once again be realised:

With all the changes, even the demand for some of the reporting has gone away. It went away for a year. Like, the whole scorecard thing just sat in hibernation for a year. And now it's coming back. Because people's attention has been so diverted for a solid twelve months, it's been incredible ... It sat at a hiatus ... There was just no demand for anyone to look at it, anyone to see it. But now it's come back ... It's on their attention, and they want it. It's reshaping ... We've started to really get back into like that balanced scorecard stuff. That's starting to happen now. (Dave, ISOM Manager, interview, 23 March 2007)

Part of this renewed urgency on Dave's part seems to have stemmed from pressure applied by the IS Commercial Services Manager, Stuart: "to actually show that it's [the MDS solution] actually useful" (Gary, IS Commercial Analyst, interview, 12 March 2007). Certainly, Dave appeared to feel the need to demonstrate the usefulness of the MDS solution, given the investment made by AlphaCo:

It's driven by me and the fact that they spent one hundred thousand [dollars] there. We need to show something for it. On any significant spend, we need to start showing some reporting ... Demonstrating what it can be used for. (Dave, ISOM Manager, interview, 23 March 2007)

For some time, Gary had wanted to demonstrate the capabilities and potential of the MDS solution to others in AlphaCo IS, particularly Dave and Stuart. Gary believed that a major reason the MDS solution was being underutilised was that "no one knows it exists, really" (Gary, IS Commercial Analyst, interview, 12 March 2007). As Dave later observed, "No one has seen the model, only Gary ... It's been Gary's secret project for two years" (Dave, ISOM Manager, MDS solution demonstration meeting, 13 June 2007). Gary also felt that Dave lacked a detailed understanding of the MDS solution, which at times meant that he had unrealistic expectations of its capabilities. In addition, Gary wanted to review the future use of the MDS solution in the restructured AlphaCo IS context, to "actually work out if it's got a use" (Gary, IS Commercial Analyst, interview, 27 October 2006). In June 2007, a meeting was held to demonstrate the MDS solution and discuss its future. Those present at the meeting, including Dave and another IS manager, felt that it had potential and that there would be demand for its use going forward.

Of course we want to use it ... There's a demand for this. It's been hidden away in our team for a little while because we haven't had the resources to get at it. (Dave, ISOM Manager, MDS solution demonstration meeting, 13 June 2007)

Crucially, however, at the last minute Stuart cancelled his attendance at the demonstration meeting, which Gary perceived as demonstrating his lack of support for the MDS solution: "Stuart was supposed to come to this meeting, which is funny, because it shows the low priority of the model" (Gary, IS Commercial Analyst, informal conversation, 13 June 2007). This effectively meant that the MDS solution still lacked visibility within AlphaCo's senior IS management:

They are no more aware of it ... Stuart didn't come, and then suddenly now you can't take it up any higher, because you've got a glass ceiling. (Gary, IS Commercial Analyst, interview, 16 July 2007)

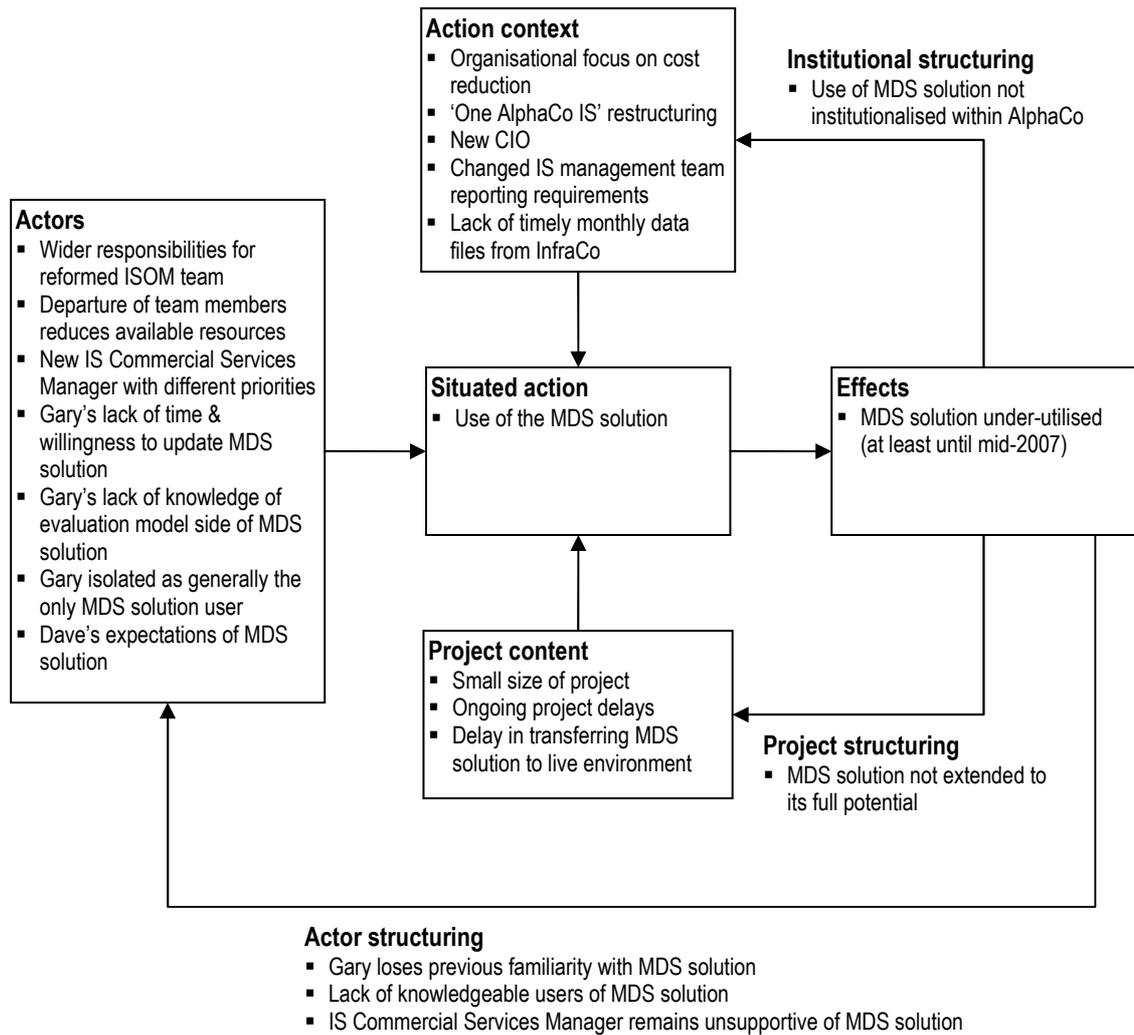
Gary remained incredulous that senior IS management were not demanding the sorts of reporting on outsourcing contracts that the MDS solution was intended to produce. In his opinion, the forthcoming implementation of a new outsourcing contract, this time for IS applications delivery and support, would increase the visibility of the MDS solution:

We've got to have something to benchmark the new outsourcing deal. So we're hoping that will, that will be in MDS, I guess ... It's amazing that they haven't been asking for more ongoing ... People have dropped the ball on it, really. It's just sort of gone in the too-hard basket. Yeah, it'll get more and more and more visibility as we go forward, I think. (Gary, IS Commercial Analyst, interview, 16 July 2007)

Associated with the introduction of this new applications outsourcing contract was yet another restructuring of AlphaCo IS, taking effect from August 2007. Gary hoped that this restructuring would increase the human resources available to work with the MDS solution, "because you have suddenly got some hands and you can actually put one or two people on it and say, 'Right, get this up-to-date. Make it work'" (Gary, IS Commercial Analyst, interview, 16 July 2007). However, judging by past experiences of organisational restructuring, it also had the potential to once again disrupt AlphaCo IS operations and, thus, the resourcing and visibility of the MDS solution. As Gary noted, "there is just so much uncertainty" (Gary, IS Commercial Analyst, interview, 13 June 2007).

Figure 10.1 illustrates the situated action surrounding the (lack of) use of the MDS solution. The One AlphaCo IS restructuring was a major contextual influence on the decisions and actions made by senior IS managers and members of the ISOM team in relation to use of the MDS solution. The level and scope of change involved in the restructuring caused disruption to normal IS operations and uncertainty as roles and responsibilities were realigned, with many projects 'falling off the radar' or losing momentum during this period. Changed senior IS management priorities led to a lack of demand for reporting on the outsourcing contract and IS balanced scorecard, both of which the new MDS solution was intended to contribute to. Further, an expanded role for the downsized ISOM team increased the pressure of work on those remaining and meant that there was a lack of resources available to maintain and use the MDS solution. The lack of staff resources 'to get at it' meant that the full potential of the MDS solution was not developed and that it was underutilised. This effectively restricted its visibility with respect to the senior IS managers whom the ISOM team expected would be the main users of the information and reports it was designed to provide. As the IS manager attending the demonstration meeting in June 2007 summarised, "You need a resource and you need some users" (IS manager, MDS solution demonstration meeting, 13 June 2007).

Figure 10.1: Use of the MDS solution



### 10.3 Project Outcome

As noted in Chapter 3, evaluating the outcome of an IS project is a subjective process and interpretations of the outcome may differ depending on various actors' interests and perspectives. Further, an IS project outcome can be evaluated in terms of the development process, the product delivered from that process or the overall solution as implemented within the organisational context.

As noted in Chapter 7, at the time of the case study, a well-defined measure of IS project success had not been implemented in AlphaCo IS. With respect to monitoring project performance, the IS Project Office utilised traditional measures of on time, to budget and to specification. In terms of product delivery, success seemed to encompass business acceptance of the solution as well as potentially the delivery and realisation of benefits as outlined in the project's business case.

In terms of the project performance measures used by the IS Project Office, the ISOM database project was officially completed to specifications, within budget, but ran over time. Gary's final monthly progress report noted that the project was completed by the end of February 2006, "A little late, due to resource issues, well under budget, despite a few small 'out-of-scope' items being added, [with] full benefits described in Feasibility Report [the business case] expected" (ISOM database project document, March 2006). In his subsequent Closure Report, Gary noted that "All objectives ... have been met ... The finishing deadlines for the project were stretched out longer than expected" (ISOM database project document, April 2006). In fact, it was not until August 2006 that the MDS solution was finally transferred to the live environment, mostly because of delays on AlphaCo's part. At the time the project was closed in Tracking and capitalised (April 2006), the actual project costs were below the budgeted costs by around \$20,000. The remaining costs required to make the MDS solution operational and transfer it to the live environment were treated as additional costs as they were incurred after project capitalisation. These amounted to around \$15,000, so that had they been included in the official project costs (as would normally have been the case), the project would still have been completed under budget.

Other members of the ISOM team also considered the project to have been successful, although delayed in terms of delivery. James, the project sponsor, noted that, "It meets all the requirements ... [although] it's taken longer to implement than initially per the Project Plan" (James, IS Commercial Services Manager, interview, 14 June 2006). Similarly, when asked about the project, Claire suggested that "It's gone okay. No major issues ... It's been a good project ... Things [just] took a bit longer to complete, to finalise" (Claire, IS Commercial Analyst, interview, 20 June 2006). Dave, the ISOM Manager, also considered the project to be successful. To account for the delays in testing the MDS solution and transferring it to the live environment, Dave distinguished between the solution development and its deployment:

The project was a success ... In the project, the model was built, it was delivered ... The final deployment, I see as something being quite different, because the model operates as intended ... It's just unfortunate that the database information supplied by AlphaCo has now been demonstrated to be flawed. (Dave, ISOM Manager, interview, 25 May 2006)

In fact, Dave used the problems with the original spreadsheet data to justify the basis for the project itself: "It proves the main reason for driving the whole programme ... which was, 'Stop relying on dumb spreadsheets. Let's rely on a single, intelligent repository', yeah" (Dave, ISOM Manager, interview, 25 May 2006).

Indeed, in terms of product success, the MDS solution was perceived by members of the ISOM team as being superior to their original Excel spreadsheets. The Closure Report prepared

by Gary noted that the “New model [is] far superior to present solution ... much improved ... more accurate and useful ... The final result is a very useful application that has endless opportunities” (ISOM database project document, April 2006). This assessment was borne out by comments made in interviews and project conversations. For example, Gary commented that: “It works well. We can pull heaps of stuff off it ... The thing seems to run perfectly” (Gary, IS Commercial Analyst, interview, 27 October 2006). In fact, many of the evaluative statements about the MDS solution were future-oriented and often rehearsed benefits related to speed, flexibility, and capability for detailed analysis and reporting anticipated earlier in project documentation:

We never quite knew how quick it would be to produce ad hoc reporting. So, it's in the ad hoc space that it's *going to be* most valuable. (Claire, IS Commercial Analyst, interview, 20 June 2006, emphasis added)

The reports that we come up with, to make recommendations from, *should be* more reliable, more complete and more informative” (Dave, ISOM Manager, interview, 25 May 2006, emphasis added)

I mean, it *will allow* more different scenarios, you know costing, and more detailed reporting and analysis to actually be done ... So, it *will be* a significant improvement in that area. (James, IS Commercial Services Manager, interview, 14 June 2006, emphasis added)

However, by mid-2007, the majority of these benefits had not been realised, as the MDS solution had essentially not been used for the purposes for which it was intended. The level of change and disruption associated with the One AlphaCo IS restructuring had removed much of the perceived relevance of the MDS solution. Despite Gary and Dave's optimistic predictions that the need for the MDS solution would once again be recognised within the company when things had begun to “settle down again” (Dave, ISOM Manager, interview, 23 March 2007), this had not eventuated by the end of the research study. Thus, there remain questions about the overall solution success of the ISOM database project in terms of addressing AlphaCo's ongoing business needs.

Further, the identified business risk of having a single person with a thorough understanding of the original spreadsheet models was simply transferred to the MDS solution, with Gary being the only knowledgeable user. Through his participation in the project (particularly in the first half of 2006), Gary had developed a good knowledge of the MDS solution, including the evaluation model side that he had previously not understood: “It's been a useful exercise” (Gary, IS Commercial Analyst, interview, 21 April 2006). However, Gary's subsequent low level of use of the MDS solution meant that he appeared to have lost much of the detailed knowledge he had acquired, particularly with respect to the evaluation model side of the MDS solution:

As for the evaluation model, I don't even understand it [any more]. I don't know how it works. So, how are we going to do it? I'm just going to report what ever it says. But to get

in behind it and check the numbers, yeah, I don't know. (Gary, IS Commercial Analyst, interview, 12 March 2007)

In terms of project success, the senior SoftCo developers, Nancy and Ross, were pleased with what they had achieved in the available timeframe:

From my perspective, I think [the project] went well ... To get [the basic model] done within those three weeks or four weeks, I think that went quite well ... I think Nancy and I worked quite well to get it done in that timeframe. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

Even so, Nancy was disappointed that they had not made delivery on time: "It's gone alright. But, I mean for me, ... I like to deliver a project on time and it didn't get delivered on time" (Nancy, SoftCo Senior Developer, interview, 22 December 2005). Marie also emphasised the achievement attained within the constrained timeframe, noting that with more time the interactive aspect of development with the AlphaCo project team would have progressed more smoothly:

I think it went relatively well. It was a bit rushed. Like I would have loved to have seen six to eight weeks for the project to, you know, do it well. The other thing was there was not enough time to get Gary and Frank and Claire up to speed with MDS, to understand how MDS works. (Marie, SoftCo Project Manager, interview, 21 December 2005)

The SoftCo team felt that, once minor problems had been addressed, the MDS solution had achieved what it was meant to. This was evident not just to the researcher, but to members of the AlphaCo project team. As Gary observed:

They [the SoftCo team] do all talk highly of it. When you get away with them out for a beer afterwards, they don't go, 'Shit, no, I think we sold you a hospital pass', or something like that. They're actually, they are quite positive about it. They believe in it. (Gary, IS Commercial Analyst, interview, 5 January 2006)

SoftCo's overriding goal was to use the successful delivery of the MDS solution as an opportunity to establish an ongoing relationship with AlphaCo. Despite Marie's view that "the client relationship was good" (Marie, SoftCo Project Manager, interview, 21 December 2005), at the time fieldwork concluded, achievement of this goal was not evident, not least because of the shift in focus away from use of the MDS solution that occurred as a result of the One AlphaCo IS restructuring. The cost to SoftCo must have been relatively high. The SoftCo development team worked extremely long hours to complete the MDS solution (much longer than forecast or billed for) and, from the outset, Marie was very open about the fact that SoftCo were not making any money on the project and were seeking to minimise their losses where possible.

#### **10.4 Insights from the Case Study**

The ISOM database project case study contributes to an understanding of IS development and acquisition practices in the contemporary environment. In particular, it offers insights into the significance of external actors, the importance of full stakeholder participation,

the influence of initial characterisations of the nature of the project, and the observance of project management processes.

*The role of external actors.* Set against an established organisational practice of outsourcing non-core IS services (institutionalised in various IS guiding principles), the analysis highlights the important role played by various external actors in this project in processes related to project management, vendor engagement, application development and outsourced IT infrastructure provision (Table 10.1). In reflecting on the reasons for the late project delivery, three of the four reasons identified by Gary related to external actors:

One, SoftCo didn't understand the complexity of the model. They underestimated the complexity of the model. That would be number one. Number two, Christmas ... Yeah, the holiday season. Three, would be Frank finishing ... And now, four, would be SoftCo's new projects. (Gary, IS Commercial Analyst, interview, 21 April 2006)

*Stakeholder participation.* The case study illustrates the importance of appropriate and adequate stakeholder participation in a project. For example, initially there was some contention over what role Gary should have in solution development. While Gary did participate during the development of the MDS solution, as the main intended user of the new solution, the extent and nature of his participation was problematic. Back-filling his regular role with an external financial analyst would have enabled Gary to undertake some of the work Frank did in the early stages of the project and in testing the MDS solution, which would have helped him to develop the understanding of the evaluation model and MDS solution that he needed. Claire's (deliberate) non-participation in much of the later stages of the project was perceived by both SoftCo and AlphaCo project staff as impeding solution development (e.g. requiring the developers to work through Frank as an intermediary, and leaving Gary to struggle testing the evaluation model side of the solution in 2006). The opportunity to participate in the ISOM database project at short notice meant that initially SoftCo's project team was somewhat makeshift (because the individuals who would eventually participate in the project were unavailable), which constrained the effectiveness of SoftCo's participation. For example, had Marie, the SoftCo Project Manager, been involved in the development of SoftCo's RFI response, the project timeframe may have been more realistic. Moreover, the senior SoftCo developers, Nancy and Ross, felt that their delayed start in the project lost them valuable time in coming to an understanding of the specific nature of the project and what was required. In other examples, an increased level of engagement with and direct involvement of staff from BetaCo and InfraCo may have mitigated some of the problems experienced in transferring the MDS solution to the live environment. Finally, although the project enjoyed a level of top management support, there were issues around the availability of resources to release members of the ISOM team to the project.

Following James' departure as IS Commercial Services Manager and the One AlphaCo IS restructuring, the interest of senior IS management in the MDS solution was almost non-existent.

Table 10.1: The role of external actors in the ISOM database project

Process	Nature of influence of external actor
Project management	<ul style="list-style-type: none"> <li>• <i>External project manager</i>: The appointment of a relatively inexperienced and external project manager seems to have influenced how the project management was conducted. Frank's role was broader than project management, encompassing requirements definition, prototype development, vendor engagement, and application testing. In addition, as an outsider, he appeared to have little control or influence over the co-operation of the ISOM team and other AlphaCo functions, and faced a steep learning curve in terms of AlphaCo's project management processes and practices.</li> <li>• <i>Overlapping project management roles</i>: The external developers, SoftCo, had their own project manager, Marie. As development proceeded, Frank took on more of a liaison role between the two project teams rather than explicit project management. The overlapping of external project management roles between Frank and Marie highlights the potential for role conflict or gaps in coverage, and the need for clear role definition to avoid this occurring.</li> <li>• <i>Management of external actors</i>: Frank's departure prior to project completion resulted in lost momentum and delays through a loss of continuity and knowledge. This highlights the need to address and manage such eventualities through external actors' contracts.</li> </ul>
Vendor engagement	<ul style="list-style-type: none"> <li>• <i>Vendor identification</i>: The IS architect's failure to identify the MDS tool as a potential solution at the outset delayed the project by up to four weeks. Given the relatively late timing of the discovery of the MDS tool, the question remains as to whether it should have been excluded from consideration. This case study highlights the issue of identifying suitable vendors more generally, particularly within large organisations with many vendor relationships.</li> <li>• <i>Politics of vendor competition</i>: The two main contenders in the project had agendas that extended beyond the immediate project. Both vendors regarded the project as an opportunity to further their interests in and relationship with AlphaCo. In using the project to publicise their corporate management software to AlphaCo senior management, Vendor3 lost sight of the more immediate needs of the project, ultimately losing out to SoftCo. SoftCo's enthusiasm to attain AlphaCo as a client led Leon to underestimate the project's complexity and commit SoftCo to an overly tight timeframe and project budget. The AlphaCo IS Commercial Services team exploited the competition between the vendors to their own advantage, e.g. in renegotiating a corporate discount and reduced price from Vendor3.</li> </ul>
Application development	<ul style="list-style-type: none"> <li>• <i>Timeframe</i>: The tight project timeframe meant that the principal external developers, Nancy and Ross, arrived after development had started and without the benefit of a detailed project definition exercise. As a result, developing an understanding of what was required took time and occurred in a piecemeal manner. This was exacerbated by the specialised and complex nature of the financial models involved in the project. The case study highlights the need to involve the appropriate development staff from the outset, rather than using a makeshift team.</li> <li>• <i>Development approach</i>: The SoftCo developers utilised a trial and error development approach. While they felt that this was appropriate given the nature of the MDS development tool and the lack of complete definition of solution requirements, the AlphaCo project team perceived this approach to be lacking in rigour and with detrimental effects on delivering a fully-functioning MDS solution in a timely manner.</li> <li>• <i>Unavailability of external developers</i>: After they had built a largely complete but untested solution, the SoftCo developers moved onto work for other clients. This limited their availability and delayed project completion, and highlights the difficulties and importance of managing external agents' contracts.</li> </ul>
Outsourced IT infrastructure provision	<ul style="list-style-type: none"> <li>• <i>Service delivery</i>: Poor service delivery by the outsourced InfraCo server team contributed to the delayed transfer of the MDS solution to the live environment. Prior to this project, the ISOM team were unaware of problems with timely server delivery by InfraCo.</li> </ul>

*Project characterisation.* Early characterisation of the project by the AlphaCo project team as a small, well-defined, low risk and straightforward migration project, meant that decisions and choices were made that affected the project trajectory. For example, no baseline review of

the adequacy of the original financial models was undertaken, the decision was made to forego a formal problem definition process, and an inexperienced project manager (albeit with specialised financial analysis skills) was considered acceptable.

*Project management processes.* There is some evidence to suggest that AlphaCo's formal project management processes, designed primarily for large projects in a large organisation, in this project were observed more in their form than substance. For example, the ownership of the project by a team within AlphaCo IS, may have allowed certain IS processes to be circumvented (e.g. in project initiation), fast-tracked (e.g. commencing solution development before project planning had been completed) or not rigorously scrutinised. With regard to the latter, for those phases of the IS project lifecycle not administered by the IS Project Office (due to the lack of project management process maturity in AlphaCo IS), no deliverables were prepared. Other project deliverables were produced but often not used to any great extent. For example, although the main purpose of the Project Plan is for detailed project planning, it was not used again by Frank after it was submitted for gating approval. Further, in order to avoid the project registering as a problem on the IS balanced scorecard, pressure was placed on Gary to formally complete the project in Tracking (even though the project itself was not complete), raising questions about the value of the Closure report. As an external participant, Frank suggested that the "bureaucracy" involved in AlphaCo's "project management regime" may have been inappropriate and unduly slow for the relatively small ISOM database project: "It's a small project in a big organisation, and it has to go through all the hoops to make sure you're ticking boxes and following due process" (Frank, Project Manager, interview, 21 October 2005).

### **10.5 Insights from the Process Analysis**

The ISOM database project was intended to be a straightforward migration of existing spreadsheet models to a database solution. Had the individuals involved in the ISOM database project initially been asked to evaluate the project in terms of a prescriptive list of factors likely to influence the outcome, the chances are that they would have predicted a smoothly completed project. They certainly would not have anticipated what unfolded. From the outset, the project was perceived to be well-defined, with no major threats to project delivery. For example, the project's Feasibility Report did not anticipate any problems with the technical development of the project or in obtaining required resources. Management support was "clearly demonstrable" and the users were "committed" and "highly positive". The implementation was considered to be "very simple" and no issues were expected to arise due to size and complexity (ISOM database project Feasibility Report, September 2005). The only anticipated risk or constraint was the availability of Claire and Gary, as key users of the existing spreadsheet models.

In practice, however, the project was subject to various delays and problems so that it stretched over a protracted period of time, eventually losing much of its currency as organisational events overtook it. As soon became obvious to the researcher, the project trajectory and outcome could not readily be reduced to a single set of contributory factors, but were the result of a number of complex, interrelated influences and unintended effects. To reveal the emergent, complex, multi-dimensional and interactive process through which this occurred, a process approach was used to analyse the case study data. Informed by the theoretical model of IS development as sociotechnical, situated action developed in Chapter 5, the longitudinal micro-analysis of individuals' situated actions provides a rich and detailed understanding and explanation of how the outcome unfolded over time.

The process map shown in Figure 8.1 demonstrates that this project can be conceptualised as a trajectory of key events and activities, albeit often overlapping and iterative. This is not to suggest that the project followed a predictable pathway, but that the trajectory around which the project analysis is organised was the result of multiple interacting and interconnected influences leading to a range of intended and unintended effects. Applying the sociotechnical model of IS development as situated action to the process analysis offers a way of interpreting events and activities in terms of three interrelated and complementary dimensions or perspectives (as explicated in Chapter 5): the skills, interests, and beliefs of knowledgeable actors; the material capabilities of the various development resources, technologies and tools; and structural elements of the context in which action occurs. This distinction is for analytical convenience; in practice, all three dimensions constitute a mutually interactive, complex sociotechnical ensemble. These dimensions play out in the focal point of the model, the situated action in which actors involved in IS development engage in a process of sense-making, communication and negotiation to develop an emergent IS solution. Actors' interactions are both reflective and practical, involving decisions and actions with effects or consequences, whether intended or unintended, that shape future actions in an emergent process involving continuous local adaptations and change.

The following discussion illustrates the situated action that constituted IS development in the case study by highlighting several key aspects of the process analysis. First, the meaning and form of the project solution was negotiated by a group of actors in an attempt to develop an intersubjective understanding of the solution requirements and the most appropriate way to achieve them. Often, this involved an interpretation or translation of interests by individuals that (directly or indirectly) influenced the understanding and actions of other project participants. In some translations, project artifacts and representations mediated or functioned as boundary objects in the negotiation of meaning within the project. Second, the constraints and capabilities

of the material and technological content of the project acted as technological conditions of possibility, within which the emerging solution was developed in practice. Third, various contextual elements, including historical and organisational structures, practices and relations, shaped the process by which development was enacted in this project. In particular, institutionalised 'guiding principles' developed as part of the company's IS strategy were an important structuring influence on the decisions and actions taken in the ISOM database project. Fourth, a transformative change in the organisational context, which occurred between when the need for change in the original spreadsheet models was problematised and when the new MDS solution was eventually transferred to the live environment and made available for routine use, appears to have undermined the relevance of the new solution in the restructured AlphaCo IS. Finally, the importance of unanticipated events and unintended effects of decisions and actions in shaping the project trajectory and outcome is discussed.

### **10.5.1 Lost in translation**

Viewing IS development as situated action and interaction within a local context suggests that development proceeds through the communication and maintenance of an intersubjectively-held understanding of design requirements and goals that emerges from actors' participation in development activities (Gasson, 1999). In this study, attempts to develop a shared understanding of what was required in the project arose from the communication and negotiation of individual and collective perceptions of the development problem and solution, and from various artifacts created to represent these that were shared between project participants. Frequently, this involved a 'translation' or interpretation of the problem at hand intended to stabilise its meaning and align the interests of different actors around it.

For example, an early translation of significance that can be seen in the project trajectory relates to the problematisation of the limitations of the original spreadsheet models so that the agreed solution was a dynamic database with modelling and reporting capabilities. Produced in various conversations between the ISOM team and its manager, this translation appeared to exist as an intersubjectively-held understanding of the problem and its solution. It does not seem to have been inscribed or materialised into an artifact at that time, suggesting that the ISOM team felt comfortable with the shared understanding that had developed and that it was not seen as necessary to document. However, the centrality of a database as the ideal solution to the ISOM team's problem can be seen in the way it was incorporated into subsequent project artifacts, including the project name, the position description prepared for the recruitment of an external project manager, and various project deliverables. The problematisation of the original spreadsheet models was facilitated by their labelling as a 'monster' with a range of associated

problematic characteristics. The use of this transient construct helped make sense of the need for change and enabled the ISOM team to move towards identifying an appropriate solution. Overall, the translation aligned the interests of the ISOM team and its manager as users and consumers of the envisaged solution, and establishing a collective understanding of the need for a new solution.

Leon was the SoftCo representative involved in the MDS product demonstration and contract negotiations with AlphaCo. With Marie unavailable to attend these early meetings, it was his translation of the ISOM database project that defined the parameters for SoftCo's subsequent involvement in the project. This translation gave priority to a perceived interest in SoftCo securing AlphaCo as major, ongoing client. However, in his desire to construct SoftCo as the obvious solution to the ISOM team's problem, Leon's underestimation of the scope and complexity of the project and the original models committed SoftCo to a tight development timeframe and budget, a point the SoftCo development team were well aware of: "I always said we could never do it in this time for the money" (Marie, SoftCo Project Manager, project meeting, 15 December 2005). For instance, Ross, one of the senior SoftCo developers was sceptical of the ability of intermediaries such as Leon to convey effectively what was required to the developers, noting that this "would have been lost in translation" (Ross, SoftCo Senior Developer, interview, 22 December 2005). He believed, for example, that Leon had not grasped that parts of AlphaCo's proposed solution design involved untried, new functionality: "They'd seen the prototype evaluation model, but they didn't realise that AlphaCo didn't do the [additional functionality] ... It would have been better if [they had]" (Ross, SoftCo Senior Developer, interview, 22 December 2005).

The AlphaCo project team later mobilised this underestimation of the project complexity to explain why solution development took longer than planned, even including it in the project Closure Report as a significant cause for this:

The timeline was too tight for how complex it is ... It was a problem with them underestimating it slightly and probably being a bit too keen for the project, and sort of just saying 'Yes' to everything before they really sat down. (Gary, IS Commercial Analyst, interview, 21 April 2006)

I think they underestimated the complexity and the size of the project ... [and as a consequence] things took a bit longer ... They formed the opinion, even in the sales pitches and things like that, that it was easy ... For a salesman to come in and go, 'Yeah, it'll take five minutes and it's a very simple model', when we always said to them it was actually a very complex model. (Claire, IS Commercial Analyst, interview, 20 June 2006)

As part of his translation, Leon outlined a solution development approach that constructed a form of joint development that involved a synthesis of specific expertise and knowledge from both parties. AlphaCo staff would provide "business knowledge (business rules, model look and feel, reporting requirements, etc)" (SoftCo RFI response, September 2005), while

SoftCo staff would provide “knowledge of the [MDS] tool, how it works” (Leon, SoftCo representative, vendor presentation, 27 September 2005). This translation was congruent with AlphaCo’s perceived interest in developing Gary as a ‘super-user’ with expertise in using not only the MDS solution but the MDS tool itself. Joint development would facilitate knowledge transfer between the SoftCo developers and Gary.

However, Marie subsequently offered an alternative translation that redefined Gary’s role in this regard, limiting his participation in the actual building of the MDS solution. Faced with what she considered to be an unrealistic timeframe and budget for solution delivery, Marie focussed on balancing competing interests in timely project completion (to maintain the possibility of SoftCo securing AlphaCo as an ongoing client) and minimising cost overruns for SoftCo (which would reflect badly on her performance). The task allocation plan she prepared became a boundary object in the negotiation of the respective roles of SoftCo and AlphaCo project staff. Although Frank resisted the definition of Gary’s role as involving only testing of the emerging solution (he was concerned that the original conceptualisation of a MDS super-user would not be realised), Marie successfully appealed to Claire’s interest in completing the MDS solution by Christmas by arguing that a higher level of participation for Gary would significantly delay the project. As it turned out, her translation also managed to accommodate Gary’s interest in rejecting his definition as a technical super-user of the MDS tool.

The notion of translation is also a useful way to think about how the migration of the original spreadsheet models into a database solution occurred. At various times the project participants themselves referred to this process in terms of translation. For example, as Claire at one point explained to a vendor:

We know what we want it to do, and how it does it and everything like that. It’s just we need to take the Excel monstrosity that we have and *translate* it. (Claire, IS Commercial Analyst, vendor presentation, 12 August 2005, emphasis added)

SoftCo similarly perceived their role in developing MDS solutions for clients as one of translation:

We look at their current requirement and we *translate* that, and we work with you ... to help us build your model ... We take existing Excel models that people have got, or whatever application it may be, and *translate* it back into MDS models. (Leon, SoftCo Director, SoftCo product demonstration, 27 September 2005, emphasis added)

In the ISOM database project, this translation did not occur directly between the original spreadsheet models and MDS. Instead, the AlphaCo project team had decided that these models, which had been incrementally developed in somewhat ad hoc manner over an extended period, would be too complicated for the developers to follow. Frank spent considerable time rationalising the models into a set of prototype models and database file for the developers to use. This effective translation of the original models into prototype models by Frank created

mediating artifacts that became the basis of development work on the MDS solution by SoftCo. It was these prototype models that SoftCo translated into MDS: “deconstructing it, interpreting it and rebuilding it in MDS” (Marie, SoftCo Project Manager, informal conversation, 7 November 2005).

In practice, the prototype models and other project artifacts provided to SoftCo acted as boundary objects in the development work, used for facilitating knowledge transfer between the AlphaCo project team and SoftCo. For example, the SoftCo staff relied heavily on the prototype models, together with the database file, business rule documents and RFI document, to develop their understanding of what was required. Frank seems to have intended the prototype models to have been the basis of extended discussions between himself and the SoftCo staff. While some discussion did occur, the tight timeframe under which development proceeded appeared to restrict the extent to which the SoftCo developers took advantage of this opportunity. Instead, they relied primarily on developing their own understanding of the prototype models and assessing that against Frank’s validation of the emerging MDS solution, itself an important boundary object in this process.

As published representations of the solution design, the prototype models and the RFI document also performed a contractual role, used as boundary objects in negotiating what tasks fell within the scope of the original project specification and what were ‘out-of-scope’. In particular, the SoftCo staff understood their role to be “replicating” the prototype models, an interpretation Marie relied on in the ‘out-of-scope’ negotiations. It was not until a relatively advanced stage in their involvement in the project, that the SoftCo staff even became aware of the existence of the original spreadsheet models.

The intended reliance of the developers on the prototype models presupposed that these were an accurate translation of the original models. However, as discussed above, the prototype models included some omissions and oversights on Frank’s part, an abridged prototype scorecard model front-end, and untried additional functionality with incorrect or not fully defined business rules. Gary later observed that both he and Claire should have played a more active role than they did in verifying the accuracy of the prototype models that Frank created: “Possibly, we should’ve been a little more involved. When he put it together ... we should’ve run through that ourselves” (Gary, IS Commercial Analyst, interview, 5 January 2006). The developers believed that the differences would have been apparent or easier to understand if they had had direct access to both the original models and Claire, who had the most detailed understanding of how they worked and what they were intended to achieve. This view echoes Keil and Carmel’s (1995) caution against relying on intermediaries or user surrogates, either of whom may intentionally or unintentionally filter or distort information. Although the AlphaCo project team had

intended the various project artifacts to adequately define the solution design, the developers' experiences during development challenged this view. The artifacts created to simplify things for the developers ended up being perceived by the developers as making aspects of the development process more difficult and time-consuming: "I believe Frank thought he was making it easier for us, however I believe it caused more problems" (Nancy, SoftCo Senior Developer, email, 19 January 2006).

The use of the prototype models as mediating artifacts, together with the perceived imperative to commence solution development without a detailed project definition, meant that the SoftCo developers' understanding of the original spreadsheet models and what was required in the MDS solution formed incrementally as development proceeded. This was exacerbated by the untried nature of part of the required functionality and limitations in the prototype models, which members of the AlphaCo project team also needed to work through in order to develop a more complete understanding of the MDS solution design. To some extent, this was reflected in the final form of the MDS solution, which grew progressively and iteratively over time, sometimes in an ad hoc manner. The number of cubes grew from the seven initially planned to fifteen in the completed solution in order to accommodate the emerging understanding of the solution requirements.

So, yeah, I mean, if we had to go and build it now, straight away, it would be a lot easier, because we know and we understand the model a lot better, and we understand the data ... That kind of thing ... would have been nice to know back then, and we would have put that in straight away. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

Certainly, both Frank and Gary were unsure that aspects of the MDS solution had been constructed in an optimal manner, although both acknowledged their reliance on the technical expertise of the SoftCo developers and the imprecise or emergent nature of some of the solution requirements:

The way it's built may not be the way I would have built the cubes. But then again you're limited by the fact that you don't understand MDS, and they [SoftCo] understand MDS. And so, you've got to present them with the data and say, 'Well, build it in the best way you think will represent the data to us in the future'. So, you rely a lot on them understanding your model and understanding how MDS works. (Frank, Project Manager, interview, 12 December 2005)

The way it's constructed seems a bit bizarre to me, which is, sort of, what you try and say at the time. But other people, other people were saying 'No. This is how it should be' ... But it's not super-intuitive ... I think I would have built it differently. Yeah, I think, a little bit differently ... We probably should've planned it a bit better. (Gary, IS Commercial Analyst, interview, 27 October 2006)

## 10.5.2 Technological possibilities

Clearly, the constraints and capabilities of the MDS technology also influenced the form of the solution that was developed in this particular case, as well as the course of IS development. In this sense, the MDS technology acted as a technological condition of possibility. Other technological conditions of possibility included the field of available technological solutions, and the existing technological infrastructure in AlphaCo, within which choices and decisions on solution development and deployment were made.

AlphaCo operates in a technology market constructed by the range of available technological packages, the existing organisational IT infrastructure, and institutionalised policies and practices that govern perceptions and decisions about appropriate technological solutions. In identifying potential solution vendors, the AlphaCo project team relied on the recommendations of their IS Architect, Harry, who acted as a 'gatekeeper' in developing a particular view of the nature of the required solution and the type of packages available (Knights & Murray, 1994). In particular, Harry concentrated on enterprise-level solutions from existing AlphaCo suppliers, resulting in a number of the identified products that were proverbial "sledgehammers" and the overlooking of other possibilities that "had not been on the radar" (Gary, IS Commercial Analyst, informal conversation, 16 June 2006). The field of possible technological products was further reduced by the as yet unavailability of a new product from one vendor, and the disinterest shown by another vendor after AlphaCo had replaced their main financial applications with a competing product. When MDS emerged as a possible product – an unintended consequence of a routine follow-up about the Vendor3 product within AlphaCo – it was constructed by the AlphaCo project team as the obvious technological fit for their solution requirements in terms of its relative size and cost.

Providing multi-dimensional OLAP capabilities, an MDS solution offered technological possibilities not available or poorly performed in the original Excel spreadsheet models. The large amounts of data involved in monitoring and evaluating the InfraCo IT outsourcing contract could be stored and manipulated efficiently using the cube structure inherent in a multi-dimensional database. Designed as a 'business intelligence' tool, MDS offered the modelling, reporting and analytics functionality that the ISOM team felt was needed in any solution to their design problem:

Financial people that use Excel can play with the data a bit more. I mean, it's used to slice and dice and do 'what if' scenarios. Basically it's that whole financial modelling kind of situation ... It handles the multiple scenarios really well. (Nancy, SoftCo Senior Developer, interview, 21 December 2005)

The lack of pre-built front-end with MDS was promoted by SoftCo as an advantage in minimising integration issues in solution development and allowing the use of Excel as a complementary and familiar front-end resource: "Users are familiar with it. It's a really low training

curve in terms of rolling out stuff via Excel” (Leon, SoftCo Director, SoftCo product demonstration, 27 September 2005). SoftCo also claimed that MDS would allow users to “build complex models without special training” (SoftCo RFI response, September 2005), which was consistent with the AlphaCo project team’s initial perceived interest in developing Gary as a ‘super-user’ capable of building further applications.

As a development tool, MDS offered a high degree of flexibility in producing a customised solution, in which: “the program is modelled around your business [rather than] you having to model your business around the program” (Ross, SoftCo Senior Developer, interview, 22 December 2005). MDS was also flexible in terms of how the various components of the solution were constructed and modified, a feature that suited the SoftCo developers’ ‘learning through doing’ approach to building the solution: “If we build it wrong, we can keep breaking it up and putting it back together” (Marie, SoftCo Project Manager, interview, 21 December 2005), as well as the way that a complete understanding of the solution requirements and design evolved over the course of the solution development:

As they [SoftCo] developed, they’ve not really understood how the model came together. But it really hasn’t impacted it too much because they can just quickly – it’s a flexible product enough to re-jig. (Frank, Project Manager, interview, 12 December 2005)

Alongside the facilities and possibilities offered by the MDS technology, there were also constraints and limitations in the resulting MDS solution. A number of these were related to idiosyncratic features of MDS that were unfamiliar to the AlphaCo project team or prevented them from reproducing familiar ways of working in other applications. For example, MDS did not provide equivalent functionality to the ‘AVERAGE’ or ‘COUNT’ functions found in Excel and used in the original spreadsheet models. This required the SoftCo developers to create ‘work-arounds’ (Pollock, 2005) to replicate these functions in the MDS solution. Similarly, MDS did not have the ability to report data upload errors (e.g. when there was no data to upload or the data was invalid), a facility that Frank felt would be useful: “What were [the MDS software proprietors] thinking of not to do this?” (Frank, Project Manager, informal project conversation, 16 December 2005). The SoftCo developers discussed various work-arounds they might be able to implement, although they were themselves constrained by being unable to access the source code in the MDS tool: “The code is all locked down. They [the MDS software proprietors] won’t let us touch that” (Ross, SoftCo Senior Developer, informal project conversation, 16 December 2005).

At times, Gary and Frank, as novice users, and even the SoftCo developers, experienced difficulty locating specific data in the various cubes comprising the MDS solution, particularly those with a large number of dimensions and elements. Ross and Nancy commented that this was a commonly experienced difficulty, especially for users who had not actually built the cubes and lacked knowledge of how the data was stored:

Finding data ... [is an issue] if you don't know the model and you don't understand how it's all stored ... I mean, it's quite a big cube to be honest, and ... because cubes are generally sparsely populated, to actually find the data is pretty hard if you're not the one that actually built it and works in it quite a lot. (Ross, SoftCo Senior Developer, interview, 22 December 2005)

Nancy explained how the developers often dealt with this problem in MDS applications by creating a "meaningless" consolidation element that indicates to users the presence of data in the elements being consolidated so that they can drill down to find it: "the consolidations just don't make sense, but it allows them to get down to where they want" (Nancy, SoftCo Senior Developer, interview, 21 December 2005). The SoftCo developers did initially execute this work-around in the AlphaCo MDS solution, but were subsequently asked to "zero out" the consolidations by the AlphaCo project team, who found them meaningless in the context of the underlying models.

Despite the claims made in the SoftCo 'sales pitch' and RFI response that building in MDS was straightforward, the AlphaCo project team's experience challenged this view. While Leon obviously considered writing "plain English" business rules in MDS did not require programming expertise (Leon, SoftCo Director, SoftCo product demonstration, 30 September 2005), neither Gary nor Frank considered the rules were easy to read or write:

I think they oversell the 'It's a plain English language'. I mean, that's really oversold. It's not a plain English language. You have to learn the rules of MDS. And anyone – if they think you can sit down and look at the rules and understand how they work, then they're wrong. Unless you're really familiar with programming or you know MDS. (Frank, Project Manager, interview, 12 December 2005)

In negotiating the nature of Gary's participation in the MDS solution development, Marie had successfully articulated a similar argument to avoid having to provide Gary with the intensive training necessary to write business rules and data upload processes in MDS: "To write the rules to set up a new process, that's complicated ... He needs to understand and learn the code ... It's too hard for this short timeframe" (Marie, SoftCo Project Manager, project meeting, 10 November 2005). The difficulty of writing business rules and processes in MDS subsequently experienced by Gary during the project reinforced this construction of his role, shaping his future as a super-user of the MDS solution rather than the MDS tool itself. Future development work in MDS would have to be performed by SoftCo:

When they first explained the rules, they showed us pretty simple rules and it looked all very easy, but actually after doing it ... I'm not really that keen to learn it that thoroughly to be honest ... If something needs to change, we'll get SoftCo to come in and do it again, because it's not a skill set that's really required ... in my personal job. (Gary, IS Commercial Analyst, interview, 5 January 2006)

The existing IT infrastructure in AlphaCo also acted as a local condition of technological possibility, in that it represented the organisational context within which choices and decisions on solution development and deployment were made. For example, the decision to develop the MDS solution on a standalone server outside the networked environment maintained and administered by InfraCo was influenced by the time delays AlphaCo project team members had previously experienced in requesting services from InfraCo. In particular, AlphaCo's common operating environment meant that software could only be loaded onto AlphaCo computers by InfraCo, through a formal service request. Further, SoftCo had also experienced delays and difficulties in developing BetaCo's MDS application within the AlphaCo networked environment. However, the use of a non-networked development environment had unintended consequences for the ISOM database project, such as limiting access to the emerging MDS solution, encouraging the SoftCo developers to work offsite, and consequential problems with version control, data integrity, and the loss of development work.

The existing IT infrastructure also shaped the form of the MDS solution and the long lead time to transfer the completed solution to the live environment through the decision to share software and hardware with BetaCo (the decision itself shaped by various organisational structures in the form of IS guiding principles). While this decision reduced the cost of the ISOM database project, it did result in a number of unintended consequences. Most obviously, development of the MDS solution occurred using an older version of the MDS software, with which BetaCo had commenced their application development. BetaCo had not upgraded to the most current version of MDS, allegedly because "InfraCo won't upgrade them, because they have to go through all these tests and change requests ... I think BetaCo don't want to do it because there's too much work involved" (Ross, SoftCo Senior Developer, informal project conversation, 8 December 2005).

The version of MDS being used was two years old at the time, and by the end of the ISOM database project was no longer supported. This version did not have all the functionality of the latest MDS version, which had been used by SoftCo to demonstrate the product and had impressed the AlphaCo project team: "You are missing out on some cute little features though ... Like dynamic reporting and drill-down [in Excel]" (Nancy, SoftCo Senior Developer, informal project conversation, 8 December 2005). When Gary and Frank expressed their disappointment at the prospect of not being able to utilise such functions in the MDS solution, Nancy pointed out that: "We can offer it – you guys just don't want to get the upgrade" (Nancy, SoftCo Senior Developer, informal project conversation, 8 December 2005).

Members of the AlphaCo project team found the inability to drill down frustrating when doing data reconciliation using the Excel front-ends of the emerging MDS solution. Further,

because the reports comprising the MDS solution front-ends were static it would be time consuming to update them whenever changes occurred in the outsourced IT infrastructure environment. A partial work-around using Visual Basic scripts was developed by one of the SoftCo developers for the scorecard model front-end of the MDS solution. This allowed a limited number of new resource unit additions to automatically feed through into the reports in this front-end. However, the work-around was not adopted for the evaluation model front-end of the MDS solution as “it does take a lot longer to load ... it requires maintenance ... and it has taken a bit more time [to build]” (Nancy, SoftCo Senior Developer, interview, 21 December 2005). While a more effective work-around for dynamic reporting in the MDS solution front-ends was possible, Nancy considered that it was not feasible to do so within the time constraints of the project.

Sharing the same instance of MDS software with BetaCo produced another unintended consequence for development of the MDS solution that the SoftCo developers initially overlooked. The coexistence of the two applications in the same MDS database required that dimensions in each application had unique names. Unfortunately, it turned out that the BetaCo application used many of the same dimension names as the MDS solution, which would have been overwritten when the MDS solution was uploaded to the shared server. When they realised this, the SoftCo developers had to create new dimensions with unique names for the MDS solution, as the MDS software does not allow dimension names to be renamed. This necessitated time-consuming rebuilding of the ten cubes in the MDS solution at that point, modifying the relevant rules and processes, and reloading the data: “If you have to rename ... you’ve got to rebuild it, and therefore you lose your data and stuff. So, it is kind of a constraint” (Nancy, SoftCo Senior Developer, interview, 21 December 2005). Consequential problems also occurred such as the loss of previously created ‘aliases’ for specific dimensions and the loss of data when rules functioned incorrectly by referencing now non-existent dimensions.

Sharing the MDS software with BetaCo also entailed transferring the completed MDS solution to a shared hardware server in the AlphaCo network. This turned out to be problematic, causing significant delays in the availability of the MDS solution for use in the live environment by the ISOM team. The server being used by BetaCo became unstable and had limited capacity to house and operate both MDS applications, particularly as the BetaCo application had grown substantially more than originally anticipated. The need for a formal change request process and server performance monitoring by InfraCo led to a considerable delay, before the decision was made to acquire a new hardware server.

### 10.5.3 Guiding principles

As discussed above, the decision to share software and hardware with BetaCo had a range of unintended effects on the MDS solution and its development trajectory. This decision reflected the influence of the AlphaCo IS guiding principle on acquisition preference and its application by members of the AlphaCo project team within the situated action of the ISOM database project. The acquisition preference guiding principle emphasised the need to, where possible, leverage existing applications, infrastructure, contracts and supplier relationships, in order to reduce costs and optimise the company's return on their IT investments.

The acquisition preference principle is one of a number of guiding principles developed around IS development and acquisition practices and institutionalised within AlphaCo. As such, these principles provide a decision-making framework and structuring influence on behaviour in regard to these areas. Designed to implement the AlphaCo IS strategy, the guiding principles are operationalised in IS projects through their incorporation into aspects of project management processes, and through the participation in IS projects of IS Architects, who are the "conscience of the guiding principles" (James, IS Commercial Services Manager, interview, 14 June 2006). As the IS Project Office Manager observed: "By just applying the guideline, your strategic guideline, you're enacting that anyway" (Andrew, IS Project Office Manager, interview, 16 May 2006).

Table 10.2 summarises the guiding principles enacted in the ISOM database project, related mainly to the decisions and actions around identifying and selecting a suitable solution.

Table 10.2: Application of IS guiding principles in the ISOM database project

<b>IS guiding principle</b>	<b>Application in the project (Relevant episode)</b>
<i>Acquisition preference</i> Buy not build  Leverage existing infrastructure and software	Sourcing an external project manager (E1) Defining the shape of project (E2) Finding a vendor (E3 & E4) Gary's resistance to building solutions in MDS (E5) Using external developers to build the MDS solution (E6) Finding a vendor (E3) Selecting a preferred vendor solution (E4) Transfer of MDS solution to live environment (E7)
<i>Package modification</i> Vanilla implementation – avoid customisation	Defining the shape of project (E2)
<i>Vendor selection</i> Use preferred suppliers	Finding a vendor (E3 & E4)
<i>Package selection</i> Use a small number of enterprise-level packages	Finding a vendor (E3)
<i>Technology adoption</i> Use proven technologies and vendors	Reviewing the various vendor products (E3 & E4)
<i>Scalability</i> Use scalable solutions	Conceptualisation as a scalable solution (E0) Reviewing the various vendor products (E3 & E4)
<i>Total cost of ownership</i> Include initial and full-cycle costs	Establishing the cost of various solutions (E3 & E4) As part of the Feasibility Report (E3 & E4)

The influence of these guiding principles in the ISOM database project can be traced in two ways. First, aspects of them were inscribed in the various templates, procedures and evaluation criteria used in managing the ISOM database project. For example, the RFI template contained in the ISPDR incorporates the principle of total cost of ownership in its pricing model and as an evaluation criterion. Frank included “the total cost of the proposed solution” in the RFI document as one of the criteria that would be used to assess RFI responses (ISOM database project RFI document, July 2005), and circulated a spreadsheet containing total cost of ownership information to members of the AlphaCo project team for financial evaluation of the products from Vendor3 and SoftCo. Total cost of ownership information was required as part of the Feasibility Report prepared in Tracking for Gate 2 approval in the IS project lifecycle.

Second, organisational participants mobilised them, implicitly or explicitly, in explanations and justifications for decisions and actions taken in relation to this project. As mentioned above, one example was the decision taken by the AlphaCo project team to leverage off the BetaCo server and instance of MDS software (despite SoftCo’s recommendation for a separate server and software instance). On various occasions members of the AlphaCo project team raised this possibility. As Frank once pointed out: “The very fact that we have it [MDS] already installed here makes it a lot cheaper ... It’s sort of like leveraging off an existing system” (Frank, Project Manager, interview, 21 October 2005). In addition, an important part of the justification for both the ISOM database project itself and the specific MDS product selected was the potential for the chosen technology itself to be leveraged for future outsourcing contracts or in other areas of the company. For example, in talking about the emerging MDS solution with the SoftCo staff, Gary said:

The aim is, I think, eventually if we can do a good job of doing this, and show it’s worked, potentially, we may have more use for [it]. Because I can see the full AlphaCo IS going, ‘Hey, that’s quite a good tool. We want that too. And we can leverage off this’. (Gary, IS Commercial Analyst, project meeting, 10 November 2006)

Elements of other guiding principles were also often articulated by members of the project team. For example, in discussing the appropriateness of a customised Excel front-end for the MDS solution with the SoftCo project staff, Gary reiterated: “AlphaCo’s not about custom solutions. It’s about buying packaged solutions. And one’s that don’t need any change, they’re easier” (Gary, IS Commercial Analyst, project meeting, 10 November 2005). His comments reflect both the ‘buy not build’ aspect of the acquisition preference principle and the package modification guiding principle, which emphasises ‘vanilla’ implementations. The guiding principles could also be mobilised by organisational participants to construct or defend perceived interests. This can be seen in Gary’s implicit invoking of the ‘buy not build’ acquisition preference principle to resist the technical role originally proposed for him, by asking, “Is it going to be our intention to

build models? Or, is it to get people to build them for us?” (Gary, IS Commercial Analyst, project meeting, 10 November 2006).

At times, the guiding principles were explicitly mentioned by organisational participants involved in the ISOM database project. For example, James, the IS Commercial Services Manager, explained that developing an in-house solution for the ISOM database project “would be in conflict with” the “guiding principle, as part of the AlphaCo IS strategy, to ‘buy not build”” (James, IS Commercial Services Manager, interview, 14 June 2006). When he presented the project Feasibility Report for approval at a gating meeting, James referred to the development of an in-house solution as “not aligned with IS strategy” (ISOM database project Feasibility Report, September 2005). Given the role of the AlphaCo IS Architects in ensuring that any proposed solution is consistent with the guiding principles, it is not surprising that Harry, the IS Architect assigned to the ISOM database project, often explicitly referred to the guiding principles. In describing his participation in project, Harry’s explanation of the process he followed acknowledged the role of the guiding principles in general and contained examples and references that reflected a number of specific principles. For example, when discussing the priority for sourcing proven package software from an established vendor, Harry noted that the policy on this was “expressed ... in the principles” (Harry, IS Architect, interview, 23 September 2005), in this case primarily the technology adoption guiding principle. At another point, Harry explained that:

With problems like this, we want to solve it by getting standardised software and having it implemented on the ... standard InfraCo infrastructure. And the way ... [is] to follow good procurement processes. And so, in the principles, yeah, it's all about standard software etc. (Harry, IS Architect, interview, 23 September 2005)

The influence of the AlphaCo IS guiding principles could be discerned in the way that decisions and actions taken in the project reflected and reinforced various guiding principles. This reinforcement of the guiding principles occurred through the reproduction of the AlphaCo IS project discourse and practices in which they are implicated or inscribed. As Giddens (1984) suggests, through their enactment of structures in everyday, routine and recurrent organisational interaction and practices, organisational actors reinforce and institutionalise those structures. While the possibility of transforming structures such as the guiding principles exists through their appropriation and enactment in different ways than intended by organisational actors, in the ISOM database project their enactment reproduced the existing structural status quo.

#### **10.5.4 Organisational change**

In problematising the need for change to the original spreadsheet models, key actors in the ISOM team drew on their understanding of the ‘formative context’ (Ciborra & Lanzara, 1994)

within which these models had been developed and were being used. That is, their understanding of the purpose and use of the models was grounded in a particular set of taken for granted organisational structures and interpretive schemes that they used to make sense of and rationalise the need for change. While a contextual change had been acknowledged in the form of a shift in the team's focus from initial contract appraisal to ongoing performance evaluation and management, the functional utility represented by the models was assumed to be applicable into the foreseeable future, only made more efficient, dynamic and user-friendly by migration to a database solution. In addition, the anticipation of further future outsourcing contracts seemed to reinforce the ISOM team's perception of the need for change. However, formative contexts can shift, particularly in periods of organisational transformation (Ciborra & Lanzara, 1994).

The characterisation of AlphaCo as a "constantly evolving" and "continuously changing" organisation reflects the level and scale of organisational change experienced by staff within the company. In the case of AlphaCo IS, this was evidenced in the initial outsourcing of IT infrastructural functions, followed by IS applications development and support, and associated organisational restructurings. The One AlphaCo IS restructuring, designed to further implement a shared services model for IS within the company, was undertaken in the first half of 2006, at a time when the MDS solution was being finalised and transferred to the live environment. This restructuring introduced a high degree of disruption and change within AlphaCo IS. The relatively small size of the ISOM database project and its ownership by a support service, rather than a business unit producing direct business value, meant that the MDS solution "fell off the radar" during this period. The restructuring and accompanying changes in senior IS management personnel (including the CIO) led to changed reporting requirements for the former ISOM team, which was down-sized and given responsibilities for financial management and performance reporting across all AlphaCo IS.

The changed focus of senior IS management and a general lack of demand for the reports that the MDS solution was intended to provide represents a shift in the formative context from that underlying the development and routine use of the original spreadsheet models, and on which the project to migrate the models to a database solution was predicated. The apparent necessity of the information flows and work routines intended for the MDS solution was contingent upon this original formative context. In the post-restructuring formative context in which the residual and reformed ISOM team operated, these flows, routines and functions lost much of their relevance, and were enacted differently (Ciborra & Lanzara, 1994).

### 10.5.5 Unintended effects

One of the strengths of a process approach for analysing organisational change is its ability to account for the details and complexities of actual situations by revealing the influence of unanticipated events and unintended consequences on change outcomes (Markus & Robey, 1988). This is reflected in the process analysis presented in this study through the consideration of the role of effects, both intended and unintended, on future action in the sociotechnical model of IS development as situated action. Human actors, as knowledgeable agents, reflexively monitor both the conditions and consequences of action. Their decisions and actions have effects that shape future situated actions. That human knowledgeability is bounded by unacknowledged conditions or unanticipated events and unintended consequences of action, means that the trajectories and outcomes of social processes such as IS development and acquisition emerge somewhat unpredictably as actors respond to the contingencies and unintended effects of their situated experiences.

Unanticipated events and unintended effects played a significant role in shaping the trajectory of the ISOM database project. A number of these have already been highlighted in the preceding discussion of the case study analysis in this chapter, and Table 10.3 provides a summary of the main examples (together with the relevant episode in which they occurred). The first column of the table describes the event, decision or action that led to the unintended effects or consequences for the project, described in the second column. The majority of the examples presented in Table 10.3 involved unintended effects of decisions and actions taken by project participants. However, in four cases, the effects observed arise from unacknowledged conditions or unanticipated events. For example, the failure to recognise and manage the high level of Claire's ongoing work commitments had a direct consequence in delaying the project while an alternative project manager was identified, and ongoing implications through the recruitment of an external project manager. The other examples of unanticipated events are the relatively late discovery of SoftCo as a potential vendor, a major corruption of the base data in the emerging MDS solution, and the One AlphaCo IS restructuring discussed in the previous section, which undermined the relevance of the MDS solution.

The effects summarised in Table 10.3 occur predominantly in the material domain, although there are some instances of unintended non-material effects. For example, the perception shared by members of the AlphaCo project team that the ISOM database project was well-defined and straightforward influenced their attitude towards project management (unproblematic) and project timeframe (non-urgent). Unintended material effects observed in the case study can be usefully categorised as temporal, financial or functional in nature.

Table 10.3: Unintended effects observed in the ISOM database project

<b>Events, decisions or actions (Relevant episode)</b>	<b>Unintended effects or consequences for the project (Relevant episode)</b>
In deciding to transfer the original spreadsheet models to database solution as is, consideration was not given to undertaking a baseline review of the models (E0).	<ul style="list-style-type: none"> <li>The MDS solution reproduced the original models developed for an original purpose, and may not reflect the future needs of the ISOM team or the organisation (particularly in light of the changed formative context).</li> </ul>
From the outset, the project was perceived by the AlphaCo project team as well-defined and straightforward (E0).	<ul style="list-style-type: none"> <li>The Christmas deadline was regarded as easily achievable (E1).</li> <li>Project management was regarded as unproblematic (E1).</li> <li>No significant risks or constraints were anticipated or identified (E3).</li> <li>No sense of urgency existed until much later in the project (e.g. in E4).</li> </ul>
Claire's ongoing work commitments meant she was unavailable to manage the project as originally intended (E1).	<ul style="list-style-type: none"> <li>The project start date was delayed by 2 months, while an external project manager was sought (E2).</li> <li>Frank was appointed as external project manager on the basis of his finance experience. Nevertheless, he faced a steep learning curve in becoming familiar with the spreadsheet models (E2).</li> </ul>
Prototype models and business rules created by Frank became the basis for project work (rather than the original spreadsheet models). At the time, these were not checked thoroughly by Claire and Gary (E2). They were subsequently found to be incomplete or not fully defined (E6).	<ul style="list-style-type: none"> <li>The developers' understanding of the solution requirements developed slowly, partly as a result of the (incomplete or not fully defined) prototype models and business rules) (E6).</li> <li>Multiple amendments needed to be made to the emerging MDS solution (E6).</li> <li>Contention between AlphaCo and SoftCo arose over aspects of project scope, which were subsequently negotiated and resolved (albeit with a delayed solution delivery date) (E6).</li> </ul>
In identifying potential vendors/solutions, the IS Architect, Harry, focused on enterprise-level applications (E3).	<ul style="list-style-type: none"> <li>Some (enterprise-level) solutions were perceived to be 'overkill', reducing the number of potentially viable solutions presented (E3).</li> <li>Smaller, potentially more suitable solutions (including SoftCo/MDS), were not considered (E3).</li> </ul>
In doing routine checks on Vendor3's product, Frank unexpectedly discovered another potential vendor/solution (E4).	<ul style="list-style-type: none"> <li>SoftCo/MDS replaced Vendor3/ProductA as the preferred solution for the project (E4).</li> <li>The project was delayed by 3 weeks (E4).</li> </ul>
The project complexity was underestimated by SoftCo representative, Leon (E4). Aspects of the emerging solution were also underestimated by the developers (E6).	<ul style="list-style-type: none"> <li>SoftCo became committed to tight timeframe and costs, despite Marie's attempts to ameliorate these (E4). The tight timeframe necessitated a reduced level of participation by Gary (E6).</li> <li>Unrealistic milestones were set and then missed, resulting in project slippage (E6).</li> <li>Mistakes crept into the emerging MDS solution (also partly as a result of quirks in the original models and source data from InfraCo). Repeated testing of data was time-consuming and frustrated both Frank and Gary (E6).</li> </ul>
The AlphaCo team decided to share software and hardware with BetaCo in order to reduce project costs (E4).	<ul style="list-style-type: none"> <li>The ISOM database solution was developed in an old version of MDS that lacked features users had been expecting (E6).</li> <li>The MDS ISOM database had to be rebuilt to accommodate common element names with the BetaCo's solution (E6).</li> <li>Performance problems and inadequate capacity of the shared server (exacerbated by unanticipated growth in the size of the BetaCo solution) meant that a new server had to be purchased (at extra cost) (E7).</li> <li>Transfer of the MDS solution to the live environment took considerably longer than expected (&gt;4 months). This was exacerbated by InfraCo's slow response to Gary's request for the transfer (E7).</li> </ul>

Table 10.3 continued

<p>Due to expected difficulties, it was decided that solution development would occur on a non-networked environment (E5).</p>	<ul style="list-style-type: none"> <li>• The AlphaCo users had limited access to emerging MDS solution (E6).</li> <li>• The SoftCo developers often worked offsite, reducing their availability to Frank and Gary (E6).</li> <li>• Problems occurred with version control, data integrity and loss of development work in the emerging MDS solution (E6).</li> </ul>
<p>Frank (and his project and solution knowledge) departed before a completed solution was delivered. This left Gary responsible for completing the project (E7).</p>	<ul style="list-style-type: none"> <li>• Gary's prior limited participation in the project and consequent lack of knowledge of the evaluation model hindered his ability to reconcile the MDS solution with the original evaluation model, contributing to a delay in solution acceptance by several months (E7).</li> <li>• AlphaCo paid for time SoftCo spent tracing data differences between the two models (E7).</li> </ul>
<p>The MDS solution delivered in early 2006 contained corrupted base data that had previously been reconciled (E7).</p>	<ul style="list-style-type: none"> <li>• Recreating the base dataset in the MDS solution took up to 2 weeks (E7).</li> </ul>
<p>The One AlphaCo IS restructuring reduced the size of the ISOM team and expanded their focus. It also reduced demand for the reports produced by the MDS solution.</p>	<ul style="list-style-type: none"> <li>• Gary had limited time to work on the project, delaying its completion (E7).</li> <li>• There was a lack of knowledgeable users of the MDS solution.</li> <li>• The relevance of MDS solution became questionable in the new environment.</li> </ul>

Temporal effects were the most common, and represented consequential delays to project completion. For example, the decision to allow Frank, the external project manager, to leave before the MDS solution had been completed, left an overworked and less knowledgeable Gary to complete the project, significantly delaying final solution acceptance. Unintended financial effects resulted in additional project costs. For example, the decision to share software and hardware with BetaCo, together with the unexpected growth in size of the BetaCo solution, necessitated the purchase of a new, additional hardware server. Other unintended effects were more functional in nature. For example, the decision to share software and hardware with BetaCo also limited the AlphaCo MDS solution to an older version of the MDS software that lacked features the AlphaCo project team had been expecting. In another example, the decision to focus on enterprise-level application providers meant that SoftCo and its MDS tool were excluded from the pool of potential solutions initially considered.

Multiple unintended effects, often of varying nature, can arise from a single decision or action. For example, the unintended effects of the decision to share software and hardware with BetaCo included additional financial costs to the project, reduced functionality available in an older version of the MDS software, as well as temporal delays in transferring the MDS solution to the live environment. Further, an event, decision or action could produce a series of ongoing, consequential unintended effects. For example, the initial underestimation of the project complexity by Leon, SoftCo's contract negotiator, committed SoftCo to unrealistic project milestones and costs, with consequential downstream effects in the form of project slippage, version control problems, solution errors and inadequate testing, repeated amendments, and

Gary's reduced participation in development work. The latter, in particular, further compounded the delays experienced in checking and reconciling the emerging MDS solution, when Gary assumed primary responsibility for the project once Frank had left.

One implication of the above discussion of unintended effects is that IS development and acquisition is more an emergent than managed process, as actors recognise and respond to unanticipated events or the unintended consequences of decisions taken (Galliers & Swan, 2000). That is, the unpredictable unfolding of the project analysed in this case study suggests that control of an IS project is an emergent property or outcome of the situated action involved, rather than a determining factor (Madsen et al., 2006).

## **10.6 Summary**

The longitudinal case study of IS development in AlphaCo was analysed using a process approach. A range of strategies for working with process data were utilised, including temporal bracketing, visual mapping and a detailed process narrative. The sociotechnical model of IS development as situated action developed earlier in the thesis was used to theorise and illustrate the interpretive explanation offered by the narrative analysis. This approach enabled the IS project studied to be conceptualised as a complex and emergent trajectory of overlapping and iterative events and activities, often with unintended effects. Despite the optimistic expectations for the apparently well-defined ISOM database project, the process analysis reveals how what was intended to be a straightforward migration of existing spreadsheet models to a database solution became a protracted and, in many ways, problematic development process. It could be argued that, ultimately, the inability to complete the ISOM database project and produce a usable MDS solution in a timely manner was crucial to its subsequent (non-)use within AlphaCo IS. In retrospect, the failure to take advantage of the short window of opportunity available before the One AlphaCo IS restructuring occurred meant that the utility of the MDS solution and the reports it produced was not able to be demonstrated, and their use did not become institutionalised within AlphaCo IS.

## Chapter 11: Conclusion

### 11.1 Introduction

This study set out to obtain a deeper understanding of IS development in New Zealand organisations. Despite the ongoing attention given to this topic in IS research, the continued problematic nature of many IS projects, apparent inadequacy of simple factor-based prescriptions, and the changing IS development environment, underline the need for more detailed consideration and conceptualisation of the complex organisational phenomena that are IS development processes and practices. Contemporary IS development encompasses both IS development in the traditional sense and the acquisition and customisation of software packages. Accordingly, this extended definition of IS development is used in this thesis. The research approach adopted involved a multi-phase design, based on an examination of the content, context and process of IS development (Walsham, 1993), in order to address the following research questions:

1. What is currently known about the influences shaping IS development? (Content)
2. What is the current state of IS development practice in New Zealand? (Context)
3. How is the process of IS development enacted? (Process)

First, a detailed meta-review of prior empirical research on IS development was conducted to synthesise the content of contemporary knowledge on the various influences that shape IS development. A classificatory framework was developed to organise the results of this empirical literature review, based on four dimensions: the characteristics, actions and interactions of the actors involved in an IS project, the practical and material content of an IS project, the various IS development processes, and the layers of context within which an IS project is located. Second, a Web-based survey of IS development and acquisition in relatively large New Zealand organisations (with 200 or more FTEs) was undertaken to obtain a 'snapshot' of current practices in this context. The survey instrument was developed from the detailed literature review and the results suggest that there are variations in how IS development is enacted in practice in line with the changing nature of the contemporary IS development environment.

The third and major phase of the research involved an in-depth, longitudinal case study of an IS development project in order to observe in detail the practice of IS development. A process perspective was adopted that conceptualised IS development as an emergent process involving dynamic and complex interactions between the technology, its social and organisational context, and the negotiated, situated actions of various individuals and groups involved in the project. The fine-grained process analysis that resulted offers a way to understand the complex enactment of IS development in a contemporary organisational environment.

This concluding chapter is structured as follows. The next three sections draw together conclusions from the three strands of the research conducted – the content, context and process of IS development. The subsequent two sections present the contribution of the thesis and an evaluation of the research conducted, including limitations of the study. The implications of the research for the development of theory and practice are then offered. The chapter concludes with some suggestions for future research.

## **11.2 The Content of IS Development**

Organising and synthesising the substantial body of prior research on IS projects and the influences shaping their outcomes is a major undertaking. While a number of attempts have been made at various intervals in the last twenty years, these classificatory schemes are limited in their currency, level of detail or scope. To redress these limitations, an extensive review and synthesis of recent empirical IS literature (1995-2006) was conducted and a systematic conceptualisation of factors influencing the outcomes of IS projects developed. The intent of the meta-review was to evaluate whether or not these factors had changed relative to traditional studies of IS development, possibly in line with changes in IS development and acquisition methods and practices. The contemporary and inclusive analytical framework developed from the meta-review serves as both a means of making sense of the empirical findings on this topic and a tool for facilitating ongoing investigation of influential factors.

The framework (summarised in Figure 3.1) presents IS project outcomes as the intersection of broad groupings of influences related to (1) the various actors involved in an IS project (e.g. their characteristics, actions, interactions, and relationship); (2) the project content itself (e.g. its characteristics, dimensions, resources and technologies); and (3) the various processes associated with IS development (e.g. requirements determination, project management, standard method use, user participation, user training, and change management); all situated within (4) the broader context in which IS development occurs (e.g. organisational properties and environmental conditions). Together, these four dimensions enable a project and its outcomes to be considered in terms of content, process and context (Walsham, 1993). The result is an empirically grounded framework that reflects contemporary thinking, recognizing that IS development is a multi-dimensional process in which people and technology act and interact in locally situated contexts.

Five general themes were identified in the review of empirical research on IS projects and their outcomes. These five themes form the basis for the conclusions generated by the meta-review summarised in Chapter 3.

1. A number of factors traditionally considered to influence IS project outcomes continue to be perceived and empirically demonstrated as important influences on IS development. The persistent presence of these factors in the IS literature suggest that they constitute a set of fundamental (but not exclusive) issues that need to be addressed in most IS projects. The ongoing problematic nature of many IS projects implies that, at best, these factors are necessary but not sufficient for achieving positive IS project outcomes. Indeed, the poorly defined nature of many of these factors, the difficulty of implementing them in practice, particularly within specific organisational or environmental conditions, their variable influence over a project timeframe, and the possibility of complex interrelationships and interactions, potentially leading to unintended consequences, suggest that simple prescriptive lists of such factors are inadequate for theorising about or improving IS project outcomes.
2. Significant changes to the environment in which IS development occurs in relatively recent times have had implications for the nature and practice of IS development that, in turn, have foregrounded other issues and influences on this organisational phenomenon. For example, the emergence of enterprise-wide IS, inter-organisational IS and globally-distributed IS, increased outsourcing of IS development and packaged software acquisition and customisation, and the development of IS based around new technologies, have increased the complexity in many IS projects and introduced a diversity of new development and acquisition methods and approaches. Such trends have also encouraged the development of smaller-sized projects or the delivery of larger projects in parts, the active participation of a wider range of participants in a greater variety of roles, an increased emphasis on project management, and a heightened need for management of the concomitant organisational changes associated with novel, complex or inherently political IS.
3. The review confirmed the growing recognition of the importance of organisational, political and human-related issues, relative to more functional or technical issues, as influences on IS project outcomes. However, recognition alone is not sufficient. There is a need to examine the organisational and professional conditions within which IS development and acquisition occurs to uncover institutionalised constraints on addressing these socio-political issues. For example, the techno-centric nature of much IS development and standard method use encourages attending to technical issues first and often only addressing organisational implications after IS implementation. Empirical evidence suggests that a variety of organisational issues need proactive attention at multiple stages in the IS development process, and benefit from the active participation of a wider variety of organisational participants. The increasing acceptance of IS development as a socio-political process

recognises the heterogeneity of project participants and stakeholders, and how the nature and quality of their interactions can influence the course and outcome of an IS project.

4. One area that is beginning to receive more attention in the IS development literature is the importance of the organisational and environmental context in which IS development occurs. There is increasing emphasis on the relationship between context and people and process in IS development. In particular, the form, nature and conduct of IS development processes need to be viewed as situated within their contextual setting. This has important implications for research and practice in this area, including an appreciation of how IS project outcomes emerge from their historical, organisational and societal context.
5. A final conclusion that can be drawn from the meta-review of IS development research is the need to focus on the interrelationships and interactions between factors or potential influences on IS project outcomes. While a number of authors have pointed out that project outcomes typically involve multiple factors that interact in complex ways, either directly or indirectly, actually addressing this in empirical studies of IS development requires new or modified approaches to this research topic. Some quantitative studies attempt to hypothesise and identify relationships between specific factors, indirect effects on IS project outcomes, or the role of mediating factors on relationships. However, a lack of consensus on commonly defined terminology, instruments and scales that can be used to measure specific factors and project outcomes often inhibits progress in this research tradition. An alternative approach involves treating IS development as a complex and dynamic process in which multiple interrelated influences interact to produce an outcome that emerges (often unpredictably) over time. Empirical research of this nature attempts to avoid the reductionism of other research approaches, and includes a growing body of process studies and interpretive case studies, such as the one presented in this thesis.

### **11.3 The Context of IS Development in New Zealand**

As noted above, there is a relative paucity of information on contemporary IS development and acquisition practices in New Zealand organisations. The survey conducted as part of this PhD was intended to address this gap by providing an updated picture of New Zealand practice based on empirical data from actual IS projects. The results of the survey have been presented in some detail in Chapter 4 and Appendix 2. Here, a few broad conclusions on the context of New Zealand IS development and acquisition practice are drawn.

1. The majority of projects (72%) reported over the three year period of the survey had a project cost of less than \$100,000. The prevalence of smaller sized projects is consistent with the IS literature in that most organisations spend the majority of their time on smaller projects (Eva

& Guilford, 1996) and that the development of smaller-sized projects is an emerging part of the modern IS development landscape (Johnson et al., 2001; SoftwareMag, 2004).

2. The results of the survey indicate a trend away from in-house bespoke development towards outsourced development and, particularly, the purchase of packaged software. A comparison of average development profiles suggests that, while levels of outsourced development are comparable with international practice, the New Zealand organisations surveyed reported higher levels of packaged solution use than previously reported in overseas studies. New Zealand organisations appear to be responding to the availability of packaged software and the perceived higher cost and risk of in-house development. The dearth of contemporary data on overseas practice suggests the need for further study in this area.
3. Both user participation and standard method use appear to play a prevalent role in IS development in New Zealand, at levels higher than those reported in the overseas studies available and a significant proportion of the responding organisations anticipated extending or increasing their use of these practices. However, there seems to be some variation in how user participation and standard method use are enacted in practice in New Zealand organisations.
4. With respect to factors influencing IS project outcomes, the results of this survey support observations in the IS literature highlighting the importance of organisational or people-related issues in determining the outcome of IS development (Doherty & King, 2001, 2005; Doherty et al., 2003; Eason, 2001). These studies suggest that organisations that address various organisational issues are more likely to enjoy a higher level of IS project success.
5. The changes to IS development anticipated by many of the survey respondents reflect the changing development environment described in Chapter 3. In particular, the most commonly reported anticipated change involved an increased focus on business outcomes. This is consistent with the emphasis placed on linking IT and business strategies by senior IS managers in both New Zealand and overseas and presumably reflects the demands placed on IS functions by the modern business environment.

#### **11.4 The Process of IS Development**

As seen from the meta-review of prior empirical research on IS development conducted as part of this PhD, factor-based studies form the basis of much of the current knowledge on the content of IS development. However, the inherent limitations of factor-based studies and their apparent inability to explain or prevent the continuing problems with many IS projects, suggest that a more productive approach would be to focus on IS development as a *process*. Consequently, a process perspective (Markus & Robey, 1988) was adopted to analyse a

longitudinal, in-depth case study of an IS project in a contemporary organisational setting. Inherent to the approach taken is a conceptualisation of IS development as a multi-dimensional, dynamic, sociotechnical and situated process from which a specific outcome emerges over time.

The process analysis of the case study utilised a combination of analytical strategies: temporal bracketing, visual mapping and a detailed narrative (the main product of the process analysis). Temporal bracketing was used to divide the IS project into eight episodes. These structured the narrative and provided a temporal dimension to the process map produced for the IS project. Visual mapping allowed synthesis and representation of the process data into a high-level graphical form. By depicting both the trajectory of key (often overlapping and iterative) project events and activities, as well as the influence of significant contextual events, actors and artifacts, the process map provided a useful abstraction and visual support to the process narrative.

The process narrative attempts to explain how and why the observed sequence of events unfolded over time to produce the observed effect or outcome. In constructing the narrative, the focus was on meaningful explanation, rather than just description. This was achieved by informing the narrative analysis with a theoretical model of IS development as situated action. At the heart of the model (summarised in Figure 5.1) are the decisions and actions related to various IS development processes and activities situated in local interaction settings. Three interrelated dimensions (separated for analytical convenience) of situated action are presented: (1) the relevant actors involved, (2) the practical and material content of the IS project, and (3) the context in which action occurs. Situated action and interaction has intended or unintended sociotechnical effects or consequences. These have the potential to shape future situated actions through their structuring of material and social aspects of the action context, the actors, or the project content. Following Fitzgerald (1998b), this model served as an analytical device, intended to aid interpretation, rather than as a deterministic or predictive tool.

The process approach adopted in the case study analysis meets the criteria advocated by Pettigrew (1990; Pettigrew et al., 2001) for researching contextually-situated organisational change processes, such as IS development and acquisition, by incorporating: (1) multiple contexts and levels of analysis, (2) a consideration of time and history, (3) the reciprocal interplay between context and actions, and (4) the portrayal of change as a continuous and multi-faceted process.

This section draws a number of conclusions from process analysis of the case study presented in Chapters 7 to 10.

1. At the outset of the project (and indeed for most of its course), the ISOM database project was regarded by AlphaCo IS staff as being a well-defined, small scale, low risk, relatively

straightforward exercise involving the migration of existing spreadsheet models to a database solution, which would be easily achievable within the available timeframe. In practice, this did not occur. The project was subject to various delays and problems and eventually lost much of its currency within the organisational context. The use of a process analysis informed by the theoretical model of IS development as sociotechnical, situated action developed in the thesis resulted in a detailed understanding and explanation of the emergent, complex, multi-dimensional and interactive process by which this occurred.

2. Consideration of the context in which the action was situated helped to demonstrate how various structural properties, such as the IS guiding principles, historical organisational practice and wider industry best practices, influenced the project-related choices and decisions. Further, the notion of structuration incorporated into the theoretical model used in the study allowed an understanding of how the mobilisation and enactment of these structural properties during the ISOM database project reproduced and reinforced the structures they represented.
3. Consideration of how individual project participants' knowledge, expectations, perceptions and interests shaped their sense-making, decisions and actions helped to explain how IS development proceeds through the negotiation and communication of an intersubjectively-held understanding of the development problem and solution. Frequently, this involved a translation or interpretation of the problem at hand that stabilised its meaning and aligned the understanding and interests of different actors around it. The analysis also highlighted how the contribution or lack of contribution of key individuals can facilitate or constrain the development of such an intersubjective understanding.
4. Also of note is the emergence and mobilisation of transient constructs by project participants to conceptualise and make sense of ambiguous or problematic aspects of the project, enabling a way forward to be identified and negotiated. Transient constructs that were drawn on during the project tended to be symbolic artifacts such as metaphors (e.g. the original spreadsheet models as a 'monster', the 'sledgehammer' metaphor to evaluate various solutions, and the desirability of reaching a 'happy place' in resolving project issues and the delivery of an IS solution).
5. The process analysis highlighted the role of boundary objects in the negotiation of meaning and sharing of knowledge within the project. Various project artifacts and representations mediated understanding, facilitated collaboration or served as the basis of negotiation between the AlphaCo project team and the SoftCo developers. In some instances, particular boundary objects stood in for or delegated for individual participants and their knowledge. In general, the boundary objects associated with the project provided sufficient flexibility in

interpretation to accommodate individual meanings and interests while facilitating collaboration and acting as a basis for translation and negotiation.

6. The role played by boundary objects in the project is one example of how technological aspects were implicated in the sociotechnical interactions comprising the project. Overall, the constraints and capabilities of the material and technological content of the project (e.g. the chosen development technology and existing IT infrastructure) acted as technological conditions of possibility, within which the emerging IS solution was developed in practice. The process analysis presented in the thesis emphasised the importance of not neglecting the technological dimension in analyses of IS development.
7. The process analysis of the case study illustrated the extent to which the project trajectory and emergent IS solution are shaped and influenced by unanticipated events (e.g. the discovery of a new potential vendor) or unintended consequences (e.g. the decision to share software and hardware with BetaCo). This suggests that control of an IS project is an emergent property of the situated action involved in IS development. In the AlphaCo case study, the outsourcing of project management, solution development and IT infrastructure may have exacerbated the effects of unanticipated events or unintended consequences.
8. The AlphaCo case study provided a useful exploration and analysis of contemporary IS development. The project involved the outsourced construction and configuration of a proprietary software package, with a variable degree of joint development and involving a range of internal and external participants. The nature of the project focused the company's attention on project management as opposed to say the use of standard methods for IS development (perceived as the responsibility of the external developers). It also demonstrated the potential difficulty in identifying an appropriate range of software solution candidates, particularly in specialised application areas, and the role played by vendor engagement and management in IS development and acquisition in the modern development environment (e.g. the influence of a vendor's perceived interests in undertaking a project on the contract negotiation and subsequent approach to the project).
9. Further, the IS project studied took place in an organisational context of rapid and continuous change. The process analysis of the case study highlighted the potential for the formative contexts within which IS development is situated to shift, particularly in periods of organisational transformation, thus potentially undermining the relevance of a developed IS solution within the changed context.

## 11.5 Contribution

As noted above, this PhD was conducted as three strands of research each aimed at addressing a specific research objective: (1) a literature review of the content of IS development research, (2) a contextual survey of IS development practice, and (3) a longitudinal case study of the process of IS development. These strands were in effect consecutive, with the results and insights gained from a particular strand informing subsequent strands.

An important outcome of this thesis is the synthesis of contemporary knowledge of the various influences that shape IS development based on a systematic review of the relevant literature. Specific contributions are (1) the definitional or conceptual ambiguity of IS project outcomes, (2) the identification and nature of some eighteen individual factors influencing IS project outcomes, (3) the development of a framework for classifying these factors and structuring the review, and (4) the presentation of five general themes that emerged from the review, which highlight key areas on which to focus IS development research. The findings of this strand of the PhD research form the basis of an extended review article that is currently under second review with *ACM Computing Surveys*.

A second outcome of this PhD is an updated assessment of IS development and acquisition practices in New Zealand organisations based on empirical data from actual IS projects. This addresses the relative paucity of information on contemporary practices in New Zealand and provides a basis of comparison for researchers and practitioners monitoring IS development practice, either in New Zealand or other national contexts. Tangible evidence of its value is the requests received from other researchers in New Zealand and overseas to use aspects of the survey instrument or data. The survey findings also represent a key outcome of this government-funded PhD research project, and were disseminated to New Zealand industry via a summary report to survey participants, two conference presentations (McLeod, 2007; McLeod et al., 2004) and three academic journal articles (McLeod et al., 2007a, 2007b, 2008).

The third and major outcome of this thesis is the process analysis of the longitudinal case study of IS development conducted between 2005 and 2007. As highlighted in Chapter 10, important insights were obtained into the nature of IS development and acquisition that factor studies could not have revealed. The case study itself functions as a useful exemplar of IS development and acquisition in the modern development environment. It illustrates how a seemingly small, well-defined project was actually anything but that, experiencing delays and difficulties more typical of larger, more complex projects. As an example of IS development involving the participation of diverse actor groups (Markus & Mao, 2004), it highlights the important role played by various external actors in project management, vendor engagement, application development, and outsourced IT infrastructure provision.

The use of a range of complementary strategies for analysing the process data enabled comprehensive and rigorous treatment and presentation of the case study data. The process map presented in Figure 8.1 provides a useful aid for abstracting and representing process data that could be utilised in other case study analyses. An important contribution of this research is the development of a new theoretical (sociotechnical) model for viewing and interpreting IS development as situated action (Figure 5.1). This model incorporates (1) three interrelated dimensions of situated action: actors, project content and action context, (2) its intended and unintended sociotechnical effects, together with (3) the structuring of these sociotechnical effects. The case study analysis illustrates the model's utility for analysing and interpreting the complex processes that constitute contemporary IS development and acquisition.

Considered across the three strands, this PhD reviewed a range of 'factors' influencing IS project outcomes, highlighting both the ongoing importance placed on them both within the IS literature and by respondents to the survey of IS development practice, and the need to actively attend to them on an ongoing basis during an IS project. Common themes emerged across the PhD study around the importance of people and process, and the context in which IS development takes place, while at the same time explicitly including a consideration of technology in the analysis (Orlikowski & Iacono, 2001).

The PhD also highlighted the changing nature of the IS development environment. In recognition of these changes, an extended definition of IS development was adopted that included both traditional IS development and software acquisition. The results presented in this thesis highlight the ongoing need for both researchers and practitioners to keep up-to-date with such changes in order to be able to continually "revisit and refresh" (Markus & Mao, 2004, p. 515) their understanding and practices, where necessary.

## **11.6 Research Evaluation**

This PhD thesis represents the product of an ongoing and evolving process of learning. As the research developed, the focus shifted from understanding the content and context of IS development towards a greater emphasis on understanding the process by which IS development occurs. As presented, the thesis builds on the meta-review of the empirical literature in the topic area and the contextual survey of IS development and acquisition practice in New Zealand, both undertaken in the early stages of the PhD, to present a detailed case study analysis of a specific, contemporary IS project. Consistent with this, the focus in the main body of the thesis is on presenting the principal aims and outcomes of the literature review and survey, and their contribution to the in-depth case study analysis that follows. The detailed results that underpin these early chapters are preserved in several appendices and are thus available for further

reference and consultation without impeding the flow of the thesis in its final form. The emphasis given to the case study analysis represents the researcher's growing awareness and appreciation that attempting to "capture the complexity of the dynamics of change" (Walsham, 1993, p. 214) in IS development would be facilitated by an intensive and longitudinal process study.

The emphasis given to the case study analysis is also consistent with the broadly interpretive research perspective that underlies this PhD. As noted in Chapter 2, the focus on IS development as situated social action reflects the researcher's belief that social and organisational reality is interpreted by understanding the meaning that human beings attribute to their actions as they intersubjectively make sense of their world and everyday work. This interpretive research perspective is able to accommodate the mixed method research design used in the PhD study. The combination of literature review, survey and case study methods provided the opportunity to gather mixed-level data, and enabled a more nuanced understanding of the specific case study organisation and project in the context of New Zealand IS development practice and the changing nature of the contemporary IS development environment. Care was taken not to exceed the limitations of each method used in the research and to maintain a philosophically consistent interpretation of the findings of each phase of the study.

The meta-review of empirical studies on IS development was intended to provide an updated synthesis of the extant literature organised using a classificatory scheme that addressed the perceived limitations of earlier schemes. While an effort was made to obtain comprehensive coverage of published empirical research on this topic, the sheer volume of studies meant that some compromises were made. Although comprehensive, the review cannot claim to be exhaustive. It is possible that the search terms used to identify studies of interest in the electronic databases and journals surveyed did not uncover all potentially relevant studies. Further, research studies published in conference proceedings were not specifically targeted (although a number were encountered and included from secondary searching). To ensure the potential relevance and currency of the material reviewed, three specific criteria were applied to each potential study. Studies had to be published within a specific date range (1995-2006), be focused on IS project outcomes or factors influencing IS development, and include empirical data. However, variation in the way authors designed their research, defined and measured individual factors and project outcomes, and reported their findings meant that researcher judgement was often needed to identify and interpret relevant categories in the reviewed studies. This variability meant that it was difficult to distinguish influential factors for different types of project outcomes (e.g. process success versus product success), summarise potential interrelationships and interactions between factors influencing IS project outcomes, and report on the relative significance of specific factors.

The survey of IS development and acquisition practice in New Zealand was intended to address the paucity of information on IS development practices in actual IS projects in contemporary New Zealand organisations. Well-established principles for constructing Web surveys were followed in developing the survey instrument so as to minimise the effects of measurement, non-response, coverage and sampling errors. The response rate achieved (25%) was satisfactory and comparable to that reported in similar IS surveys, and was broadly representative of the target population of organisations being studied. In order to ensure currency of the results (at the time) and to ensure more accurate recall by survey respondents, the survey focused on IS projects undertaken and completed (or substantially completed) in the three calendar years 2001 to 2003. The time involved in completing this PhD means that this time period is no longer as current as when the survey was conducted. However, the results of the survey were disseminated to the respondent organisations soon after the survey was completed and have subsequently been published in conference proceedings and academic journals. The survey findings also contributed a contextual understanding that informed the subsequent case study (2005 to 2007). The decision to target managers responsible for IS project work within an organisation was deliberate as it was considered that they would be more likely to have knowledge of actual IS projects as well as organisation-wide issues. However, it is acknowledged that single-respondent managerial surveys have their limitations with respect to distance from actual development work and that the survey findings represent an IS management perspective on IS development and acquisition. It should also be acknowledged that respondents may have answered (consciously or unconsciously) in a way that would portray them in a more favourable light or reflect normative expectations of IS practice. Hopefully, the anonymity given to respondents and the absence of any particularly contentious questions meant that the extent of any exaggeration was minimal. The sample size, nature of respondents and New Zealand context potentially limit the applicability and generalisability of the survey results, although comparisons were made with those reported from other national contexts where data was available.

The longitudinal case study of an IS project was intended to address the perceived limitations of prior factor-based studies by providing an opportunity to examine in detail the process of IS development in a contemporary organisation. The case study facilitated the application of a process perspective informed by a sociotechnical model of IS development as situated action. The intention was not to generalise the findings of the case study in a statistical sense, but rather develop theoretical insights and an in-depth understanding of IS development as a process that, although grounded in the particularity of the case study, are relevant and meaningful beyond the research site. In this respect, there is recognition that interpretive case studies should be evaluated against criteria appropriate to their nature (Klein & Myers, 1999;

Knights, 1995; Markus & Lee, 1999; Walsham, 2006). Because interpretive case studies present interpretations rather than ‘fact’, the credibility and cogency of the account produced to the reader are essential. Following Golden-Biddle & Locke (1993), Walsham & Sahay (1999) suggest that to produce convincing explanations of organisational phenomena, interpretive case study accounts need to demonstrate authenticity, plausibility, and criticality. These three criteria and their applicability to the process analysis produced from the case study in this thesis are summarised in Table 11.1. The seven principles for evaluating interpretive research proposed by Klein & Myers (1999) were also drawn on in developing the evaluation presented in Table 11.1.

Table 11.1: Criteria for evaluating the interpretive case study

Criterion	Explanation	Application in this study
Authenticity	“Ability of the text to show that the authors have ‘been there’, by conveying the vitality of life in the field” (Walsham, 2006, p. 326)	<ul style="list-style-type: none"> <li>• Describes the extent and nature of fieldwork, the role of the researcher and interaction with participants</li> <li>• Displays familiarity with participants’ everyday actions and uses quotes from participants</li> <li>• Seeks multiple participant perspectives and is sensitive to different participant interpretations</li> <li>• Demonstrates systematic, disciplined and iterative approach to data collection and analysis</li> <li>• Researcher allowed data to inform personal perspectives rather than imposing preconceived notions on the data</li> </ul>
Plausibility	“How well the text connects to the personal and professional experience of the reader” (Walsham, 2006, p. 326)	<ul style="list-style-type: none"> <li>• Uses schematics such as tables, figures, models and visual mapping to make sense of the data for the reader</li> <li>• Uses a ‘theoretically aware’ approach, drawing on concepts from structuration theory and the sociology of technology</li> <li>• Built on a comprehensive understanding of contemporary IS development practice, informed by content and context</li> <li>• Explicitly considers the social and historical context of the phenomena investigated</li> <li>• Demonstrates the relevance of the analysis to contemporary IS development and acquisition practice in organisations</li> <li>• Makes a distinctive contribution through the development and application of a sociotechnical model of IS development as situated action</li> </ul>
Criticality	“The way in which the text probes the reader to consider their taken-for-granted ideas and beliefs” (Walsham, 2006, p. 326)	<ul style="list-style-type: none"> <li>• Offers a novel model for understanding IS development as situated action</li> <li>• Applies non-mainstream ways of thinking about social interaction and the role of technology in IS development, such as ‘transient constructs’ and ‘boundary objects’</li> </ul>

## 11.7 Implications for Research and Practice

A major implication of this study is that a multi-dimensional consideration of the content, context and process of IS development is needed to understand this complex organisational phenomenon. Adopting such an approach facilitates a more holistic analysis that avoids the narrow focus on individual dimensions and aspects of the phenomenon that has proved to be inadequate in the past. This focus on content, context and process is used to structure the study

in terms of answering the three research questions posed in Chapter 1; namely, a meta-review of the content of empirical research on IS development, a contextual survey of IS development and acquisition practice in New Zealand organisations, and a process analysis of a longitudinal case study of an IS development project. It is also explicitly drawn on in the construction of the classificatory framework developed in Chapter 3, and the sociotechnical model of IS development as situated action developed in Chapter 5.

The classificatory framework developed in Chapter 3 was used to categorise and synthesise prior empirical research on various influences on IS development. This framework can be used by researchers as a useful device for enabling analytical abstractions, since the four dimensions of the framework are conceptually more manageable than having to deal with eighteen (or more) individual 'factors'. When greater detail is required, consideration can be given to the individual factors within each dimension. A particular strength of the framework is its capacity to accommodate interrelationships between the various dimensions. Indeed, an exclusive focus on any one dimension encourages a myopic analysis of IS development and fails to take into account how, for example, the content of an IS project is intimately connected with the context in which development occurs, the processes it involves and the people who perform them. Using the framework as an analytical guide facilitates the more holistic analysis referred to above.

The classificatory framework also has potential practical application in risk management. Consideration of the content, process and context of IS projects, as well as their potential interaction, could form the basis of an inclusive project risk framework. For example, during initial risk identification, the various factors included in the framework could provide a comprehensive list of areas of potential risk that need to be addressed. Further, the four dimensions of the framework could represent general themes around which these risks could be grouped for subsequent ongoing risk management as an IS project proceeds. Inclusion of contextual elements, such as the organisational history of IS development and use, facilitates the organisational learning from past projects that is a critical part of managing risk in IS development.

The Web-based survey conducted as part of this study provides an updated assessment of IS development and acquisition practices in New Zealand that may be drawn upon by researchers interested in the changing landscape of practice in this area, as well as providing a basis of comparison for IS development and acquisition practices in other national contexts. The survey findings are likely to be of interest to IS practitioners in New Zealand, enabling them to benchmark their organisations' practices against those of a larger sample. The survey outcomes also have practical implications for IS development practice in a changing and more dynamic

development environment, including the continued importance placed on user participation and standard method use in IS development, although the growth in packaged software acquisition and outsourced development suggests an increasing need for IS implementation management as well as development management, possibly reflecting an increased visibility given to standard project management methods.

The process analysis of an IS project conducted in this study combines a detailed narrative with temporal bracketing and visual mapping techniques to provide a description and explanation of how the specific outcome of the IS project emerged in practice and over time. This approach enables the IS project studied to be conceptualised as a complex and emergent trajectory of overlapping, iterative and interacting events, activities and influences, often with unintended effects. The analysis confirms the utility of process-based approaches for both addressing and abstracting the complexity of IS development processes as enacted in local settings. The analysis also suggests that process studies of IS development, previously applied to relatively large and contested IS developed over a long timeframe, can also be usefully employed to understand and explain much smaller and less politically-charged IS projects. Indeed, a micro-level analysis reveals the complex and situated nature of the sociotechnical interactions that constitute even these seemingly mundane IS projects. Researchers can use the approach developed here to conduct, analyse and illustrate the processes occurring in the longitudinal case studies of IS development and acquisition. Comparison of how IS project outcomes emerge and unfold over time in multiple longitudinal case studies of IS development and acquisition will help “build up a repertoire of knowledge about what can be expected in practice and what can be done to cope with the situation” (Madsen et al., 2006, p. 236).

The sociotechnical model of IS development as situated action developed and used to inform the process analysis of the case study has implications for both IS development research and practice. An important theoretical implication is that IS development, at least in its contemporary form, is not necessarily a straightforward process under the control of a “select few individuals” (Constantinides & Barrett, 2006, p. 52), but emerges less predictably through complex sociotechnical interactions and subject to unanticipated events and unintended consequences. The study also highlights how aspects of the IS development process are translated and negotiated by a range of organisational participants, using sense-making devices such as transient constructs and boundary objects. While the concept of boundary objects is well-established in the sociology of technology, only relatively recently has it been applied within the field of IS research (e.g. Constantinides & Barrett, 2006; Gasson, 2006). The research presented here confirms the usefulness of this theoretical concept for examining the role of development artifacts and representations in knowledge sharing and negotiating an intersubjective

understanding in IS development. From a practice perspective, IS professionals also need to understand the role of these artifacts, so that they pay attention to the potential for such objects to influence interaction and negotiation between participants in an IS project.

As an analytical framework, the model used in this study focuses attention on the complex process by which IS development is negotiated through the interaction of multiple actors, technological possibilities, and structural properties of the organisational and work contexts. Although the model was primarily used here to explicate events and actions considered to be analytically important in the process narrative of IS development, it can also be used to interpret the situated action around the ongoing use of an IS (as was demonstrated in the Epilogue in Chapter 10), or indeed to any situated action related to IS, more generally.

The model also has implications for education. As Gasson (1999) and Lang & Fitzgerald (2007) have noted, future IS professionals and managers need to be made aware of the situated nature of IS development and acquisition activities. An emphasis on the straightforward application of prescriptive or formal development approaches neglects the complex and potentially unpredictable process by which IS development occurs in practice. IS education needs to locate IS development and acquisition within a context of complex and interrelated organisational activities and change, so that IS graduates become cognisant of the broader constraints on and implications of their work.

With respect to practice, the model developed in this study can be used by IS managers or project managers to gain an understanding of IS development and acquisition as an emergent, multi-dimensional, sociotechnical, situated process involving human action and interaction. The model could be usefully applied to planning the form or nature of the sociotechnical interaction that may arise during a specific IS project taking into account the actors involved, the practical and material project content, and the action context. The model could also be used to manage actions and decisions as they emerge with due regard to the possibility of unanticipated events and unintended consequences, and the potential of both intended and unintended effects to shape future actions. Further, the model could form the basis for retrospective evaluation of an IS project and the identification of lessons learnt (Madsen et al., 2006).

## **11.8 Future Research**

The various conclusions and implications outlined above suggest that future research on IS development needs to take several trends into account. Given the substantial changes in IS development and acquisition practices observed over the past decade, it seems reasonable to expect further changes in the future. Empirical research needs to address these changes while attending to any persistent aspects. The continued occurrence of perceived IS project failures

suggests that simple prescriptive lists of 'best practice' factors are inadequate, and that research is needed that acknowledges and explores the complex interrelationships and interactions between influences on IS projects.

More detailed and longitudinal research on IS development and acquisition practices from a range of perspectives is needed. For example, exploring the various forms and dimensions of stakeholder participation as enacted in a changing IS development context (Markus & Mao, 2004), and the implications of increased ownership of IS projects by users. Similarly, further research could usefully explore the subtleties and complexities of emergent standard 'methods-in-action' (e.g. Fitzgerald et al., 2002; Lang & Fitzgerald, 2007), and the possible shift in emphasis from traditional standard development methods to project management methods in light of changing IS development practices, such as higher levels of package acquisition or outsourced development. Further research is also needed in order to develop a fuller understanding of the processes of vendor engagement and management and their influence on IS development and acquisition in the new environment. Comparative research could usefully establish whether the trends identified in the survey conducted for this study occur at a wider regional or international level.

Further research on longitudinal case studies of IS development and acquisition is needed to refine the theoretical ideas developed in the process analysis presented in this study. Such studies should consider IS development as a multi-dimensional, sociotechnical and situated process that emerges over time from a dynamic interaction between the negotiated actions of various individuals and groups, their technological choices and constraints, and the social and organisational context in which development occurs. The recognition that IS projects take place in specific contextual settings implies a need for detailed empirical research that focuses on the institutional dimensions of IS development and acquisition across multiple contexts and levels of analysis. Similarly, future empirical research needs to consider the sociotechnical nature of IS development, including how IS and their meanings are negotiated by multiple actors, and the mediating role of material artifacts in that process. Building a body of cumulative research that addresses the complex and dynamic nature of IS-related change will better inform IS development and acquisition practice and lead to more beneficial outcomes for all stakeholders involved in this organisational phenomenon.

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# Appendix 1: Empirical Research on IS Development

## A1.1 Introduction

This appendix presents the detailed findings of a comprehensive review of recent empirical studies of IS development. The purpose is to synthesise contemporary knowledge of the various influences that shape IS development. Details of how the review was conducted, together with the classificatory framework used to organise the findings of the review, are available in Chapter 3 of the main thesis. The findings of the review are summarised and discussed in Chapter 3.

This appendix consists of five sections. The first section discusses the definition of IS project outcomes. The following four sections present the findings on potential influences on IS development related to (1) the various actors involved in an IS project, their characteristics, actions, interactions, and relationships; (2) the project content itself; (3) the various processes associated with IS development; and (4) the various layers of context in which the IS project unfolds. The section on IS development processes contains additional empirical information related specifically to the use of a standard method and user participation in IS development. This additional material provides supplementary information on the nature and practice of these two processes, and was used to construct and interpret the results of relevant parts of the survey conducted as part of this thesis (Chapter 4).

## A1.2 IS Project Outcome

In the literature on IS development, the outcome of an IS project is typically conceived of in terms of whether the project is successful or not. However, identifying what constitutes 'success' or 'failure' can be problematic. In general, there is lack of consensus on how to define success and failure. Such terms are perceived to be vague and difficult to measure (Butler & Fitzgerald, 1997, 2001; Lynch & Gregor, 2004; Wilson & Howcroft, 2002).

It is generally recognised that success or failure are multi-dimensional constructs, with inter-related technical, economic, behavioural, psychological and political dimensions (Beynon-Davies, 1995; Bussen & Myers, 1997; DeLone & McLean, 2003; Doherty et al., 2003; Lynch & Gregor, 2004; Wixom & Watson, 2001). IS success and failure have been defined (and measured) in terms of the IS development process and/or its product. That is, success is a high quality development process and/or a high quality outcome (Barki et al., 2001; Karlsen et al., 2005; Markus & Mao, 2004; Nelson, 2005; Procaccino & Verner, 2006; Wixom & Watson, 2001). DeLone and McLean (2003), for example, describe the success of the IS product in terms of IS quality, information quality, services quality, use (or intention to use), user satisfaction and net benefits. In terms of the IS development process, some authors have described the outcome an IS project in terms of whether or not the IS project is completed on time or in budget (Standish Group International, 1995, 1999, 2001; Wixom & Watson, 2001). Other authors define the project outcome in terms of whether the project is smoothly completed, redefined or abandoned (Martin & Chan, 1996; Yetton et al., 2000). While IS projects will ideally have successful process and product outcomes, Wallace & Keil (2004) suggest that projects emphasising process outcome goals (such as budget and schedule) will be managed differently to those emphasising product-related outcomes.

Some authors are proposing additional concepts of IS success. For example, Markus & Mao (2004) distinguish IS *development* success from the concept of IS *implementation* success, which they view as the process of change management associated with preparing users for use of the IS and/or the outcome or product of this change process. They suggest that, given changes in the IS development environment, it may be appropriate to extend the concept of IS success beyond the IS itself to a wider solution that also includes complementary business or process interventions (i.e. *solution* success). Similarly, Crowston et al. (2006) examine the increasing interest in open source software development and present additional concepts of IS success that they suggest are more appropriate for this emerging development domain.

A number of researchers have approached success or failure in terms of the ability of an IS to meet the expectations of its stakeholders. In Lyytinen and Hirschheim's (1987) view, IS failure and success form a continuum in which the likelihood of fulfilling an individual's expectations varies from very low to very high. Different groups or individuals may differ in their assessments of the extent to which an IS is successful, judging the IS according to different criteria. Further, their opinions and evaluative assessments are fluid and may change over time, in response to political manoeuvring, persuasion, or changes in the organisational and technological context (Briggs et al., 2003; Bussen & Myers, 1997; DeLone & McLean, 2003; Jiang & Klein, 2000; Jiang et al., 1998a; Karlsen et al., 2005; Kim et al., 1999-2000; Lynch & Gregor, 2004; Nelson, 2005; Skok & Legge, 2002; Standing et al., 2006; Wilson & Howcroft, 2002). For example, in a study of an IS project in social services sector, Riley & Smith (1997) found that the many different stakeholders identified had different assessments of IS success. The authors categorised these stakeholders into (1) project team members, who believed the IS was innovative and valuable; (2) those outside the project team who questioned the basis of the project but thought that the IS was worthwhile; and (3) user groups, some of whom accepted it and made it work, others of whom rejected it. In another example, some of the team of developers interviewed by Linberg (1999) suggested that even a project that was not completed could be successful, so long as some learning occurred that can be carried forward to future projects.

Karlsen et al. (2005) suggest that project evaluations should reflect some of the issues outlined above. They recommend that success criteria need to be defined from the outset, using input from the various stakeholders and incorporating a range of criteria, and that they may need to be modified to reflect changes that occur during the course of a project. They also suggest that multiple evaluations should be undertaken at different points in time, for different purposes (e.g. a project management assessment could be done during project execution and in the project delivery stage, whereas a user assessment should be done after users had had some experience using the IS).

Some authors suggest that success or failure should be thought of as a process rather than a single discrete outcome (Wilson & Howcroft, 2002). From this perspective, the success or failure of an IS is constructed as the result of negotiated or contested subjective interpretations, and needs to be viewed against the historical context of IS development and the complex social and political interactions it involves (Mitev, 2000; Wilson & Howcroft, 2000, 2002). However, not all interpretations are afforded equal status. Apparent definitional closure may not necessarily represent consensus. Dissenters may be forced to accept the situation or be denied a legitimate voice (Wilson & Howcroft, 2002). Wilson & Howcroft (2002) describe a nursing IS which was perceived as a success by its sponsors, but as a failure by its nurse users. Three years after its implementation, in the face of continued user resistance, poor performance and financial pressures, the IS was finally acknowledged as a failure by its sponsors.

From the above, it can be seen that labelling an IS project outcome as a 'success' or 'failure' can be problematic. However, despite their definitional or conceptual ambiguity, these terms are still frequently used (and measured, often via proxy indicators) in IS research. The position taken in this research is that IS project outcomes vary along a continuum, may be interpreted differently from different perspectives, and are in many cases constructed through processes of sense-making and negotiation with an organisation. The use of the terms 'success' or 'failure' in the following discussion reflects their use by authors of the empirical studies reviewed.

### **A1.3 Influences on IS Development – Actors**

This section discusses influences related to the characteristics and actions of various actors with an interest in the IS, and their interactions. Typical roles in IS development include user, developer, IS manager, business or user manager, project manager or leader, project team member, trainer, sponsor, customer, vendor, top management, or external consultant (Butler, 2003; Enquist & Makrygiannis, 1998; Heiskanen et al., 2000; Nandhakumar & Avison, 1999; Riley & Smith, 1997; Roberts et al., 2000; Robey & Newman, 1996; Robey et al., 2001). In some cases, an individual may have multiple roles or their roles and perspectives may change over time (Pouloudi & Whitley, 1997; Robey et al., 2001). It is also important to remember that an individual's actions in pursuit of organisational objectives or in relation to an IS initiative will be influenced by

competing commitments arising from social or professional groups he or she identifies with, organisational commitments institutionalised as organisational policy and practice, wider societal and cultural interests, or sectional interests arising as a result of the specific course of action (Butler, 2003). For example, user managers can be conceived of as either users or managers. They can potentially mediate between their user group and higher level management (Marion & Marion, 1998), or they may be more inclined to align themselves more with their user group.

To a large extent, the definition of such roles and the allocation of individuals to them are undertaken for analytical purposes and will depend on the specific context and time frame under consideration (cf. Pouloudi & Whitley, 1997). Categorisation into a particular group often reflects a researcher's preconceptions or bias rather than how individuals perceive themselves. The unreflective use of these groupings can be problematic for both IS research and practice (Butler & Fitzgerald, 1997; Iivari & Igbaria, 1997; van Offenbeek & Koopman, 1996). The following discussion attempts a finer-grained characterisation of various groups with an interest in an IS in order to improve our understanding and conceptualisation of various aspects of IS development (Markus & Mao, 2004). Attention in the IS literature has focused on four main relevant actor groups in IS development, which are discussed in detail below: developers, users, top management and external agents. The project team forms another, composite, actor group that is often identified. Finally, consideration is given to the potential influence of interaction between actors on IS development and its outcomes.

### **A1.3.1 Developers**

IS professionals possess a range of characteristics that can influence how they approach and practice IS development and what contribution they make to an IS project and its outcomes. These characteristics include: technical skills, capabilities, expertise and experience; interpersonal and social skills; application domain knowledge; commitment, motivation and trustworthiness; and norms, values and beliefs. Significant variation in skills and capabilities of developers can influence development productivity (Fitzgerald, 1998b; Fitzgerald et al., 2002) and hence IS project outcomes.

Empirical studies suggest that competent staff with adequate technical skills can play an important role in facilitating positive project outcomes (Jiang et al., 1996; Keil et al., 2002; Procaccino et al., 2006; Somers & Nelson, 2001; Standish Group International, 1995, 1999). In particular, developer technical expertise, experience and training are often perceived to have an important influence on IS project success (Aladwani, 2002; Baddoo et al., 2006; Fitzgerald, 1998a; Fitzgerald et al., 2002; Kim & Peterson, 2003; Peterson et al., 2002; Wixom & Watson, 2001; Yoon et al., 1995). Conversely, lack of developer expertise and experience is considered to be a project risk and may contribute to poor project outcomes, even project abandonment (Beynon-Davies, 1995; Peterson & Kim, 2003; Schmidt et al., 2001; Standish Group International, 1995).

In a survey of US project leaders, Aladwani (2002) found that problem solving competency was perceived to be critical to successful IS outcomes. This is not surprising as IS projects generally involve identifying and defining problems, generating solutions, reviewing alternatives, and evaluating options. According to Fitzgerald et al. (2002), in addition to analytical skills, this process requires creative skills and judgement. An individual's education, training and work background can influence his or her problem solving approach and ability (Gasson, 1999). As developers gain more experience, they learn, extending their skill level and building up a repertoire of development strategies (Fitzgerald, 1998b; Fitzgerald et al., 2002). Aladwani (2002) suggests that since a high proportion of developers' work can involve problems that are very similar in nature, developers with wider experience and knowledge are more likely to have faced similar problems before. In light of rapid advances in technology and changing development practices, Kim & Peterson (2003) suggest that ongoing training may be important to organisations with an ongoing commitment to IS development. Baskerville & Pries-Heje (2004, p. 260) [argue that in the short cycle time development characterising many modern IS development projects, "skilled, experienced, and talented developers are needed to anticipate problems and innovate workable shortcuts".

Good interpersonal and communication skills are perceived to be important for interacting with users, and for facilitating dialogue between different groups of users (Baddoo et al., 2006; Fitzgerald et al., 2002; Jiang, Klein et al., 1998a; Marion & Marion, 1998; Wixom & Watson, 2001; Yoon et al., 1995). Hornik et al. (2003) found low levels of user satisfaction in IS projects where users perceived the developers to have poor communication skills, regardless of their technical expertise.

If IS development is as much a social and political activity as a technical one, then change management skills may be necessary for IS developers (Markus & Benjamin, 1996; Symon, 1998). Howcroft & Wilson (2003) suggest that developers require political skills in order to negotiate the often competing demands or interests of management on the one hand and user groups on the other. Other authors observe that developers may exercise political advocacy and image management skills (Markus & Benjamin, 1996; Symon, 1998). In the acquisition and use of packaged software, internal IS professionals are becoming increasingly involved in negotiating contractual and financial issues (Howcroft & Light, 2006).

The outcome of an IS project can depend on the understanding that IS professionals have of the IS context or problem domain (Baddoo et al., 2006; Butler, 2003; Fitzgerald, 1998a; Fitzgerald et al., 2002; Sumner, 2000). This includes their knowledge of organisational operations, sensitivity to organisational norms and politics, understanding of the culture and functioning of user departments, and familiarity with and expertise in the type of application being developed (Jiang & Klein, 2000; Marion & Marion, 1998). Where IS professionals are outsiders to the organisation, they are more likely to have a more limited knowledge of the user and the IS context (Sarkkinen & Karsten, 2005).

Fitzgerald (1998b; Fitzgerald et al., 2002) identified the level of motivation and commitment of developers as an important influence on the outcome of an IS project. Developers who were motivated and committed to the project are more likely to ensure that the project is successfully completed. According to Oz & Sosik (2000), developer motivation is likely to be influenced by both the organisational context, and the composition and culture of the project team. Developers may be motivated by effective leadership, a positive working environment, a sense of being involved, positive feedback, and where they enjoy a reasonable level of autonomy or responsibility. The technical challenge of designing a new IS solution, the opportunity to work with new technology or standard methods of IS development, working more closely with top management, or being helpful to users may also motivate some developers (Fitzgerald, 1998b; Fitzgerald & Fitzgerald, 1999; Fitzgerald et al., 2002; Jones & Harrison, 1996; Kautz et al., 2004; Linberg, 1999; Nandhakumar & Avison, 1999; Phan et al., 1995). On the other hand, developers may become frustrated or demotivated, not fully committing to the goals of the project, for various reasons, including lack of autonomy, inadequate development resources, technologically unrealistic requirements, conflict between team members or with managers, poor prior development experiences, job insecurity, and use of an inappropriate or constraining standard method or tools (Linberg, 1999; Nandhakumar & Avison, 1999).

Marion & Marion (1998) suggest that, in order to establish a working relationship with other actors interested in an IS, IS professionals need to be perceived as trustworthy and sincere. Based on interviews with experienced IS developers in eight Irish organisations, Fitzgerald (1998b; Fitzgerald et al., 2002) found that IS managers and project managers used their knowledge of developers' skills and aptitudes in allocating development work. Within an organisation, developers who could be trusted were assigned responsibility for critical tasks or projects. Trust was also an issue where critical roles were assigned to an external consultant or vendor.

IS professionals have norms, values and codes of behaviour that shape their behaviour, and which reflect their socialisation and training, and the professional, social and organisational context in which they work. For example, as a consequence of their professional norms, developers may focus on technical matters at the expense of human or organisational issues (Poulymenakou & Holmes, 1996), which can adversely affect the outcome of an IS project (Skok & Legge, 2002). However, Jiang, Klein, & Balloun (1998b) challenge the assumption that developers are a homogeneous group with one set of norms and behaviours. Based on a survey of US IS professionals, they found that different developers had different orientations, including technical, socio-political, or user orientations, or various combinations of these. Symon (1998) notes that different IS developers may contest representations of and rationales for their work.

Developers' values, beliefs and assumptions about the users of a technology, including their roles, abilities and needs, and the context of use, shape a technology such as an IS. The work of Madeleine Akrich

(1992) is useful for understanding how this might occur. She observes that “a large part of the work of innovators is that of *‘inscribing’* this vision (or prediction about) the world in the technical content of the new object” (Akrich, 1992, p. 208). Such inscriptions provide a presumed way of using the technology or IS which influences users’ interaction with it (Wilson, 2002). For example, IS developers may design an IS using themselves as typical users, resulting in an IS suitable more for expert users (Iivari, 2004a). According to Wilson (2002), users may become dissatisfied with an IS and even resist it, when there is a contradiction between their perceived roles and those roles inscribed for them by the developers of the IS. Riley & Smith (1997, p. 309) highlight the problems that may result from developers’ “reductive view of a given user situation”.

Lyytinen & Hirschheim (1987) conclude that failure by IS professionals to appreciate differences in how individuals process information or how they may behave in response to the new IS can result in poor fit between the IS and its users. They argue that IS development activities tend to assume an idealised, average user, ignoring cognitive, motivational or skill differences within the population of users. The user is often viewed as static, with little or no allowance made for learning or cognitive evolution with the IS. This can result in an IS in which the user is constrained by technical rigidity of the interface presented to him or her.

### **A1.3.2 Users**

A number of authors have highlighted that (perhaps to a greater extent than developers) the users of an IS are not a homogeneous group (Butler & Fitzgerald, 1997; Cavaye, 1995; Iivari & Igbaria, 1997; Markus & Mao, 2004; Taylor et al., 2002; van Offenbeek & Koopman, 1996). Rather, ‘users’ may be made up of groups of individuals from different functional, geographical, vertical and horizontal areas in an organisation with potentially different characteristics, interests in an IS, and capabilities to influence the course and outcome of IS development (Asaro, 2000; Cavaye, 1995; Markus & Mao, 2004; van Offenbeek & Koopman, 1996). As Butler & Fitzgerald (1997, p. 424) put it,

Users are not a homogenous group of social actors with convergent views on the trajectory and outcomes of the development process. Rather, users tend to belong to distinct social groupings or constituencies, each with their own particular organizational agenda, collective world views, and socially constructed subuniverses of institutional reality.

A review of the extensive literature on users and IS suggests that users may shape the outcome of IS development in three main ways. Users can have an effect through (1) their expectations of the IS being developed; (2) their attitude towards and involvement with the IS; and (3) specific characteristics that may affect their ability to utilise the IS.

#### *A1.3.2.1 User expectations*

As a major relevant social group in any developed IS, users’ expectations are an important influence shaping an IS project (Staples et al., 2002). Lyytinen & Hirschheim (1987) argue that user expectations are value-based beliefs and desires about how the IS will serve their interests. While some user expectations are explicitly formulated as IS goals and requirements (Lemon et al., 2002), other expectations may remain unarticulated or only vaguely expressed. The latter may be a result of the unclear nature of an expectation, the sheer number and diversity of users, or their inability or lack of opportunity for users to voice their expectations (Lyytinen & Hirschheim, 1987).

A survey of New Zealand Chief Information Officers ranked meeting user expectations as their third most important challenge (Hind, 2002). Schmidt et al. (2001) note that the growing sophistication of users is leading to higher user expectations of IS. They also identify the need to manage user expectations so as to avoid the mismatch between user expectations and the IS delivered. It is commonly held that this can be achieved by user participation in IS development, through the creation of more realistic user expectations about the IS (Lin & Shao, 2000; Mahmood et al., 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000).

The failure to manage user expectations has been found to be an important risk factor to the successful completion of IS projects (Keil et al., 1998; Rainer & Watson, 1995; Schmidt et al., 2001). Empirical studies have found that established, managed or realistic user expectations are perceived to be important for IS success (Lemon et al., 2002; Somers & Nelson, 2001; Standish Group International, 1995; Yoon et al., 1995). Similarly, unrealistic expectations may inhibit successful IS development (Barry & Lang, 2003; Standish Group International, 1995).

#### *A1.3.2.2 User attitude and involvement*

User attitude is usually defined as a psychological state reflecting an evaluative judgement or feeling towards an IS (Barki & Hartwick, 1994). Users' attitudes towards an IS affect their intention to use and actual use of the IS (Amoako-Gyampah, 1997; Mahmood et al., 2000). User attitudes may not necessarily result from a reasoned assessment of the functionality of the IS. Although nothing can compensate for a lack of needed functionality (Mahmood et al., 2000), often subjective perceptions of the characteristics of the IS determine a user's attitude towards it (Amoako-Gyampah, 1997). Users are likely to have a positive attitude about an IS if they perceive that it is useful to them, it is easy to use, or it is in their interests to use it (Mahmood et al., 2000; Wilson & Howcroft, 2002). There is some empirical evidence that positive user attitudes can be an important factor in IS success (Yoon et al., 1995). Riley & Smith (1997) argue that if users are enthusiastic about an IS then other obstacles are less likely to become critical problems.

Negative user attitudes towards an IS can result from a perceived lack of its relevance, changes to the way work is performed, or when users feel threatened by the change associated with the new IS (Bussen & Myers, 1997; Yoon et al., 1995), and in some cases may lead to user resistance to an IS project or use of the resulting IS (Irani et al., 2001; Keil et al., 2002; Martin & Chan, 1996; Skok & Legge, 2002). Empirical studies have shown that the introduction of an IS can be problematic in situations where workers have a strong professional culture, identity, autonomy or level of unionisation (such as in the health, education and social care sectors). Problems can arise where the IS, or parts of it, are perceived as challenging traditional professional values, roles, status and work conditions, undermining or threatening individual or collective identities, and making work practices more transparent (Beynon-Davies, 1995; Doolin, 2004; Marion & Marion, 1998; Myers & Young, 1997; Riley & Smith, 1997; Wilson, 2002; Wilson & Howcroft, 2002).

User involvement is a psychological state that reflects the extent to which a user perceives an IS to be both important and personally relevant (Barki & Hartwick, 1994). Empirical studies have found that user involvement or ownership are significant factors in the successful completion of IS projects (Hwang & Thorn, 1999; Standish Group International, 1995). Conversely, lack of user commitment is considered to be a project risk (Keil et al., 1998; Schmidt et al., 2001) and lack of user support has been found to be negatively related to various measures of IS project success (Jiang, Chen et al., 2002; Jiang & Klein, 1999, 2000; Jiang, Klein et al., 2000). In abandoning an \$11 million hospital IS project in 2000, partly as a result of the lack of acceptance of the IS by medical staff, management at a large New Zealand hospital acknowledged the need to give staff "the opportunity to contribute to future clinical and business IT developments" (North, 2000, p. 1).

Prior work in IS has found a relationship between user attitude and user involvement (Hunton & Beeler, 1997). Changing the attitude of highly involved users tends to require strong persuasive arguments that are factual and logical. In contrast, individuals with low involvement are more likely to change their attitudes because of normative influences such as interpersonal concerns or appeals from others who are important to them. Kirsch & Beath (1996) suggest that the actions of developers (e.g. through education, motivation or negotiation) can increase the extent to which users feel involved in an IS project.

#### *A1.3.2.3 Other user characteristics*

User attitude towards and involvement with an IS may also be influenced by user characteristics such as personality type, experience with IS and organisational status (Barki & Hartwick, 1994). Some user characteristics, particularly users' lack of experience with or understanding of IS generally, the specific IS or type of application, or the activities the IS is intended to support, have been found to have a negative relationship with overall IS success and some measures of project effectiveness (Jiang & Klein, 1999, 2000).

Yoon et al. (1995) found that user knowledge of computer technology was positively correlated to expert system success.

### **A1.3.3 Top management**

The presence or absence of top management support, commitment or understanding continues to be consistently reported in the IS development literature as important in determining the outcome of an IS project (Akkermans & van Helden, 2002; Aladwani, 2002; Jiang et al., 1996; Jiang, Klein et al., 2000; Newman & Sabherwal, 1996; Pan et al., 2004; Procaccino et al., 2005; Sharma & Yetton, 2003; Somers & Nelson, 2001). For example, top management support ranks highly in the Standish Group's CHAOS studies of project success factors, ranking either first or second of ten success factors in 1994, 1998 and 2000 (Johnson et al., 2001; Standish Group International, 1995, 1999, 2001). The importance of top management support for IS success has been observed across a range of national and organisational contexts (Coombs et al., 1999; Kim & Peterson, 2003; Lemon et al., 2002; Peterson et al., 2002; Yoon et al., 1995). Several authors suggest that top management support needs to be sustained throughout IS development and implementation if a project is to be successful (Butler & Fitzgerald, 1999b; Keil et al., 1998; Umble et al., 2003). Sabherwal & Robey (1995) suggest that the timing and intensity of top management's role may be important in influencing others' perceptions of the IS project. For example, an active role early in the development process may be taken to indicate their support for the project, whereas their involvement in the later stages may signal difficulties with the project.

Similarly, lack of top management support is considered an important project risk factor (Kappelman et al., 2006; Keil et al., 1998; Schmidt et al., 2001; Sumner, 2000) and has been implicated in challenged, abandoned or failed projects (Oz & Sosik, 2000; Standish Group International, 1995). In a survey of UK and New Zealand project managers, Yetton et al. (2000) found support for the hypothesis that a project was more likely to be completed and not redefined or abandoned with senior management support.

Top management support may be particularly important in specific IS development contexts. For example, executive information systems (EIS), where the support of an executive sponsor as a potential user is important (Nandhakumar, 1996; Rainer & Watson, 1995), IS projects that are considered to be strategic or critical to business success (Yetton et al., 2000), IS projects that challenge professional identity or autonomy of the users (Riley & Smith, 1997), IS projects with high task interdependence (Sharma & Yetton, 2003), or large IS that have significant impacts throughout the organisation, such as customer relationship management (CRM) projects (Kim & Pan, 2006), data warehouse projects (Wixom & Watson, 2001), ERP projects (Mabert et al., 2003; Somers & Nelson, 2001) and manufacturing resource planning projects (Irani et al., 2001).

The importance placed on top management support stems from the various roles that top management is perceived to play in IS development. For example, top management support is considered important for ensuring the availability of budgetary and human resources required for the project (Aladwani, 2002; Butler & Fitzgerald, 1999b; Kim & Peterson, 2003; Parr & Shanks, 2000; Schmidt et al., 2001; Sharma & Yetton, 2003; Yetton et al., 2000; Yoon et al., 1995). In a survey by Martin & Chan (1996), New Zealand project managers indicated that senior management commitment to providing the resources needed to implement an IS project was more prevalent in smoothly completed projects compared to redefined or problematic projects.

Top management is considered to have an important role in overseeing IS development (Aladwani, 2002; Schmidt et al., 2001; Sharma & Yetton, 2003; Yetton et al., 2000), and ensuring that the project supports organisational strategies and goals (Clegg et al., 1997; Kim & Peterson, 2003; Wastell & Swards, 1995). Failure of top management to monitor progress, support and enforce management and control procedures, or be involved in critical decisions can cause project failure or abandonment (Goldstein, 2005). According to Standish Group International (2001), top management should be responsible for setting the agenda for the project, and articulating the project's overall goals. It should have an overall understanding of the project and how it benefits the organisation. Pan & Flynn (2003) argue that top management has a role to play in managing political conflicts that emerge during IS development and implementation.

Top management support is also considered important in influencing user attitudes, whether actively championing or visibly associating with the IS project to signal organisational commitment to the project (Parr & Shanks, 2000; Sharma & Yetton, 2003), encouraging user participation in an IS project (Kim & Pan, 2006; Wilson et al., 1997; Wixom & Watson, 2001; Yoon et al., 1995), or countering any negative attitudes of users towards the new IS or resulting organisational changes (Kim & Peterson, 2003; Riley & Smith, 1997; Yetton et al., 2000; Yoon et al., 1995). A significant IS project may entail the redefinition of roles and responsibilities. Top management can be influential in creating a positive context for change (Butler & Fitzgerald, 1999b; Lemon et al., 2002; Schmidt et al., 2001; Wixom & Watson, 2001). According to Sharma & Yetton (2003), top management plays an important role in shaping the organisational context, which can influence how users appropriate an IS. They suggest that top management can facilitate successful IS implementation by instituting mechanisms or structures that facilitate user learning, instituting performance control systems that recognise and reward use, instituting coordination mechanisms that support the changes associated with an IS, and instituting changes to performance goals.

Other influential decision-makers, such as a company's board of directors, may exert a similar influence, particularly in terms of sponsoring an IS project (Gasson, 1999).

#### **A1.3.4 External agents**

According to Sawyer (2001b), the IS development market has changed from the approach of the early 1990s in which organisations largely developed their own IS internally. Increasingly, organisations are sourcing their IS solutions externally as made-to-order software or ready-to-install software packages. Within this development context, external consultants are playing an increasingly important role, particularly, in bridging the gap between IS consumers and software vendors (Howcroft & Light, 2006; Sawyer, 2001b; Skok & Legge, 2002). External consultants may also be utilised where the organisation lacks specific expertise (Butler, 2003), or to 'grow' internal staff expertise (Sumner, 2000). Although prior studies have found only limited evidence for the importance of the use of external consultants on the outcome of an IS project (Akkermans & van Helden, 2002; Irani et al., 2001; Rainer & Watson, 1995; Schmidt et al., 2001; Somers & Nelson, 2001), with an increasing presence in IS development, their influence on project outcomes can be expected to increase.

Challenges associated with using external consultants or contractors could include the nature of the contract and contractual issues (such as what constitutes an error, enhancement or unforeseen cost) (Goldstein, 2005; Pan et al., 2004); lack of understanding or misinterpretation of organisational requirements by consultants (Howcroft & Light, 2006; Pan et al., 2004); lack of control over the actions of external consultants (Schmidt et al., 2001); poor product quality and poor service (Pan et al., 2004); communication problems between consultants and users, or no direct communication channels between them (Pan et al., 2004; Skok & Legge, 2002); high expense (Lemon et al., 2002); lack of internal IS support once external consultants have departed (Butler, 2003); and possibly reduced participation of users (Howcroft & Light, 2006; Sawyer, 2001b).

Sarkkinen & Karsten (2005) highlight the difficulties that external developers or consultants can encounter during an IS project, particularly where the IS significantly changes individuals' work practices, task division, and organisational status or authority. As outsiders to the organisation, external developers or consultants may be unaware of the consequences associated with the new IS or of any political undercurrents. They are more likely to focus on the technical aspects rather than the social aspects of the project. In doing so, they are likely to be perceived by users participating in the project as agents of management, forwarding their interests.

### A1.3.5 Project team

IS projects are usually conducted by a team that may include IS personnel, user representatives, managers, and possibly external consultants. The composition of the project team, their collective expertise, their roles and relationships, may influence IS project outcomes through project team performance. For example, Jiang, Klein et al. (2002) found that strong project team effectiveness improves project outcomes. Similarly, Wang et al. (2005) found that project team cohesiveness was significantly positively related to project performance.

The size and composition of the project team may influence the outcome of an IS project. For example, large-sized project teams and teams that have not worked together in the past have been suggested as project risk factors (Jiang, Klein et al., 2000). In an analysis of eight-four projects, Aladwani (2002) found that project team size was significantly negatively correlated with project team performance, with larger teams experiencing dissatisfaction among team members and decreased productivity and problem solving. Developers in the team interviewed by Linberg (1999) felt that small-sized teams improved communication, enabled collaboration, and facilitated a sense of synergy. Empirical evidence suggests that a stable, experienced, cohesive project team can lead to good IS project performance (Yetton et al., 2000). The most effective development teams may be those with a balance of diverse personality types and mutual openness to ideas (Bradley & Hebert, 1997; Linberg, 1999).

Project team skills have also been found to have a major influence on IS project outcomes. According to Aladwani (2002), a project team with a variety of experience and skills is likely to perform better than one with less available skills. It has been suggested that for effective project team functioning, the collective expertise of the project team should enable them to accomplish the range of allocated tasks, to work with undefined elements, uncertain objectives and issues emerging during the project, to work cooperatively as a team and with top management, and to understand organisational operations and the human implications of the IS (Jiang & Klein, 2000; Jiang, Klein et al., 2000; Kim & Peterson, 2003; Wixom & Watson, 2001).

In a survey of data warehousing managers and users, Wixom & Watson (2001) found that a project team with strong technical and interpersonal skills was able to perform tasks well and interact with users, leading to project implementation success. A skilled and competent project team was more able to identify the complex project requirements. Wixom & Watson (2001) concluded that in IS projects that involve specialised technology, such as data warehousing projects, it is important that the development team understand how to use the technology and how it relates to the existing technical infrastructure. Jiang, Klein et al. (2000) suggest that where teams lack sufficient expertise with the application or technology being developed, they may become reliant on the few team members who do, leading to inefficient use of team resources. In three case studies of CRM system implementations, Kim & Pan (2006) found that the balance between high levels of business skills and technical expertise within the project team in the successful implementation was missing in the unsuccessful cases.

The use of support technologies and tools may supplement the capabilities and productivity of the team (Aladwani, 2000, 2002). However, in a study of sixty-six IS project teams performing requirements analysis, Guinan et al. (1998) found that group processes and team performance were positively influenced more by project team skill, the project manager's involvement in the day-to-day workings of the team, and similar levels of experience within the team, than by the use of IS development methods and tools. Similarly, Sawyer & Guinan (1998) found that the use of automated development tools had no explanatory effect on variances in either software product quality or project team performance.

The roles and responsibilities of the various team members need to be well-defined and clearly communicated to team members. Improper definition of roles and responsibilities is perceived as a risk to successful IS completion by both project managers and IS users (Keil et al., 2002; Schmidt et al., 2001). Empirical studies have found that lack of clarity of role definition is significantly negatively related to IS success (Jiang & Klein, 1999, 2000). When roles and responsibilities are poorly defined or communicated, requirements may be overlooked, items or features may be left out or not completed, or there may be significant task overlap (Keil et al., 2002).

### A1.3.6 Interaction

IS development can be perceived (though not exclusively) as a social process involving interaction between actors in various social roles (Kirsch & Beath, 1996). Throughout IS development, individuals from the groups described above may interact in various ways, including negotiation, decision-making, communication, conflict or political manoeuvring. This interaction will be shaped by similarities and differences in the various groups' values and beliefs, professional or social norms, expectations and perceived interests.

Individuals who are perceived by other actors or participants in an IS project to be experts in some area (for example, with knowledge of IS development practice or of the application domain) can shape the meaning of IS development (and its activities) for others (Gasson, 1999, 2006; Symon, 1998). Gasson (1999) found that individual experts managed meanings to the extent that they defined what were appropriate forms of the IS development process, its products, work roles and activities. Gasson suggests that such influence may diminish as other areas of knowledge become more important in a project.

The nature and quality of interactions between participants, particularly users and developers, can influence IS project outcomes (Procaccino et al., 2006; Robey & Newman, 1996; Wang et al., 2006). Such interaction is dynamic rather than stable (Cavaye, 1995). Changes in the relative influence of groups, and critical encounters between them can affect the course of an IS project (Heiskanen et al., 2000; Robey & Newman, 1996). It has been suggested that the key to establishing a working relationship between project participants is creating mutual respect and trust – a responsibility that often falls to IS professionals or the project manager (Marion & Marion, 1998). A shared organisational culture can also be a basis for interaction (Butler & Fitzgerald, 2001; Poullymenakou & Holmes, 1996; Symon, 1998).

There are often multiple direct and indirect channels for interaction between IS participants. In bespoke developed IS projects, these may include facilitated workshops, IS intermediaries, a customer support line, prototyping, interviewing, testing, a survey, email or a bulletin board, and observation of work tasks. Based on interviews with project managers, Keil and Carmel (1995) recommend establishing multiple direct links between customers (users) and developers, rather than relying on intermediaries or on user surrogates, either of whom may intentionally or unintentionally filter or distort information or may not have a complete understanding of users' needs. User participation may be a means for developing a social relationship between users and developers (Kirsch & Beath, 1996). According to Fitzgerald et al. (2002), during IS development developers and users learn from each other in a mutual, interactive way. Standard methods of IS development can influence interactions between participants in an IS project by structuring roles, responsibilities and occasions for interaction (Robey et al., 2001).

Asaro (2000) suggests that in situations where the emerging IS artefact becomes part of the IS development, it mediates user-developer interaction. Developers cannot interpret requirements in isolation of users' reactions to the developing IS, and users can less easily resist an IS which has been revised in response to their concerns. Both groups also become aware of the practical and material limitations of the technology itself. For example, Hardgrave et al. (1999) suggest that prototyping facilitates increased and more responsive interaction and communication between users and developers. Butler & Fitzgerald (1997; 1999a; 1999b; 2001) describe how in certain IS projects the use of prototyping or CASE tools improved user-developer communication, and increased the level of user participation and involvement in the projects.

CASE technology enabled a sharing of 'world views' between developers and users on the properties of the emerging system. It did this by offering a common schema or language that mediated or negated the traditional schism between technically-oriented developers and business-oriented users. (Butler & Fitzgerald, 1999a, p. 80)

Interaction between participants in an IS project can facilitate the alignment of goals and expectations, achieve mutual understanding, and encourage effective communication. However, it can also lead to more contradictory outcomes when differences between participants emerge, or when misunderstandings or breakdowns in communication occur.

### A1.3.6.1 *Alignment*

The recognition that there are typically multiple interested actors in an IS project, each with different interests, values, beliefs, norms, practices and behaviours, rewards, goals or expectations has led some authors to argue that successful IS development relies on alignment or congruence between these things (Jiang, Chen et al., 2002; Jiang, Sobol et al., 2000; Keil et al., 2002; Marion & Marion, 1998; Pan, 2005). Jiang, Chen et al. (2002, p. 22) observe:

If the goals, or expectations, of the stakeholders are not aligned, then there are numerous gaps in the understanding of the system to be developed. Each group will have a different set of expectations and, therefore, will judge the system a success or failure on an entirely different set of criteria.

Substantial differences in goals and expectations can occur between groups of IS professionals, between the developers and the users of an IS, or between different groups of users. For example, Mahaney & Lederer (2003) found a perceived goal conflict between IS developers and project managers, with respect to solution quality and delivery, respectively. In a study of US IS professionals and users by Jiang, Sobol et al. (2000), IS personnel often believed that they had reached agreement with users over IS project objectives, whereas users did not believe such an agreement had been reached. Consequently, the users, who had different expectations of the IS, were dissatisfied when it failed to meet their expectations.

Different groups of users may potentially have conflicting organisational interests or professional interests (Doolin, 2004; Marion & Marion, 1998; Myers & Young, 1997; Riley & Smith, 1997; Wilson & Howcroft, 2002). Further, the interests or expectations of participants are not necessarily static and may change over the course of IS development (Pan, 2005). For example, this may occur through the development of coalitions of actors, or as members of the project team develop loyalty for each other and the project (Myers & Young, 1997).

Jiang, Chen et al.'s (2002) solution to goal or expectation incongruence is a compromise between the various groups in order to reconcile their differences. They view project management as the exercise of this compromise, in the face of resources constraints and the realisation that no one set of needs will be completely satisfied. As part of this stance, Jiang et al. (2000) argue that the common interests of various groups should be emphasised. Jiang, Chen et al. (2002) suggest that pre-project partnering, in which various groups work together before an IS project begins, is a useful approach for fostering collaboration and reducing the potential for conflict. Surveying US IS professionals, Jiang and co-authors found that pre-project partnering was significantly positively associated with project performance. They also noted that pre-project partnering reduced the risk of poor user support for the project, and led to effective project team characteristics and improved project manager performance (Jiang, Chen et al., 2002; Jiang et al., 2006; Jiang, Klein et al., 2002).

### A1.3.6.2 *Understanding*

Historically, a lack of understanding between participants in an IS project has been associated with IS failure (Sauer, 1999). Based on a survey of IS development participants, Enquist & Makrygiannis (1998) found that misunderstandings occurs frequently throughout the development process. Such misunderstanding often produces minor negative consequences (such as minor process delays, product errors, and/or problems in relations with other participants), but occasionally their consequences may be more extensive. The most common causes of misunderstandings were (in order) unclear or incompletely expressed information; differences in concepts and frames of reference; and uncertainty about tasks, responsibility, authority or intentions of other participants.

A gap in understanding (in particular, between users and developers) has been attributed to differences in organisational cultures or sub-cultures (Al-Karaghoulis et al., 2005; Coughlan et al., 2003; Enquist & Makrygiannis, 1998; Flynn & Jazi, 1998; Jiang, Sobol et al., 2000; Poulymenakou & Holmes, 1996; Taylor-Cummings, 1998). Such cultural divergence can arise from differences in organisational roles and loyalties, professional backgrounds, world views, interests, expectations, skills bases, experience, ambitions, education, training, cognitive styles, problem-solving approaches and vocabularies (Butler & Fitzgerald, 1997; Flynn & Jazi, 1998; Gasson, 1999; Jiang, Sobol et al., 2000; Symon, 1998; Urquhart, 2001). A common perception is that developers are focussed on technical issues, while users are concerned more with facilitating work or

business tasks. For example, based on a survey of developers and users in the UK, Al-Karaghoul et al. (2005) attribute the gap in understanding to lack of business knowledge by developers and lack of technical understanding by users.

Differences in understanding can also be viewed as the result of the diverse interpretive schemes or frames used by various IS participants to construct meaning in relation to the IS project (Galliers & Swan, 2000). For example, individuals (with different education, training, work background and prior experiences with IS development) may have different perceptions (and preconceptions) of the purpose, meaning and use of an IS, which may influence their ability to achieve a shared understanding of the new IS (Gasson, 1999). In a case study of IS design, Gasson (1999) observed that individual project team members influenced each others' perspectives on the IS project, and that these perspectives converged with time as the team developed a shared understanding of the project.

The construction of a shared understanding in IS development may be mediated through power relations. In an environment where asymmetries of power exist between different organisational groups, interaction may become problematic as individuals withhold or substitute information that they perceive as politically or socially unacceptable (Gallivan & Keil, 2003). In other situations, management may exercise a powerful influence, such as in defining the boundaries of user participation (e.g. defining whether participation occurs, who participates, their level of participation and their influence), which leaves developers in the contradictory position of trying to mediate the competing interests of management and of users (Howcroft & Wilson, 2003).

#### *A1.3.6.3 Communication*

Communication is often perceived to be an important dimension of the interaction between users and IS staff, essential for effective functioning of the project team, and a key factor in IS success (Akkermans & van Helden, 2002; Butler, 2003; Butler & Fitzgerald, 2001; Hartwick & Barki, 2001; Sawyer & Guinan, 1998; Somers & Nelson, 2001; Yoon et al., 1995). Conversely, poor communication can lead to misunderstanding and conflict between participants, which may even be carried over into subsequent IS projects within the organisation (Amoako-Gyampah & White, 1997; McKeen & Guimaraes, 1997; Skok & Legge, 2002).

Communication between participants in an IS project can be informal or formal, direct or indirect, one-way or two-way (Amoako-Gyampah & White, 1997; Butler, 2003; Butler & Fitzgerald, 2001; Gallivan & Keil, 2003). Communication is influential through the role it plays in facilitating information exchange, mutual understanding and collaboration, and in identifying and resolving conflicts (Amoako-Gyampah & White, 1997; Keil et al., 2002; Oz & Sosik, 2000). It has been suggested that establishing a shared language or vocabulary between participants is important for achieving this (Marion & Marion, 1998).

Effective communication is frequently perceived as important for meaningful user participation in IS projects (Amoako-Gyampah & White, 1997; Cavaye, 1995; Hartwick & Barki, 2001). It is considered necessary for users to convey their understandings of the organisational context and their requirements to developers, and for developers to explain technical issues to users and listen to user-related problems (Al-Karaghoul et al., 2005; Butler & Fitzgerald, 2001). However, Gallivan & Keil (2003) suggest that 'communication lapses' may occur that negate or reduce the effectiveness of user participation. Such communication lapses can occur where development is framed in a way that excludes consideration of particular issues; where users are unaware of an issue being a problem, see no need to communicate an obvious problem, or are unable to articulate an issue as a problem; where user representatives may not perceive an issue as problematic even though other users might; where communication channels are not available or where users are unaware of communication channels; where users actively decide not to communicate through a channel because certain messages are perceived as politically or socially unacceptable; where interpretive schemes, mental models, differences in language use, or intermediaries distort or filter out specific messages; or where developers fail to act on a message, act on the wrong messages or consider certain actions unacceptable (Gallivan & Keil, 2003).

Communication may also be used by the IS project team as an important component in maintaining relationships with, and the support of, other organisational groups (Jiang, Klein et al., 2000). Amoako-Gyampah & White (1997) note the need for ongoing two way communication so that users and managers feel that their input is valued (and will be sought), are given feedback on their input or concerns, and are informed

about project changes. In a post-hoc longitudinal case study, Butler & Fitzgerald (1999b) found that the project manager, developers and users had employed various strategies (such as a high degree of formal and informal communication between groups) to avoid 'us vs. them' issues developing.

#### A1.3.6.4 *Conflict and politics*

Differences in values, perceptions, interests, goals or expectations, a lack of mutual understanding, and ineffective communication, have all been attributed to causing disagreement or conflict between participants in an IS project. Conflict may occur between groups associated with IS development, such as users or developers, and within such groups (Symon, 1998), including the project team. Coakes & Coakes (2000) suggest that conflict can arise between different groups or individuals with apparently similar interests because of different interpretations of a problem. Conflict may also be of an interpersonal nature. For example, conflicting personalities and attitudes may lead to poor project team relationships (Keil et al., 2002; Schmidt et al., 2001).

Unsurprisingly, the presence and intensity of conflict and disagreement between IS participants can adversely impact the IS development process and project outcomes (Jiang & Klein, 2000; Keil et al., 2002; Pan, 2005; Robey & Newman, 1996; Schmidt et al., 2001). Poor relationships between participants may continue until they are disrupted by conditions that challenge existing behaviour (Robey & Newman, 1996).

The literature suggests that the potential for conflict increases as the number and diversity of participants involved increases, when the scope of the IS project is large, when the project is highly complex, when high levels of integration among the participants is necessary, and when external factors such as third parties or other projects are involved (Linberg, 1999; van Offenbeek & Koopman, 1996; Yetton et al., 2000). Robey et al. (2001) argue that conflict increases as role interdependence between IS participants increases, especially under time or resource constraints and when responsibilities or approaches to the work differ. Developers interviewed by Linberg (1999) indicated that conflicts often occurred both within the project team and with external managers, sometimes as a result of the pressure developers were working under. Similarly, Sawyer (2001a, p. 174) sees conflict as inevitable when people interact in activities such as IS development, which are "characterized by ambiguity, contradictory information and time pressures".

Robey et al. (2001) suggest that conflict can sometimes have a positive effect if it encourages meaningful and constructive debate among participants. Acknowledging disagreement and conflict may ensure important project issues are addressed and new or creative solutions are considered (Wilson et al., 1997), arguably leading to better decision making (Sawyer, 2001a). The participation of various groups in IS development has been suggested as a way of reducing potential conflict in IS projects. The rationale for this position is the increased level of mutual understanding between different groups through working together (Jiang, Chen et al., 2002) or the increased sense of ownership and control engendered through involvement (Butler & Fitzgerald, 1999b). However, conflict resolution may not always be achieved through the articulation of differences and the negotiation of a shared understanding or compromise (Jiang, Chen et al., 2002; Sawyer, 2001a).

Given the long term consequences of what is at stake, it is not surprising that the level of political activity in IS development can be high (Butler, 2003; Clegg et al., 1997; Foster & Franz, 1999; Howcroft & Wilson, 2003; Myers & Young, 1997; Newman & Noble, 1990). A number of studies have found that in certain cases organisational politics can adversely affect the outcome of an IS project (Robey & Newman, 1996; Warne & Hart, 1996; Wastell & Sowards, 1995; Yetton et al., 2000). Pan & Flynn (2003) identified a number of political issues that influenced decision making or produced conflict in an electronic commerce IS project, leading to its abandonment. These were political mistrust among project stakeholders (including those external to the organisation), formation of an opposing coalition, threats of retaliation, political insensitivity, lack of political promotion of the IS project, and failure to obtain continued political support from top management. Politics may become a problem with organisation-wide IS (or even industry-wide IS) that span multiple groups who feel their interests (e.g. their ownership and control of business processes and data) are being threatened enough to want to take action (Drummond, 1996; Gasson, 2006; Warne & Hart, 1996). Akkermans & van Helden (2002) found that open communication and a lack of political behaviour among different organisational groups were important in turning around a failing ERP project.

Participants may draw on prevailing norms, values and resources to legitimise their actions (e.g. to justify using a particular development approach or method or to include or exclude various groups or individuals from participating) or to mask their political motives (Fitzgerald, 1998b; Fitzgerald et al., 2002; Howcroft & Wilson, 2003). Butler & Fitzgerald (2001) describe how in a case of shared project ownership, different user groups resorted to political infighting in order to influence the development team in their favour. Butler (2003) also describes how friction developed between two user units in a corporate IS project. Doolin (1999) describes a struggle for control of an IS project, but between the IS department and a competing source of authority within the organisation, the Finance department, which contested the perceived validity of the IS solution.

Myers & Young (1997) describe how, in an IS project in the New Zealand health sector, user participation was used to legitimise the project amongst the wider user community. Further, senior management had a hidden agenda. Features that clinical users perceived as challenging their professional status were omitted from the initial user requirements, and were not discussed until the project was well underway and the project team and user representatives had built up allegiance to the project.

Developers themselves, often lacking formal organisational authority, may also use political tactics to secure access to necessary resources, to work around management-imposed constraints, or to secure the support and cooperation of other organisational groups (Linberg, 1999; Nandhakumar, 1996; Phan et al., 1995). Alternatively, IS professionals may fail to support an IS project that is not under their control (Olesen & Myers, 1999).

## **A1.4 Influences on IS Development – Project Content**

This section discusses influences related specifically to an IS project, including the characteristics of the project, its goals and objectives, the resources made available for it, and aspects of technology that will support the IS and its development.

### **A1.4.1 Project characteristics**

There is some evidence that the outcome of an IS project may be related to various characteristics of the project itself, such as its size, technical complexity, and newness to the organisation (Jiang & Klein, 1999; Johnson et al., 2001; Martin & Chan, 1996; Standish Group International, 1999; Yetton et al., 2000).

Project size may be characterised (if not measured) in a number of ways, including the duration of the project, its cost, the size of the project team, the number of different groups on the team, the number of users of the IS, the number of organisational units involved, and the number of hierarchical levels occupied by users (Jiang & Klein, 2000; Standish Group International, 1999). Each characteristic provides a sense of the scale of a project, the implication being that a higher value generally indicates a larger and hence more challenging IS project. Johnson et al. (2001) attribute part of the increase in IS project success rates observed in the US between 1994 and 2000 by the Standish Group to smaller project size. They suggest that the emergence of the World Wide Web and the use of standard software infrastructures have facilitated the development of smaller-sized IS projects. Some organisations have dealt with large projects by breaking them down into smaller projects or by using incremental development (Kautz et al., 2004; Pan et al., 2004) in an effort to produce the likelihood of a successful outcome.

Chatzoglou (1997) suggests that smaller IS projects tend to have more well-defined project domains, facilitating the effective determination and implementation of IS requirements. Large IS projects are more likely to have high complexity and high task interdependence, need to be redefined, take longer to complete, require more resources, and involve increased lines of communication and potential conflict (Schmidt et al., 2001; Yetton et al., 2000). In their survey of UK and New Zealand project managers, Yetton et al. (2000) found that project size was negatively related to project completion. However, in an earlier survey, Martin & Chan (1996)

found no significant difference between redefined and smoothly completed projects with respect to large project size.

As IS become more pervasive in organisations, increasing functionality, scope and speed of technical change, and potential for integration of IS, are contributing to an increase in complexity (Clegg et al., 1997). A number of authors have suggested that technical complexity may adversely affect IS project outcomes, including aspects such as project completion and delivery of expected benefits (Barry & Lang, 2003; Beynon-Davies, 1995; Jiang & Klein, 2000; Parr & Shanks, 2000; Wastell & Swards, 1995). Jiang & Klein (1999) found a significant negative relationship between application complexity and overall IS success. High project complexity may pose problems for various actors associated with an IS. Lyytinen & Hirschheim (1987) suggest that, in such cases, actors often find it difficult to understand the IS, and to articulate and act on their concerns.

A project that is new to an organisation, in terms of application domain or required functionality, can pose problems because the organisation may lack the relevant knowledge, skills or competencies to successfully complete the project. To access these skills or competencies, the organisation may outsource part or all of the project (Yetton et al., 2000). In Martin & Chan's (1996) New Zealand survey, project managers indicated that project newness was more of a feature of redefined or problematic projects than of smoothly completed projects. Similarly, Yetton et al. (2000) found that newness reduced the chances of project completion, with newer projects being more problematic and more likely to be redefined.

#### **A1.4.2 Project scope, goals and objectives**

A number of studies have highlighted the importance to IS project 'success' of appropriate and achievable project scope, and well-defined and clear project goals or objectives (Aladwani, 2002; Jiang et al., 1996; Kim & Peterson, 2003; Peterson et al., 2002; Phan et al., 1995; Somers & Nelson, 2001; Standish Group International, 1995). Empirical findings suggest that less than successful project outcomes can arise from excessively large project scope, underestimating the project scope, changing scope or objectives, unclear goals or objectives, lack of agreement on goals or objectives among interested parties (e.g. management, IS staff, users), or elusive goals that change as the project proceeds (Barry & Lang, 2003; Keil et al., 1998; Keil et al., 2002; Oz & Sosik, 2000; Pan et al., 2004; Parr & Shanks, 2000; Schmidt et al., 2001; Standish Group International, 1995).

It has been argued that clear project goals can help IS projects to address the needs and expectations of both users and the organisation. In this sense, the project goals guide the determination of information requirements (Kim & Peterson, 2003). According to Aladwani (2002), clear, well-defined project goals enable the project team to develop a common understanding of the problem and so develop a unified approach to solving it.

Yetton et al. (2000) point out that project goals need to be well communicated to all concerned with the IS project. They view clarifying and communicating project goals or objectives to be the role of senior management. Aligning project goals with the goals of the organisation is also perceived to be important in ensuring that the IS supports organisational strategies (Aladwani, 2002; Clegg et al., 1997; Kim & Peterson, 2003; Peterson et al., 2002; Poulymenakou & Holmes, 1996). Clegg et al. (1997) found that the integration of technology and business goals was regarded as the responsibility of senior management. In the survey by Martin & Chan (1996), New Zealand project managers agreed more strongly that smoothly completed projects included clearly defined project scope and objectives, well communicated to the various actors involved, and clear strategic and business needs, than did redefined or problematic projects.

These challenges are enduring. According to Lyytinen & Hirschheim (1987), part of the cause of IS development failure lies in the fact that IS goals are often ambiguous, particularly with respect to technical, data, user or organisational requirements. IS project goals tend to focus on quantitative aspects, such as technical aspects of IS development and economic aspects of organisational performance. Furthermore, goals reflect values – often those of management or IS professionals – that may later be incorporated into the IS being developed. The uncritical adoption of such perspectives may lead to "expectation failures", particularly on the part of users.

### A1.4.3 Resources

Like any project within an organisation, the level of resources made available to an IS project (including money, people and time for development and implementation) can often be central to the outcome of the project (Table A1.1). Not only is the provision of adequate resources perceived to be important for ensuring successful IS development, but the allocation of inadequate resources is often perceived as contributing to the problems encountered in challenged or failed projects. For example, New Zealand project managers have indicated that the provision of adequate financial, human and time resources occurred more in smoothly completed projects compared to redefined or problematic projects, where the total project cost and time frame were frequently revised (Martin & Chan, 1996). Even where adequate resources are made available, problems can arise where the project exceeds its allocated costs or project schedule or where the project schedule is altered in some way (Linberg, 1999). Provision of adequate resources can be particularly critical to organisation-wide IS, which can be expensive, time-consuming and resource intensive (Wixom & Watson, 2001).

The allocation of adequate resources can indicate senior management support and commitment to the project, may help to overcome organisational obstacles, and may enable the project team to meet project milestones (Wixom & Watson, 2001). On the other hand, perceived unwillingness of the organisation to provide adequate resources may demotivate members of the project team, causing them to question the project's importance and to not fully commit to the project. Furthermore, unrealistic project schedules can result in extreme workload pressures that undermine developer creativity and compromise project quality (Linberg, 1999).

Table A1.1: Contribution of resources to IS project outcome

<p><b>Financial resources</b></p> <ul style="list-style-type: none"> <li>• Adequate financial resources perceived to be important to successful IS development (Fitzgerald, 1998a; Jiang et al., 1996; Nandhakumar, 1996; Rainer &amp; Watson, 1995; Wixom &amp; Watson, 2001)</li> <li>• Inadequate financial resources perceived as contributing to problems encountered in IS projects (Beynon-Davies, 1995; Jiang et al., 1998a; Martin &amp; Chan, 1996; Standish Group International, 1995)</li> </ul>
<p><b>Development time</b></p> <ul style="list-style-type: none"> <li>• Adequate development time perceived to be important to successful IS development (Fitzgerald, 1998a; Martin &amp; Chan, 1996; Wixom &amp; Watson, 2001).</li> <li>• Inadequate development time or unrealistic deadlines perceived as contributing to the problems encountered in IS projects (Beynon-Davies, 1995; Jiang, Klein et al., 1998a; Linberg, 1999; Martin &amp; Chan, 1996; Oz &amp; Sosik, 2000; Schmidt et al., 2001; Standish Group International, 1995).</li> </ul>
<p><b>Human resources</b></p> <ul style="list-style-type: none"> <li>• Adequate or appropriate project staff perceived to be important to successful IS development (Jiang et al., 1996; Martin &amp; Chan, 1996; Rainer &amp; Watson, 1995; Wixom &amp; Watson, 2001).</li> <li>• Insufficient or inappropriate project staff perceived as contributing to problems encountered in IS projects (Barry &amp; Lang, 2003; Jiang, Klein et al., 1998a; Keil et al., 2002; Linberg, 1999; Nandhakumar, 1996; Schmidt et al., 2001)</li> <li>• Project staff turnover perceived as contributing to problems encountered in IS projects (Bussen &amp; Myers, 1997; Schmidt et al., 2001; Sumner, 2000; Yetton et al., 2000).</li> </ul>

The effect of human resources is not confined solely to insufficient staff numbers for development. People with appropriate technical infrastructure skills are needed (Schmidt et al., 2001). Limited access to technical expertise in certain areas or competition between projects for common human resources may adversely affect or delay a project (Linberg, 1999; Nandhakumar, 1996). Project staff turnover, especially the loss of key project personnel, can remove critical knowledge about the new IS causing time delays and a loss in user confidence that the IS will meet specifications (Schmidt et al., 2001). In May 2000, Health Waikato, a large New Zealand District Health Board, abandoned an \$11 million IS implementation project that was perceived to be no better than their current IS and would cost too much to modify. Independent consultants identified problems with the implementation team's skill. There were also concerns about the lack of expert support and lack of qualified staff to run the IS (North, 2000).

#### A1.4.4 Technology

There are clearly many considerations relating to either hardware or software that may potentially influence the outcome of an IS project. Inappropriate technology selection or use, rapidly changing or new technology, inadequate or inappropriate technical resources available to design and build an IS, and difficulties with data, may all result in a problematic technological solution (Kim & Peterson, 2003). The level of software modification undertaken can negatively impact on project success in packaged software projects such as ERP implementations (Mabert et al., 2003; Sumner, 2000).

The use of appropriate technology is perceived to be important for IS success in some cases (Kim & Peterson, 2003; Nandhakumar, 1996; Peterson et al., 2002; Rainer & Watson, 1995; Somers & Nelson, 2001; Wixom & Watson, 2001), but not necessarily in others (Jiang, Klein et al., 2000; Oz & Sosik, 2000; Yetton et al., 2000). For example, the increasing software and hardware options available means that the technology infrastructure of an organisation and the technical expertise available are important considerations in whether or not particular technologies are appropriate (Kim & Peterson, 2003). Because a high proportion of application code is infrastructure (70% on average), it has been suggested that purchasing standard software infrastructure rather than building it may positively influence IS project outcomes (Johnson et al., 2001). The use of an appropriate technical architecture can be helpful for managing project complexity (Vidgen et al., 2004). In the large IS project failure described by Beynon-Davies (1995), the software was unstable, incomplete, and not fully tested, and the choice of development tools and the operating system used were questionable.

Wixom & Watson (2001) found that appropriate IS development technology (including the hardware, software, methods and tools required to complete an IS project) was significantly associated with successful technical implementation. They suggest that development technology influences the efficiency and effectiveness of the project team. Aladwani (2000) found that adequacy of the development tools was significantly positively associated with IS project performance. Not only is use of appropriate hardware and software technologies important for delivering an adequate technological solution, it may be important for ensuring user acceptance. For example, in an in-depth study of EIS development, the use of impressive interfaces was perceived to be important in ensuring executive acceptance (Nandhakumar, 1996).

The introduction of unproven or new technology is also perceived to be an important risk factor in various aspects of successful completion of an IS project (Jiang & Klein, 1999; Keil et al., 1998; Schmidt et al., 2001; Standish Group International, 1995; Wastell & Newman, 1996), although Jiang & Klein (2000) found no relationship between technological newness and project effectiveness. In the New Zealand survey by Martin & Chan (1996), departments whose main emphasis had been the assimilation of new technologies had a relatively higher rate of project redefinition. Wastell & Newman (1996) identified the use of proven software as a critical factor in a case study of successful IS development.

The impact various technical problems that may arise during the course of an IS project on the outcome of an IS project may be influenced by the technical expertise available. For example, in a case study of four IS projects by Butler & Fitzgerald (1999b), various technical problems were encountered with introducing client-server architectures, developing a corporate data warehouse, evaluating hardware platforms, and integrating and interfacing new and existing IS. Overcoming project technical obstacles was perceived to be critical to the success of the development process, and required significant developer or vendor technical skills and expertise.

Data can also present challenges to an IS project. In designing and developing a new IS solution, the data may be incorrect or in an inappropriate form (Bussen & Myers, 1997; Nandhakumar, 1996). In a study of EIS development, problems were encountered where data was not available in an easy-to-adopt form, with one project not going ahead for this reason. Management of data issues, such as availability, ownership and security, can also lead to problems for the project team, such as lack of cooperation from other groups (Nandhakumar, 1996). Data quality is particularly critical in the development and implementation of enterprise-wide IS, given the need for data integration across the organisation (Somers & Nelson, 2001; Sumner, 2000; Umble et al., 2003; Wixom & Watson, 2001).

## **A1.5 Influences on IS Development – IS Development Processes**

This section discusses influences related to aspects of the IS development process. In particular, it deals with processes of requirements determination, project management, use of a standard method, user participation in the IS development process, user training, and the management of change arising from IS development and implementation.

### **A1.5.1 Requirements determination**

Requirements determination is widely regarded as a critical step in IS development (Alvarez, 2002; Coughlan et al., 2003; Flynn & Jazi, 1998; Urquhart, 1999, 2001). Essentially, requirements determination involves achieving a shared understanding of the information, processes and functions that need to be incorporated into the new IS (Al-Karaghoulis et al., 2005; Coughlan et al., 2003; Urquhart, 1997, 1999, 2001). Although there are often many actors with an interest in an IS, expectations and functional needs are typically elicited from the intended users of the IS (Lemon et al., 2002). In addition to user requirements, there may be business requirements that the IS will need to satisfy, or technical requirements related to the existing IT infrastructure, the need for integration with other IS, regulatory requirements, or the IS itself in the case of packaged software acquisition. A (formal) requirements specification document is usually produced that specifies what the IS should do, and often functions as a contract between the project team and the sponsors of the IS. It can also serve to guide subsequent design activities. The realisation of user requirements – delivering an IS that matches the users' needs – is perceived as important by various parties with an interest in an IS, including IS managers and staff, and users and their managers (Li, 1997).

A number of empirical studies have highlighted the importance of well-defined and clearly stated requirements to IS project success (Lemon et al., 2002; Procaccino et al., 2005; Procaccino et al., 2006; Rainer & Watson, 1995; Standish Group International, 1995; Verner & Evanco, 2005). Similarly, a lack of or misunderstood requirements is considered to be a project risk factor (Kappelman et al., 2006; Keil et al., 1998; Keil et al., 2002; Schmidt et al., 2001). Other authors observe that poorly defined or unclear requirements are often an important factor in challenged or abandoned projects (Barry & Lang, 2003; Beynon-Davies, 1995; Bussen & Myers, 1997; Standish Group International, 1995). Unstable or changing requirements are also perceived to render IS projects problematic (Barry & Lang, 2003; Keil et al., 1998; Oz & Sosik, 2000; Schmidt et al., 2001; Standish Group International, 1995; Wastell & Sowards, 1995). Strategies that have been suggested to counter the risk of changing requirements include using iterative design, in which different parts of the IS functionality are delivered in different phases (Johnson et al., 2001; Larman & Basili, 2003; Schmidt et al., 2001), prototyping (Beynon-Davies et al., 1999; Hardgrave et al., 1999) or agile methods (Vinekar et al., 2006; Williams & Cockburn, 2003).

IS projects in which the requirements are poorly defined can experience difficulties because the resources required to complete the project are not fully understood or made available (Butler & Fitzgerald, 1999b; Schmidt et al., 2001). Poor requirements determination can also result in unclear objectives for the IS project team, or an IS that does not meet the needs and expectations of one of the groups with an interest in it. The latter can result from a failure to identify and include in the requirements determination all parties with an interest in an IS (Pan et al., 2004; Schmidt et al., 2001). This is particularly relevant where the IS spans multiple, diverse groups, whose needs must be understood and communicated to the project team (Wixom & Watson, 2001). The beliefs, ideas and assumptions held by those developing the IS can shape requirements determination, particularly in terms of who is (and is not) included.

Drawing on a post-hoc longitudinal case study of four IS development projects, Butler & Fitzgerald (1999b) argue that, for IS project success, adequate time needs to be spent with relevant users to elicit user requirements. They observed that the outcome of requirements determination depends both on the time that is allocated to it and, more importantly, on the participation of suitable users. Butler & Fitzgerald (1999b) note that within their case study organisation, decisions concerning the time allocated for requirements

determination were not usually made by the development team, and were often made in response to external conditions, without due regard to what requirements determination actually entailed.

Requirements determination is a complex social process. Various authors have highlighted the importance of communication and mutual understanding between participants in the construction of IS requirements (Al-Karaghoulis et al., 2005; Coughlan et al., 2003; Flynn & Jazi, 1998; Guinan et al., 1998; Urquhart, 1999, 2001). Problems in requirements determination can arise because users may be unable or unwilling to articulate their requirements, or they may not even know them. Different user constituencies may have different requirements or differing viewpoints on requirements. Users and developers often speak different 'languages' and have different frames of reference. Even if users are willing or able to share their requirements, these are typically translated by developers in most IS development approaches. Users may utilise different mental models or ontological views of organisations and IS. They may not understand (or support) requirements models developed by developers or technically-oriented modelling languages. Developers may not fully understand users' work or needs, or may be unable to elicit user requirements, or may think they know already what is required. Further, they may have interests or objectives that take precedence over meeting user requirements (e.g. maintaining technical credibility or technical design integrity) (Al-Karaghoulis et al., 2005; Alvarez, 2002; Flynn & Jazi, 1998; Guinan et al., 1998; Urquhart, 2001).

These problems may be compounded by many approaches to (and tools used in) requirements determination, which tend to assume that requirements are objective artefacts that can be codified, specified at the outset, and remain unchanged during development. Such approaches may not adequately recognise the emergent and socially-constructed nature of requirements, nor the political aspects of requirements determination, in which IS participants may have different goals, objectives and interests. Often insufficient attention is paid to the social and political context in which the IS will be situated (Flynn & Jazi, 1998; Galliers & Swan, 2000).

### **A1.5.2 Project management**

In general terms, IS project management involves planning, organising, and managing organisational resources, both financial and human resources, for the duration of an IS project. Given the complex nature of such projects, the complexity of the social interactions that can occur in and around IS development, and the dynamic nature of the development context, it is hardly surprising that empirical studies have emphasised the perceived value placed on project management by the various parties involved in an IS project (Butler & Fitzgerald, 1999b; Jiang et al., 1996; Lemon et al., 2002; Linberg, 1999; Wastell & Swards, 1995). According to Johnson et al. (2001), the increased project success rate observed between 1994 and 2000 in the Standish Group's CHAOS studies is due in part to improved project management processes, better management tools, and more highly skilled project managers. An international survey in 2005 found that the organisational profile of project management continues to increase, with more organisations using project management processes, having project management offices (PMOs), using business cases to justify invest in IS projects, and undertaking project governance for selecting and approving projects (but less so for monitoring projects and measuring benefits) (KPMG, 2005).

Project planning activities include defining the project; estimating its size, cost, and scheduling; assessing potential risks; and developing a project plan. Such activities are usually undertaken by the project manager or leader, a steering committee or an ad hoc planning group (Phan et al., 1995). Empirical studies have highlighted the perceived importance of planning activities to successful project outcomes (Aladwani, 2000; Barki et al., 2001; Butler & Fitzgerald, 1999b; Kim & Peterson, 2003; Lemon et al., 2002; Mabert et al., 2003; Peterson et al., 2002; Standish Group International, 1995). In their survey of New Zealand and UK project managers, Yetton et al. (2000) found that project planning reduced budget variances, but had no effect on project completion rates. Planning was also found to reduce project team instability. In their earlier survey, Martin & Chan (1996) reported that New Zealand project managers agreed more strongly that, compared to redefined or problematic projects, smoothly completed projects had a realistic project plan and time schedule, with time allowances made for developer learning and education. Inadequate or insufficient planning, poor estimates, and poor risk management have been held responsible for detrimental project outcomes (Keil et al.,

2002; Phan et al., 1995; Standish Group International, 1995; Yetton et al., 2000). Poor planning can result in unrealistic deadlines or budgets, or poorly defined project goals and objectives.

Once IS development is underway, project management invariably involves managing and controlling resources in the pursuit of project objectives. Time and cost targets may be adjusted to reflect changes in both the project and the organisational context in which it is taking place (Clegg et al., 1997). Monitoring and control, providing feedback to the project team (e.g. through regular project review meetings), providing them with adequate information and the opportunity to make suggestions relevant to the project (e.g. on project goals and objectives, status, any changes, user needs), coordination of multidisciplinary project teams, and coordination and collaboration with organisational units or groups affected by the IS, are all perceived to be important factors influencing IS success (Barki et al., 2001; Butler & Fitzgerald, 1999b; Jiang et al., 1996; Jonasson, 2002; Kim & Peterson, 2003; Pan et al., 2004; Peterson et al., 2002; Phan et al., 1995; Schmidt et al., 2001; Wang et al., 2006). In a longitudinal case study, Butler & Fitzgerald (1999b; 2001) found developers and users representatives felt that regular project meetings enabled project members to keep abreast of each other's activities and of external issues and that they were good for morale. User representatives felt that the project meetings also enabled them to feel part of the team.

Use of a formal project management method, project management techniques or quality control standards are believed to facilitate the project management process (Barki et al., 2001; Johnson et al., 2001; Kautz et al., 2004; Phan et al., 1995). Based on a survey of IS project managers, Gowan & Mathieu (2005) found that, in enterprise-wide IS upgrade projects, projects are more likely to be completed by their target completion date when a formal project management method is used. They also found that there was a greater need for project management interventions in larger or more technically complex projects. In discussing the high-profile failure of the UK London Ambulance Service Computer Aided Despatch project, Beynon-Davies (1995) describes how the project team failed to use the prescribed project management method. However, Clegg et al. (1997) caution that project management methods and techniques are often criticised for their techno-centric and bureaucratic effects and their neglect of human and organisational issues.

A number of studies have suggested the importance of having an experienced and competent project manager or leader with technical, management and interpersonal skills (Coughlan et al., 2003; Jiang et al., 1996; Jiang, Klein et al., 2002; Jiang, Klein & Margulis, 1998; Johnson et al., 2001; Kappelman et al., 2006; Keil et al., 2002; Kim & Peterson, 2003; Peterson et al., 2002; Phan et al., 1995; Schmidt et al., 2001; Sumner et al., 2006; Verner & Evanco, 2005; Wang et al., 2005; Wastell & Newman, 1996). Project leaders may have an influential role in shaping working condition through their decision making and their ability to motivate and empower the project team (Jiang, Klein et al., 2000; Linberg, 1999; Sumner et al., 2006; Verner & Evanco, 2005; Wang et al., 2005). However, it has also been suggested that the project manager or leader needs to be able to balance his or her controlling activities with recognition of the autonomous self-control of the project team (Kim & Peterson, 2003; Vidgen et al., 2004). Various authors emphasise the role of the project manager in mediating between the various groups involved in the IS project. This might include communicating and translating business and technical requirements between different disciplines (Coughlan et al., 2003; Johnson et al., 2001; Standish Group International, 2001), building consensus and commitment among groups with an interest in the IS (Jiang, Klein et al., 2000; Pan et al., 2004), or acting as a buffer between the project team and external influences (Linberg, 1999). Verner & Evanco (2005) found that changing the project manager during an IS project was significantly negatively correlated with project success.

### **A1.5.3 Use of a standard method**

A standard method of IS development is a formal or documented set of procedures for directing or guiding IS development, whether commercially or publicly available, or developed internally by an organisation. The focus of a standard method in IS is not just on software development, but on the analysis, design and implementation of the whole IS (Wynekoop & Russo, 1995).<sup>1</sup> Each standard method embodies a

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<sup>1</sup> This use of 'method' to refer to the codified systematic conduct of IS development is primarily European. North American usage tends to refer to a method as a 'methodology' (Iivari et al., 2000/2001; Robey et al., 2001).

set of guiding principles and is based upon a particular philosophy, paradigm or approach to IS development. Usually, each method is supported by a set of preferred development techniques and tools (Fitzgerald et al., 2002; livari et al., 2000/2001; livari & Maansaari, 1998; Robey et al., 2001; Wynekoop & Russo, 1995, 1997).

According to much (although not all) of the IS literature, use of an appropriate standard method of IS development can improve both the development process and its outcomes, particularly in large or complex IS projects (Butler & Fitzgerald, 1999b; Chatzoglou, 1997; Fitzgerald, 1998c; Kim & Peterson, 2003; Peterson et al., 2002). A standard method is considered to facilitate the development process by supplying an element of control (perceived or actual) over aspects such as the sequence of development activities, project management, cost allocation, project team composition and user participation (Lyytinen & Hirschheim, 1987). Conversely, lack of or inappropriate use of a standard method has been considered to increase the risk of IS project failure (Pan et al., 2004; Schmidt et al., 2001; Wynekoop & Russo, 1995). Robey et al. (2001) suggest that the effects of standard method use on communication, interaction and conflict among participants in IS development may also influence the outcome of an IS project, for example by assigning roles and responsibilities, and indicating how such roles are to interact.

A number of empirical studies, however, have failed to find a significant association between the use of standard methods and IS project success (Barry & Lang, 2003; Fitzgerald, 1998a; Martin & Chan, 1996; Sawyer & Guinan, 1998). Certainly, relative to other factors influencing IS development, use of a standard method has not usually been regarded as a primary mechanism for improving IS project outcomes, and may not be enough in itself to ensure success of an IS project (Barry & Lang, 2003; Warne & Hart, 1996). Kiely & Fitzgerald (2003) suggest, for instance, that standard methods can be of help if used properly by experienced developers, but are still unlikely to solve all IS development problems. In a survey of UK IS professionals examining the economic impact of using methods on IS development, Chatzoglou (1997) found that using any method was generally better than using no method at all.

Since the late 1990s, various researchers and practitioners have, therefore, questioned the relevance of traditional standard methods and their underlying concepts, particularly in light of the more dynamic IS development environment characterised by short-term business needs, rapid application development, Internet and multimedia applications, and different IS acquisition options (Avison & Fitzgerald, 2003; Baskerville et al., 2003; Fitzgerald, 1996, 1998b, 2000; Fitzgerald et al., 2002; Fitzgerald et al., 1999; livari et al., 2000/2001; Kautz et al., 2004; Kiely & Fitzgerald, 2003; Nandhakumar & Avison, 1999; Sawyer, 2001b; Wynekoop & Russo, 1997). It seems that some organisations are now trying new methods, or even rejecting the use of methods altogether. Other organisations are employing alternatives to traditional in-house IS development, such as incremental development or continuous redevelopment of IS, component-based development, agile software development, contingent use of individual tools and techniques, packaged software acquisition or outsourced IS development (Aoyama, 1998; Avison & Fitzgerald, 1999, 2003; Avison et al., 1992; Baskerville et al., 2003; Baskerville & Pries-Heje, 2004; Madsen & Kautz, 2002; Sawyer, 2001b; Sparling, 2000; Truex et al., 1999; Williams & Cockburn, 2003).

Empirical studies of standard method use since 1995 suggest that in general more organisations use a standard method than not, although reported use has no apparent pattern over time or by different national contexts (Table A1.2)<sup>2</sup>. In relation to New Zealand, a preliminary investigation of software development practices involving 26 organisations of variable size found that only 15% reported not using a standard method (Taylor, 2000). Some 27% of the organisations used a formal standard method. These tended to be larger organisations, which is consistent with Urban & Whiddett (1996) who found that, in New Zealand, structured methods are more likely to be used by large organisations. The majority of organisations in Taylor's (2000) study (58%) had an ad hoc approach to development, using an informal framework to guide development or adapting a standard method.

The use of standard methods by organisations needs some qualification. First, organisations who claim to use a standard method often use more than one method (Barry & Lang, 2003; Eva & Guilford, 1996; livari & Maansaari, 1998; Rahim et al., 1998; Russo et al., 1996; Schambach & Walstrom, 2002-2003). Second, even though an organisation claims to use standard methods, it cannot be assumed that a method will be used in all their IS projects (Wynekoop & Russo, 1995). For example, in their study of 92 US

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<sup>2</sup> According to livari & Maansaari (1998), the lower level of method users reported by Fitzgerald (1998a) may in part be accounted for by the proportion of organisations in his sample that used packaged applications or outsourced their development.

organisations, Russo et al. (1996) found that, while 80% of organisations reported using a standard method, close to half of those organisations (46%) reported that at least some of their IS development was performed without using a standard method. Third, it has been suggested that organisations that are not using a standard method are not doing so out of ignorance, as they are usually knowledgeable about standard methods (Fitzgerald, 1997, 1998a, 1998b, 2000; Fitzgerald et al., 2002). Hidding (1997) notes that practitioners may sometimes claim to not be using a standard method, even though they actually are, because “they had internalised the methodology ... to the point that it had become subconscious” (p.105). Finally, variation in the interpretation of terms such as ‘approach’, ‘method’, ‘technique’ and ‘tool’ may lead to inconsistent reporting of the use of standard methods in IS development research (Iivari & Maansaari, 1998; Lang & Fitzgerald, 2006).

Table A1.2: Reported use of standard methods

Study	Country	% organisations using a method	% method users using commercial or published method	% method users using in-house method		% method users using method as specified
				Total	Based on a commercial method	
Fitzgerald et al. (1999)	UK	57	11	89	30	
Eva & Guilford (1996)	UK	76				17
Hardy et al (1995)	UK	82	54	46		12
Wastell & Swards (1995)	UK	65	58	42		
Kiely & Fitzgerald (2002)	Ireland	62	32	66		19
Barry & Lang (2001; 2003)	Ireland	75	24	76		
Fitzgerald (1998a)	Ireland	40	35	64	29	42
Russo et al.(1996)	US	80	21	79	37	6
Iivari & Maansaari (1998)	Finland	73	47	47	44	
Rahim et al. (1998)	Brunei	67		58		
Taylor (2000)	NZ	85				

There are range of reasons why a particular standard method might be used in a given IS project. Hornby et al. (1992) found that the methods used by developers are heavily influenced by choices made by their organisation (although the developers have more control over how they used the methods). The decision may be taken by one or more of the groups with an interest in the project (e.g. top management, the IS function, users, or an external development company or consulting firm) (Chatzoglou & Macaulay, 1996; Madsen & Kautz, 2002). Although selection and adoption of standard methods is often regarded as a technical concern for the IS function, Sauer & Lau (1997) argue that other groups, such as users, can legitimately try to influence such decisions. Use of a (particular) standard method may be historical practice within an organisation or a policy requirement (Chatzoglou, 1997; Chatzoglou & Macaulay, 1996). Within a given organisation, method selection and use may depend on the specific project and its context (Butler & Fitzgerald, 1999b; Chatzoglou, 1997; Chatzoglou & Macaulay, 1996; Fitzgerald et al., 2002; Kautz et al., 2004; Russo et al., 1996; Wynekoop & Russo, 1995). Trying a new development method during an important project or choosing the wrong method is perceived to be an important risk threatening successful completion of IS projects (Pan et al., 2004; Schmidt et al., 2001). This may arise in part because developers feel more comfortable with using their existing method and may become demotivated if a new method is used (Linberg, 1999).

Standard methods may be commercially available, published in academic or practice literature, or developed within an organisation (Wynekoop & Russo, 1995). Some in-house methods can be based on a commercial or published method. Prior studies suggest that a reasonable proportion of organisations are not using commercial methods, choosing instead to develop their standard methods in-house (Table A1.2). Wastell & Swards (1995) found that organisations that used in-house methods reported higher levels of

measurable benefits to the organisation than those who used either structured methods or ad hoc approaches. In-house methods are often perceived to be inexpensive, and, because they are based on prior experiences, to be more amenable to being changed, to promote a greater sense of ownership, to reflect the organisational structure and culture, and to suit the needs of developers and the organisation. By contrast, commercial methods are often perceived to be too expensive, too inflexible, failing to fit or reflect specific organisational contexts (Fitzgerald et al., 1999; Kiely & Fitzgerald, 2002, 2003). It has also been argued that traditional commercial methods may be unsuitable for the development of modern applications such as multi-media and Web-based applications (Avison & Fitzgerald, 2003; Barry & Lang, 2003; Kiely & Fitzgerald, 2003; Taylor et al., 2002).

The level of detail provided by a standard method can vary from broad guidelines to detailed specifications of the steps to be carried out in a prescribed order. It has been argued that, because of the uniqueness of each IS project, detailed prescriptive methods are impractical and that instead methods should provide guidance to inform or support developers' judgement and decisions (Fitzgerald, 2000; Fitzgerald et al., 2002; Vidgen et al., 2004). Standard methods comprising broad guidelines are often favoured by more experienced developers, while methods comprising detailed specifications can be perceived as being useful by inexperienced developers who then rely heavily on them and follow them strictly (Fitzgerald, 1997, 1998b, 1998c; Fitzgerald et al., 2002).

Prior empirical studies addressing the adherence to standard methods in practice reveal that they are only being used as specified within the method in a limited number of organisations (Table A1.2). Instead, standard methods are often not rigorously followed or are adapted to fit the specific characteristics of an organisation or project (e.g. the complexity of the project, or the time, human resources or money available) on a systematic or ad hoc basis, or to suit client preferences (Barry & Lang, 2003; Coughlan et al., 2003; Fitzgerald, 2000; Groves et al., 2000; Kiely & Fitzgerald, 2003; Taylor, 2000; Wynekoop & Russo, 1997). Adaptation may include removal of parts of a method, addition of supplementary techniques, or a differing interpretation of a method (Butler & Fitzgerald, 1999b; Fitzgerald, 1996, 1997; Fitzgerald et al., 2002; Hardy et al., 1995; livari et al., 2000/2001; Kautz et al., 2004; Kiely & Fitzgerald, 2003; Nandhakumar & Avison, 1999; Wynekoop & Russo, 1995, 1997). Some empirical studies have shown that strict adherence to a method does not match how developers work in practice and may even be counter-productive (Wastell, 1996). Indeed, some standard methods may be too structured to be practical on a daily basis (Nandhakumar & Avison, 1999). Method adaptations may reflect the observation that since each IS project is unique, no single standard method is universally applicable (Fitzgerald, 1996; Fitzgerald et al., 2002; Kautz et al., 2004; Kiely & Fitzgerald, 2003; Russo et al., 1996; Truex et al., 2000).

Varying levels of adherence notwithstanding, a number of empirical studies have highlighted that standard methods are largely perceived to be beneficial, particularly (and not unexpectedly) by people who use them (e.g. Chatzoglou, 1997; Fitzgerald, 1997; livari & Maansaari, 1998; Kiely & Fitzgerald, 2003; Nandhakumar & Avison, 1999; Roberts et al., 2000; Schambach & Walstrom, 2002-2003; Westrup, 1993). Hardy et al (1995) surveyed IS professionals in UK-based companies and found that they agreed most that standard methods lead to specifications that match requirements and thus IS that meet users' requirements and with fewer errors in design. Respondents also felt, however, that standard methods were often complicated and time-consuming to use and provided poor coverage of the IS development lifecycle. Similar findings were obtained by Rahim et al. (1998), who surveyed IS managers in public and private sector organisations in Brunei Darussalam. The most widely perceived benefits were improved productivity, better communication with users, increased user participation and fulfilled user requirements. Problems perceived with standard method use included the time taken to learn them, increased project duration and incomplete coverage of the IS development lifecycle. Johnson and Hardgrave (1999) surveyed developers from various countries (mainly the US) about current practices with object-oriented methods. They found that the developers agreed most strongly that the methods made the IS more understandable, were useful and increased their productivity, and were easy to learn and use. There was also agreement that the methods were effective in capturing requirements, led to improved user-developer communication and helped reduce the development time.

In a survey of Irish organisations, Fitzgerald (1998a) found that IS managers believed that standard methods facilitated project control and visibility of the IS development process. However, they also felt that

methods were cumbersome, led to inertia in the development process, and could interfere with actual development work. In a later survey of Irish project managers, Kiely & Fitzgerald (2002) found that just under half (46%) felt that their IS project could not have been completed without using a method, compared to 38% who felt that their IS project could have been completed without using a method. The majority (90%) of respondents who used a standard method felt that its use provided significant benefits to the IS development process, including as a project management and quality control aide. In terms of perceived disadvantages, many respondents felt that methods prolonged the development process. In their subsequently reported survey of traditional IS development in Irish companies, Barry and Lang (2003) found that the most common reasons for developers not using standard methods were that they were too cumbersome, too costly, were difficult to understand and use, required extensive training, and were not suited to the 'real world' of IS development

Any benefits to be derived from using standard methods may depend on the context in which they are used (Fitzgerald, 1998b). In some situations, such as small organisations or small projects with a small development team, methods may hinder rather than help development (Kiely & Fitzgerald, 2002, 2003). Further, different groups may have different perceptions of the relative value of using a standard method. In a Delphi study of IS project managers and users, Keil et al. (2002) found that users perceived that lack of an effective development process or method was the most important risk to an IS project, whereas it was not perceived to be a risk by project managers, who were apparently confident in their chosen method.

A comprehensive list of the various benefits of using standard methods of IS development that have been identified in the IS literature are summarised in Table A1.3.

Table A1.3: Potential benefits of standard methods

<p><b>A standard method may ...</b></p> <ul style="list-style-type: none"> <li>• Enable the effective management of IS development costs through standardisation, control, skill specialisation and division of labour (Barry &amp; Lang, 2001; Chatzoglou, 1997; Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002; Kautz et al., 2004).</li> <li>• Ensure that an IS is developed in a timely manner by facilitating project management and control (Barry &amp; Lang, 2001; Chatzoglou, 1997; Fitzgerald, 1998a; Hardy et al., 1995; Johnson &amp; Hardgrave, 1999; Kautz et al., 2004; Kiely &amp; Fitzgerald, 2003).</li> <li>• Lead to the delivery of a high quality IS with fewer design errors, which is easier to maintain and is adaptable to future needs (Butler &amp; Fitzgerald, 1999b; Fitzgerald, 1998a; Hardy et al., 1995; Nandhakumar &amp; Avison, 1999; Rahim et al., 1998; Roberts et al., 2000).</li> <li>• Help to ensure that user requirements are captured and well-defined (Chatzoglou, 1997; Hardy et al., 1995; Johnson &amp; Hardgrave, 1999; Kautz et al., 2004; Roberts et al., 2000).</li> <li>• Help to ensure that an IS meets user requirements (Chatzoglou, 1997; Fitzgerald, 1998a; Hardy et al., 1995; Rahim et al., 1998).</li> <li>• Facilitate project management and control by incorporating various control strategies, increasing the visibility of development progress, structuring the use of techniques and resources, and reducing risk and uncertainty (Butler &amp; Fitzgerald, 1999b; Fitzgerald, 1996, 1998a, 1998b; Fitzgerald et al., 2002; Kiely &amp; Fitzgerald, 2002, 2003; Rahim et al., 1998; Roberts et al., 2000).</li> <li>• Improve productivity of the project team by increasing the efficiency and effectiveness of IS development (Butler &amp; Fitzgerald, 1999b; Hardy et al., 1995; Johnson &amp; Hardgrave, 1999; Nandhakumar &amp; Avison, 1999; Rahim et al., 1998; Roberts et al., 2000).</li> <li>• Facilitate movement of developers between projects by standardising the development process and structuring development knowledge (Fitzgerald, 1996, 1998a, 1998b; Fitzgerald et al., 2002).</li> <li>• Facilitate effective communication among developers (Fitzgerald, 1998a, 1998b; Fitzgerald et al., 2002; Rahim et al., 1998).</li> <li>• Facilitate effective communication between IS personnel and other IS stakeholders (particularly users) (Butler &amp; Fitzgerald, 1999b; Fitzgerald, 1996; Fitzgerald et al., 2002; Johnson &amp; Hardgrave, 1999; Rahim et al., 1998; Roberts et al., 2000).</li> <li>• Facilitate user participation in the development process (Hardy et al., 1995; Rahim et al., 1998; Roberts et al., 2000).</li> <li>• Help to maintain quality and ensure consistency in IS development practices (Kiely &amp; Fitzgerald, 2002, 2003).</li> <li>• Ensure that documentation is produced (Butler &amp; Fitzgerald, 1999b; Fitzgerald, 1998a; Rahim et al., 1998).</li> </ul>
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Table A1.4 lists the various limitations of using standard methods of IS development that have been identified in the IS literature.

Table A1.4: Potential limitations of standard methods

<p><b>A standard method may ...</b></p> <ul style="list-style-type: none"> <li>• Constrain developer creativity or flexibility, particularly where adherence to procedures becomes an end in itself (Avison &amp; Fitzgerald, 2003; Butler &amp; Fitzgerald, 1999b; Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002; Kiely &amp; Fitzgerald, 2002, 2003; Nandhakumar &amp; Avison, 1999; Roberts et al., 2000; Wastell, 1996)</li> <li>• Constrain effective user participation in the development process, e.g. by utilising technical detail unfamiliar to users (Wastell, 1996)</li> <li>• Not cover the entire development process (Hardy et al., 1995; Rahim et al., 1998)</li> <li>• Not match how IS are developed in practice. Actual development is not linear and is more complicated than suggested by the method (Barry &amp; Lang, 2003; Clegg et al., 1997; Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002; Nandhakumar &amp; Avison, 1999; Roberts et al., 2000).</li> <li>• Not adequately recognise variations in developers' knowledge, skills and experience, which change over time and vary significantly between individuals (Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002).</li> <li>• Emphasise technical aspects of IS development at the expense of social, political or organisational aspects, or treat them indirectly as user participation (Avison &amp; Fitzgerald, 2003; Clegg et al., 1997; Doherty &amp; King, 1998; Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002; Galliers &amp; Swan, 2000; Hornby et al., 1992; Kiely &amp; Fitzgerald, 2003; Nandhakumar &amp; Avison, 1999).</li> <li>• Be difficult to adapt to a specific situation, assuming that many IS development situations are similar (Avison &amp; Fitzgerald, 2003; Barry &amp; Lang, 2003; Fitzgerald, 1996, 1998a; Fitzgerald et al., 2002; Hidding, 1997; Kiely &amp; Fitzgerald, 2003).</li> <li>• Be complicated, difficult or time-consuming to learn or use (Avison &amp; Fitzgerald, 2003; Barry &amp; Lang, 2001, 2003; Fitzgerald, 1996, 1997, 1998a; Fitzgerald et al., 2002; Hardy et al., 1995; Hidding, 1997; Kiely &amp; Fitzgerald, 2002, 2003; Nandhakumar &amp; Avison, 1999; Rahim et al., 1998; Roberts et al., 2000; Wastell, 1996).</li> </ul>
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#### A1.5.4 User participation

The term 'user participation' (as distinct from user involvement, Barki & Hartwick, 1994) is commonly used to describe the activities performed by users or their representatives in IS development. The participation of users in IS development has been an important focus of interest within the IS literature since the early 1980s (Ives & Olson, 1984), when a perceived 'user relations problem' (Friedman & Cornford, 1989) led to calls to better articulate user requirements or improve user influence, concerns with democratising IS development, and attempts to align the social and technical aspects of development (Knights & Murray, 1994).

Extensive support for user participation in IS development can be found in both the IS academic and practice literature (e.g. Johnson et al., 2001; Reel, 1999). Indeed, it has become institutionalised in IS development practice through education and training, standard reference texts (e.g. Avgerou & Cornford, 1998; Hoffer et al., 1999; Noyes & Baber, 1999), standard methods of IS development such as ETHICS (Mumford, 1997, 2000), Multiview (Avison et al., 1998), joint application design (Davidson, 1999), prototyping (Baskerville & Stage, 1996; Beynon-Davies et al., 1999), or information engineering (Beath & Orlikowski, 1994), and standards or best practice prescriptions such as ISO Standard 13407 (ISO, 1999), IEEE Standard 1233 (IEEE, 1998) and SWEBOK (Bourque et al., 2004). User or business participation is emphasised as an important part of IS development within the New Zealand IS practice literature (Bell, 1998; Newman, 2004; Smith, 2003).

A number of authors have conducted meta-analyses of prior empirical studies examining the relationship between user participation and IS success (Cavaye, 1995; Hwang & Thorn, 1999; Mahmood et al., 2000). Overall, it seems that while in some studies user participation was found to positively influence IS outcomes, many studies were inconclusive regarding this issue. As Cavaye (1995) observes, there have been IS projects without user participation that succeed and other projects with participation that are not successful. She concludes, "it seems that participation is neither sufficient nor necessary to guarantee system success" (p. 311), and suggests that the relationship between user participation and IS success is more complex than the causal relationship normally proposed.

In terms of specific empirical studies, a number have identified a significant positive relationship between user participation and IS success (Coombs et al., 1999; Doherty et al., 2003), user satisfaction or acceptance (Foster & Franz, 1999; Hardgrave et al., 1999; Lin & Shao, 2000; Lu & Wang, 1997; Terry & Standing, 2004), project completion (Wixom & Watson, 2001; Yetton et al., 2000), project performance (Aladwani, 2000; Procaccino et al., 2005), system impact (Lynch & Gregor, 2004) or data quality (Zeffane &

Cheek, 1998). Case study evidence also suggests that active user participation is an important component of successful IS development (Butler, 2003; Kim & Pan, 2006; Sumner, 2000; Wastell & Newman, 1996; Wilson et al., 1997).

Perhaps more importantly, various groups of organisational participants perceive user participation to be important to IS project success, including IS development managers, IS developers, users, and user managers (Butler & Fitzgerald, 1999b; Fitzgerald, 1998a; Johnson et al., 2001; Kim & Peterson, 2003; Lemon et al., 2002; Peterson & Kim, 2003; Standish Group International, 1999, 2001). Similarly, lack of user participation is perceived to be a project risk factor, contributing to IS failure or abandonment (Clegg et al., 1997; Johnson et al., 2001; Keil et al., 1998; Keil et al., 2002; Pan, 2005; Peterson et al., 2002; Schmidt et al., 2001).

The perception that user participation can play an important role in influencing IS project outcomes has meant that it has become an established practice within many organisations, with users playing an increasingly important role in IS development. For example, Howcroft & Wilson (2003) describe an organisation in which user participation became so entrenched in the IS development culture that it was inconceivable that an IS project would be developed without the participation of users. In a survey of Irish project managers Kiely & Fitzgerald (2002) found that users played a substantial part in development in two thirds of IS projects.

There are potentially many reasons why an organisation may choose to have users participate in IS development. The decision may rest with one of the many groups within an interest in the project (such as top management, the IS function, users, an external consultant, or an external development company). An organisation may have an organisational policy on user participation, or it may be established practice within the organisation. User participation may be a requirement of the standard method of IS development being used or it may be appropriate given the characteristics of the project (Wilson et al., 1997).

Not all forms of user participation are equally effective (Lin & Shao, 2000; Ljung & Allwood, 1999; McKeen & Guimaraes, 1997). Ljung & Allwood (1999) argue that the forms adopted for a given IS project should be appropriate for its size and the type of development or acquisition involved. They further suggest that decisions concerning the nature and extent of user participation are usually made by project administrators and may not be directly related to developers' preferences, but to external considerations such as the IS project itself, the structure of the organisation, the wishes of the client, or time and financial constraints. Drawing on a longitudinal study of the organisational practice of user participation, Symon & Clegg (2005) argue that what was considered as an appropriate participation strategy varied over time and according to political interests.

A number of authors have suggested that 'user participation' is not a homogeneous construct (e.g. Hartwick & Barki, 2001; Iivari, 2004b; Ljung & Allwood, 1999; Palanisamy, 2001). For example, Cavaye (1995) identifies various dimensions of user participation relating to the proportion of users who participate, the formality of users' participation, their level of responsibility during development, the effect or influence of participation on the development effort, and the level of participation during different phases or aspects of development.

Individuals may participate in an IS project directly, or indirectly through user representatives (Butler & Fitzgerald, 2001). For logistical reasons, IS projects usually involve user representatives rather than all intended users of the IS (Cavaye, 1995). In a survey of Swedish computer consultants, Ljung & Allwood (1999) found that half of the respondents did not consult the entire user population. Some respondents felt that the complete user population was too large to participate, given the financial or time constraints present in many IS projects. Other respondents felt that smaller groups were important for ensuring that users were heard. Users outside the group of user representatives may need to feel involved and that their interests are being adequately conveyed by their representatives (Butler & Fitzgerald, 1997).

The conventional wisdom is that user groups from all organisational levels and functions, and reflecting all levels of expertise, need to be considered for participation in order for that participation to be representative and to capture the breadth and depth of expertise in an organisation (Damodaran, 1996; Pan et al., 2004; Wilson et al., 1997). Individuals can come to participate in IS development because they are selected by their managers, IS professionals, external consultants or other change agents; their peers elect them as their representatives; their position in the organisational hierarchy; or they volunteer. Often participant

selection is informal, and may be based more on perceived rank or status than on domain knowledge (Butler & Fitzgerald, 2001; Coughlan et al., 2003; Hartwick & Barki, 2001; Wilson et al., 1997).

However, several problems have been identified within the IS literature concerning which users actually participate in an IS project. For example, the increasing numbers and types of affected or intended users in the changing IS development context can increase the difficulty of securing appropriate participation (Markus & Mao, 2004). It may be difficult to identify or access specific users of an IS, particularly in the development of packaged software (Iivari, 2004b; Kujala, 2003; Ljung & Allwood, 1999) and Web-based IS (Kautz et al., 2007). The people chosen to represent the users may not have the same job descriptions or work tasks as the staff they are meant to represent, particularly if they are not chosen by the users themselves. The same representatives may be involved in several projects within the organisation, because of their interests or prior experience, so that the IS function loses direct contact with the wider user community (Ljung & Allwood, 1999). Several authors have discussed the possibility of user representatives 'going native', developing a strong loyalty to the project team, adopting the perspective of IS developers, and failing to adequately advocate the needs of the users they are meant to represent (Butler & Fitzgerald, 1999a; Damodaran, 1996; Myers & Young, 1997).

A number of authors have emphasised the importance to IS success of active participation of wider groups with an interest in the IS (including groups external to the organisation), particularly in modern IS development contexts (Chang, 2006; Jiang, Chen et al., 2002; Liebowitz, 1999; Markus & Mao, 2004; Newman & Sabherwal, 1996; Pan, 2005; Pan & Flynn, 2003; Ravichandran & Rai, 2000; Roberts et al., 2000; Sabherwal & Robey, 1995). In this way, the interests and objectives of each group may be represented or articulated, mutual understanding may be facilitated, any issues or concerns that arise may be addressed, and commitment (particularly from senior management) may be maintained for the duration of the project (Jiang, Chen et al., 2002; Newman & Sabherwal, 1996; Pan, 2005; Ravichandran & Rai, 2000). Participation of groups external to the organisation (e.g. vendors or external consultants) may provide access to knowledge (e.g. about emergent technologies) that may not be available within the organisation (Ravichandran & Rai, 2000). Failing to include all interested groups, including non-represented user groups, in IS development can result in an IS that does not address their needs, or can lead to their lack of commitment or active resistance to the IS (Pan, 2005; Pan et al., 2004). For example, Pan (2005) describes the development of an electronic procurement system in which the procurement manager ignored the concerns of the organisation's suppliers who felt their business interests were threatened by the new system. The perceived threat of the new system united the suppliers in influencing the organisation to abandon the new system.

User participation activities may be performed individually or as part of a group. Participation may involve formal groups or teams (e.g. steering committees, reference groups), individuals in a formal advisory capacity (as official liaison between the project team and the application domain), official meetings or seminars, or informal relations, discussions and tasks (Butler & Fitzgerald, 2001; Damodaran, 1996; Heinbokel et al., 1996; Ljung & Allwood, 1999). User input may be sought through seminars, workshops or meetings, questionnaires, interviews, observation, email or bulletin board (Butler & Fitzgerald, 2001; Gallivan & Keil, 2003; Ljung & Allwood, 1999; Palanisamy, 2001). Some participation activities are believed to produce better IS outcomes than others, e.g. using non-technical approaches in requirements determination or observing users at work (Markus & Mao, 2004).

Users or their representatives may have various levels of responsibility in IS development (Barki et al., 2001; McKen & Guimaraes, 1997). They may participate in an advisory role (as a group or individually), as part of the project team, be given sign-off responsibilities at various stages, or be given full responsibility for development (Butler & Fitzgerald, 2001; Heinbokel et al., 1996; Ljung & Allwood, 1999; McKen & Guimaraes, 1997; Palanisamy, 2001). Empirical studies have shown that organisations where users and IS staff are held jointly accountable appeared to have higher perceived project success rates than the average (Wastell & Swards, 1995).

The influence that users can have on how the IS project is managed and on the final design of the IS product varies, ranging from no influence (where users are not asked, are unwilling to participate or have no impact) to strong influence (where the user department pays for and/or controls the development) (Damodaran, 1996; Hartwick & Barki, 2001; Hunton & Beeler, 1997; Palanisamy, 2001). In between these extremes, their influence often depends on the role they play in development (e.g. project leadership, as part

of the team, given sign-off responsibility, or in an advisory role only), how well they are represented (e.g. few or unrepresentative users participate), when and how frequently they interact with the project team, and the amount of consideration given to their contribution by the project team (e.g. whether their contribution is considered, taken seriously, ignored, misunderstood, or not even solicited) (Butler & Fitzgerald, 2001; Gallivan & Keil, 2003; Hartwick & Barki, 2001; livari, 2004a, 2004b; Ljung & Allwood, 1999; Lynch & Gregor, 2004; Palanisamy, 2001; Saleem, 1996).

At what stages in the IS development process user participation occurs can also impact on project outcomes (Lin & Shao, 2000; McKeen & Guimaraes, 1997; Saleem, 1996). Empirical studies have shown that user participation in the early stages of development can have greater impact on user acceptance of an IS than participation at later stages (Foster & Franz, 1999; Kujala, 2003; Pan, 2005). Participation throughout the entire development process may similarly increase the likelihood of user acceptance (Butler & Fitzgerald, 1999b, 2001). User participation is most likely to occur in early stages of (traditional) development, such as problem definition and requirements determination, and in latter stages of development, such as testing and installation. Users do not usually participate in physical design and coding (Butler & Fitzgerald, 2001; Foster & Franz, 1999; Heinbokel et al., 1996; McKeen & Guimaraes, 1997; Wastell & Swards, 1995). In the modern IS development context, however, users may participate in a wider variety of technical and non-technical activities than may have been previously the case (e.g. business process redesign, IT infrastructure development, project management or change management) (Markus & Mao, 2004).

The benefits of user participation are well rehearsed in the IS literature. In an early and influential paper, Ives & Olson (1984) argued that user participation can improve system quality by providing more accurate and complete user requirements, providing knowledge of the business context, avoiding unacceptable or unnecessary system features, and improving user understanding of the IS. Further, user participation may lead to greater user acceptance by creating realistic user expectations of the IS, providing a forum for conflict resolution about design issues, fostering feelings of ownership and commitment, and decreasing resistance to change. Subsequent studies have reinforced these potential benefits (Table A1.5).

Table A1.5: Potential benefits of user participation

<ul style="list-style-type: none"> <li>• Improve quality of the IS developed (Butler &amp; Fitzgerald, 2001; Kim &amp; Peterson, 2003; Lin &amp; Shao, 2000; Roberts et al., 2000)</li> <li>• Avoid unacceptable or unnecessary system features from being developed (Kujala, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000).</li> <li>• Provide a more accurate and complete assessment of user requirements (Butler &amp; Fitzgerald, 1999a; Foster &amp; Franz, 1999; Kim &amp; Peterson, 2003; Kujala, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000; Wixom &amp; Watson, 2001).</li> <li>• Provide developers with knowledge of the IS context, particularly in relation to the organisation and functional unit it is to support (Butler &amp; Fitzgerald, 1999b; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000; Yetton et al., 2000).</li> <li>• Improve user understanding of the IS and its features (Kim &amp; Peterson, 2003; Kujala, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Wixom &amp; Watson, 2001).</li> <li>• Increase user acceptance of the IS (Butler &amp; Fitzgerald, 1999b, 2001; Foster &amp; Franz, 1999; Kim &amp; Peterson, 2003; Kujala, 2003; Lin &amp; Shao, 2000; Roberts et al., 2000; Saleem, 1996; Wixom &amp; Watson, 2001).</li> <li>• Lead to user satisfaction with the IS (Butler &amp; Fitzgerald, 1999a; Kujala, 2003; Lin &amp; Shao, 2000; Lu &amp; Wang, 1997; Lynch &amp; Gregor, 2004; McKeen &amp; Guimaraes, 1997; Yoon et al., 1995).</li> <li>• Help to create more realistic user expectations about IS capabilities (Butler, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000).</li> <li>• Provide a forum for bargaining and conflict resolution (Amoako-Gyampah &amp; White, 1997; Butler, 2003; Butler &amp; Fitzgerald, 1999b; Foster &amp; Franz, 1999; Jiang, Chen et al., 2002; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000).</li> <li>• Facilitate communication between participants, particularly users and developers (Amoako-Gyampah &amp; White, 1997; Hartwick &amp; Barki, 2001).</li> <li>• Foster feelings of ownership of the IS by users (Butler, 2003; Butler &amp; Fitzgerald, 1999b; Lin &amp; Shao, 2000; Lynch &amp; Gregor, 2004; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000; Saleem, 1996; Yoon &amp; Guimaraes, 1995).</li> <li>• Foster user commitment to the IS (Butler, 2003; Kim &amp; Peterson, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000).</li> <li>• Decrease user resistance to change (Amoako-Gyampah &amp; White, 1997; Butler, 2003; Lin &amp; Shao, 2000; McKeen &amp; Guimaraes, 1997; Roberts et al., 2000).</li> <li>• Ensure the developed IS meets user needs (Butler, 2003; Kim &amp; Peterson, 2003; Lynch &amp; Gregor, 2004; Pan et al., 2004; Yetton et al., 2000).</li> </ul>
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It is generally accepted that, in order to realise the potential benefits of user participation, users need to perceive that their participation (or that of their representatives) is meaningful (Butler & Fitzgerald, 2001; Hunton & Beeler, 1997; Lynch & Gregor, 2004; Saleem, 1996).

User participation is not without its perceived limitations (Table A1.6). For example, user participation can increase the complexity of the IS development process, particularly where it is intensive, or may be difficult to implement or manage in practice. The greater the number of users or user groups involved, the longer it may take to reach agreement and the greater the amount of resources required. Even with user participation, user resistance may still occur (Butler & Fitzgerald, 2001). It has been suggested that ignoring users' suggestions may have worse consequences than not involving users in the first place (McKeen & Guimaraes, 1997). However, drawing on a survey of project managers and users involved in IS projects in large US organisations, McKeen and Guimaraes (1997) found no evidence of dysfunctional effects of user participation, even in IS projects where user participation was relatively unnecessary.

Howcroft & Wilson (2003) caution that many of the purported benefits of user participation may accrue to management (who often define the boundaries of user participation, at least initially) rather than to users of an IS. Furthermore, user participation may not just be about attaining practical benefits. It may be used in a symbolic or political role. For example, it may be used by management to gain legitimacy for an IS (Myers & Young, 1997), or as a means of silencing users in that they are less able to reject an IS which they have helped to develop (Iivari, 2004b).

Table A1.6: Potential limitations of user participation

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| <ul style="list-style-type: none"> <li>• Increase project duration, particularly where there are large numbers of users or multiple user groups with differing interests (Iivari, 2004b; Kujala, 2003; Ljung &amp; Allwood, 1999).</li> <li>• Increase project cost, particularly where there are large numbers of users or better informed users needing more support (Iivari, 2004b; Kujala, 2003; Ljung &amp; Allwood, 1999).</li> <li>• Be difficult to manage or implement, particularly where there are time constraints, large numbers of users, competing user groups, or where users are unable or unwilling to participate (Butler &amp; Fitzgerald, 1999b; Heinbokel et al., 1996; Kujala, 2003; Ljung &amp; Allwood, 1999).</li> <li>• Create or reinforce user resistance to implementation of the IS, particularly where users perceive that their suggestions have been ignored (Butler &amp; Fitzgerald, 2001; McKeen &amp; Guimaraes, 1997).</li> <li>• Reduce developers' influence in the IS development process, as users exert greater influence (Heinbokel et al., 1996).</li> </ul> |
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### A1.5.5 User training

User training and education has been identified in the IS literature as a factor that may influence the outcome of an IS project. A number of studies have found that user training can be important for IS success (Coombs et al., 1999; Riley & Smith, 1997; Skok & Legge, 2002; Sumner, 2000; Wastell & Newman, 1996; Wastell & Swards, 1995), although it may be time-consuming in some large projects (Mabert et al., 2003). Beynon-Davies (1995) found that inadequate and inconsistent user training contributed to "two days of reported 'chaos'" (p. 178) when the London Ambulance Service Computer Aided Dispatch IS was trialled and the eventual abandonment of the project.

Training seems to affect IS project outcomes through its influence on users' attitudes towards the IS. Through a training programme, users can gain skills and experience in using the IS, potentially increasing their confidence in using the IS, as well as knowledge and understanding of the IS, which may influence their acceptance (or rejection) of the IS (Skok & Legge, 2002). It has been argued that user education and training may be critical to the long term success of an IS, especially when users feel threatened (such as by changed job roles), as incomplete knowledge and understanding of the IS and lack of appreciation of changes can lead to resistance to new IS (Irani et al., 2001; Marion & Marion, 1998). Wilson & Howcroft (2002) argue that training may also be used to try to persuade users of the benefits of a new IS in an effort to enrol them to use it. Although training usually begins after installation has occurred (Jiang et al., 1998a), Mahmood et al. (2000)

suggest that by introducing a training programme earlier in the development process users may contribute more effectively to development.

#### **A1.5.6 Management of change**

The management of changes resulting from IS implementation has long been recognised as important to the outcome of an IS project (Lyytinen & Hirschheim, 1987). In a 2002 survey of New Zealand and Australian CIOs, change management was ranked fifth in the top 10 challenges facing CIOs in New Zealand organisations (Hind, 2002).

The introduction of an IS to an organisation can produce considerable changes and have consequences for many users of the new IS (Butler & Fitzgerald, 1997; Riley & Smith, 1997). Confronted with change, individuals may experience a range of negative emotions such as fear, anger or denial. They may be reluctant to share their knowledge or information, or may provide inaccurate or conflicting information, if they feel that their jobs are threatened. They may resist changing how they work or even resist using the new IS (Butler, 2003; Butler & Fitzgerald, 1999b, 2001; Coughlan et al., 2003; Lin & Shao, 2000; Lu & Wang, 1997; Olesen & Myers, 1999; Pan, 2005; Pan et al., 2004; Skok & Legge, 2002; Wixom & Watson, 2001; Yoon & Guimaraes, 1995). According to van Offenbeek & Koopman (1996), potential resistance increases when the individuals involved have a low potential for change, a low willingness to change, and when the impact on the organisation is high.

For example, when the London Ambulance Service attempted to implement a new Computer Aided Despatch IS, they encountered user resistance. Staff morale was low, friction existed between management and the user groups, and users were hostile towards computerised IS in general. User acceptance and ownership had not been established. Users mistrusted the new IS because of the many problems that they had experienced during its implementation. They preferred the established way of doing things in which they had complete confidence. Many staff had little experience using computerised IS. The public inquiry into the failed project concluded that management had underestimated the difficulties associated with introducing change into the strong and unionised culture of the ambulance service, which comprised a network of autonomous and semi-autonomous groups. In the end, staff were alienated rather than enrolled in the changes. Introducing a new IS into such an environment required consideration of how the IS was going to impact on the relationships within the network. In particular, management saw the new IS as a means of replacing outmoded work practices, and naively assumed that introducing the new IS would automatically change work practices. In fact, users were able to circumvent the new IS and accommodate their established work practices (Beynon-Davies, 1995).

Risk management notwithstanding, some consequences cannot always be anticipated or identified at the start of a project. Increasingly sophisticated, flexible and integrated IS increase the potential for unpredictable or unintended consequences (Doherty et al., 2003; Robey & Boudreau, 1999). Further, individuals may interpret or appropriate the IS in a variety of ways during its development and use (Eason, 2001).

While change management is not necessarily an issue in every project (Martin & Chan, 1996), many recent studies highlight the ongoing importance for IS success of addressing organisational change or the perils of ignoring or inadequately understanding the dynamics of change that occur for both individuals and the organisation (Butler, 2003; Butler & Fitzgerald, 1997, 1999b, 2001; Dhillon, 2004; Irani et al., 2001; Kappelman et al., 2006; Lu & Wang, 1997; Schmidt et al., 2001). IS development can overlook organisational changes, such as changes to structures and processes, work loads, organisational roles, job content or autonomy (Clegg et al., 1997; Doherty et al., 2003). Dhillon (2004) argues that a consideration of power relationships within an organisation during IS design and implementation is essential in order to manage the alignment of these consequential changes.

Several authors suggest that change management issues needs to be addressed and resolved early in the IS development process to avoid problems later on (Butler & Fitzgerald, 1999b; Skok & Legge, 2002). Eason (2001) notes that even when change management practices are well established, they tend to occur after IS design, restricting the possibilities for social or organisational issues to be taken into account. With

respect to enterprise-wide IS, Skok & Legge (2002) recommend that organisations need to act to change the culture within the organisation, possibly starting long before the new IS is implemented. Enterprise-wide IS (such as ERP systems or data warehousing systems) can involve significant changes, such as changing business processes, organisational structure and culture; altering data ownership, use and access; or changing roles, work processes and jobs specifications (Chang, 2006; Doherty & King, 1998; Doherty et al., 2003; Irani et al., 2001; Riley & Smith, 1997; Skok & Legge, 2002; Wixom & Watson, 2001).

As noted earlier, a number of authors suggest that managers within an organisation, particularly top management, can play an important role in facilitating IS-related change by championing the project, creating a suitable context for change, and countering any negative attitudes (Butler & Fitzgerald, 1999b; Kim & Peterson, 2003; Lemon et al., 2002; Riley & Smith, 1997; Wixom & Watson, 2001; Yetton et al., 2000; Yoon & Guimaraes, 1995). However, some managers may be reluctant to challenge what they perceive as powerful user groups (Doolin, 2004; Marion & Marion, 1998; Riley & Smith, 1997; Wilson, 2002). IS professionals may also play an important bridging role in managing change by facilitating communication between different participants in an IS project (Marion & Marion, 1998). Symon (1998, p. 39) emphasises the role of internal IS developers as change agents, “effectively embed[ding] new organizational systems into organizational contexts”.

## **A1.6 Influences on IS Development – Context**

Various authors have argued that aspects of the organisational context and wider social, economic, political, cultural, and historical environments can influence IS project outcomes, often in unpredictable ways (Bussen & Myers, 1997; Constantinides & Barrett, 2006; Gärtner & Wagner, 1996; Iivari, 2004a; Mitev, 2000). Unlike many of the other factors discussed above, these contextual factors often lie outside the direct control of the project team (Bussen & Myers, 1997). IS development occurs across layers of context, ranging from the local organisational context to the national and international environment (Avgerou, 2001; Christiaanse & Huigen, 1997; Krishna & Walsham, 2005; Symon, 1998). Elements of context may shape IS project outcomes through their influence on IS development processes and procedures, such as user participation and standard method use. Social processes such as communication and interaction need to be considered together with the historical and organisational structures within which they are enacted (Butler & Fitzgerald, 2001).

This section discusses influences on IS development related to properties of the context in which it occurs. In relation to IS development, these may include an organisation’s structures, culture and practices, the historical context of IS use within the organisation, and wider socio-economic conditions and regulatory requirements. For ease of presentation, a somewhat arbitrary but convenient distinction is made between internal organisational properties and external environmental conditions.

### **A1.6.1 Organisational properties**

The term ‘organisational properties’ is used here to encompass a range of organisational structures, practices and relations that make IS development possible. These include: institutionalised norms, values and beliefs; the distribution of available organisational resources (time, money and skills); standard rules and operational procedures; established customs and practices; formal and informal organisational structures; control and coordination mechanisms; reward structures; and the division of labour (Knights & Murray, 1994; Orlikowski, 1992).

Particular structural properties and context-specific features can enable or constrain the course of IS development. For example, structures of authority within an organisation will influence the time, money, tools and other resources available for development, such as organisationally-imposed restrictions on IS expenditure (Bussen & Myers, 1997). The organisational structure and culture may discourage or encourage communication and cooperation between functional units (Gallivan & Keil, 2003). According to Butler &

Fitzgerald (2001), the increased size and complexity of mature IS functions in older or larger organisations may decrease their ability to develop IS that are perceived as useful.

Three types of organisational properties that have received particular attention in the IS literature include aspects of organisational culture, those related to organisational policy and established practices, and the history of IS development and use in the organisation.

#### *A1.6.1.1 Organisational culture*

Organisational culture can be viewed as a symbolic system of learned and shared sets of meanings that provide patterns for behaviour within an organisational setting (Iivari, 2004a; Walsham, 1993). In order to achieve a sense of meaning and security, organisational participants buy into (and consequently conceive of themselves in terms of) specialist practices, cultures and workplace identities (Murray & Willmott, 1991). Relevant aspects of organisational culture include systems of ideas and symbols, values and beliefs, collective identity, shared experiences, and common understandings, interpretations and assumptions that shape behaviour or action in relation to IS development and implementation (Avgerou, 2002; Iivari, 2004a; Robey & Azevedo, 1994; Robey & Boudreau, 1999).

The established organisational culture may reflect widely accepted norms and values that shape interactions between users and developers, inter-departmental cooperation, or the intended use of an IS (Nandhakumar & Avison, 1999; Nandhakumar & Jones, 1997; Somers & Nelson, 2001). For example, an organisational culture based on consensus encourages communication and conflict resolution (Coughlan et al., 2003). Umble et al. (2003) highlight how the development of an organisational culture that was receptive to change and continuous improvement facilitated implementation and acceptance of the changes associated with an ERP system. In a contrasting example, Olesen & Myers (1999) describe how the existing culture and norms of an organisation meant that users appropriated a new groupware system in a way that reproduced their existing work practices rather than accepting the work-related changes envisaged by senior management.

In her study of three software development organisations, Iivari (2004b) identified multiple discourses on user participation that constructed user participation in different ways in the organisations. Butler (2003) describes the IS development practices in a large multinational organisation where the social matrix and identity of the organisation (including culture, structure, business processes, communication and learning) were shaped by the dominant group of employees who were engineers. Engineering 'communities of practice' existed within the various business functions and retained a high degree of autonomy in developing their own IS.

In another example of the influence of organisational culture on IS development, Chae & Poole (2005) discuss the development of an enterprise-wide IS in a university context. The new IS was envisaged by the project sponsors and project team as a centralised, integrating IS that could serve as a standard solution across different sized organisations and various levels of users. Centralisation would mean that it would be easier to modify the IS in response to external changes, such as new regulations or laws. However, the IS was developed locally within particular units rather than globally, in an organisational culture that emphasised decentralised decision making and autonomy. As development proceeded, the project team modified their development approach to become more user-oriented in an attempt to satisfy the unique needs of various organisational units. According to Chae & Poole, the result was an 'average' IS that satisfied nobody. Some units customised the new IS using workarounds; other units continued using existing IS or developed their own IS.

In studying the development of an EIS, Nandhakumar & Jones (1997) found that while established hierarchical structures initially restricted opportunities for interaction between developers and executive users, they also provided a medium for some legitimate interaction. In conforming to such established patterns, individuals reproduce the norms and values that underlie them. However, individuals may also be able to modify established patterns of behaviour, or at least find ways of working around those that are relatively resistant to change (e.g. using intermediaries such as secretaries to obtain user requirements) (Nandhakumar & Jones, 1997).

### *A1.6.1.2 Organisational policy and practice*

There is a link between organisational culture and the policies and practices which emerge around IS development. Robey & Newman (1996) suggest that organisations may have an embedded cultural orientation to IS development (or even sub-cultures with different perspectives). They argue that “cultures develop rituals that are repeated, and systems development can be regarded as a ritualistic cultural practice” (p. 59). An organisation’s goals, policies or procedures can enable or constrain individuals’ actions by enforcing organisational rules or norms of what constitutes appropriate or acceptable behaviour (Butler, 2003). Once a particular practice has been utilised on a routine basis, it becomes institutionalised (or taken-for-granted), becoming an integral part of the organisation’s culture (Butler & Fitzgerald, 1997). In this way, organisational policies and established practice related to IS development may define and shape human action in development activities (Butler & Fitzgerald, 2001). Of relevance are policies and practices related to IS procurement, user participation, standard method use, and change management.

Charette (2005) suggests that increasing numbers of organisations are assessing their development practices using approaches such as the Capability Maturity Model (CMM), and its variants, for development, acquisition and for people. Such an approach reflects an organisational culture that first seeks to have defined and repeatable processes before possibly building on these towards continuous improvement and optimisation. The motivation for organisations to adopt such an approach may draw on several factors; e.g. these may be financial (in terms of being in a position to be awarded contracts), or cultural (in terms of embracing the principles of continuous improvement). To date, there are very few empirical studies that have identified process maturity as an influential factor in affecting project outcomes.

Existing organisational policies and practice may constrain the appropriation of IS development innovations, such as new standard methods, techniques or tools. In a case study of IS design, Gasson (1999) found that even though attempts were made to utilise a new approach to IS design (integrating business process investigation with technical IS design), established practice shaped IS development. It did so by constraining the choices of available methods and tools, and influencing the problem-solving approach of the ‘expert’ designer on the project team, who initially tried to impose a structured approach on IS development.

However, organisational policies on and practice in IS development can change over time (Heiskanen et al., 2000; Robey & Newman, 1996). For example, drawing on two IS projects in a large Irish organisation, Butler & Fitzgerald (2001) illustrate how the organisation’s policy on user participation and development-related change influenced how user participation and change management were enacted. The organisation had a participative approach to decision-making and change, which was reflected in their policy and institutionalised practice of user participation. Both projects had high levels of user participation but still experienced change-related problems. As a result of the problems experienced, the organisation implemented a more structured policy on development-related change and negotiated employee commitment to future changes. The organisation’s policies and procedures in relation to IS development continue to evolve, in response to either past experiences or to changes in the IS development context (Butler & Fitzgerald, 1999a).

### *A1.6.1.3 Organisational IS history*

Knights & Murray (1994) discuss various aspects of technology which form local conditions that may influence IS development in an organisation. These include attitudes to and understandings of IS within the organisation; the position occupied by IS specialists within the organisational structure; and the legacy and past experience of IS development and use. For example, a history of IS failures in an organisational context can create cynicism or resistance towards new IS development (Doolin, 2004). On the other hand, success in prior IS projects within an organisation does not necessarily guarantee success in future projects (Goldstein, 2005).

Various authors have suggested that analysing IS failures (and by analogy, IS successes) can potentially play an important role in informing IS development practice (e.g. by supporting established practice or suggesting changes) (Beynon-Davies, 1995; Lyytinen & Robey, 1999; Nelson, 2005; Poulymenakou & Holmes, 1996; Warne & Hart, 1996). However, Lyytinen & Robey (1999) argue that many organisations fail to learn from their previous IS development experiences. By ignoring or reinterpreting relevant information, they have learnt to fail to the point that failure comes to be accepted as normal. If this situation continues, failure

may become institutionalised. In a case study describing the development of an electronic procurement IS at a local government organisation in the UK, Pan et al. (2004) found that failure had become an acceptable norm.

An organisation's failure to learn may arise from limited time available for reflective analysis, a reluctance to allocate additional resources for retrospective analysis of a failed project, a desire to move on, a high turnover of staff with relevant experience and knowledge, and established institutionalised arrangements and patterns of thinking. There may be no incentives to learn from IS failures; in fact, organisations may try to forget their failures or punish those perceived to be responsible for them. Further, organisational structure or competition between business units may inhibit interaction, information sharing and learning between groups involved in an IS project failure (Lyytinen & Robey, 1999; Nelson, 2005). Lyytinen & Robey (1999) discuss three generic 'myths' that inhibit learning from failure. These are the myth of the 'technological fix', in which more and better technology will solve IS development problems, the 'organisational' myth that changing organisational design will solve IS development problems (e.g. changing the organisational structure, outsourcing or process re-engineering), and the 'silver bullet' myth, in which a 'magical' solution exists that will rectify IS development problems.

Legacy IS and an organisation's existing technological infrastructure may also influence IS development (Knights & Murray, 1994). According to Chae & Poole (2005), pre-existing IS (both internal and external to an organisation) play an active role in shaping the direction of new IS development. Drawing on a case study of the development of an enterprise-wide IS, they argue that pre-existing IS can exert an influence by constraining or directing the new IS development trajectory. For example, the new IS described by Chae & Poole had to conform to the requirements of the existing computing infrastructure in the organisation and other IS with which it was meant to interface and exchange data. In considering design options, the project team considered alternative IS in other organisational settings, which acted as standards of functionality for the new IS. Pre-existing IS can also shape approaches to developing a new IS through developers' prior experiences and learning. For example, Chae & Poole (2005) describe how the project team director adopted a relatively conservative approach to the project that was shaped by his previous experiences in developing large-scale IS. Similarly, Symon & Clegg (2005) observe that the history of IS development in an organisation can shape the strategy adopted for user participation in IS projects.

### **A1.6.2 Environmental conditions**

Knights & Murray (1994) discuss the general and local socio-political and economic conditions within which an organisation functions. They suggest that "within a market economy, these conditions largely concern labour, product and capital markets, their respective regulatory frameworks, and the social relations of class, gender and race" (p. 43). Bussen & Myers (1997) describe the case of failure of an EIS in a large New Zealand organisation. While their case exhibited many of the traditional risk factors identified within the academic literature, the authors also identify various environmental conditions, which they argue probably had more influence over the project outcome. These included changes in company ownership, leading to eventual overseas ownership, and rapid organisational and economic growth in a depressed economy. Changes in the external environment may also mean that a proposed IS loses its former relevance (Doolin, 2004).

A range of external entities operating at the environmental level may influence IS development decisions and practices. These potentially include: government authorities, international agencies, professional and industry associations, trend setting or multinational corporations, universities, financial organisations, and trade unions. For example, the impetus to introduce a new IS may arise from a new government initiative (Doolin, 2004; Myers & Young, 1997). In fact, a new IS may be the means by which the policies or objectives of government are imposed on an organisation (Myers & Young, 1997). Conversely, withdrawal of government financial support may result in project abandonment (Constantinides & Barrett, 2006; Doolin, 1999).

External entities exert their influence through a range of processes such as building and/or deploying specific knowledge related to IS development; subsidising or directing development; establishing standards, norms or regulations within which IS development occurs; and institutional isomorphism (Avgerou, 2001, 2002; Nicolaou, 1999). Institutional isomorphism, the idea that organisations in the same field adopt similar

structures and processes, may occur through coercive pressures, such as government mandates, industry standards or dominant business partner influences (Chae & Poole, 2005).

Isomorphic effects can also be seen in the voluntary imitation of organisations' IS development processes and decisions that are perceived to be successful, or in the normative effects of professional networks and educational bodies (Avgerou, 2002; Nicolaou, 1999). For example, IS developers work within professional disciplines, which represent "bodies of knowledge that preserve concepts, practices, and values" (Chae & Poole, 2005, p. 23). These disciplines structure developers' actions in the IS development process.

Differences in national cultural contexts may cause a range of issues in IS development, including attitudes to project roles, use of procedures, developer autonomy, team relationships, flexibility for organisational or process change, and the balance between technical and organisational issues (Coughlan et al., 2003; Krishna & Walsham, 2005). Walsham (2002) explores contradiction and conflict in a case study of cross-cultural IS development work. He suggests that the conflict that developed around management style, work ethos and project coordination reflected "differences in deep-seated cultural attitudes" (p. 365). Similarly, Kumar et al. (1998) discuss how traditional US IS development approaches based on technical-economic rationality do not translate well into different cultural contexts, which may require consideration of specific cultural dimensions of work and communication practices.

The influence of national culture can also be seen in Mitev's (2000) description of the difficulties encountered by the French government rail service in introducing a computerised reservation IS originally developed for the US airline industry. The new IS completely changed the established practices of rail workers and railway users, who rejected such changes. According to Mitev (2000, p. 90), the difficulties arose through attempts to translate "management discourses, commercial practices, economic models, strategic goals, political perspectives, sectorial markets, and structures" between two very different cultural and sectorial contexts.

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## **Appendix 2: Survey Method**

### **A2.1 Introduction**

This appendix provides a detailed description of the design and implementation of the Web-based survey of IS development practices in New Zealand organisations conducted as part of the PhD. While the main objective was to obtain an updated assessment of IS development practices in New Zealand organisations, the survey also focused on the nature, extent and perceived contribution of the use of standard methods and the participation of users in the development process.

The appendix is structured as follows. Section A2.2 introduces the Web-based survey instrument. Sections A2.3 and A2.4 deal with the structure of the questionnaire used in the survey and the specific details of each question asked, respectively. Potential measurement and non-response errors are addressed in Section A2.5, followed by a consideration of ethical issues in Section A2.6. Details of the pilot testing of the survey, including subsequent refinements made to the survey instrument, are outlined in Section A2.7. Coverage and sampling considerations related to the design and implementation of the survey are discussed in Section A2.8. The following three sections (A2.9–A2.11) provide details of the data collection, data processing and data analysis, respectively.

### **A2.2 A Web-based Survey**

Surveys can be administered and delivered through various modes (e.g. telephone, mail or electronic delivery), each of which has recognised benefits and limitations. Web-based survey delivery was chosen for this study because of its benefits and because it was believed to be the most appropriate medium to reach the target population. A Web-based survey is defined as a self-administered survey in which a computer questionnaire based on HTML is presented to the participant in a standard Web browser, and responses are submitted over the Internet (Vehovar et al., 2000). The benefits and limitations of Web-based surveys are presented in Table A2.1.

As can be seen from Table A2.1, Web-based surveys tend to have a comparatively low cost of implementation, and their response times tend to be shorter. Data from responses can be entered directly into a database for subsequent analysis. In this survey, programming expertise to achieve this was readily and inexpensively available. The nature of the survey required only a relatively straightforward questionnaire design, so design flexibility was not necessarily a benefit in this study (indeed, Dillman (2000) advises against unnecessarily using over-sophisticated Web-based designs).

Most of the potential limitations of Web-based surveys arise from measurement, non-response, coverage and sampling errors. Indeed, these limitations are applicable to sample surveys in general, not just to Web-based surveys (e.g. Dillman, 2000; Dillman & Bowker, 2001; Dillman et al., 1998; Groves, 1989). To be able to make meaningful inferences to the target population of New Zealand organisations involved in IS development, these considerations needed to be addressed (Couper, 2000; Dillman & Bowker, 2001; Manfreda et al., 2002), and are discussed later in this appendix.

Although the routine use of Web surveys is largely untested, some guidance on sound Web-based survey design and construction is available from the literature (Dillman, 2000; Dillman & Bowker, 2001; Dillman et al., 1998; Shannon et al., 2002; Solomon, 2001). In constructing the questionnaire and designing its implementation, Dillman's principles for conducting Web-based surveys were followed (Dillman, 2000; Dillman et al., 1998).

Table A2.1: Benefits and limitations of Web-based surveys

<b>Benefits of Web-based surveys</b>
<p>Design flexibility</p> <ul style="list-style-type: none"> <li>• Incorporation of advanced graphical and programming features to create interest and to allow validation of responses, automatic skipping, randomisation of question order, and adaptive questioning (Boyer et al., 2001; Manfreda et al., 2002; Sheehan &amp; Hoy, 1999).</li> </ul>
<p>Speed</p> <ul style="list-style-type: none"> <li>• Responses can be collected and analysed quickly (Couper, 2000; Manfreda et al., 2002; Sheehan &amp; Hoy, 1999).</li> <li>• Retrieval of survey responses in a digital form compatible with existing data analysis software (Shannon et al., 2002), reducing the possibility of human error in data entry (Manfreda et al., 2002; Solomon, 2001).</li> </ul>
<p>Cost</p> <ul style="list-style-type: none"> <li>• The costs of survey distribution and data processing can be minimised (Couper, 2000; Dillman &amp; Bowker, 2001; Manfreda et al., 2002; Shannon et al., 2002; Sheehan &amp; Hoy, 1999; Solomon, 2001; Vehovar et al., 2000).</li> </ul>
<b>Limitations of Web-based surveys</b>
<p>Sampling error considerations</p> <ul style="list-style-type: none"> <li>• Claims of high survey accuracy based on high numbers of respondents in Web-based surveys often overlook coverage problems and self-selecting populations (Couper, 2000; Dillman &amp; Bowker, 2001).</li> <li>• Web-based surveys often allow for multiple responses from a single individual or responses from individuals outside the population of interest (Shannon et al., 2002; Sheehan &amp; Hoy, 1999; Solomon, 2001).</li> </ul>
<p>Coverage error problems</p> <ul style="list-style-type: none"> <li>• Differential access to the Web can cause coverage errors (Couper, 2000; Dillman, 2000; Dillman &amp; Bowker, 2001; Dillman et al., 1998; Shannon et al., 2002; Solomon, 2001; Vehovar et al., 2000).</li> <li>• Web-based surveys often utilise self-selecting populations, which reduces the representativeness of the sample (Dillman &amp; Bowker, 2001; Sheehan &amp; Hoy, 1999).</li> </ul>
<p>Non-response error problems</p> <ul style="list-style-type: none"> <li>• Lower response rates are often observed in Web-based surveys, and are likely to be influenced by interest in the topic or the mode of responding (Couper, 2000; Dillman &amp; Bowker, 2001; Solomon, 2001; Vehovar et al., 2000; Watt, 1997).</li> <li>• Non-response can result from variations in potential respondents' computer literacy, hardware and software compatibility, computer processing capacity, screen configurations and connection speeds, and from poor survey design or display (Boyer et al., 2001; Couper, 2000; Dillman &amp; Bowker, 2001; Dillman et al., 1998; Manfreda et al., 2002; Shannon et al., 2002; Solomon, 2001).</li> <li>• Concerns about anonymity, privacy and Internet security (Boyer et al., 2001; Couper, 2000; Shannon et al., 2002; Vehovar et al., 2000), and the perception of unsolicited email as 'spam' (Shannon et al., 2002; Vehovar et al., 2000), may cause non-response.</li> </ul>
<p>Measurement error problems</p> <ul style="list-style-type: none"> <li>• The potential for unequal delivery of item stimuli arises because of differences in Web browsers, operating systems, screen configurations, and hardware of potential respondents (Couper, 2000; Dillman &amp; Bowker, 2001).</li> <li>• Poor survey design or layout, and inappropriate use of colour or advanced Web features, can adversely affect question consistency, readability and measurement properties (Couper, 2000; Dillman, 2000; Dillman &amp; Bowker, 2001; Manfreda et al., 2002).</li> </ul>
<p>Comparability issues</p> <ul style="list-style-type: none"> <li>• Web-based survey methods are less established as a research tool compared to other self-administered survey methods (Shannon et al., 2002).</li> <li>• There is little in the way of tested methods for design and implementation of Web-based surveys (Manfreda et al., 2002; Shannon et al., 2002).</li> </ul>

The survey consisted of three separate Web pages: an introductory page, the questionnaire itself, and a concluding page (Appendix 3). In the first instance, participants were directed to the introductory page, which outlined the purpose of the survey and defined specific terms used in the questionnaire (Table A2.2). Access to the questionnaire was provided through the introductory page, and was restricted to only those individuals who received an email requesting their participation and who accessed the Web survey in the prescribed manner. This was done to ensure respondents were sampled from the defined population (Dillman, 2000).

Table A2.2: Definitions of terms used in the survey

Term	Definition
Information system (IS)	A computerised system that is used to satisfy the information needs of an organisation. This excludes standard desktop applications.
IS project	A project in which your New Zealand organisation has developed or otherwise acquired an IS for its own use.
IS development	Either the traditional process of IS development (e.g. requirements determination, system design, building, and implementation), or the selection, possible customisation and implementation of packaged software.
Standard method of IS development	A formal or documented approach for directing or guiding the IS development process. A standard method may be commercially or publicly available, or documented within your organisation.
User	An employee of your organisation who interacts with the IS on a day-to-day basis.

The questionnaire form consisted of a long, single page, comprising radio buttons and drop-down menus to select options, and text boxes for answers to open-ended questions. Respondents were able to scroll through the entire questionnaire at once. This meant they were able to change their responses at any time and allowed for cross-checking. Their responses were submitted in one event by clicking on a button at the bottom the page. After completing the questionnaire and submitting their responses, participants were shown the concluding page, which acknowledged receipt of the participant's response and thanked them for their participation.

The three Web pages of the survey were initially generated using Microsoft FrontPage 5.0 to create the desired format and content (both descriptive text and form elements). The formatted Web page files were then coded to incorporate additional functionality using VBScript and JavaScript, before being published on an Auckland University of Technology server. This included the automatic insertion of the response data into an SQL database.

### A2.3 Structure of the Questionnaire

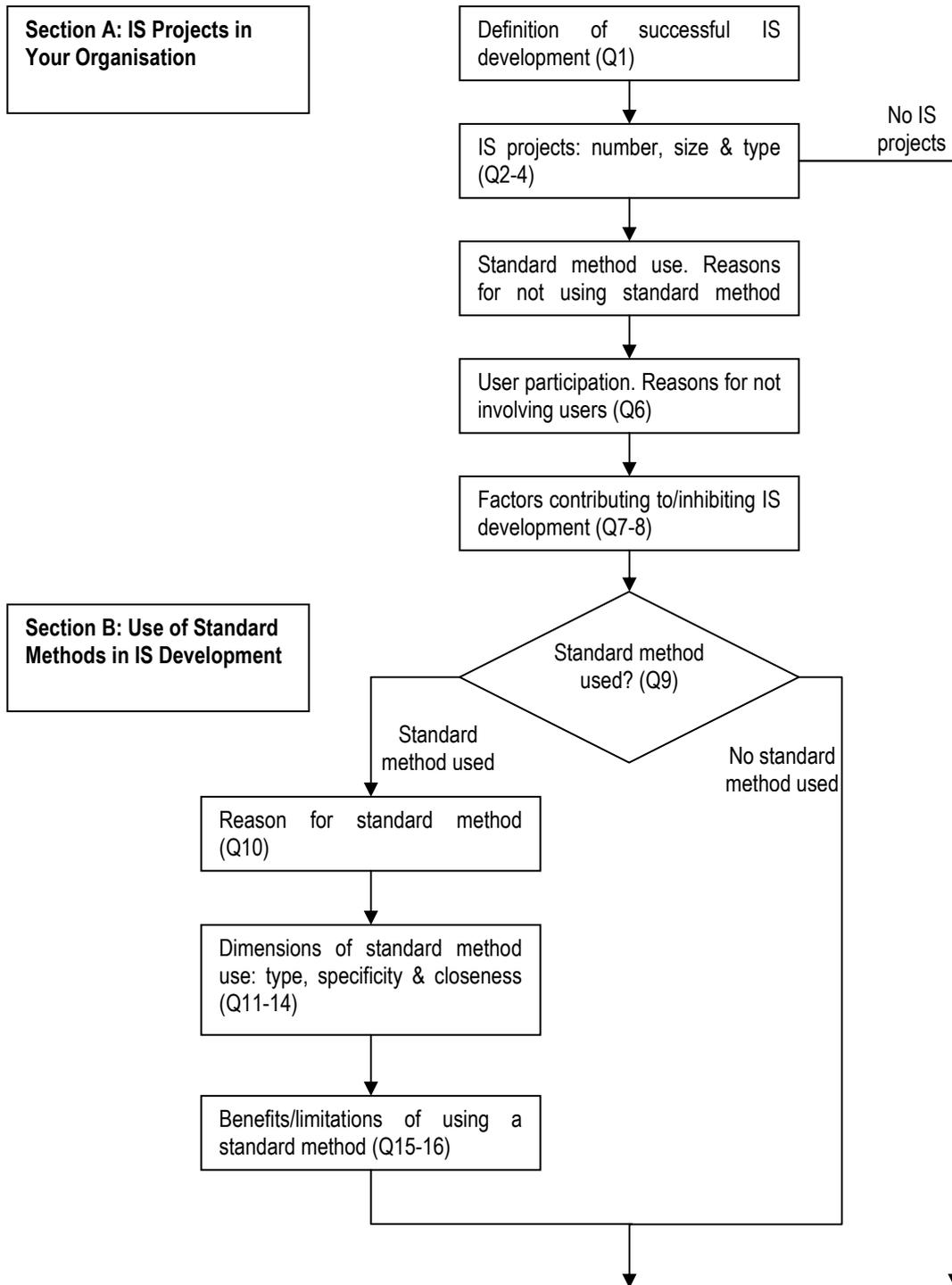
The survey solicited information on IS projects undertaken and completed (or substantially completed) by respondent organisations. In order to ensure currency of the results and to ensure more accurate recall by survey participants, the survey focused on IS projects in the three calendar years prior to the survey implementation (between 1 January 2001 and 31 December 2003).

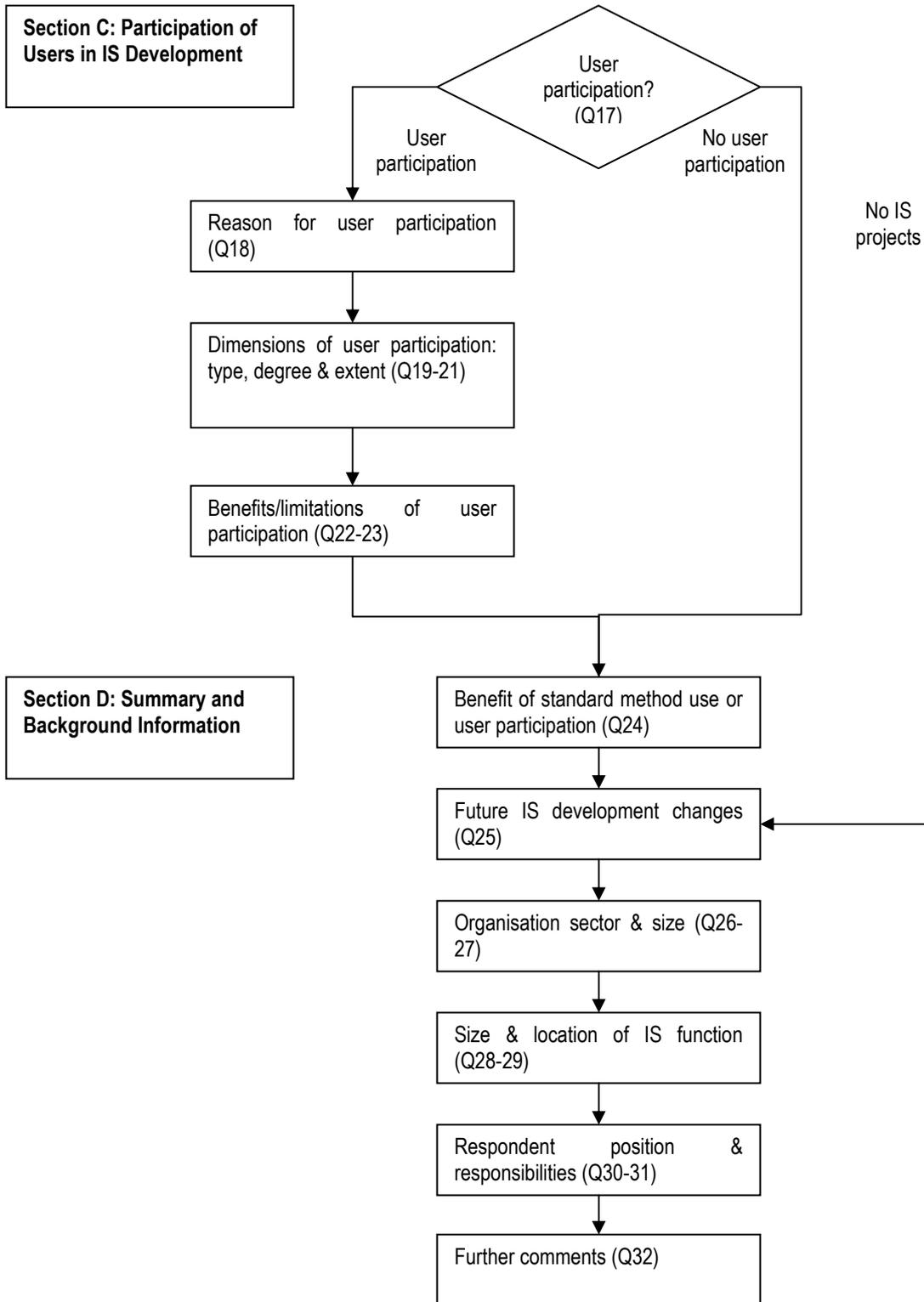
The questionnaire comprised thirty-two questions and a separate request soliciting their participation in the planned case study. The questionnaire was divided into four sections as follows:

1. Section A dealt in general terms with IS project work undertaken and completed (or substantially completed) within the organisation over the selected time frame.
2. Section B dealt with the use of standard methods in IS development within the organisation.
3. Section C dealt with the participation of users within IS development in the organisation.
4. Section D covered background demographic information about the organisation and the participant.

The structure of the questionnaire, and the general nature of its questions, is presented in Figure A2.1. Details of the construction of each question are discussed in the next section.

Figure A2.1: Structure of questionnaire





## A2.4 Construction of the Questions

### A2.4.1 Section A: IS Projects in your organisation

Participants were asked whether or not their organisation had a formal or commonly agreed understanding of successful IS development, and, if so, to define what that understanding was (Question 1).

They were then asked to specify (or estimate) the total number of IS projects that had been undertaken and completed (or substantially completed) by their organisation over the selected time frame (Question 2). At this point, participants whose organisation had not undertaken any IS projects were directed onto Question 25 (in Section D).

The remaining questions in the section were aimed at organisations that had undertaken IS projects over the selected time frame. Participants were asked to classify these projects in terms of their size (Question 3), their IS development and acquisition type (Question 4), the levels of standard method use in the development process (Question 5), and the levels of user participation in the development process (Question 6).

Overall project cost was selected as the criterion for measuring the project size, as project cost figures are readily available and they encompass other possible criteria such as size of the project team and the duration of the project. The categories used for IS development and acquisition reflect the various software procurement practices available; that is, the purchase of packaged software for use as is or with customisation (either in-house or outsourced), or bespoke development of software (either in-house or outsourced) (Fitzgerald, 1998; Groves et al., 2000).

The categories used for both standard method use and user participation in the development process include: used for more or less all of the development process, used for only part of development process, or not used at all. For those projects where no standard method was used, participants were asked to specify why that was the case. For those projects where users did not participate, participants were asked to specify the reasons for this.

Finally, participants were asked to rate the relative importance of a number of factors that might be influential in facilitating or inhibiting IS development (Questions 7 and 8, respectively). A review of the extant literature resulted in a wide variety of factors influencing IS development outcomes (Appendix 1). Realistic constraints in survey design prohibited asking participants to respond to the full range of possible factors. Instead, a selection of factors was chosen based on the overall focus of this study; that is, factors that were considered to be most related to IS development participants and their interaction. To these were added a small number of traditional IS development factors as a basis for establishing the comparative importance of the interaction-related factors. Space constraints and the desire to encourage participants to complete the questions meant that the items used for these additional factors were relatively broad and, in some cases, combined several related factors. For example, the item *adequate resources or time* was deliberately worded in a non-specific way so as to include all types of resources relevant to IS development (such as human resources, financial resources and time).

The selection of items used in the questionnaire, together with their source in the literature, is shown in Table A2.3. Participants could also provide up to two other items of their own to rate. In rating each item, participants were asked to select a number from a five-point anchored rating scale of 1 ('Not important') to 5 ('Very important'), or a 'Don't know or Not applicable' option.

Table A2.3: Items representing factors facilitating or inhibiting IS development

Facilitating IS development (Question 7)	Inhibiting IS development (Question 8)	Sources
Adequate resources or time	Resource or time constraints	(Fitzgerald, 1998; Jiang & Klein, 2000; Jiang et al., 1996; Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995; Wixom & Watson, 2001; Yetton et al., 2000)
Adequate developer knowledge of the system context	Inadequate developer knowledge of the system context	(Fitzgerald, 1998; Jiang & Klein, 2000; Schmidt et al., 2001)
Effective communication between developers and users	Ineffective communication between developers and users	(Jiang & Klein, 2000; Jiang et al., 1996)
Effective management of changes resulting from system implementation	Ineffective management of changes resulting from system implementation	(Schmidt et al., 2001; Wixom & Watson, 2001)
Effective project management	Ineffective project management	(Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995)
Effective functioning of the project team	Ineffective functioning of the project team	(Jiang & Klein, 2000; Schmidt et al., 2001; Yetton et al., 2000)
Effective user participation in the development process	Ineffective user participation in the development process	(Fitzgerald, 1998; Johnson et al., 2001; Schmidt et al., 2001; Wastell & Sowards, 1995; Wixom & Watson, 2001; Yetton et al., 2000)
Top management support	Lack of top management support	(Jiang et al., 1996; Johnson et al., 2001; Rainer & Watson, 1995; Schmidt et al., 2001; Verkerk et al., 2000; Wixom & Watson, 2001)
Use of a standard method of IS development	Not using a standard method of IS development	(Barry & Lang, 2003; Fitzgerald, 1998; Johnson et al., 2001; Schmidt et al., 2001; Wastell & Sowards, 1995)
Use of external consultants		(Irani et al., 2001; Rainer & Watson, 1995)
User commitment or buy-in	User resistance	(Jiang & Klein, 2000; Jiang et al., 1996; Schmidt et al., 2001; Yetton et al., 2000)
Well-defined user requirements	Poorly defined or changing user requirements	(Barry & Lang, 2003; Johnson et al., 2001; Rainer & Watson, 1995; Schmidt et al., 2001; Verkerk et al., 2000; Wastell & Sowards, 1995)
	Political manoeuvring or disagreements within the organisation	(Schmidt et al., 2001; Wastell & Sowards, 1995; Yetton et al., 2000)
	Technological problems	(Jiang & Klein, 2000; Schmidt et al., 2001; Wastell & Sowards, 1995; Yetton et al., 2000)
	Unrealistic user expectations of the system	(Barry & Lang, 2003; Schmidt et al., 2001)

#### A2.4.2 Section B: Use of standard methods in IS development

Question 9 asked participants whether a standard method had been used in any of the IS projects undertaken and completed (or substantially completed) by the organisation over the selected time frame. At this point, participants whose organisation had not used a standard method were directed to the next section. The remaining questions in the section were aimed at organisations that had used a standard method and were related to the nature of that use. Participants were asked to answer these questions in relation to those IS projects where a standard method was used for at least part of the development process.

Question 10 asked participants to identify the most common reason for selecting the standard method or methods that had been used. Participants could select one item from a list of options representing the common reasons identified in the literature: historical practice in the organisation, developer familiarity with the method, fit with characteristics of the project, choice of external development company, quality of support for the method, or ease of use of the method (Chatzoglou, 1997; Chatzoglou & Macaulay, 1996). Participants were asked to specify the most common origin of the standard method or methods used (Question 11). The

categories for the origin of the method were: commercial or published method, method developed in-house, or method developed in-house based on a commercial or published method (Fitzgerald, 1998; livari & Maansaari, 1998). In Question 12, participants were asked to name any commercial or published standard methods that were used. Participants were then asked whether the standard method(s) used typically comprised broad guidelines only, detailed specifications only, or both (Question 13) (Fitzgerald, 1997). Question 14 asked participants how frequently a standard method was used as specified, and how frequently it was adapted or used in part (Fitzgerald, 1998; Hardy et al., 1995; livari & Maansaari, 1998; Wynekoop & Russo, 1995). In answering this question, participants could choose from an ordinal scale comprising 'Never', 'Sometimes', 'Often', and 'Always' options, or a 'Don't know' option.

Finally, participants were asked to indicate their level of agreement with various positive and negative statements about the use of standard methods (Questions 15 and 16). A review of the literature highlighted a wide variety of benefits and limitations associated with the use of standard methods (Appendix 1), the majority of which were presented to participants. The statements used in the questionnaire, together with their literature sources, are shown in Table A2.4. Westrup (1993) was used as an additional source for two items relating to user participation. Participants could also provide up to two other items of their own to rate. In answering these questions, participants could choose from a five-point Likert-type scale comprising 'Strongly disagree', 'Disagree', 'Neutral', 'Agree' and 'Strongly Agree' options, or a 'Don't know or Not applicable' option.

Table A2.4: Positive and negative statements about standard methods

<b>Positive statements about standard methods (Question 15)</b>	<b>Sources</b>
Allowed movement of developers between projects	(Fitzgerald, 1998)
Enabled us to manage costs effectively	(Barry & Lang, 2001, 2003; Chatzoglou, 1997; Fitzgerald, 1998; Hardy et al., 1995)
Ensured the developed system met user requirements	(Fitzgerald, 1998; Hardy et al., 1995; Roberts et al., 2000)
Ensured timely development of the system	(Barry & Lang, 2001; Chatzoglou, 1997; Fitzgerald, 1998; Hardy et al., 1995; Johnson & Hardgrave, 1999; Rahim et al., 1998)
Ensured well-defined user requirements	(Hardy et al., 1995; Johnson & Hardgrave, 1999; Rahim et al., 1998)
Facilitated effective communication among developers	(Fitzgerald, 1998; Rahim et al., 1998)
Facilitated effective communication between developers and users	(Johnson & Hardgrave, 1999; Rahim et al., 1998; Roberts et al., 2000)
Facilitated effective project control	(Fitzgerald, 1998; Kiely & Fitzgerald, 2002; Rahim et al., 1998; Roberts et al., 2000)
Facilitated successful IS development	(Barry & Lang, 2003; Fitzgerald, 1998; Kim & Peterson, 2003)
Facilitated user participation in the development process	(Hardy et al., 1995; Rahim et al., 1998; Westrup, 1993)
Led to a high level of productivity of the project team	(Fitzgerald, 1998; Hardy et al., 1995; Johnson & Hardgrave, 1999; Rahim et al., 1998; Roberts et al., 2000)
Led to the delivery of a high-quality system	(Barry & Lang, 2001; Fitzgerald, 1998; Hardy et al., 1995; Rahim et al., 1998; Roberts et al., 2000)
<b>Negative statements about standard methods (Question 16)</b>	
Constrained developer creativity and flexibility	(Fitzgerald, 1998; Roberts et al., 2000)
Constrained effective user participation in the development process	(Westrup, 1993)
Did not cover the entire development process	(Hardy et al., 1995; Rahim et al., 1998)
Did not match how systems are actually developed	(Barry & Lang, 2003; Fitzgerald, 1998; Roberts et al., 2000)
Ignored developers' knowledge and experience	(Fitzgerald, 1998)
Ignored people-related factors in development	(Fitzgerald, 1998)
Was difficult to adapt to a specific situation	(Fitzgerald, 1998; Hidding, 1997)
Was difficult or time-consuming to learn or use	(Barry & Lang, 2001, 2003; Fitzgerald, 1998; Hardy et al., 1995; Hidding, 1997; Kiely & Fitzgerald, 2002; Rahim et al., 1998; Roberts et al., 2000)

### **A2.4.3 Section C: Participation of users in IS development**

Question 17 asked participants whether or not users had participated in any of the IS projects undertaken and completed (or substantially completed) by the organisation over the selected time frame. At this point, participants whose organisation had not had any user participation were directed onto the final section of the questionnaire. The remaining questions in the section were aimed at organisations where users had participated in IS development. Participants were asked to answer these questions in relation to those IS projects in which users had participated in at least part of the development process.

Participants were asked to identify the most common reason for user participation (Question 18), by selecting one option from a list of reasons identified in the literature: organisational policy, historical practice in the organisation, influence of users, fit with characteristics of the project, choice of external development company, or requirement of a standard method (Cavaye, 1995; Lin & Shao, 2000). Question 19 asked participants whether user participation had involved all users or just their representatives (Cavaye, 1995). In Question 20, participants were asked to indicate the form of user participation in IS development. The options, drawn from the literature, were: users had full responsibility for development; users were part of the development team; users had sign-off responsibility at various stages of development; users participated in a formal advisory capacity as a group; users participated in a formal advisory capacity as individuals; and users were informally consulted during development (Cavaye, 1995; Ljung & Allwood, 1999; McKeen & Guimaraes, 1997). Participants were then asked how frequently users participated in different stages of the development process, including planning, requirements determination, design, programming, testing, installation, training and evaluation (Question 21) (Cavaye, 1995; McKeen & Guimaraes, 1997). In answering Questions 20 and 21, participants could choose from an ordinal scale comprising 'Never', 'Sometimes', 'Often', and 'Always' options, or a 'Don't know' option. In both questions, participants could also add up to two 'Other' items.

Finally, participants were asked to indicate their level of agreement with various positive and negative statements about user participation (Questions 22 and 23). A review of the literature highlighted a wide variety of benefits and limitations associated with user participation (Appendix 1), the majority of which were presented to participants. The statements used in the questionnaire, together with their literature sources, are shown in Table A2.5. Participants could also provide up to two other items of their own to rate. In answering these questions, participants could choose from a five-point Likert-type scale comprising 'Strongly disagree', 'Disagree', 'Neutral', 'Agree' and 'Strongly Agree' options, or a 'Don't know or Not applicable' option.

Table A2.5: Positive and negative statements about user participation

<b>Positive statements about user participation (Question 22)</b>	<b>Sources</b>
Avoided unacceptable or unnecessary system features	(Cavaye, 1995; Kujala, 2003; Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Created realistic user expectations of the system	(Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Ensured accurate and complete user requirements	(Cavaye, 1995; Foster & Franz, 1999; Kim & Peterson, 2003; Kujala, 2003; Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Ensured developer knowledge of the system context	(Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Ensured the developed system met user needs	(Cavaye, 1995; Kim & Peterson, 2003; Lynch & Gregor, 2004)
Ensured user understanding of the system features	(Kim & Peterson, 2003; Kujala, 2003; Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Facilitated conflict resolution between users and developers	(Amoako-Gyampah & White, 1997; Foster & Franz, 1999; Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Facilitated effective communication between developers and users	(Amoako-Gyampah & White, 1997; Hartwick & Barki, 2001; Markus & Mao, 2004)
Facilitated successful IS development	(Cavaye, 1995; Fitzgerald, 1998; Jiang & Klein, 2000; Jiang et al., 1996; Kim & Peterson, 2003; Kujala, 2003; Lin & Shao, 2000; Sauer, 1999; Schmidt et al., 2001; Yoon et al., 1995)
Led to the delivery of a high-quality system	(Butler & Fitzgerald, 2001; Hwang & Thorn, 1999; Kim & Peterson, 2003; Lin & Shao, 2000; Roberts et al., 2000)
Led to user commitment to implementation of the system	(Cavaye, 1995; Kim & Peterson, 2003; Lin & Shao, 2000; McKeen & Guimaraes, 1997; Roberts et al., 2000)
Led to user satisfaction with the system	(Hwang & Thorn, 1999; Kujala, 2003; Lin & Shao, 2000; Lynch & Gregor, 2004; McKeen & Guimaraes, 1997; Yoon et al., 1995)
<b>Negative statements about user participation (Question 23)</b>	
Constrained developers' influence in the development process	(Cavaye, 1995; Heinbokel et al., 1996)
Created user resistance to implementation of the system	(Butler & Fitzgerald, 2001; Canel et al., 1997; Markus & Mao, 2004; McKeen & Guimaraes, 1997)
Was difficult to manage or implement	(Butler & Fitzgerald, 1999; Canel et al., 1997; Heinbokel et al., 1996; Kujala, 2003; Ljung & Allwood, 1999)
Was time-consuming or costly	(Canel et al., 1997; Cavaye, 1995; livari, 2004; Kujala, 2003; Ljung & Allwood, 1999)

#### A2.4.4 Section D: Background information and summary

Participants were asked to indicate their level of agreement with several statements, namely whether use of a standard method was beneficial to IS development, whether user participation was beneficial to IS development and whether organisational or human-related issues were more important than technical issues in determining the outcome of IS development (Question 24). In answering this question, participants could choose from a five-point Likert-type scale comprising 'Strongly disagree', 'Disagree', 'Neutral', 'Agree' and 'Strongly Agree' options, or alternatively a 'Don't know or Not applicable' option. Participants were also asked to identify any changes in IS development in their organisation in the three years to follow, in terms of general changes and in relation to the use of standard methods and user participation (Question 25).

Participants were then asked to characterise their organisation in terms of business sector (Question 26), organisational size (Question 27), and the size (Question 28) and location (Question 29) of its IS function. Participants were also asked to specify their official position title (Question 30) and their main responsibilities in relation to IS development in the organisation (Question 31). Question 32 gave participants the opportunity to enter any further comments about the survey.

The business sector categories used in the questionnaire are an abridgement of the Australian and New Zealand Standard Industrial Classification 1996 (ANZSIC96) categories used by Statistics New Zealand. Both organisational size and size of the IS function were measured as the number of full-time equivalent employees (FTEs). The categories used for the location of the IS function reflect the configurations previously observed in organisations; namely, centralised within one unit, decentralised throughout the organisation, or outsourced (Rahim et al., 1998).

## A2.5 Measurement and Non-Response Considerations

In self-administered surveys, measurement error arises when the answer given by a respondent to a question differs from its true value on the measurement instrument. Such errors can stem from aspects of the respondent's behaviour or from problems with the survey instrument (Couper, 2000). A number of questionnaire design procedures were used in this study to minimise problems associated with measurement errors (Dillman, 2000; Dillman et al., 1998). They are summarised in Table A2.6, along with the approaches used to minimise measurement error during survey implementation.

Table A2.6: Procedures used to reduce measurement error in the survey

<p><b>Questionnaire design</b></p> <ul style="list-style-type: none"> <li>• Questions were formatted in a manner that resembled conventional paper-based questionnaires.</li> <li>• The use of colour and advanced Web features was avoided so as to maintain consistency, readability and the measurement properties of the questions.</li> <li>• The layout used minimised differences in the visual appearance of questions resulting from different screen resolutions or browsers.</li> <li>• Skip directions were positioned on the form so as to encourage the answering of the question before being used to go to the next applicable question.</li> <li>• To avoid biases from respondents selecting the first answer option, the visible line space in drop-down menus contained a '- Click Here-' instruction rather than an answer option.</li> <li>• In questions where participants had to choose an answer from a range of options that were not exclusive, additional options were offered as possible choices including 'Don't know', 'Not Applicable', or 'Other'.</li> <li>• In questions where participants were asked to rate items on a categorical or Likert-type scale, participants could provide up to two other items of their own to rate.</li> <li>• In order to measure respondent reliability, questions of a similar nature, or even opposing questions, were asked in different parts of the questionnaire.</li> </ul>
<p><b>Survey implementation</b></p> <ul style="list-style-type: none"> <li>• Exhaustive testing of the survey was undertaken by the researcher. This included testing of the Web survey access procedure, the functioning of the various form field elements in each Web page, the interconnection of the Web pages, and data storage of submitted responses.</li> <li>• A trial run of the survey was undertaken involving 6 senior academics from a range of disciplines in the Business Faculty at Auckland University of Technology. Participants were asked to comment on aspects of the implementation process and the nature and content of Web-based survey itself. Where appropriate, their feedback was incorporated into the survey. The trial provided the opportunity to test the data recovery routines.</li> <li>• A pilot test of 20 organisations across a range of business categories &amp; size categories was undertaken.</li> <li>• In processing the data for the survey, the data was checked to ensure that each response was valid, that only one response was received from each organisation, and that the business category and organisational size data were sensible. Each response was checked to ensure that the correct sections had been answered, and for consistency of the answers between sections of the questionnaire.</li> </ul>

Non-response refers to situations where people are unwilling or unable to participate in a survey, or when they only complete parts of the questionnaire. The magnitude of non-response error depends on the proportion of the sample population who did not respond, and on the differences between those who responded and those who did not (Couper, 2000). In addressing non-response error, the aim is to achieve representative responses through as high a response rate as possible, so as to be able to draw valid

inferences about the target population from the survey population. Partial non-response tends to be addressed through questionnaire design, encouraging as many participants to return complete responses.

Respondent participation can be encouraged through many aspects of the questionnaire design and the implementation process. Approaches include designing questionnaires so as to reduce potential frustration among respondents, having multiple points of contact with potential respondents by multiple modes, establishing trust by reinforcing the importance, authenticity and confidentiality of the study, and by using a sound sampling strategy (Boyer et al., 2001; Dillman, 2000; Dillman & Bowker, 2001; Manfreda et al., 2002; Shannon et al., 2002; Solomon, 2001; Watt, 1997). A number of these ideas were incorporated into the questionnaire design and survey implementation used in this study (see Table A2.7).

Table A2.7: Procedures used to reduce non-response error in the survey

<p><b>Questionnaire design</b></p> <ul style="list-style-type: none"> <li>• The first page of the survey consisted of an introductory page that welcomed participants and provided instructions on how to proceed to the questionnaire.</li> <li>• A single-page design was used for the questionnaire. Respondents were able to scroll the survey, evaluate the length of the questionnaire and answer questions in the order they wanted, facilitating a lower partial non-response rate.</li> <li>• Careful attention was given to the information organisation of the questionnaire, navigational guides, layout and format, and content and wording of each question (see also Table A2.6). A linear structure was adopted to facilitate navigation and improve the response rate.</li> <li>• Where Web form features such as radio buttons or drop-down menus were used, participants were provided with instructions on how to take the necessary computer actions.</li> <li>• The use of open-ended questions was kept to a minimum to ease response burden.</li> <li>• The questionnaire was designed to be viewed using the two most common Web browser software and in two common screen configurations.</li> </ul>
<p><b>Survey Implementation</b></p> <ul style="list-style-type: none"> <li>• A purposive sampling strategy was adopted in this study. The sample population was chosen to maximise the number of larger organisations in the sample to ensure that participants would be likely to be involved in the phenomenon of interest (i.e. IS projects involving the use of standard methods and/or participation of users of the IS). Such sampling enables more powerful inferences to be made (Mason, 1991).</li> <li>• The survey was directed to individuals rather than to a generic role within each organisation.</li> <li>• Participants were expected to have an email account and Internet access, to be familiar with their use, and to appreciate the convenience of responding to a Web-based survey.</li> <li>• The subject of the survey was directly relevant to participants, and was not of a sensitive nature.</li> <li>• Participants were informed of the procedures in place to ensure confidentiality and anonymity, such as separating the participant's identity from the questionnaire data as soon as it was received.</li> <li>• The involvement of the Auckland University of Technology was highlighted to give the study authenticity.</li> <li>• The importance of the survey both to the industry in general, and, more specifically, to the participating organisations was emphasised.</li> <li>• Appropriate wording was used in all communications to convey to the potential respondent the value placed on their responses.</li> <li>• Respondents were offered a summary of the survey results and the opportunity to enter into a prize draw.</li> <li>• Multiple points of contact were made with participants.</li> </ul>

## A2.6 Ethical Considerations

Delegated ethical approval was granted for this survey by the Auckland University of Technology Ethics Committee on 23 March 2004. In the first email sent to participants, participants were informed of the voluntary nature of their participation and reassured of the confidentiality of their responses. The precautions that would be taken to ensure the anonymity of responses were also outlined. These included: separation of the data from participant's identity, access to the data restricted to survey researchers, use of aggregate data for release to other survey participants, and secure storage of the data. The confidentiality of their response was reiterated on the introductory page, and email contacts were provided should the participant have any queries relating to the survey. The participant's consent was taken to be implicit in his or her completion of the questionnaire.

## A2.7 Pilot Testing

Once ethical approval for the study was obtained, a pilot study involving twenty organisations, from a range of business categories and organisational sizes, was conducted during March 2004.

Given that the focus of the survey was IS development practices in New Zealand organisations, the level of analysis for the survey was the organisation (as opposed to individual IS projects). The population of interest was public and private sector organisations in New Zealand large enough to require IS beyond that which could be achieved by standard desktop applications.

At the outset, it was largely unknown which sized organisations were likely to maintain a dedicated IS management function or likely to engage in IS development of the scale envisaged by this research. Large organisations are more likely to have an inherent need for systematisation and computerised integration of business functions. Other studies of IS development practice have tended to focus on large sized enterprises (e.g. Barry & Lang, 2001; Martin & Chan, 1996; Rahim et al., 1998). Large organisations are also more likely to utilise up-to-date software innovations and development practices (Falconer & Hodgett, 1999b; Fitzgerald, 1998; Kiely & Fitzgerald, 2002; Wastell & Sowards, 1995). The limited evidence from New Zealand suggests that (a) structured IS development is predominantly found in organisations with more than 500 employees (Urban & Whiddett, 1996); and (b) organisations with relatively large software development teams tend to have more defined IS development processes (Groves et al., 2000).

For this study, a composite list of organisations with 100 or more employees was constructed from organisations listed in either the New Zealand Business Who's Who online (New Zealand Financial Press Ltd), the New Zealand Management's Top 200 New Zealand companies for 2003 (based on financial criteria) (New Zealand Management, 2003) or the MIS Magazine Top 100 organisations (based on the number of screens) (MIS New Zealand, 2003). Detailed information about each organisation (such as contact details, the organisation's Web site, its business activities, and the number of employees) was obtained using New Zealand Business Who's Who online (New Zealand Financial Press Ltd), Kompass online (Kompass International) or from searching the World Wide Web using the Google™ search engine (<http://www.google.co.nz>). This work was undertaken during February and March 2004.

Each organisation was classified by business sector (using the twelve business categories used in Question 26 of the questionnaire) and, within each business sector, by organisational size (according to the following size categories: 100 to 199 FTEs, 200 to 499 FTEs, 500 to 999 FTEs, 1000 to 1999 FTEs, 2000 or more FTEs). The categories and sub-categories of the ANZSIC96 classification were used to assist in the business categorisation. The categorisation was crosschecked independently by two senior academics at Auckland University of Technology.

Specific business categories and organisational sizes were selected for inclusion in the pilot study to maintain approximate representativeness across the business sectors and organisational sizes (based on a minimum level of inclusion for each organisational size) (Table A2.8). Additional groups were sampled from the largest organisational size grouping to reflect the wide range of organisational sizes that the group spanned. One organisation was chosen from each group, usually the first in an alphabetic listing of the group. One participant from each organisation was then invited to participate in the survey.

Each organisation was contacted by email or telephone to identify the manager responsible for IS project work (usually the IS or IT Manager or the Chief Information Officer), who was then sent an email inviting him or her to participate. Care was taken to target the person most likely to have a knowledge of the IS project work undertaken and completed (or substantially completed) by the organisation over the selected time frame (cf. Doherty & King, 2001; Roberts et al., 2000). A follow-up email was sent to the participants a week later, thanking them for their participation and reminding those who may not have yet responded to do so. After a further week, participants who had not responded nor made contact with the researcher were phoned to establish why they had not responded. This was done to identify any potential barriers to response arising from the implementation process or the Web-based survey itself.

Table A2.8: Distribution of organisations in the pilot study by business category and organisational size ('X' marks a group targeted in the pilot study)

Business category	Organisational size (Number of FTEs)					
	100-199	200-499	500-999	1000-1999	2000+	Total
Communications and Media		X				1
Construction and Engineering		X				1
Transportation, Logistics and Storage		X				1
Education, Health and Community Services	X		X		X	3
Electricity, Gas and Water Utilities		X				1
Finance, Insurance and Banking					X	1
Government and Local Government		X			X	2
Manufacturing and Processing	X		X		X	3
Primary Industries			X			1
IT, Business, Legal and Property Services	X			X		2
Tourism, Recreation, Accommodation & Food Services	X					1
Wholesale and Retail Trade		X	X	X		3
Total	4	6	4	2	4	20

Within five days of the initial email being sent out, survey responses were received from four of the organisations and individuals from two other organisations indicated that they were not interested in participating in the survey. After the follow-up email was sent, another individual indicated that she was unable to participate. The follow-up email elicited no further responses.

Of the thirteen people who were phoned by the researcher, one person was on annual leave, four people were unavailable to speak, and eight people were available to provide feedback. Two people subsequently responded to the survey after being phoned.

Overall, 6 of the 20 organisations in the pilot study completed the survey, while 14 did not. This corresponds to a response rate of 30% (or a non-response rate of 70%). Respondents took around 20 and 25 minutes to complete the survey. The breakdown of responses (and non-responses) in terms of the organisational size (Table A2.9) shows that most of the responses came from the organisations in the larger group sizes, and not from those in the smaller group sizes. Furthermore, all of the organisations that completed the survey undertook and completed IS projects over the selected time frame, all but one of the organisations used standard methods of IS development to some extent, and all of the organisations had experience of user participation. That is, the organisations that responded were participating in the types of activities that are central to this survey.

Table A2.9: Distribution of responses and non-responses in the pilot study by organisational size

	Overall	Organisational size (Number of FTEs)				
		100-199	200-499	500-999	1000-1999	2000+
Total surveys sent out	20	4	6	4	2	4
Number of non-responses	14	4	5	3	1	1
Number of responses	6	0	1	1	1	3
Response rate	30%	0%	17%	25%	50%	75%

Of the individuals in the pilot study who completed the survey, one indicated that the survey “was easy to follow/complete”. Another respondent indicated that, in relation to the questions in Section A of the survey, it was impractical to “account for all projects completed over a 3 year period ... especially given the various

views of what actually constitutes an individual project". He suggested that Question 2 might deter potential respondents from completing the questionnaire.

From the three people who notified the researcher about not participating in the survey and the eight people who provided feedback on phone contact, the following reasons emerged for non-participation (some people gave more than one reason):

- Too busy: Five people indicated that they were too busy at the time to respond. One person felt that responding to the survey was a major undertaking for such a large organisation and that in some instances the information sought was not in a readily available form. Another person added she would respond if the request to participate were sent to her at a later date.
- Survey overload: Three people said that they were sent requests to participate in surveys so regularly that they generally did not respond to such requests. One of these indicated that it was company policy not to respond to surveys.
- No IS development: Three people indicated that their organisations were not involved in IS development. These organisations fell into the smaller size categories. One of these people started to answer the questionnaire but stopped part way through because he felt that he did not have the knowledge to answer some of the questions. From his conversation, he did not appear to understand the nature of the IS development that the survey addressed.
- IS development not done in New Zealand: One person indicated that IS development within the organisation was done offshore. He felt that he was unable to provide worthwhile data.
- Nature of the survey: One person objected to the nature of the questions.

Overall, the pilot study provided useful information about aspects of the survey design and the implementation process. In particular, it highlighted those areas that required further consideration, which resulted in a reconsideration of the sampling strategy (discussed in the next section) and the following refinements to the survey instrument:

- The subject line of the email message inviting individuals to participate in the survey was changed to remove the reference to 'survey'. This was to avoid people discarding the email without reading it because they considered it to be spam or yet another market research exercise.
- Details of the ethical approval for the project were included in the email message inviting individuals to participate in the survey to reinforce the authenticity of the study.
- The wording of Questions 2 to 6 in the questionnaire was modified to allow respondents to estimate relevant information about IS projects undertaken over the specified time period.

## **A2.8 Coverage and Sampling Considerations**

In the process of contacting organisations in the list of organisations of interest to identify the most appropriate person to participate in the survey, it emerged that a number of the smaller organisations either did not have a specifically dedicated IS function or IS manager, or their IS function was controlled from their head office overseas, or they outsourced their entire IS function. This, in conjunction with the observation from the pilot study that some of the smaller organisations were not involved in IS development while the larger organisations that responded were, resulted in a re-evaluation of the population from which the sample of survey participants was drawn (the frame population).

A decision was made to focus on larger sized organisations. Consequently, it was decided to restrict the frame population to organisations with 200 or more FTEs. The rationale behind this was to ensure that participants would be likely to have undertaken IS projects involving the use of standard methods and/or participation of users. Such purposive sampling has been applied to other studies of IS development (e.g. Fitzgerald, 1997; Fitzgerald, 1998), and offers the advantage of enabling more powerful inferences to be made (Mason, 1991).

Examination of the list compiled from the three databases as described in the previous section produced 460 organisations with 200 or more FTEs (the frame population). Coverage error arises when the

frame population does not match the target population, so that not all of the target population is represented. The target population consisted of all organisations with 200 or more FTEs in New Zealand. According to Statistics New Zealand, as at February 2003, there were 629 enterprises with at least 200 FTEs in New Zealand. The distribution of these organisations across the various organisational size categories and business sectors are presented in Table A2.10 and Table A2.11, respectively. In both tables, there are cases where the number of organisations for particular groups in the survey frame exceeds that for the target population. This presumably reflects the different data sources used for each population, the way the frame population was categorised by the researcher, and possibly differences in the timeframe to which the data applies.

These figures show that the frame population represents a high proportion of the target population, and that it provides a reasonable match with respect to organisational size and business sector. All of the business categories include at least 50 percent of the target population. Overall, by surveying the entire frame population, 73% of the target population were potentially involved in the survey, thereby reducing coverage error. This should make it easier to draw valid inferences about the target population from the survey population.

Table A2.10: Distribution of organisations with 200 or more FTEs across organisational size groups for New Zealand (February 2003) and for the survey frame population (March 2004)

<b>Organisational size (as FTEs)</b>	<b>New Zealand</b>	<b>Survey frame</b>	<b>% coverage</b>
200 to 499	393	259	66
500 to 999	141	96	68
1000 to 1999	46	52	100
2000+	49	53	100
Total	629	460	73

Table A2.11: Distribution of organisations with 200 or more FTEs across business sectors for New Zealand (February 2003) and for the survey frame population (March 2004)

<b>Business Sector</b>	<b>New Zealand</b>	<b>Survey frame</b>	<b>% coverage</b>
Communications and Media	29	15	52
Construction and Engineering	34	21	62
Education, Health and Community Services	90	45	50
Electricity, Gas and Water Utilities	10	12	100
Finance, Insurance and Banking	26	21	81
Government and Local Government	54	49	91
IT, Business, Legal and Property Services	72	44	61
Manufacturing and Processing	151	110	73
Primary Industries	9	16	100
Transportation, Logistics and Storage	32	34	100
Tourism, Accommodation & Food Services	20	24	100
Wholesale and Retail Trade	102	69	68
Total	629	460	73

Although coverage can be a problem for Web-based surveys of the general population, it is much less of a problem for populations where Internet penetration is higher (Vehovar et al., 2000), such as employees of certain organisations, members of professional organisations, certain types of business and groups with high educational level (e.g. Dillman & Bowker, 2001; Manfreda et al., 2002; Shannon et al., 2002). According to Couper (2000), Web-based surveys are appropriate for populations with very high or complete coverage.

Internet penetration has occurred to a reasonable extent in New Zealand with up to 95% of organisations with 50 or more FTEs having Internet access, and 98% of these organisations using email (Statistics New Zealand, 2002). It was considered reasonable to assume that organisations in the target population would be likely to have an IS manager, and that that person would have Internet and email access and use them on a regular basis within the context of their job (in fact, phoning or emailing the organisation verified the email address of each participant). Email recruitment and Web-based delivery should not have contributed unduly to coverage error in this study.

Sampling error arises when the sample selected is not representative of the frame population (Couper, 2000). In this study, sampling error was minimised by using a directed sampling strategy (rather than a self-selecting population), sampling the entire frame population, eliciting only one response from each organisation, restricting access to the survey to only those organisations who were invited to participate, and checking responses for multiple, duplicate or invalid responses.

## **A2.9 Data Collection**

Once the changes were made to the survey, the revised survey was distributed to the remainder of the 460 organisations in the frame population during April and May 2004. Of the 20 organisations included in the pilot study, 16 had 200 or more FTEs and formed part of the frame population. Thus, a further 444 organisations in the frame population were contacted using a structured email or phone conversation to identify the manager responsible for IS project work within the organisation. In most cases, this was an IS manager. However, in nine organisations where IS management was outsourced, the manager responsible for managing the outsourcing contract or the contractor (if nominated by the organisation) was targeted. Often, contact was made directly with the potential participant.

Each participant was then contacted by email over a two day period, inviting him or her to participate in the survey. The email outlined a summary of the project, emphasising its value and the importance of the participant's response, instructions on how to access and complete the survey, and the individual's rights as a participant of the survey. Participants were asked to answer the questionnaire in terms of IS projects developed for use within their own organisation. Participants who were unable to answer questions about IS projects over the selected time frame were asked to forward the email onto the person who could.

A week later, a follow-up email was sent to the participants, thanking them for their participation and reminding those who may not have yet responded to do so. Two weeks after the follow-up email was sent, a final email was sent to those participants who had not completed the survey nor made any contact with the researcher, encouraging them to participate and indicating a final date for submission of responses.

Any participant who contacted the researcher to say they were not interested in participating was removed from subsequent stages in the process. Over both the pilot study and the main survey, 54 organisations or participants from the frame population expressed their non-interest in participating in the survey. This seems to reflect the increasing difficulty in securing IS management participation in surveys. For example, the 2003 MIS survey of Top 100 New Zealand companies found that CIO and IT managers were busier and were more reluctant to disclose information than they had been previously (Bell, 2003, 2005; Bell et al., 2003).

A breakdown of the reasons for not participating given by the non-respondents to the current survey is presented in Table A2.12. Common reasons included the participant being too busy, their being new to the job and so not having the knowledge to satisfactorily answer the questionnaire, IS development being done off-shore, and it being organisational policy not to participate in surveys. Some gave no reason. Two non-respondents stated that they could not access the survey Web site, but did not provide a reason. Possible explanations could be that the Web server was temporarily unavailable or their access was blocked by their organisation's Internet security.

Table A2.12: Reasons given for not participating in the Web-based survey

Reason for not participating	Number of participants
No reason given	11
Participant too busy	15
Participant new to the job	8
IS development done off-shore	7
Organisational policy not to respond to surveys	6
Survey overload	1
Security risk	1
Other	3
Technical problem accessing the survey	2

These reasons for non-response are similar to those reported elsewhere in the IS literature, suggesting that they are not specific to this study. For example, Ravichandran & Rai (2000) contacted 60 non-respondents of their survey of IS executives to see why they had not participated. The major reasons given included: the large number of survey requests they received (53%), the length of the questionnaire (17%), that it was company policy not to respond to surveys (13%), lack of interest in the topic (8%), and lack of time due to other commitments (8%). Similarly, in a follow up survey to non-respondents Falconer & Hodgett (1999b) found that the main reasons given for non-response were: lack of time (55%), the survey is not applicable to the organisation (26%), organisational constraints (e.g. it is against organisational policy or the organisation will not allow the data to be released) (11%), and not interested in such surveys (8%).

## A2.10 Data Processing

Once the Web server used to host the survey received each survey response, it automatically inserted the response data into the survey database. At the end of May 2004 the survey was taken offline. The survey database was removed from the server and burnt onto a compact disc for subsequent data processing and manipulation.

The survey data was first checked to ensure that each response was valid. For each identification number in the survey response data, the emails sent out to each organisation were checked to verify that the correct identification number had been used. Where an email address was supplied in response to Question 33, this was also used to verify the organisation's identity. No problems of this nature were found. Responses were checked to ensure that only one response was received from each organisation. In two instances, multiple responses were received from the same individual (where the respondent had submitted either a blank response or a partially completed response and duplicates of the completed response). In each case, all but one complete response were removed from the database.

After the removal of the multiple responses, 107 responses were available from the main survey. Combined with the responses from the pilot study, this resulted in a total of 113 responses, for an overall response rate of 25%. This response rate is comparable to those reported in similar IS surveys (Fitzgerald, 1998; Hood, 1999; Kiely & Fitzgerald, 2002; Martin & Chan, 1996; Ravichandran & Rai, 2000). Drawing on prior studies, Falconer & Hodgett (1999b) suggest that in IS management research, survey response rates are likely to range from 10% to 35%.

Seven responses were unusable, either because critical (demographic) data was missing or the reported organisational size was below 200 FTEs. This left 106 usable responses that formed the basis of subsequent data analysis. As shown in Table A2.13, just over half of the usable responses were received as a result of the first email request to participate in the survey (prior to the follow-up email being sent out), and the number of responses decreased with each successive email sent. At each stage, the majority of responses were received within 2 or 3 working days of the email being sent. All three email stages, however, were important in obtaining the observed response rate.

Table A2.13: Number of usable responses returned after each stage of the implementation process

Stage in the implementation process	Number of responses	Total number of responses	% total
After the pilot study	6	6	5
In response to the request to participate (prior to the follow-up email being sent out)	57	63	60
In response to the follow-up email (prior to the final invitation to participate being sent)	29	92	88
In response to the final invitation to participate	14	106	100

The business category given by each respondent was checked against the information contained in the frame population database. Where there was any obvious discrepancy, responses were re-categorised. This included: one respondent who had selected an obviously inappropriate category, seven respondents who were re-categorised in accordance with the ANZSIC96 categories used in the initial classification of the frame population, and eight respondents who had selected the 'Other' business category.

After the survey data had been cleaned in this way, any identifying information about the organisation was separated out from questionnaire data prior to the data analysis phase, so that individual responses could not be linked to specific participants. The organisation's identification number was removed, and the data from Question 32 (which addressed the organisation's potential involvement in future research, and whether or not they wanted a copy of the results) was put into a separate table to be administered independently of the rest of the data processing. The prize draw was conducted within two weeks of the survey completion date. The summary of the survey responses was sent out after the initial data analysis was complete and aggregated data was constructed. Organisations who had indicated an interest about being contacted about subsequent research were contacted at a later date.

The possibility of a systematic response bias was tested by comparing respondents who responded after to the first email requesting participating in the survey (early respondents) and those who responded to the second or third (follow-up) emails sent out (later respondents). Mann Whitney tests found no significant difference between these two groups for organisational size, size of the IS function, and total number of projects reported, suggesting that respondents can be pooled without compromising generalisability (Doherty & King, 2001; Ravichandran & Rai, 2000).

## A2.11 Data Analysis

Not all questions in the questionnaire were directed at all participants. Respondents were expected to answer only those questions that were relevant to them. Different pathways through the questionnaire were possible, depending on the whether or not the organisation had undertaken and completed any IS projects during the specified time frame (Question 2), whether or not a standard method of IS development had been used in any of the IS projects (Question 9), and whether or not users had participated in IS development in any of the IS projects undertaken (Question 17). All respondents were expected to answer the demographic questions (Questions 26 to 31) and questions about proposed changes to IS development in their organisations (Question 25).

Overall, 101 respondents indicated that their organisation had undertaken at least one IS project over the selected time frame, and answered questions that characterised their IS development practice (Questions 3 to 8). The five respondents whose organisations had not undertaken any IS projects correctly skipped the majority of questions.

In Questions 2 to 6 (concerning the IS projects undertaken over the specified time period), one organisation reportedly undertook some 4000 IS projects over the three year time period – a much larger number than might be expected to be undertaken, and very different from the other 105 organisations. The number of projects specified by this respondent in his or her answers to Questions 2 to 6 were of a similar scale, and a review of the answers given to other questions showed no reason to suspect that the respondent

had not answered the survey in a considered way. Given that the organisation was a consulting firm, it is likely that the number of IS projects specified included IS projects undertaken for client organisations. So as not to distort the results obtained on the number of projects undertaken by New Zealand organisations, the data for this organisation was excluded from the data analysis of Questions 2 to 6.

Of the 101 organisations that had undertaken IS projects, 92 reported using a standard method in at least some of their IS projects (Question 5). Eighty of these organisations answered the questions about the use of standard methods in IS development (Questions 10 to 16). For some reason, the other 12 respondents did not answer the more detailed questions about their use of standard methods. There is no obvious explanation for this inconsistency. The wording of the questions does not appear to be ambiguous. It could be that these respondents did not want to answer the remaining questions in this section or the meaning that they attributed to standard methods may have changed during their progress through the questionnaire. Obviously, the 9 respondents who reported not using a standard method at all did not complete these questions.

All of the 101 organisations that had undertaken IS projects had involved users in the development process, and answered the questions about user participation in their IS projects (Questions 18 to 23). All 101 organisations answered questions about general contribution of standard method use and user participation (Question 24).

Open-ended questions of a general nature (e.g. about proposed changes in IS development or further comments) were less well answered by respondents. A number of the questions that involved rating items included up to two items where the participant could specify their own value for rating (by entering a text description into the text area associated with the option 'Other (please specify)' in the question). In each case where respondents specified an item, they always rated that item. Sometimes a respondent would rate an unspecified item. Analysing the occurrence of such responses shows no obvious pattern in the response behaviour of individual respondents. These unspecified item ratings were not included in the data analysis of questions.

### **A2.11.1 Description of analyses used**

The questionnaire contained a number of questions that resulted in qualitative data. In analysing this data, the researcher looked through the data to identify common themes or elements. Individual responses were then categorised according to these themes.

Most of the data collected in the questionnaire was quantitative. In analysing this data, consideration was given to the type of data collected (see Table A2.14):

- Scale data: Questions in which respondents reported the numbers of IS projects undertaken (Questions 2 to 6) were treated as scale data.
- Ordinal data: There were various questions in which respondents were asked to rate different items on some scale (importance ratings, agreement ratings or frequency ratings). There were also questions in which respondents had to select an item from a list of ordered categories. Such data was treated as ordinal.
- Nominal data: In some questions respondents had to select an answer from two or more options which had no intrinsic order. Such data was treated as nominal.

In the data analysis of questions in which respondents were asked to rate different items on some scale, any 'Don't know or Not Applicable' responses were excluded. Agreement ratings were assigned the following values: 1 for 'Strongly disagree', 2 for 'Disagree', 3 for 'Neutral', 4 for 'Agree' and 5 for 'Strongly agree'.

Table A2.14: Characterisation of quantitative data from the questionnaire

Nature of question	Nature of data	Data type
<i>Demographic information</i>		
Business category (Q 26)	Single item (of 12 items)	Nominal
Organisational size (FTEs) (Q 27)	Single item (of 5 ordered ranges)	Ordinal
Size of IS function (FTEs) (Q 28)	Single item (of 6 ordered ranges)	Ordinal
Location of IS function (Q 29)	Single item (of 4 items)	Nominal
<i>Systems development practice</i>		
Total number of IS projects (Q 2)	Numeric values	Scale
IS projects by overall project cost (Q 3)	Numeric values	Scale
IS projects by type of IS development/acquisition (Q 4)	Numeric values	Scale
Factors facilitating IS development (Q 7)	Importance ratings	Ordinal
Factors inhibiting IS development (Q 8)	Importance ratings	Ordinal
<i>The use of standard methods in IS development</i>		
IS projects by the use of standard methods (Q 5)	Numeric values	Scale
Reasons for selecting the method used (Q 10)	Single item (of 9 items)	Nominal
Origin of the method used (Q 11)	Single item (of 4 items)	Nominal
Level of detail provided by the method (Q 13)	Single item (of 4 items)	Nominal
Types of method adaptation (Q 14)	Frequency rating	Ordinal
Positive statements about standard methods (Q 15)	Agreement ratings	Ordinal
Negative statements about standard methods (Q 16)	Agreement ratings	Ordinal
<i>Participation of users in IS development</i>		
IS projects by user participation (Q 6)	Numeric values	Scale
Reasons for user participation (Q 18)	Single item (of 8 items)	Nominal
Type of user participation (Q 19)	Single item (of 3 items)	Nominal
Forms of user participation (Q 20)	Frequency rating	Ordinal
Participation in different stages of development (Q 21)	Frequency rating	Ordinal
Positive statements about user participation (Q 22)	Agreement ratings	Ordinal
Negative statements about user participation (Q 23)	Agreement ratings	Ordinal
<i>Other</i>		
Statements about contribution of standard methods and user participation (Q 24)	Agreement ratings	Ordinal
Importance ratings: 5-point scale of 1='Not important' to 5='Very important'		
Agreement ratings: 5-point Likert-type scale of 'Strongly disagree', 'Disagree', 'Neutral', 'Agree' and 'Strongly agree'		
Frequency ratings: Scale of 'Never', 'Sometimes', 'Often', or 'Always'		

Data from various questions were analysed statistically to enable comparisons to be made between different groups in the respondent population. For each grouping variable, a two group approach was used as some categories had few data. The two groups were chosen to provide as near to equal proportions of respondents in each group as the data would allow. The grouping variables were:

- *Organisational size*: The respondent organisations were divided into those with 200 – 499 FTEs (43% of respondents) and those with 500 or more FTEs (57% of respondents). In their survey, Falconer & Hodgett (1999a; 1999b) defined 'large' organisations as having more than 500 employees.
- *Size of the IS function*: The respondent organisations were divided into those with IS functions of 9 or less FTEs (53% of respondents) and those with IS functions of 10 or more FTEs (47% of respondents). In their survey, Rahim et al. (1998) defined a 'small' IS function as having fewer than 20 IS personnel. However, this represented 86% of their respondents.

- *'Public sector' and 'private sector' organisations:* The business categories 'Government and Local Government' and 'Education, Health and Community Services' were used a crude proxy for 'public sector' organisations (28% of respondents). All other organisations were classified as 'private sector' (72% of respondents).
- *Level of user participation:* The respondent organisations were divided into those with 'high' reported levels of user participation in their IS projects (63% of respondents) and those with 'low' reported levels of user participation (37% of respondents). Respondents were categorised as 'high' if they reported users participating in more or less all of the development process for the majority of their IS projects. Respondents were categorised as 'low' if they reported users as either not participating or participating in only part of the development process for the majority of their IS projects.
- *Standard method use:* Of the 101 respondent organisations, 9 could be categorised as 'non-users' of a standard method based on their answers to Questions 5 and 9. All other organisations were classified as standard method 'users'.

In performing statistical analyses, non-parametric techniques were generally used because many of the variables were ordinal or nominal and because the data was not necessarily normally distributed (Fitzgerald, 1998). In general, 2-tailed tests were used as prior relationships were not necessarily assumed. A significance value of  $p \leq 0.05$  was considered significant. SPSS for Windows 12.0.1 was used for the statistical analysis.

For size-based comparisons (i.e. organisational size and size of IS function) in which the observed variable was continuous and the measurement scales of both the observed and grouping variables were at least ordinal (Questions 2 to 6), a Mann-Whitney U test was used to see if the two groups are drawn from the same population (Daniel, 1990). Where the observed variable was not continuous and the measurement scales of both the observed and grouping variables were ordinal (Questions 7 and 8), Cross-tabs with Gamma and Kendall's tau-b tests were performed to measure the association between the two groups (Daniel, 1990).

For the 'public sector' and 'private sector' comparisons, the nominal scale of the grouping variable meant that Cross-tabs with Pearson's Chi-square test of independence were used for all questions (Questions 2 to 8) to establish whether there was any association between the observed and grouping variables. Cramer's statistic was used to provide a measure of the strength of any association (Daniel, 1990). Continuous data were put into categories to ensure that most of the cells (approximately 80%) had 5 or more data points (Daniel, 1990).

Kendall's tau-b tests (non-parametric correlation) were used to measure the strength of association within and between the sets of factors facilitating and inhibiting IS development. In order to see if there were any differences between observations for matched pairs of factors facilitating and inhibiting IS development, a Wilcoxon signed-rank test was used. This test takes into account both the sign of the differences and the magnitude of the differences between pairs (Daniel, 1990). An exploratory principal component factor analysis (with varimax rotation) was conducted on the factors facilitating IS development and on those inhibiting IS development respectively, to see if there were any dimensions underlying the two sets of factors.

## A2.12 References

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## Appendix 3: The Web-based Survey

### A3.1 Introductory Page

Auckland University of Technology »

School of Computer & Information Sciences

#### Information Systems Projects in NZ Organisations

Information systems are an important capital investment for most organisations. The development and acquisition of information systems is a continually changing field, and "getting it right" can be of vital importance. We would like to learn from your experiences and obtain a better understanding of information systems development practices within New Zealand organisations.

You are part of a carefully selected sample asked to assist with this survey, and we appreciate your participation. Your responses will be treated as confidential. The survey will take about 15 minutes for you to complete. In return, you will be able to use the results of this survey to benchmark practice within your organisation, and to assist with decision-making about information systems development and acquisition in your organisation.

This survey is being conducted by the School of Computer and Information Sciences at Auckland University of Technology. Should you have any concerns about this survey, please email Professor Steve MacDonell at [stephen.macdonell@aut.ac.nz](mailto:stephen.macdonell@aut.ac.nz), or Laurie McLeod at [launcl88@aut.ac.nz](mailto:launcl88@aut.ac.nz).

**To help you answer this survey, we have defined some of the terms that we use in it:**

**Information system (IS)**

A computerised system that is used to satisfy the information needs of an organisation. This excludes standard desktop applications.

<b>IS project</b>	A project in which your New Zealand organisation has developed or otherwise acquired an IS for its own use.
<b>IS development</b>	Either the traditional process of IS development (e.g. requirements determination, system design, building, and implementation), or the selection, possible customisation and implementation of packaged software.
<b>Standard method of IS development</b>	A formal or documented approach for directing or guiding the IS development process. A standard method may be commercially or publicly available, or documented within your organisation.
<b>User</b>	An employee of your organisation who interacts with the IS on a day-to-day basis.

**The survey is best viewed using a 1024x768 display resolution configuration.**

Click the START button to begin the survey.

START

Approved by the Auckland University of Technology Ethics Committee, Reference Number: 04/45.

Concerns regarding the conduct of this research should be notified to the Executive Secretary, AUT Ethics Committee, Madeline Banda at [madeline.banda@aut.ac.nz](mailto:madeline.banda@aut.ac.nz), or by phoning (09) 917 9999, ext 8044.

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Revised: March 1, 2004.*

## A3.2 The Questionnaire

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Auckland University of Technology »

School of Computer & Information Sciences

### Information Systems Projects in NZ Organisations

**This survey has four sections.**

**Many of the questions in this survey relate to IS projects that your New Zealand organisation has undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003 for its own use. Even if no IS projects were undertaken during this period, we would still ask you to complete certain parts of the survey as your answers will provide us with a different perspective to that of other respondents.**

**When you have completed this survey, please click the "Submit your answers" button at the bottom of the page to send us your answers for processing.**

## Section A: IS Projects in Your Organisation

1. Does your organisation have a formal or commonly agreed understanding of *successful* IS development? (To answer, use the mouse to click on the button corresponding to your choice. If you make a mistake, click on the correct choice and the previous answer will disappear.)

Don't know  
 No  
 Yes

→ If your organisation has a formal or commonly agreed understanding of successful IS development, please enter it here.

2. Please estimate how many IS projects your organisation has undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003 for its own use in New Zealand? (Please click in the box below and type a numeral to record the number of projects.)

Number of projects

→ If you entered '0' (zero) projects, [CLICK HERE](#) to go to Question 25.

3. So that we can categorise the size of these projects, please estimate how many fall into each of the following overall project cost categories?  
(Please use a numeral to record the number of projects in each category.)

\$1000 or less

\$1,001 - \$10,000

\$10,001 - \$50,000

\$50,001 - \$100,000

\$100,001 - \$500,000

\$500,001 - \$1,000,000

\$1,000,001 or more

Don't know the project cost

4. Approximately how many projects correspond to each of the following types of IS development or acquisition? (Please use a numeral to record the number of projects in each case.)

Purchase of packaged software or application with little or no customisation

In-house customisation of packaged software or application

Outsourced customisation of packaged software or application

In-house development of information system

Outsourced development of information system

5. Approximately how many projects correspond to the following statements about the use of a standard method of IS development in the development process? (Please use a numeral to record the number of projects in each case.)

A standard method was used for more or less all of the development process

A standard method was used for only part of the development process

A standard method was not used at all in the development process

→ For those projects where a standard method was not used, please briefly list the reasons why.

6. Approximately how many projects correspond to the following statements about the participation of users of the system in the development process? (Please use a numeral to record the number of projects in each case.)

Users participated in more or less all of the development process

Users participated in only part of the development process

Users did not participate at all in the development process

→ For those projects where users did not participate, please briefly list the reasons why.

7. Overall, how important were each of the following factors in *facilitating* IS development in the projects undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003? (For each factor, use the mouse to click on the number that best represents your answer, where 1 = "Not important" and 5 = "Very important". You may instead select "Don't know or Not Applicable (N/A)", if appropriate. If you make a mistake, click on the correct choice and the previous answer will disappear.)

	Not important 1	2	3	4	Very important 5	Don't know or N/A
Adequate resources or time	<input type="radio"/>					
Adequate developer knowledge of the system context	<input type="radio"/>					
Effective communication between developers and users	<input type="radio"/>					
Effective management of changes resulting from system implementation	<input type="radio"/>					
Effective project management	<input type="radio"/>					
Effective functioning of the project team	<input type="radio"/>					
Effective user participation in the development process	<input type="radio"/>					
Top management support	<input type="radio"/>					
Use of a standard method of IS development	<input type="radio"/>					
Use of external consultants	<input type="radio"/>					
User commitment or buy-in	<input type="radio"/>					
Well-defined user requirements	<input type="radio"/>					
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
	1 Not important	2	3	4	5 Very important	Don't know or N/A

8. Overall, how important were each of the following factors in *inhibiting* IS development in the projects undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003?

	Not important 1	2	3	4	Very important 5	Don't know or N/A
Inadequate developer knowledge of the system context	<input type="radio"/>					
Ineffective communication between developers and users	<input type="radio"/>					
Ineffective management of changes resulting from system implementation	<input type="radio"/>					
Ineffective project management	<input type="radio"/>					
Ineffective functioning of the project team	<input type="radio"/>					
Ineffective user participation in the development process	<input type="radio"/>					
Lack of top management support	<input type="radio"/>					
Not using a standard method of IS development	<input type="radio"/>					
Political manoeuvring or disagreements within the organisation	<input type="radio"/>					
Poorly defined or changing user requirements	<input type="radio"/>					
Resource or time constraints	<input type="radio"/>					
Technological problems	<input type="radio"/>					
Unrealistic user expectations of the system	<input type="radio"/>					
User resistance	<input type="radio"/>					
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
	1 Not important	2	3	4	5 Very important	Don't know or N/A

## Section B: Use of Standard Methods in IS Development

Recall that a standard method is a formal or documented approach for directing or guiding the IS development process.

9. Was a standard method of IS development used in ANY of the IS projects undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003?
- Yes
- No → After clicking "No", [CLICK HERE](#) to go to Section C.

**Please answer the remaining questions in this section in relation to those IS projects in which a standard method was used for at least part of the development process.**

10. What was the *most common* reason for selecting the standard method(s) used? (To answer, use the mouse to click on the box below to view the options, and then click on your choice. If you make a mistake, re-click on the box and then click on the correct choice.)

- Click Here -
- Click Here -
Organisational policy
Historical practice in the organisation
Developer familiarity with the method
Fit with characteristics of the project
Choice of external development company
Quality of support for the method
Ease of use of the method
Other
Don't know

11. What was the *most common* origin of the standard method(s)?

- Click Here -

- Click Here -
- Method developed in-house
- Method developed in-house based on commercial or published method
- Commercial or published method
- Don't know

12. Please list the names of *any* commercial or published standard methods used in these projects.

13. Did the standard method(s) *typically* provide detailed specifications for the development process, only broad guidelines, or both?

- Click Here -

- Click Here -
- Method provided detailed specifications
- Method provided only broad guidelines
- Both detailed specifications and broad guidelines
- Don't know

14. How frequently did the following forms of standard method(s) use occur? (For each statement, use the mouse to click on your choice of "Never", "Sometimes", "Often", "Always", or "Don't know".)

	Never	Sometimes	Often	Always	Don't know
Standard method was used as specified	<input type="radio"/>				
Standard method was adapted or used in part	<input type="radio"/>				
Other (please specify):	<input type="radio"/>				

15. In relation to the projects in which a standard method was used, to what extent do you agree or disagree with each of the following positive statements about the use of a standard method? (For each statement, use the mouse to click on your choice of "Strongly disagree", "Disagree", "Neutral", "Agree", "Strongly agree". You may instead select "Don't know or Not Applicable (N/A)", if appropriate.)

Use of a standard method ...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know or N/A
Allowed movement of developers between projects	<input type="radio"/>					
Enabled us to manage costs effectively	<input type="radio"/>					
Ensured the developed system met user requirements	<input type="radio"/>					
Ensured timely development of the system	<input type="radio"/>					
Ensured well-defined user requirements	<input type="radio"/>					
Facilitated effective communication among developers	<input type="radio"/>					
Facilitated effective communication between developers and users	<input type="radio"/>					
Facilitated effective project control	<input type="radio"/>					
Facilitated successful IS development	<input type="radio"/>					
Facilitated user participation in the development process	<input type="radio"/>					
Led to a high level of productivity of the project team	<input type="radio"/>					
Led to the delivery of a high-quality system	<input type="radio"/>					
Other (please specify): <input type="text"/>	<input type="radio"/>					
Other (please specify): <input type="text"/>	<input type="radio"/>					
	<input type="radio"/>					

16. In relation to the projects in which a standard method was used, to what extent do you agree or disagree with each of the following negative statements about the use of a standard method?

Use of a standard method ...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know or N/A
Constrained developer creativity and flexibility	<input type="radio"/>					
Constrained effective user participation in the development process	<input type="radio"/>					
Did not cover the entire development process	<input type="radio"/>					
Did not match how systems are actually developed	<input type="radio"/>					
Ignored developers' knowledge and experience	<input type="radio"/>					
Ignored people-related factors in development	<input type="radio"/>					
Was difficult to adapt to a specific situation	<input type="radio"/>					
Was difficult or time-consuming to learn or use	<input type="radio"/>					
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
	<input type="radio"/>					

### Section C: Participation of Users in IS Development

17. Did users participate in ANY of the IS projects undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003?
- Yes
  - No → After clicking "No", [CLICK HERE](#) to go to Section D.

**Please answer the remaining questions in this section in relation to those IS projects in which users participated in at least part of the development process.**

18. What was the *most common* reason for user participation? (To answer, use the mouse to click on the box below to view the options, and then click on your choice. If you make a mistake, re-click on the box and then click on the correct choice.)

- Click Here -
- Click Here -
Organisational policy
Historical practice in the organisation
Influence of users
Fit with characteristics of the project
Choice of external development company
Requirement of a standard method
Other
Don't know

19. *Typically* was an attempt made to involve all users in the development process, or did mainly user representatives participate?

- Click Here -  
 - Click Here -  
 All users participated  
 Mainly user representatives participated  
 Don't know

20. **How frequently did the following forms of user participation occur?** (For each statement, use the mouse to click on your choice of "Never", "Sometimes", "Often", "Always", or "Don't know".)

	Never	Sometimes	Often	Always	Don't know
Users had full responsibility for development	<input type="radio"/>				
Users were part of the development team	<input type="radio"/>				
Users had sign-off responsibility at various stages of development	<input type="radio"/>				
Users participated in a formal advisory capacity as a group	<input type="radio"/>				
Users participated in a formal advisory capacity as individuals	<input type="radio"/>				
Users were informally consulted during development	<input type="radio"/>				
Other (please specify):	<input type="radio"/>				
<input type="text"/>					
Other (please specify):	<input type="radio"/>				
<input type="text"/>					

21. How frequently did users participate in the following areas of IS development?

	Never	Sometimes	Often	Always	Don't know
Planning	<input type="radio"/>				
Requirements determination	<input type="radio"/>				
Design	<input type="radio"/>				
Programming	<input type="radio"/>				
Testing	<input type="radio"/>				
Installation	<input type="radio"/>				
Training	<input type="radio"/>				
Evaluation	<input type="radio"/>				
Other (please specify):	<input type="radio"/>				
<input type="text"/>					
Other (please specify):	<input type="radio"/>				
<input type="text"/>					



23. In relation to the projects in which users participated, to what extent do you agree or disagree with each of the following negative statements about user participation?

User participation in the development process ...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know or N/A
Created user resistance to implementation of the system	<input type="radio"/>					
Constrained developers' influence in the development process	<input type="radio"/>					
Was difficult to manage or implement	<input type="radio"/>					
Was time-consuming or costly	<input type="radio"/>					
Other (please specify):	<input type="radio"/>					
<input type="text"/>						
Other (please specify):	<input type="radio"/>					
<input type="text"/>						

**Section D: Summary and Background Information**

24. In relation to the IS projects that your organisation has undertaken and completed (or substantially completed) between 1 January 2001 and 31 December 2003, to what extent to you agree or disagree with the following statements? (For each statement, use the mouse to click on your choice of "Strongly disagree", "Disagree", "Neutral", "Agree", "Strongly agree". You may instead select "Don't know or Not Applicable (N/A)", if appropriate.)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know or N/A
Overall, use of a standard method was beneficial to IS development.	<input type="radio"/>					
Overall, user participation in the development process was beneficial to IS development.	<input type="radio"/>					
Overall, organisational or human-related issues were more important than technical issues in determining the outcome of IS development.	<input type="radio"/>					

25. In what ways (if any) do you envisage IS development in your organisation changing in the next 3 years?

Changes in general:

Changes in relation to the use of standard methods:

Changes in relation to user participation in the development process:

26. Which business category *best* describes your New Zealand organisation? (To answer, use the mouse to click on the box below to view the options, and then click on your choice. If you make a mistake, re-click on the box and then click on the correct choice.)

- Click Here -

- Click Here -

- Communications and Media
- Construction and Engineering
- Education, Health and Community Services
- Electricity, Gas and Water Utilities
- Finance, Insurance and Banking
- Government and Local Government
- IT, Business, Legal and Property Services
- Manufacturing and Processing
- Primary Industries
- Tourism, Recreation, Accommodation and Food Services
- Transportation, Logistics and Storage
- Wholesale and Retail Trade
- Other

27. How many people (full-time equivalents) does your New Zealand organisation employ?

- Click Here -

- Click Here -

- Fewer than 100
- 100 to 199
- 200 to 499
- 500 to 999
- 1000 to 1999
- 2000 to 4999
- 5000 or more

29. Which category *best* describes the location of the IS function in your New Zealand organisation?

- Click Here -  
- Click Here -  
Mainly located in one central unit  
Distributed in various organisational units  
Mainly outsourced  
Don't know

30. What is your official position title?

< >

31. Please briefly describe your main responsibilities in relation to IS development in your organisation.

< >

32. If you have any further comments, please enter them here.

< >

33. During 2004 and 2005, we will be conducting a series of studies of IS development in New Zealand organisations. Through this we will gain an in-depth understanding of the complex interaction processes that can occur during systems development, in order to provide some guidance to industry on achieving more positive IS project outcomes.

Would be willing for us to contact you about this future research? If so, please click on the appropriate option and enter your email address below. You are free to enter your email address or not as you choose.

Yes, I am happy to be contacted about further research

Please do not contact me

If you would like a summary of the results of this survey, please click on the appropriate option and enter your email address below. You are free to enter your email address or not as you choose.

Yes, I would like a summary of the results

Please do not send me a summary of the results

Similarly, if you would like to enter the prize draw, please click on the appropriate option and enter your email address below. You are free to enter your email address or not as you choose.

Yes, I would like to enter the prize draw

Please do not enter me into the prize draw

My email address is:

Thank you very much for participating in this survey.

**Please click the "Submit your answers" button below to send us your answers for processing.**

Submit your answers

Clear the form

If you have any questions about this survey, please email us at: [laumc188@aut.ac.nz](mailto:laumc188@aut.ac.nz)

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Revised: March 1, 2004.*

## Information Systems Projects in NZ Organisations

Your response has been successfully submitted.

Thank you for taking the time to participate in this survey. We really appreciate your help.

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Revised: March 1, 2004.*

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## **Appendix 4: Survey Results**

### **A4.1 Introduction**

The main aim of this survey was to provide a comprehensive and updated assessment of IS development practice in New Zealand organisations. The survey questionnaire collected demographic information about the responding organisation and information on three areas of IS development: IS development practice in general, the use of standard methods in IS development and the participation of users in IS development. Each of these is addressed in turn.

As noted in Appendix 2, the survey was administered to 460 organisations during April and May 2004, with a response rate of 25%. The data analysis presented in this appendix is based on 106 usable survey responses.

### **A4.2 Characteristics of the Respondent Population**

Demographic information collected about the organisation included its business sector (Question 26), organisational size (Question 27), and the size and location of its IS function (Questions 28 and 29, respectively). Information collected about the respondent included his or her official position title (Question 30) and his or her main responsibilities in relation to IS development in the organisation (Question 31).

#### **A4.2.1 Organisational characteristics**

The 106 organisations in the respondent population represent 17% of the 629 organisations with at least 200 full-time equivalents (FTEs) in New Zealand. Comparison of the respondent population with the New Zealand population shows that for the purposes of this study the respondent population provides a reasonable match with respect to business sector and organisational size (see Figure A4.1 and Figure A4.2, respectively).

The business categories 'Government and Local Government' and 'Education, Health and Community Services' were used as a crude proxy for public sector organisations. On this basis, 30 (28%) organisations were classified as public sector and 76 (72%) as private sector. Seventy percent of public sector organisations had 500 or more FTEs, compared with 51% of the private sector organisations. A Chi-square test indicated a weak association between organisational size and business category on this basis ( $X^2=3.057$ ,  $df=1$ ,  $p=0.080$ ).

Figure A4.1: Respondent population by business category

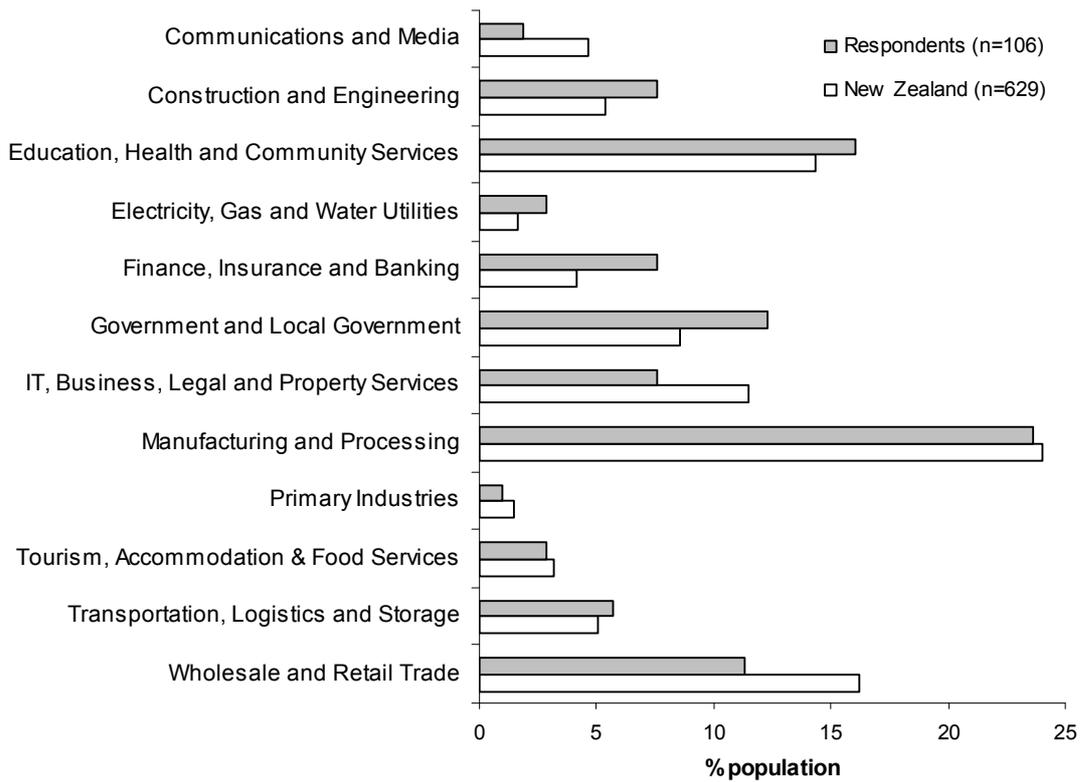
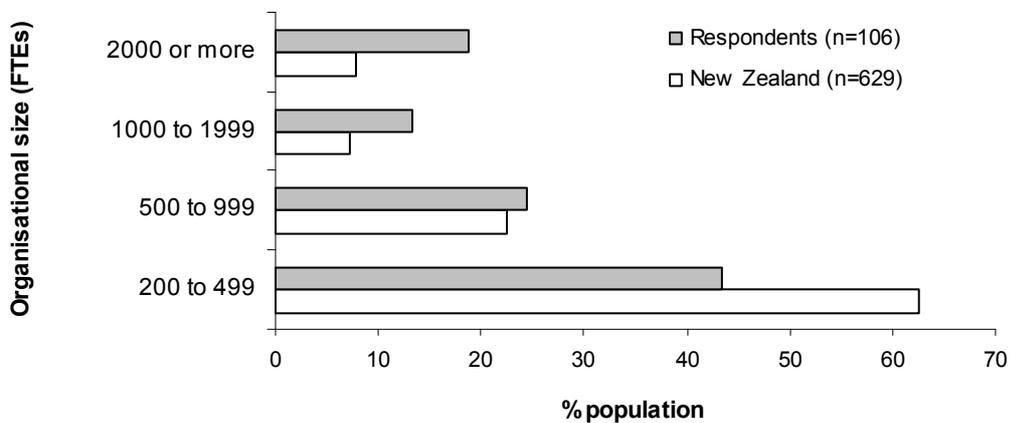


Figure A4.2: Respondent population by organisational size (FTEs)



Just over half the organisations (53%) reported sizes of IS function of fewer than 10 FTEs (Figure A4.3), and in the majority of organisations (78%) the IS function was located in one central unit (Figure A4.4). This latter finding is consistent with Rahim et al. (1998) who found that 75% of their survey respondents reported having a separate IS function. Most of the organisations reporting an outsourced IS function (77%) also had fewer than four IS FTEs.

Figure A4.3: Size of IS function (FTEs)

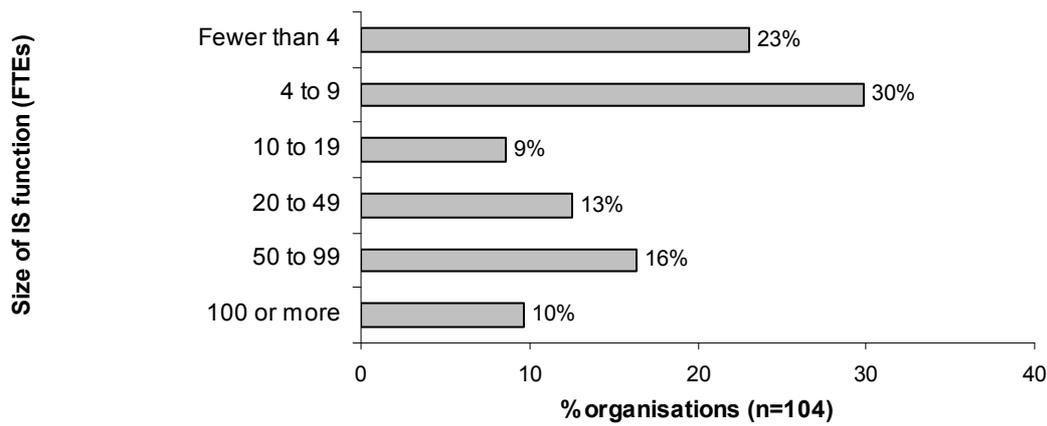
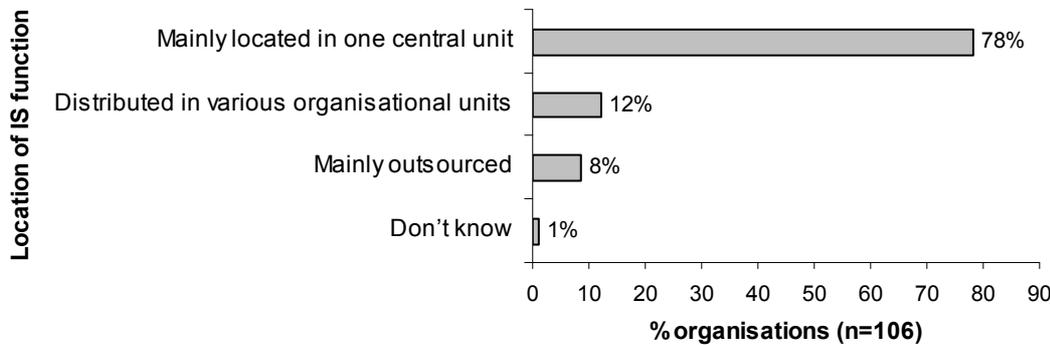


Figure A4.4: Location of IS function



As can be seen in Figure A4.5, the size of the IS function tended to follow the size of the organisation. The majority of the IS functions with fewer than 10 FTEs were located in the 200 to 499 FTEs-sized organisations. Conversely, the largest IS functions were most commonly found in the organisations with 2000 or more FTEs. This positive association between organisation size and size of IS function was confirmed by a statistical test of association using Kendall's tau ( $T_b=0.414$ ,  $p=0.000$ ). No such statistical association was found to exist between the location of the IS function and organisation size (see also Figure A4.6). In contrast, Wastell & Swards (1995) found that larger firms (>250 employees) were more likely to have a centralised IS function than smaller firms (< 250 employees).

Proportionately more public sector organisations had large IS functions; 69% had IS functions of 10 or more FTEs compared with only 39% of private sector organisations. A Chi-square test indicated this was a significant association ( $X^2=7.705$ ,  $df=1$ ,  $p=0.006$ ).

Figure A4.5: Size of IS function by organisational size (FTEs)

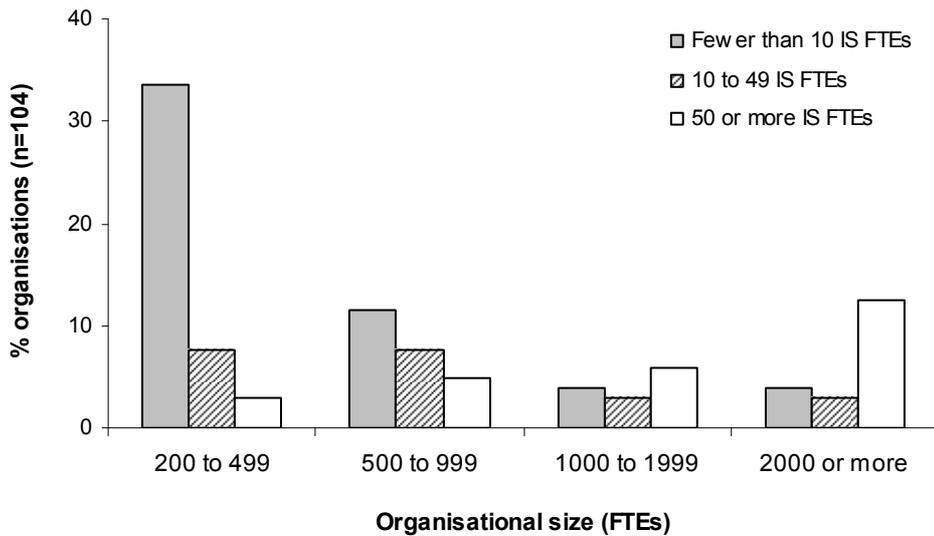
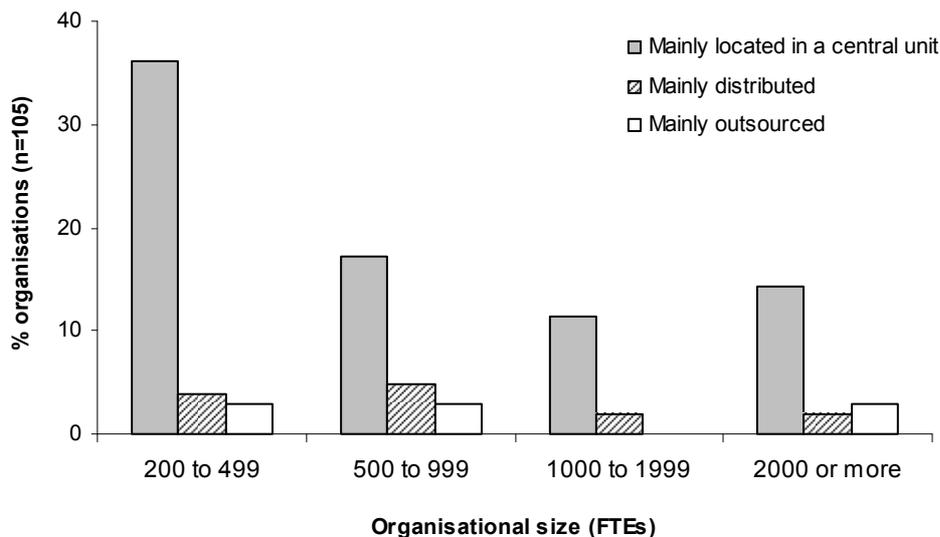


Figure A4.6: Location of IS function by organisational size (FTEs)

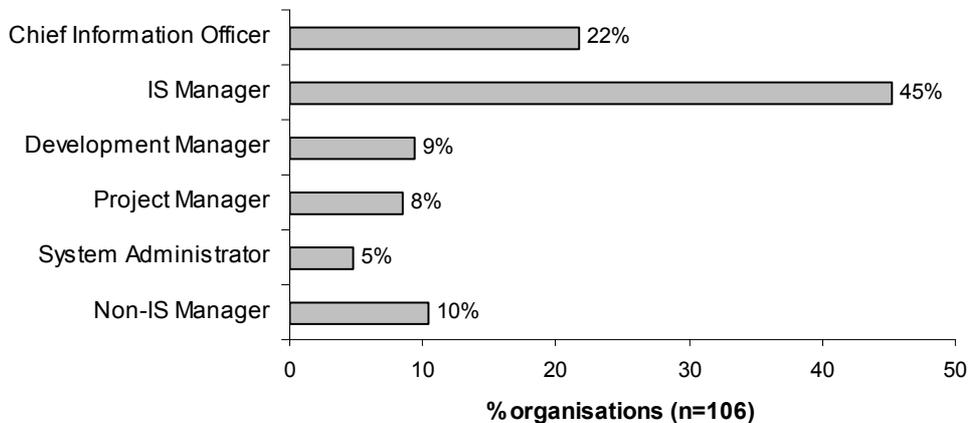


### A4.2.2 Respondent characteristics

Respondents' position titles were classified into six general positions (Figure A4.7) on the following basis. A Chief Information Officer (CIO) (which included titles such as General Manager of IS/IT, Group Manager IS/IT, and Director of IT) had overall responsibility for all aspects of IS within a (usually large) organisation. An IS Manager (also referred to as the IT Manager) was either a senior IS management position below a CIO or the primary IS manager in a smaller organisation or in an organisation where the IS function has insufficient status to warrant a CIO. A Development Manager was an IS manager specifically responsible for managing IS development within an organisation. A Project Manager was an IS professional responsible for managing specific IS projects. A Systems Administrator was responsible for systems administration and the implementation of IS projects within an organisation. A Non-IS Manager (which included titles such as Chief Executive Officer, Chief Financial Officer, and Company Secretary) either acted as a project sponsor or was a non-IS professional responsible for IS in an organisation where there is no dedicated IS manager. The majority

of respondents (90%) were IS managers or professionals of some sort, with just over three-quarters of the respondents having a senior IS management role.

Figure A4.7: Respondent's role in IS in the organisation



### A4.3 IS Development Practice

The questionnaire contained a number of questions directed at obtaining general information about IS development practices within each organisation over the three-year time frame. Questions profiling the characteristics of the IS projects undertaken by the organisation included the total number of projects that had been undertaken (Question 2), and their categorisation by overall project cost (Question 3), by the form of IS development and acquisition (Question 4), by the extent of standard method use in the development process (Question 5), and by the extent of user participation in the development process (Question 6). Other areas covered included the importance of various factors in facilitating and inhibiting IS development in these projects (Questions 7 and 8, respectively), whether or not the organisation had a formal or commonly agreed definition of successful IS development (Question 1), and anticipated changes in IS development in general in the organisation over the following three years (Question 25).

#### A4.3.1 Total number of IS projects

One hundred and five respondents reported undertaking and completing (or substantially completing) a total of 2218 IS projects over the three-year period 2001 to 2003 (Table A4.1), resulting in an average of 21 IS projects per organisation (seven projects per organisation per year). This figure is comparable with the nine projects per organisation per year obtained by a 1994 survey of New Zealand organisations by Martin & Chan (1996). The number of IS projects reported by individual organisations ranged from 0 to 230. The skewness data indicates that the number of projects undertaken across the organisations is asymmetric (i.e. not normally distributed), with a long right tail representing a few very large observations.

Characterisation of the number of projects undertaken by each organisation across various ranges of project numbers is shown in Figure A4.8. Mann-Whitney tests for equality of medians established that larger organisations, or those with large IS functions, undertook more IS projects during the survey period (Table A4.2). The median number of IS projects undertaken differed significantly between the larger (500 or more FTEs) and smaller (200-499 FTEs) organisations, and between the larger (10 or more FTEs) and smaller (fewer than 10 FTEs) IS functions.

Chi-square tests found no significant association between the number of projects undertaken by an organisation and whether the organisation was in the public sector or private sector ( $X^2=0.553$ ,  $df=4$ ,  $p=0.968$ ).

Table A4.1: Statistics on the numbers of IS projects undertaken

	Number of projects <sup>†</sup>
Total projects (for 105 organisations)	2218
Range	0 to 230
Mean	21.1
Standard deviation	37.4
Skewness	3.542
Standard error of skewness	0.236
Mode	5
Median	6

<sup>†</sup> Excludes 1 organisation (that undertook 4000 projects)

Figure A4.8: Organisations undertaking different numbers of IS projects

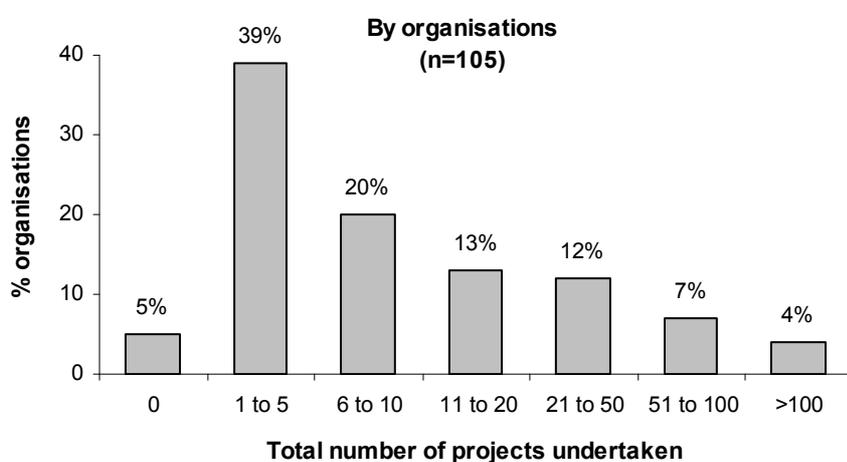


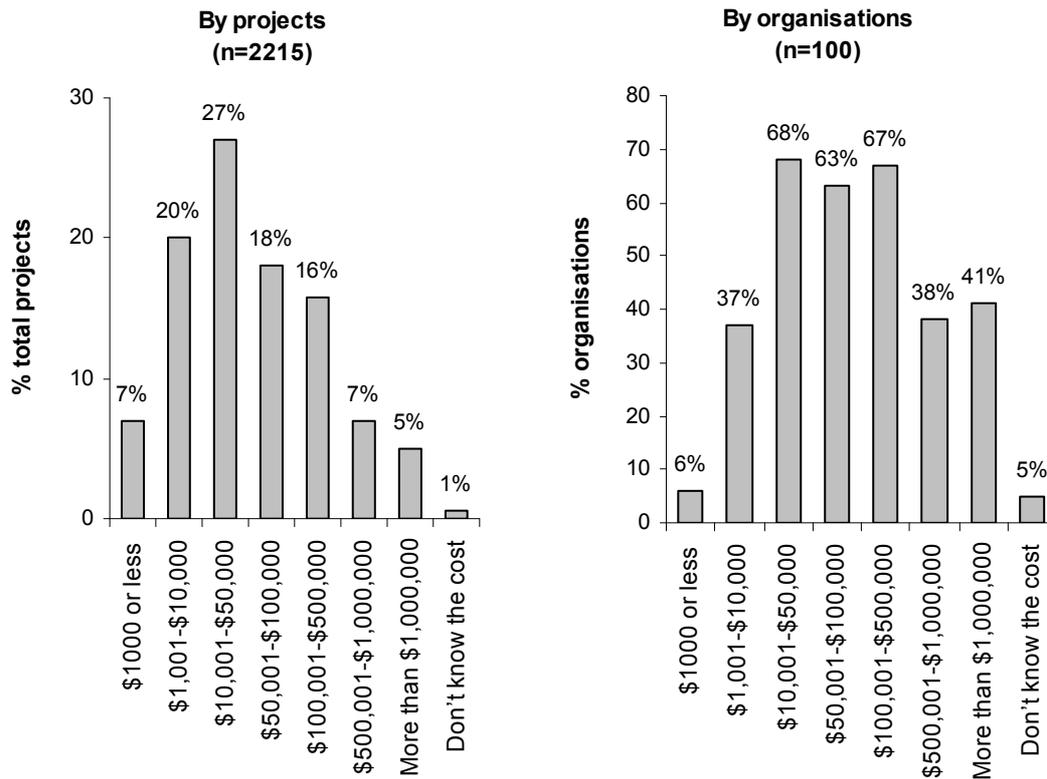
Table A4.2: Total IS projects by organisational size and size of IS function

	Median projects per organisation	Mann-Whitney test for equality of medians		
		Mean rank	Mann-Whitney U	p (2-tailed)
<b>Organisational size</b>				
200-499 FTEs (n=46)	10.7	41.93	848.0	0.001
500 or more FTEs (n=59)	29.2	61.63		
<b>Size of IS function</b>				
Fewer than 10 FTEs (n=55)	7.9	38.86	597.5	0.000
10 or more FTEs (n=48)	35.9	67.05		

#### A4.3.2 Characterisation of IS Projects by overall project cost

One hundred organisations reported a total of 2215 projects over seven project cost categories and a 'Don't know the cost' option. This figure is very close to the total 2218 projects reported for Question 2. Moreover, for each respondent, the figures reported in both of these questions (Questions 2 and 3) were also very close. Figure A4.9 shows the proportion of projects that fall into each cost category, as well as the percentage of organisations that reported projects in each cost category.

Figure A4.9: Overall project cost



Of the 2215 projects reported, just over half (54%) cost \$50,000 or less. The majority of the reported projects (81%) were distributed across four categories between \$1,001 and \$500,000. The 5% of IS projects costing over \$1 million were undertaken by 41% of the organisations (from a range of organisational sizes), suggesting that they are not the exclusive preserve of the very largest organisations. Around two-thirds of organisations undertook IS projects in each of the three categories between \$10,001 and \$500,000. The incidence of smaller sized projects is consistent with the view that most organisations spend the majority of their time on smaller projects (Eva & Guilford, 1996) and that the development of smaller-sized projects is an emerging part of the modern IS development landscape (Johnson et al., 2001; SoftwareMag, 2004).

Although smaller organisations undertook high cost projects, the larger organisations tended to undertake more of the projects costing more than \$50,000 (Figure A4.10). Mann-Whitney tests for equality of medians confirmed this for project cost categories over \$50,000, the total cost of projects undertaken and the average project cost (Table A4.3). Mann-Whitney tests also confirmed that organisations with large IS functions undertook significantly more of the higher cost IS projects during the survey period for project cost categories over \$50,000, the total cost of projects undertaken and the average project cost (Table A4.4).

Figure A4.10: Distribution of smaller and larger organisations by project cost

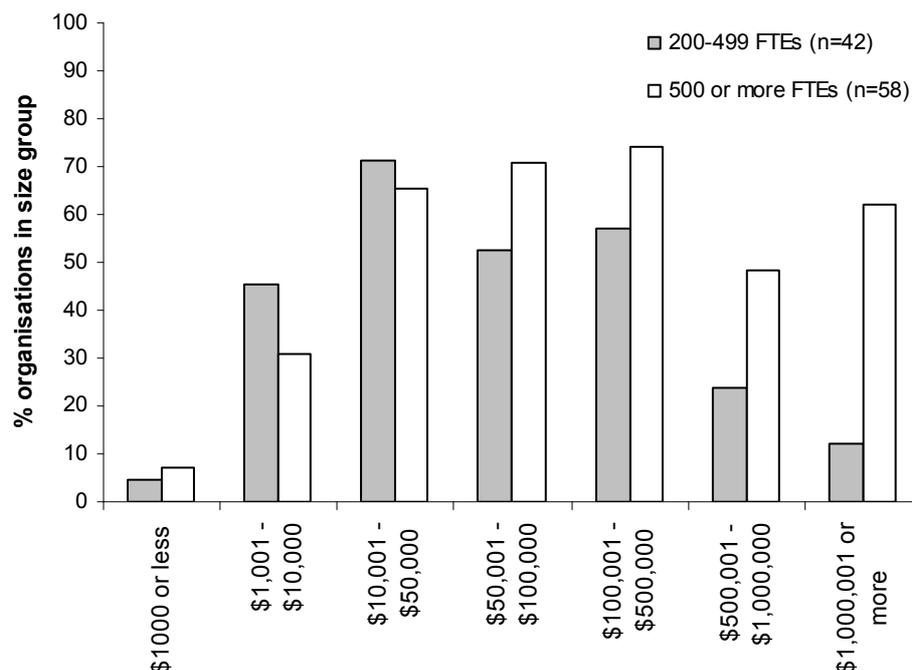


Table A4.3: Project cost by organisational size

Project cost category	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	Organisational size <sup>†</sup>			
	'Small' (n=42)	'Large' (n=58)		
\$1000 or less	49.86	50.97	1191.0	0.647
\$1,001 - \$10,000	53.17	48.57	1106.0	0.366
\$10,001 - \$50,000	46.98	53.05	1070.0	0.292
\$50,001 - \$100,000	42.61	56.22	886.5	0.017
\$100,001 - \$500,000	41.01	57.37	819.5	0.004
\$500,001 - \$1,000,000	42.05	56.62	863.0	0.004
\$1,000,001 or more	35.24	61.55	577.0	0.000
Total project cost*	34.39	62.16	541.5	0.000
Average project cost*	38.85	58.98	728.5	0.001

<sup>†</sup> 'Small' organisations had 200-499 FTEs; 'Large' organisations had 500 or more FTEs  
 \* Calculated using \$500, \$5,500, \$30,000, \$75,000, \$300,000, \$750,000, and \$2,000,000 for the respective project cost categories.

Chi-square tests found no significant association between whether an organisation was in the public sector or private sector and the number of projects undertaken in each cost category by an organisation, or the total cost of all projects undertaken by an organisation ( $X^2=3.872$ ,  $df=3$ ,  $p=0.276$ ), or the average project cost per organisation ( $X^2=3.571$ ,  $df=3$ ,  $p=0.312$ ).

Table A4.4: Project cost by size of IS function

Project cost category	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	IS function size <sup>†</sup>			
	'Small' (n=502)	'Large' (n=48)		
\$1000 or less	49.40	49.60	1195.0	0.932
\$1,001 - \$10,000	51.13	47.80	1118.5	0.506
\$10,001 - \$50,000	46.11	53.03	1030.5	0.219
\$50,001 - \$100,000	41.17	58.18	783.5	0.002
\$100,001 - \$500,000	38.51	60.95	650.5	0.000
\$500,001 - \$1,000,000	39.15	60.28	682.5	0.000
\$1,000,001 or more	36.16	63.40	533.0	0.000
Total project cost*	33.35	66.32	392.5	0.000
Average project cost*	41.27	58.07	788.5	0.003

<sup>†</sup> 'Small' IS functions had fewer than 10 FTEs; 'Large' IS functions had 10 or more FTEs  
\* Calculated using \$500, \$5,500, \$30,000, \$75,000, \$300,000, \$750,000, and \$2,000,000 for the respective project cost categories.

### A4.3.3 Characterisation of IS projects by form of IS development and acquisition

One hundred organisations reported a total of 2039 projects over five categories of IS development and acquisition. This figure differs from the total number of 2218 IS projects reported above in Question 2 by 179 projects (8%). This represents a small number of organisations who did not provide data on all of their IS projects. This situation may have arisen because there was no option under which respondents could place projects where they were unsure of the category of IS development and acquisition. Figure A4.11 shows the proportion of projects that correspond to each category of IS development and acquisition, as well as the percentage of organisations that reported projects for each category of development.

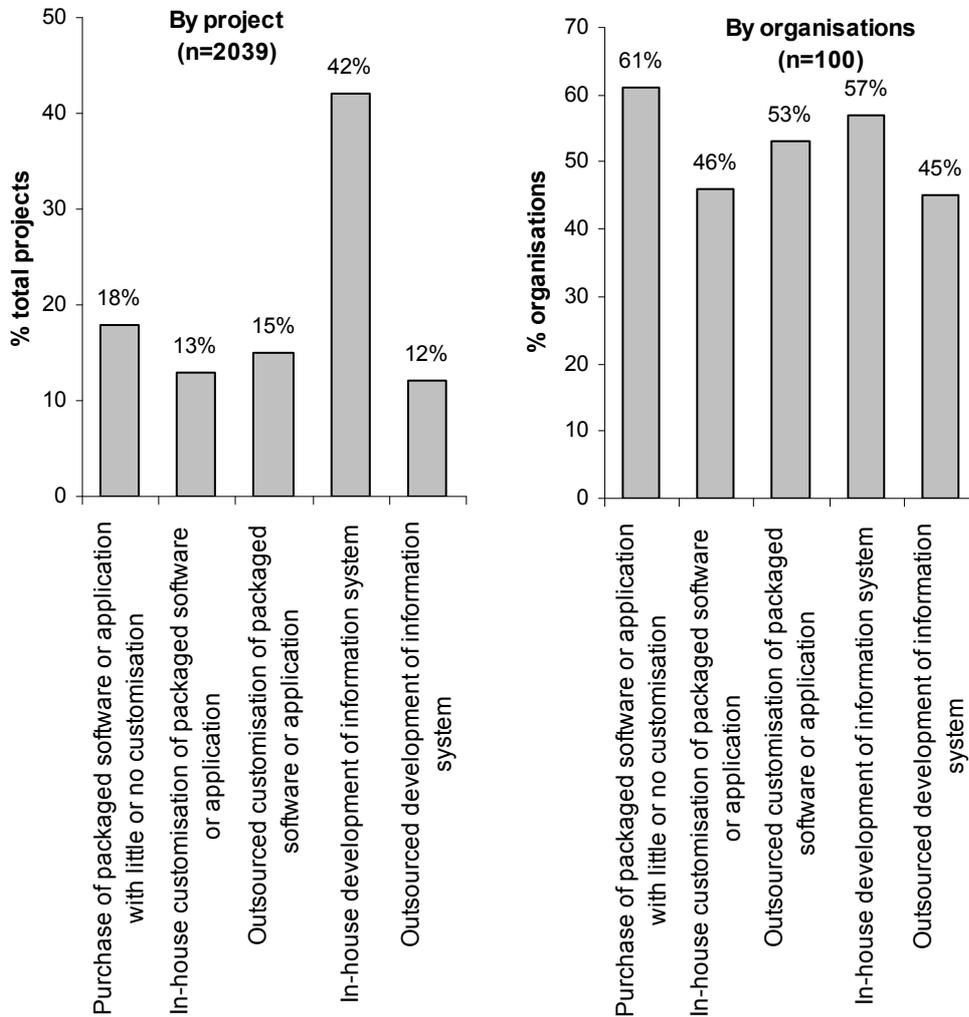
Of the 2039 projects reported, just over half (54%) were IS applications specifically developed for or by the organisation (bespoke development). The remaining 46% involved the purchase of packaged software or applications. Of these packaged acquisitions, 38% were used as is, and 62% were customised for or by the organisation. Of the 2039 projects reported, 82% involved bespoke development or customisation of packaged software. In 67% of these projects, this work was undertaken in-house within the organisation. The work in the other 33% of these projects was outsourced to another organisation. This data is comparable with data reported by the Standish Group for US application projects in 2000 (Standish Group International, 2001). They found that 46% involved bespoke development, 14% involved purchase of packages without modification, 27% involved customisation of packaged software and 13% involved developing some components and purchasing others.

Taking into account the fact that organisations could use one, many or all of the development categories, 91 (91%) organisations reported using packaged software at some stage, 57 (57%) reported using in-house bespoke development at some stage, and 45 (45%) reported using outsourced bespoke development at some stage. This data is comparable to an earlier survey of New Zealand organisations where 88% of the respondents reported using packaged software, 61% reported using in-house bespoke development, and 62% reported using outsourced bespoke development (MacDonell, 1994). The main difference over the 10 year period seems to have been a decrease (of 17%) in the proportion of organisations undertaking outsourced bespoke development.

In the current study, 76 (76%) organisations reported using bespoke development; only 9 (9%) organisations used this form of IS development exclusively. Sixty-one (61%) organisations reported at some time purchasing software packages with little or no customisation; only 4 (4%) organisations obtained all of their IS in this way. Seventy-seven (77%) organisations reported customising IS applications that they had

purchased; only 8 (8%) organisations reported obtaining all of their IS in this way. Twenty four (24%) organisations reported obtaining all of their IS as packaged software. Eight (8%) organisations used all five categories of IS development and acquisition.

Figure A4.11: Characterisation by category of IS development and acquisition



Seventy-six (76%) organisations reported using in-house customisation or development; 23 (23%) organisations reported using only this form of development. Seventy (70%) organisations reported outsourcing customisation or development. While 19 (19%) organisations used only outsourced customisation or development, 44 (44%) used outsourcing for at least half of their projects. This compares well with the 43% of New Zealand organisations who reported that they outsourced most or all of their applications development in 2002 (up from 37% in 2001) (Hind, 2002). Half the organisations in the current study used both in-house and outsourced customisation or development.

Within the IS literature, the modern IS development environment is generally characterised as having increased levels of packaged software acquisition and customisation, increased outsourcing of IS development, and concomitant reduced levels of in-house IS development (Avison & Fitzgerald, 2003; Clegg et al., 1997; Fitzgerald, 2000; Hind, 2002; Keil & Tiwana, 2006; Sawyer, 2001; Schmidt et al., 2001). The 'average' development profile for the respondents, shown in Table A4.5, is 27% in-house development of IS, 14% outsourced development of IS, and 59% packaged software or application. On average, 43% of the development profile involves in-house development or customisation, compared to 34% outsourced development or customisation. Compared to prior studies between 1994 and 2001 (Table A4.5), the average

development profile in this study has a higher level of packaged solutions and a lower level of bespoke development. In terms of bespoke development, while the level of outsourced development is consistent with some prior overseas studies (Fitzgerald, 1998a; Fitzgerald et al., 1999), the level of in-house development is lower for this study.

Table A4.5: Comparative development profile of survey participants

Forms of IS development & acquisition	New Zealand			Ireland	UK		
	This study†	MacDonell (1994)	McAulay (1987), cited in MacDonell (1994)	Fitzgerald (1998a)	Fitzgerald et al. (1999)	Wastell & Sowards (1995)	Doherty & King (2001) *
% In-house development of IS	27	29	56	47	45	)	50
% Outsourced development of IS	14	27	8	13	15	) 55	)
% Use of packaged software/application	59	44	27	40	40	42	) 50
<i>With little or no customisation</i>	23				23		
<i>With in-house customisation</i>	16				17		
<i>With outsourced customisation</i>	20				-		
† For this study, the projects undertaken in each category were expressed as a proportion of the total projects reported by an organisation. These proportions were then averaged over the 100 organisations, to give an average development profile.							
* Estimated from reported ranges of in-house developed IS							

Consideration of the New Zealand data shows a continuing trend towards packaged solutions and away from bespoke development (MacDonell, 1994). Over a 17-year period (from 1987 to 2004), packaged software use increased from 27% (in 1987) to 44% (in 1994) to 59% (in 2004) on average. In-house development fell from 56% (in 1987) to 29% (in 1994) and 27% (in 2004), while outsourced development fluctuated from 8% (in 1987) to 27% (in 1994) to 14% (in 2004). These results are consistent with an early report that many New Zealand organisations would prefer to find a packaged solution rather than developing the solution in-house (CIS 1989, cited in MacDonell, 1994)<sup>1</sup>. MacDonell (1994) suggests that the preference for packaged solutions stems from the increasingly availability of quality software packages and the relatively high cost of in-house development. Certainly, the main reasons given by respondents in McAulay's earlier survey for moving away from in-house development to packaged solutions were the high cost of in-house development and time constraints (McAulay 1987, cited in MacDonell, 1994)<sup>2</sup>. According to Chang (2006), the outsourcing of the IT function in many organisations that occurred in the 1990s was partly motivated by perceived shortcomings of IT management.

The data for each IS development and acquisition category were transformed to provide data comparing five basic types of IS development and acquisition: (1) packaged software acquisition (without customisation), (2) customisation of packaged software (whether in-house or outsourced), (3) bespoke IS development (whether in-house or outsourced), (4) in-house customisation or development, and (5) outsourced customisation or development.

Larger organisations undertook more of each of these five basic types of IS development and acquisition than their smaller counterparts. Mann-Whitney tests found that this difference was particularly

<sup>1</sup> CIS. (1989). *CASE Project - Report on Computer Aided Software Engineering in New Zealand: Case Study Report*, Centre for Information Science (CIS), University of Auckland, May 1989.

<sup>2</sup> McAulay, K. (1987). Information systems development and the changing role of MIS in the organisation. In *Proceedings of the 1st New Zealand MIS Management Conference (March, Wellington/Auckland)* (pp. S1.1-S1.16).

significant for bespoke development (Table A4.6). Examination of the data suggests that the larger organisations also tended to undertake proportionately more of each type of IS development and acquisition (as a percentage of their total IS project activity) except for packaged software acquisition (without customisation), of which smaller organisations tended to undertake proportionately more. However, Mann-Whitney tests found that none of the median differences between larger and smaller organisations were significant (Table A4.6).

Table A4.6: IS development and acquisition type by organisational size

Type of IS development & acquisition	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	Organisational size <sup>†</sup>			
	'Small' (n=42)	'Large' (n=58)		
<i>Number of projects</i>				
Package acquisition (no customisation)	44.79	54.64	978.0	0.092
Customisation of packaged software	44.06	55.16	947.5	0.056
Bespoke IS development	41.02	57.36	820.0	0.005
In-house customisation or development	44.70	54.70	974.5	0.086
Outsourced customisation/development	45.68	53.99	1015.5	0.150
<i>Proportion of projects</i>				
Package acquisition (no customisation)	54.58	47.54	1046.5	0.227
Customisation of packaged software	49.94	50.91	1194.5	0.869
Bespoke IS development	46.42	53.46	1046.5	0.227
In-house customisation or development	49.86	50.97	1191.0	0.849
Outsourced customisation/development	48.48	51.97	1133.0	0.547
<sup>†</sup> 'Small' organisations had 200-499 FTEs; 'Large' organisations had 500 or more FTEs				

Larger IS functions undertook more of each of the five basic types of IS development and acquisition than their smaller counterparts. Mann-Whitney tests found that this difference was significant for bespoke development and in-house customisation or development (Table A4.7). Mann-Whitney tests found that the proportionally more bespoke development undertaken by larger IS functions was significant. However, smaller IS functions undertook proportionately more packaged software acquisition, whether customised or not. Mann-Whitney tests found that the median difference was significant in both cases. Mann-Whitney tests also confirmed that that the proportionally more in-house customisation or development undertaken by larger IS functions was significant. While smaller IS functions tended to undertake proportionally more outsourced customisation or development, the median difference between them and larger IS functions was not significant (Table A4.7).

Chi-square tests found no significant association between whether an organisation was in the public sector or private sector and the number or proportion of projects undertaken for each of the five basic types of IS development and acquisition.

From a practical viewpoint, the results obtained in this study, together with observations in the local IS practice literature (e.g. Bell et al., 2003; Bland, 2005; Gordon, 2005; Greenwood, 2006; Hind, 2002; Watson, 2004), suggest that New Zealand organisations have been realising some of the benefits of using packaged software or outsourcing. These include reduced cost, reduced requirements for internal skilled technical staff, ongoing support, access to upgrades and avoiding operations outside their core business (Cope, 2000; Palmer, 1999). Even so, these acquisition options are unlikely to answer all of the IS needs of an organisation (especially in terms of non-standard problems), suggesting that there is still a place for in-house development (Palmer, 1999).

Table A4.7: IS development and acquisition type by size of IS function

Type of IS development & acquisition	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	IS function size <sup>†</sup>			
	'Small' (n=50)	'Large' (n=48)		
<i>Number of projects</i>				
Package acquisition (no customisation)	45.95	53.20	1022.5	0.204
Customisation of packaged software	47.72	51.35	1111.0	0.522
Bespoke IS development	35.50	64.08	500.0	0.000
In-house customisation or development	36.46	63.08	548.0	0.000
Outsourced customisation/development	47.33	51.76	1091.5	0.432
<i>Proportion of projects</i>				
Package acquisition (no customisation)	59.68	38.90	691.0	0.000
Customisation of packaged software	56.60	42.10	845.0	0.011
Bespoke IS development	39.32	60.10	691.0	0.000
In-house customisation or development	40.90	58.46	770.0	0.002
Outsourced customisation/development	53.74	45.08	988.0	0.126
<sup>†</sup> 'Small' IS functions had fewer than 10 FTEs; 'Large' IS functions had 10 or more FTEs				

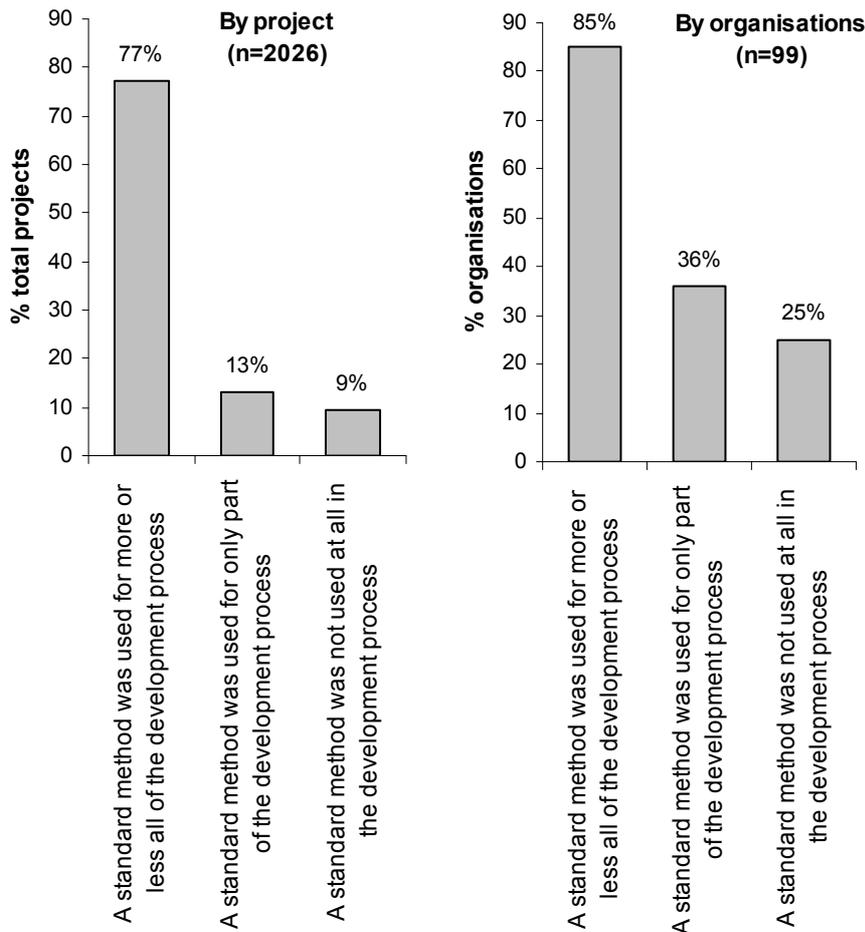
#### A4.3.4 Characterisation of IS projects by the use of standard methods

A breakdown of the number of projects undertaken over the selected time frame according to different types of standard method use in the development process is presented in Figure A4.12. Ninety-nine organisations reported on 2026 IS projects, 192 fewer than the total 2218 projects reported earlier for Question 2 (9%). This represents a small number of organisations who did not provide data on all of their IS projects. Again, this may reflect the absence of an option under which respondents could place projects where they were unsure of the category of standard method use. The responses of two organisations were not included in the analysis because of missing or questionable data.

Of the 2026 projects reported for this question, the vast majority (91%) used a standard method of IS development for at least part of the development process. In only 9% of the reported projects was a standard method not used.

Consideration of standard method use by organisation, rather than project, produced a similar result, with 91 (92%) of organisations reporting use of a standard method in at least part of the development process in at least some of their IS projects; the remaining 8 (8%) reported never using a method. Sixty-eight (69%) reported always using a standard method – 44 (44%) always for the entire development process and 6 (6%) always for only part of the development process. Seventeen (17%) reported using a method for some but not all of their projects. This accords with Wynekoop & Russo (1995), who note that just because an organisation cites use of a standard method, it may not actually be used in all of their IS projects. Six (6%) organisations did not report on all of their projects.

Figure A4.12: Extent of standard method use in IS projects



Compared to prior empirical studies (Table A4.8), and perhaps contrary to expectations (given that it was conducted more recently), this study consistently shows higher reported levels of standard method use, either in terms of the proportion of organisations that reported using a standard method, or the proportion of reported projects in which a standard method was not used, and the lower proportion of organisations doing at least some of their IS development without using a standard method. It is worth noting, however, that the highest prior reported level of method use (85%) was from another New Zealand (albeit a small sample, preliminary) study (Taylor, 2000).

Table A4.8: Comparative use of standard methods

Standard method use	This study	Prior studies
% organisations reporting use of a standard method	92	40 to 85 (Barry & Lang, 2001, 2003; Eva & Guilford, 1996; Fitzgerald, 1998a; Fitzgerald et al., 1999; Hardy et al., 1995; livari & Maansaari, 1998; Kiely & Fitzgerald, 2002; Rahim et al., 1998; Russo et al., 1996; Taylor, 2000; Wastell & Swards, 1995)
% organisations reporting at least some IS development without use of a standard method	25	46 (Russo et al., 1996)
% projects in which a method was not used at all in the development process	9	31 (Chatzoglou, 1997; Russo et al., 1996)

Prior empirical studies have shown that the use of standard methods by organisations may be associated with various organisational characteristics. For example, method use may be correlated with organisation size (Fitzgerald, 1998a; Kiely & Fitzgerald, 2002; Russo et al., 1996; Urban & Whiddett, 1996; Wastell & Swards, 1995) or size of the IS function (Fitzgerald, 1998a; Russo et al., 1996), or associated with

organisations in a particular industry sector (Fitzgerald, 1998a; Rahim et al., 1998). For example, an early New Zealand study found that more structured methods tended to be found in larger organisations (with more than 500 employees) and in information intensive sectors (such as government, finance, computing and data processing, and utilities sectors), while prototyping or object oriented methods were more commonly found in smaller organisations (Urban & Whiddett, 1996). The relatively high proportion of method users in the current study prevented such statistical comparisons. However, statistical comparisons were made between these organisational characteristics and the number or proportion of projects in which a method was used for more or less all of the development process, for only part of the development process, for at least part of the development process (i.e. either for more or less all or for only part of the process), or not used at all.

Overall, larger organisations reported more projects in each category of standard method use than their smaller counterparts. Mann-Whitney tests found that these median differences between the two groups were significant (Table A4.9). Smaller organisations tended to report a higher median number of projects where a standard method was not used, although the difference in median compared to the larger organisations was not significant. When standard method use was analysed as a proportion of an organisation's IS development efforts, median use of a standard method in any form was higher for larger organisations than for smaller organisations, although not at significant levels. Again, the proportional non-use of a standard method by smaller organisations was higher than in larger organisations, although not at a significant level (Table A4.9).

Table A4.9: Standard method use by organisational size

Form of standard method use	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	Organisational size <sup>†</sup>			
	'Small' (n=42)	'Large' (n=58)		
<i>Number of projects</i>				
Used for more or less all of the process	42.56	55.48	884.5	0.026
Used for only part of the process	44.35	54.17	959.5	0.051
Used for at least part of the process	40.80	56.78	810.5	0.006
Not used at all	53.51	47.41	1049.5	0.171
<i>Proportion of projects</i>				
Used for more or less all of the process	48.21	51.32	1122.0	0.576
Used for only part of the process	45.24	53.51	997.0	0.100
Used for at least part of the process	45.43	53.37	1005.0	0.075
Not used at all	54.57	46.63	1005.0	0.075
<sup>†</sup> 'Small' organisations had 200-499 FTEs; 'Large' organisations had 500 or more FTEs				

Size of IS function displayed a similar pattern of the results as those for organisation size. Larger IS functions tended to undertake significantly more projects in which a standard method was used than smaller IS functions. Non-use of a standard method did not differ significantly between the two groups (Table A4.10). When standard method use (or non-use) was analysed as a proportion of an organisation's IS development efforts, there were no significant differences between larger and smaller IS functions (Table A4.10).

Chi-square tests found no significant association between whether an organisation was in the public sector or private sector and the number or proportion of projects in which a standard method was used or not used.

Table A4.10: Standard method use by size of IS function

Form of standard method use	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	ISA function size <sup>†</sup>			
	'Small' (n=50)	'Large' (n=48)		
<i>Number of projects</i>				
Used for more or less all of the process	40.60	57.94	755.0	0.002
Used for only part of the process	43.79	54.54	914.5	0.027
Used for at least part of the process	38.61	60.05	655.5	0.000
Not used at all	49.50	48.47	1150.0	0.814
<i>Proportion of projects</i>				
Used for more or less all of the process	47.83	50.24	1116.5	0.655
Used for only part of the process	45.27	52.97	988.5	0.114
Used for at least part of the process	47.19	50.93	1084.5	0.395
Not used at all	50.81	47.07	1084.5	0.395
<sup>†</sup> 'Small' IS functions had fewer than 10 FTEs; 'Large' IS functions had 10 or more FTEs				

Of the 25 respondents who specified projects in which a standard method had not been used, 24 explained why a standard method had been not used in the projects concerned, sometimes providing more than one explanation. The reasons given for not using a standard method (presented in Table A4.11) tended to relate to either characteristics of the IS project or to features of the IS development process (organisational policy and practice on standard method use and the IS procurement process). Overall, the implication is that organisations may choose to not use standard methods in a given IS project for pragmatic reasons (cf. Fitzgerald, 1996; 1998a; 2000), rather than because there are fundamental problems with the methods themselves.

Table A4.11: Explanations given as to why a standard method was not used (n=24)

Reasons for not using a standard method	Number of responses
<i>Project characteristics</i>	
Small or non-critical project	5
Small-sized team	2
Project not controlled by IS or IT department	6
Urgent need for a solution	1
The scope of project was unknown at the outset	1
A standard method was not considered to be required	1
<i>Organisational policy and practice</i>	
Informal development approach used	6
No standard method in place	4
Responsible autonomy of IS developers	1
<i>IS procurement process</i>	
Packaged software requiring little or no customisation	2
Total	27

An important group of project-related reasons given for not using a standard method concerned the small size of an IS project. Examples included development undertaken by a small project team, projects that were not business critical, or a reluctance to dedicate limited resources to small projects because the costs did not outweigh the benefits of using a standard method. Control of or responsibility for the project being external to the IS function (by users or an external party) was another important reason given for not using a method. These reasons are consistent with those identified in prior studies which have shown that standard method use is less likely with small-scale projects, projects with small development teams or short durations, where

there are resource constraints or where there is no perceived net benefit in using a method (Fitzgerald, 1998a; Fitzgerald et al., 2002; Kiely & Fitzgerald, 2002, 2003; Roberts et al., 2000; Wynkoop & Russo, 1995).

Organisational policy and established practice in relation to standard method use may influence whether or not a standard method is used at all or in a particular IS project (Huisman & livari, 2002; Kautz, 2004; Nandhakumar & Avison, 1999). In terms of this study, the influence of organisational policy and practice was reflected in those projects where a method was not used through the informal or ad hoc approach taken towards development within the organisation or the unavailability of a standard method within the organisation. A number of these organisations later said that they had just introduced a standard method or were intending doing so. In one organisation, the high degree of autonomy in relation to IS development enjoyed by development staff meant they were free to choose when to use a method or not – a practice also observed in the IS literature (Fitzgerald, 1998b; Fitzgerald et al., 2002; Nandhakumar & Avison, 1999).

Two respondents stated that they had not used a standard method because the IS projects involved package software requiring little or no customisation. This is consistent with (Fitzgerald, 1998a) who found that method use was less likely in IS projects involving customisation of packaged solutions.

#### **A4.3.5 Characterisation of IS projects by user participation**

A breakdown of the number of projects undertaken over the selected time frame according to different types of user participation in the development process is presented in Figure A4.13. One hundred organisations reported on 2129 projects, 89 fewer than the total 2218 projects reported earlier for Question 2 (4%). The shortfall arises from a small number of organisations who did not provide data on all of their IS projects. Again, no option was provided for respondents to place projects where they were unsure of the category of user participation. One organisation was not included in the analysis because of questionable data.

Of the 2129 projects reported for this question, users participated in close to all the (92%) of the total IS projects reported in Question 2; users did not participate at all in 8% of the reported projects. Users participated in more or less all of the development process in 61% of the reported projects. This level of user participation is higher than that reported in Kiely & Fitzgerald's (2002) survey of project managers in medium to large Irish organisations in which users participated in 65% of the projects and played a significant part in development in 56% of projects.

All responding organisations who undertook IS projects reported having some level of user participation in at least some of their projects. Overall, 84% of organisations reported always having users participate in the development process, either always for the entire development process (46%), always for only part of the development process (19%), or a mixture of the two (18%).

Statistical comparisons were made between organisational size or size of the IS function, and the number or proportion of projects in which users participated for more or less all of the development process, for only part of the development process, for at least part of the development process (i.e. either of the preceding), or in which users did not participate at all. Overall, larger organisations tended to report more projects in which users participated for more or less all of the development process, or for at least part of the development process. Mann-Whitney tests found that the median difference between the two groups was significant for the latter (Table A4.12). This seems to reflect the higher overall number of projects reported by larger organisations as when user participation was analysed as a proportion of an organisation's IS development efforts, there were no significant differences in the medians of larger and smaller organisations.

Figure A4.13: Type of user participation in IS projects

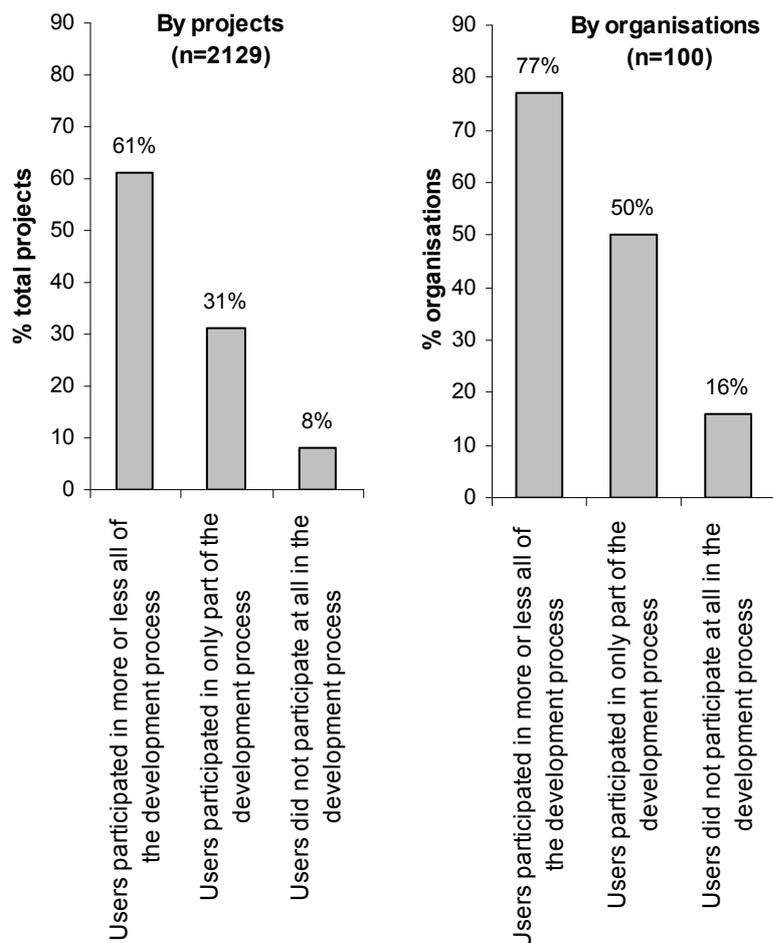


Table A4.12: User participation by organisational size

Form of user participation	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	Organisational size <sup>†</sup>			
	'Small' (n=42)	'Large' (n=58)		
<i>Number of projects</i>				
Used for more or less all of the process	44.67	54.72	973.0	0.085
Used for only part of the process	50.01	50.85	1197.5	0.878
Used for at least part of the process	42.36	56.40	876.0	0.017
Not used at all	48.01	52.30	1113.5	0.265
<i>Proportion of projects</i>				
Used for more or less all of the process	49.92	50.92	1193.5	0.856
Used for only part of the process	51.60	49.71	1172.0	0.730
Used for at least part of the process	53.31	48.47	1100.0	0.219
Not used at all	48.25	52.13	1123.5	0.313

<sup>†</sup> 'Small' organisations had 200-499 FTEs; 'Large' organisations had 500 or more FTEs

Size of IS function displayed a similar pattern of the results as those for organisation size. The median difference between larger and smaller IS functions was significant for projects in which users participated for more or less all, or for at least part of, the development process (Table A4.13). Again, this probably reflects the

higher overall number of projects reported by larger IS functions as there were no significant differences in the medians of larger and smaller organisations in terms of their proportional utilisation of user participation.

Table A4.13: User participation by size of IS function

Form of user participation	Mann-Whitney test for equality of medians			
	Mean rank		Mann-Whitney U	p (2-tailed)
	IS function size <sup>†</sup>			
	'Small' (n=50)	'Large' (n=48)		
<i>Number of projects</i>				
Used for more or less all of the process	41.83	57.49	816.5	0.006
Used for only part of the process	49.61	49.39	1194.5	0.967
Used for at least part of the process	39.54	59.88	702.0	0.000
Not used at all	47.54	51.54	1102.0	0.291
<i>Proportion of projects</i>				
Used for more or less all of the process	46.48	52.65	1049.0	0.255
Used for only part of the process	53.39	45.24	995.5	0.119
Used for at least part of the process	51.78	47.13	1086.0	0.230
Not used at all	47.79	51.28	1114.5	0.357
† 'Small' IS functions had fewer than 10 FTEs; 'Large' IS functions had 10 or more FTEs				

Chi-square tests found no significant association between whether an organisation was in the public sector or private sector and the number or proportion of projects in which users did or did not participate.

Of the 16 respondents who specified projects in which no user participation had occurred, 13 explained why users had not participated in the projects concerned (see Table A4.14). The most common reason given was that the projects were perceived to be of little or no relevance to users, usually because of their technical or infrastructural nature. Because all IS projects (even technical ones) will ultimately have some users, presumably these respondents were referring to business users. For example, one respondent noted that "technical projects would involve mainly IT professionals, whereas customer-facing projects would involve users". Other examples included projects internal to the IS or IT department and a deliberate decision to impose new processes on users. Users were also not involved in two projects where the IS was packaged software requiring little or no customisation, consistent with the findings reported by Butler & Fitzgerald (1999). Other reasons given for not including users were that development was done overseas; users were unavailable to participate in the development; and it was not organisational policy. In the latter case, the respondent noted that until recently the importance of user acceptance was not recognised by his or her organisation, a reasonably surprising comment given the relatively widespread adoption of user participation practices. In contrast, the first two reasons given are consistent with prior literature which suggests that users may not be able to participate in IS development (or may only be able to participate in a restricted way) because of their geographical location, the architectural layout of the office buildings, or other job commitments (Butler & Fitzgerald, 2001; Cavaye, 1995; Nandhakumar & Jones, 1997).

Table A4.14: Explanation given as to why users did not participate in some IS projects (n=13)

Reasons users did not participate	Number of responses
Lack of user relevance	8
Packaged software requiring little or no customisation	2
Other	3

### A4.3.6 Factors facilitating IS development

Respondents were asked to indicate how important 12 factors drawn from the literature had been in facilitating IS development in the projects undertaken over the three-year time frame. Statistical data for each of the factors is presented in Table A4.15, and their relative importance is shown graphically in Figure A4.14. The factors are shown in order of their perceived relative importance (based on the percentage of respondents rating the factor as '4' or '5' on the 5-point measurement scale).

As might be expected, overall, the respondents felt that most of the factors identified in the literature had played an important role in facilitating IS development. Ten of the factors were ranked highly in terms of their average importance (more than 4 on the 5-point scale) by respondents, reinforcing the validity of their inclusion in the survey. The two factors perceived to be important by most people were *adequate resources or time* and *well-defined user requirements*. With respect to Figure A4.14, it is interesting to note virtually none of the respondents felt that *adequate resources or time* was of little importance in facilitating IS development.

Of interest to this study is the high level of importance placed on aspects potentially related to users in the development process, including *well-defined user requirements*, *effective communication between developers and users*, and *user commitment or buy-in*. Although *effective user participation* was the third lowest factor, it was still perceived as important by 76% of the respondents (median rating of 4). None of the respondents felt that *user commitment or buy-in* was of little importance in facilitating IS development.

By contrast, the *use of a standard method* was perceived as important by only 47% of the respondents (median rating of 3). This is partly reflected in the fact that not all respondents used a standard method. Further, of the 91 respondents who reported using a standard method in at least part of the development process in at least some of their IS projects, 9 (10%) reported that the factor was of little or no importance, while 35 (38%) were neutral with regards to the relative importance of this factor. The implication of this is that these organisations are using a standard method despite their perception that standard methods were not of high importance in facilitating IS development in their IS projects.

The factor perceived to be of least importance was *use of external consultants*. This probably reflects the relatively low use of external consultants across all projects, despite changes to the IS development environment, such as the increase in packaged software acquisition.

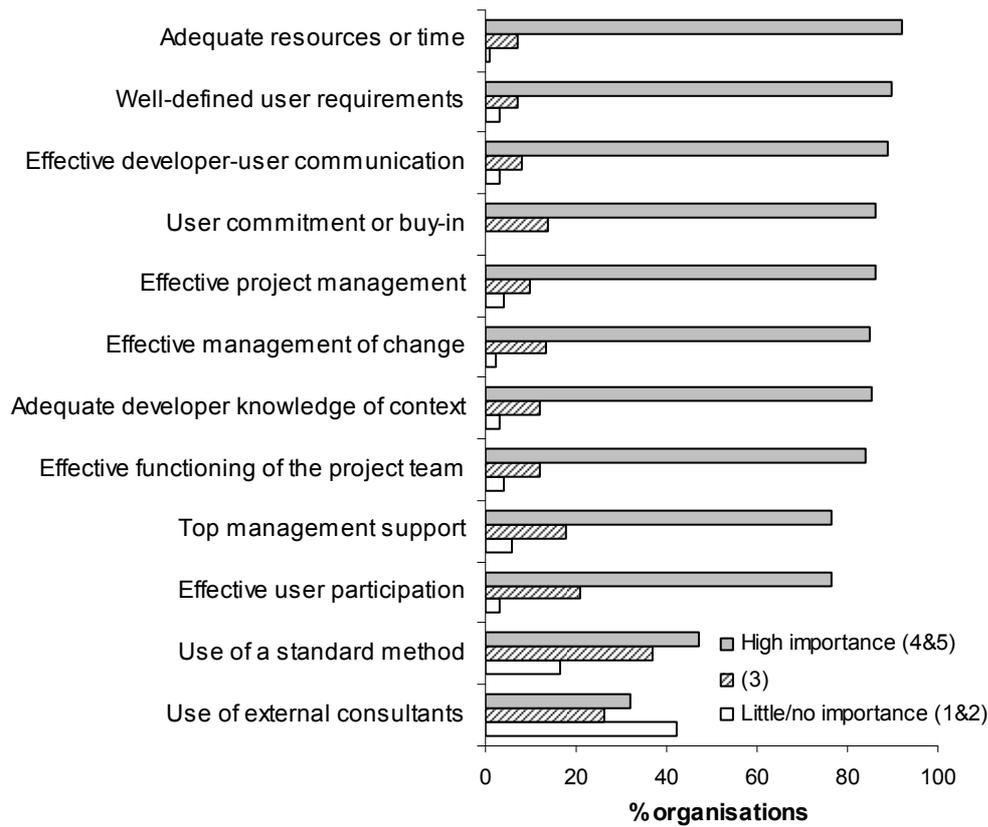
Table A4.15: Importance of factors in facilitating IS development

Factors facilitating IS development	n†	% High importance*	Mean	Median
Adequate resources or time	101	92	4.55	5
Well-defined user requirements	98	90	4.30	4
Effective communication between developers & users	100	89	4.36	4.5
User commitment or buy-in	101	86	4.40	5
Effective project management	101	86	4.34	5
Effective management of changes resulting from system implementation	99	85	4.33	5
Adequate developer knowledge of the system context	101	85	4.23	4
Effective functioning of the project team	99	84	4.12	4
Top management support	101	76	4.15	4
Effective user participation in development process	101	76	4.11	4
Use of a standard method of IS development	98	47	3.32	3
Use of external consultants	100	32	2.83	3

† Excludes any 'Don't know or Not Applicable' responses

\* % respondents who rated the factor as '4' or '5' on the 5-point measurement scale

Figure A4.14: Relative importance of factors in facilitating IS development



Non-parametric correlations were performed for the factors facilitating IS development. The inter-correlation matrix is shown in Table A4.16. Many of the factors appear to be associated at a significance level of  $p < 0.05$ . Six of the 12 factors were significantly correlated with at least 6 other factors. *Effective functioning of the project team* was correlated with all other factors except *adequate resources or time* and *use of external consultants*. The strongest correlation was between *effective communication between developers and users* and *effective user participation* ( $T_b = 0.483$ ,  $p = 0.000$ ), possibly reflecting the importance of the former in the latter. The next two strongest correlations were between *effective project management* and (1) *effective functioning of the project team* ( $T_b = 0.452$ ,  $p = 0.000$ ) and (2) *use of a standard method* ( $T_b = 0.475$ ,  $p = 0.000$ ).

Table A4.16: Inter-correlation matrix for factors facilitating IS development

Factors facilitating IS development		1	2	3	4	5	6	7	8	9	10	11	12
Adequate resources or time	1	1.00											
Adequate developer knowledge of system context	2	.158	1.00										
Effective communication between developers & users	3	<b>.247</b>	.149	1.00									
Effective management of change	4	.082	.170	.233	1.00								
Effective project management	5	.119	.103	.110	<b>.335</b>	1.00							
Effective functioning of the project team	6	.130	<b>.241</b>	<b>.242</b>	<b>.282</b>	<b>.452</b>	1.00						
Effective user participation	7	.127	.024	<b>.483</b>	.156	.218	<b>.402</b>	1.00					
Top management support	8	.099	.028	.142	<b>.399</b>	<b>.345</b>	<b>.248</b>	.111	1.00				
Use of a standard method	9	.117	.121	.203	<b>.271</b>	<b>.475</b>	<b>.271</b>	<b>.256</b>	.210	1.00			
Use of external consultants	10	-.057	.071	.037	.113	.117	.060	.074	.214	.103	1.00		
User commitment or buy-in	11	.137	-.097	<b>.306</b>	.104	.077	.220	<b>.289</b>	.077	.151	.033	1.00	
Well-defined user requirements	12	.240	-.081	<b>.277</b>	.166	<b>.342</b>	.188	.094	.216	.180	.057	.173	1.00

Bold  $p < 0.01$ ; Italic  $p < 0.05$

An exploratory principal component factor analysis (with varimax rotation) was conducted to see if there were any dimensions underlying the 12 facilitating factors. The analysis converged in 11 iterations, extracting four components with an eigenvalue of greater than one, which accounted for 60.3% of the total variance. Using conventional loading criteria of 0.50 or more on one component and no more than 0.35 on any other component, 10 of the 12 factors loaded unambiguously (with the possible exception of *effective management of changes*) (Table A4.17). The four components are logically interpretable. Component 1 is oriented towards management of the IS development process. Component 2 reflects the role of users in IS development. Components 3 and 4 are single item components representing developer knowledge and adequate resources, respectively.

Table A4.17: Rotated component matrix for factors facilitating IS development

Factors facilitating IS development	Component			
	1	2	3	4
Effective project management	<b>0.868</b>	0.072	-0.094	0.066
Use of a standard method of IS development	<b>0.740</b>	0.078	-0.031	0.048
Top management support	<b>0.602</b>	0.150	0.011	-0.354
Effective functioning of the project team	<b>0.575</b>	0.355	0.242	0.004
Effective management of changes resulting from system implementation	<b>0.492</b>	0.162	0.326	-0.211
Well-defined user requirements	0.426	0.176	-0.531	0.301
Use of external consultants	0.326	0.111	0.095	-0.558
Effective communication between developers & users	0.125	<b>0.819</b>	0.187	0.160
Effective user participation in development process	0.258	<b>0.794</b>	0.015	-0.040
User commitment or buy-in	0.034	<b>0.695</b>	-0.373	-0.037
Adequate developer knowledge of the system context	0.131	0.024	<b>0.832</b>	0.200
Adequate resources or time	0.168	0.209	0.193	<b>0.717</b>

Table A4.18 provides a comparison of the relative ranking of the factors facilitating IS development in this study with comparable factors in prior empirical studies. Collectively, these studies survey a range of respondent groups from the US, UK, Ireland and New Zealand. Different respondent groups may have different perceptions of the relative importance of these factors (Keil et al., 2002; Schmidt et al., 2001). Where possible, the preferred basis for comparison was with IS managers, then IS staff then IS users.

Overall, the results of the current study do not show a high degree of consistency with comparable factors in prior empirical studies (Table A4.18). Of the two highest ranked factors in this study, *adequate resources or time* and *well-defined user requirements* are also ranked highly in some of the prior studies. *Effective project management*, of middle order ranking in this study, was generally ranked highly in other studies. *Effective management of change*, also of middle order ranking in this study, was ranked lowly in other studies. *Effective functioning of the project team*, *top management support* and *effective user participation*, all of low ranking in this study, tended to be ranked higher in other studies. However, the low ranking of *use of a standard method* and of *external consultants* in this study is consistent with prior studies measuring these factors.

The current study is consistent with the other New Zealand study that considered factor influence (Verkerk et al., 2000) in that *well-defined user requirements* was ranked relatively highly, while *effective user participation* had a low rank. However, the very high rankings of *effective project management* and *top management support* in the earlier study are not confirmed in the current study.

Data for each of the 12 factors in the current study were analysed to investigate whether or not an association existed with organisation size, size of IS function, and business category (public vs. private sector). Tests of association using Kendall's tau found no significant association between any of the factors and organisation size. Tests of association using Kendall's tau found significant, but relatively weak associations between size of IS function and *use of a standard method* ( $T_b=0.196$ ,  $p=0.029$ ), and between size of IS function and *use of external consultants* ( $T_b= -0.235$ ,  $p=0.006$ ). These results suggest that larger IS

functions found the use of a standard method relatively important in their IS projects and were less likely than smaller IS functions to rely on outsourcing in the form of external consultants. Chi-square tests found no significant association between any of the twelve factors and business category.

Table A4.18: Comparative ranking of factors facilitating IS development

	NZ	NZ	Ireland	UK	Mostly US	US	US	US
	This study IS executives	Verkerk et al. (2000) IS & other executives	Fitzgerald (1998a) IS managers	Wastell & Sowards (1995) IS directors	Wixom & Watson (2001) IS managers	Johnson et al. (2001) IS executives	Jiang et al. (1996) IS professionals	Rainer & Watson (1995) Various†
Total number of factors ranked	12	10	5	6	8	10	13	23
Adequate resources or time	1		2		5		5	21
Well-defined user requirements	2	3				7		3
Effective communication between developers & users	3						7	
User commitment or buy-in	4						12	
Effective project management	5	1		4		3	3, 10	
Effective management of changes resulting from system implementation	6				7			17
Adequate developer knowledge of the system context	7		3					
Effective functioning of the project team	8				3		4	
Top management support	9	2			1	1	2	2
Effective user participation in development process	10	6	1	3, 5	4	2	6	
Use of a standard method of IS development	11		4	6		8		
Use of external consultants	12							23
† Including IS professionals, executive users, vendors & consultants								

Of the 101 organisations, nine could be categorised as non-users of a standard method. Chi-square tests were performed on the data for each of the twelve factors to see if there was any association between them and whether or not an organisation used a standard method. However, this statistical analysis should be treated with a degree of caution as the relatively low number of non-users meant that at least half the cells had expected counts of less than five. Three significant associations were observed. These were with *effective project management* ( $X^2=24.325$ ,  $df=3$ ,  $p=0.000$ ; Cramer's  $V=0.491$ ), *effective functioning of the project team* ( $X^2=12.899$ ,  $df=3$ ,  $p=0.005$ ; Cramer's  $V=0.361$ ), and *use of a standard method* ( $X^2=42.957$ ,  $df=4$ ,  $p=0.000$ ; Cramer's  $V=0.662$ ). Examination of the data for these factors showed that, as might be expected, method users tended to place higher importance than non-users on these three factors. In particular, method non-users ranked *use of a standard method* as either not important or only slightly important (a rating of 1 or 2 on a 5-point scale;  $n=7$ ).

A number of respondents specified and rated their own factors facilitating IS development. Some respondents gave factors that were related to those already listed in the question (see Table A4.19), and their rating of these factors generally matched those that they gave to corresponding factors.

Table A4.19: Factors related to those given in the question

Factors given by respondent	Related factor
Budget allocation from the business sponsor	Adequate resources and time
Having the right resources available	
Enabling replacement of key staff involved in the project	
Budget approval	
Programme of projects control	Effective project management
A collaborative team approach	Effective functioning of the project team

Additional factors facilitating IS development given by respondents are listed in Table A4.20. These were all rated by the respondents as being relatively important – not entirely surprising given that respondents were unlikely to specify a factor unless they regarded it as important. A number of these factors have a high level organisational or management focus.

Table A4.20: Additional factors identified by respondents

Other factors facilitating IS development	Number of responses	Rating
Strategic direction and statement of business needs	2	5,5
Scope management	2	5,5
Quality assurance processes	1	5
Effective governance structure	1	4
Prior experience in IS development	1	4
Effective risk management strategy	1	5
Contingency management	1	5

#### A4.3.7 Factors inhibiting IS development

Respondents were asked to indicate how important 14 factors drawn from the literature had been in inhibiting IS development in the projects undertaken over the three-year time frame. Statistical data for each of the factors is presented in Table A4.21, and their relative importance is shown graphically in Figure A4.15. The factors are shown in order of their perceived relative importance (based on the percentage of respondents rating the factor as '4' or '5' on the 5-point measurement scale).

The two factors perceived to be the most important in inhibiting IS development were *resource or time constraints* and *poorly defined or changing user requirements*. *Ineffective communication between developers and users* was also ranked highly.

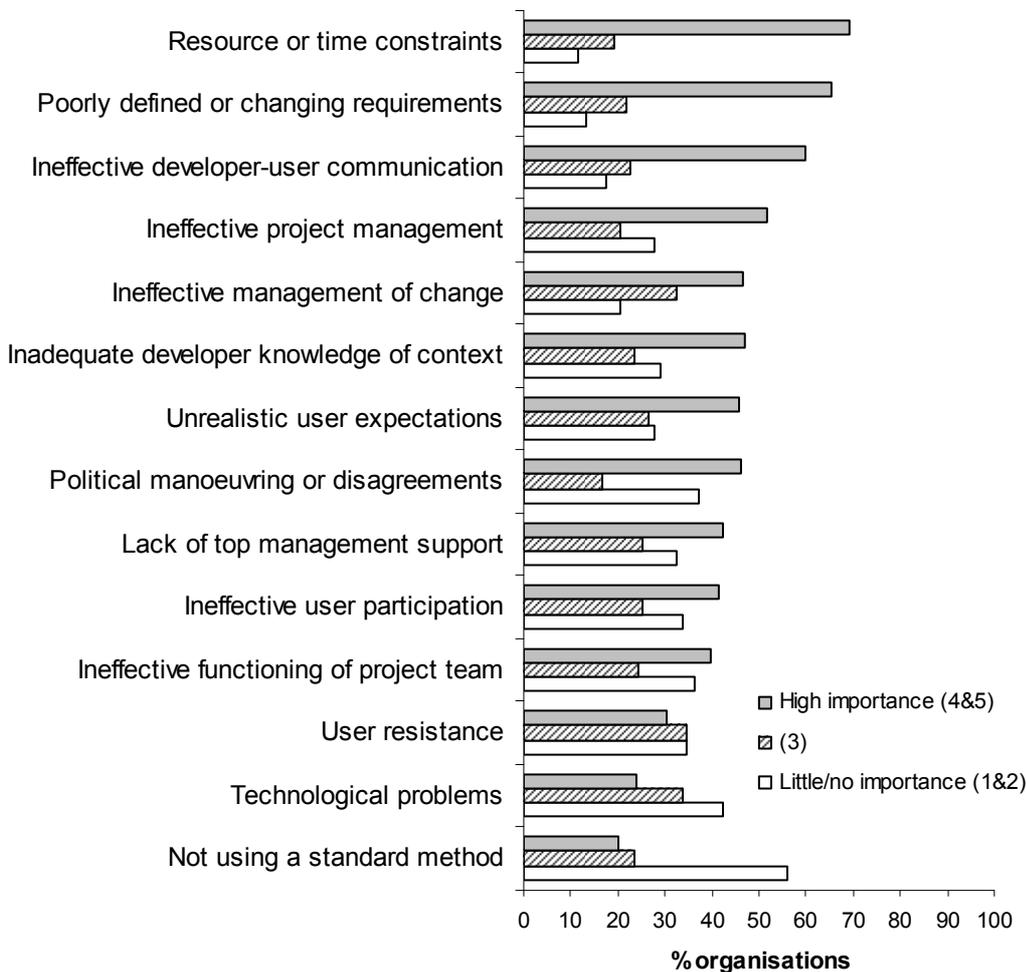
The bi-polar distribution of responses for the factors related to *political manoeuvring or disagreements*, *lack of top management support*, *ineffective user participation*, and *ineffective functioning of the project team*, suggest that these factors have the potential to be influential in certain projects. *Not using a standard method* was ranked lowest in importance (median rating of 2). *User resistance* and *technological problems* were also not considered to be important in inhibiting IS development. All three of these factors had more respondents ranking them of little or no importance (a rating of 1 or 2 on a 5-point scale) than of high importance.

Table A4.21: Importance of factors in inhibiting IS development

Factors inhibiting IS development	n†	% High importance*	Mean	Median
Resource or time constraints	94	69	3.91	4
Poorly defined or changing user requirements	92	65	3.84	4
Ineffective communication between developers & users	92	60	3.63	4
Ineffective project management	93	52	3.42	4
Ineffective management of changes resulting from system implementation	92	47	3.40	3
Inadequate developer knowledge of the system context	89	47	3.25	3
Unrealistic user expectations of the system	94	46	3.19	3
Political manoeuvring or disagreements within the organisation	91	46	3.07	3
Lack of top management support	92	42	3.17	3
Ineffective user participation in development process	92	41	3.26	3
Ineffective functioning of the project team	91	40	3.07	3
User resistance	92	30	2.92	3
Technological problems	92	24	2.72	3
Not using a standard method of IS development	89	20	2.49	2

† Excludes any 'Don't know or Not Applicable' responses  
 \* % respondents who rated the factor as '4' or '5' on the 5-point measurement scale

Figure A4.15: Relative importance of factors inhibiting IS development



Non-parametric correlations were performed for the factors inhibiting IS development. The inter-correlation matrix is shown in Table A4.22. Almost all of these factors appear to be associated at a significance level of  $p < 0.05$ . The strongest correlation was between *ineffective communication between developers and users* and *ineffective user participation* ( $T_b = 0.587$ ,  $p = 0.000$ ), again possibly reflecting the importance of the communication in effective user participation. The next two strongest correlations were between *ineffective functioning of the project team* and (1) *ineffective project management* ( $T_b = 0.566$ ,  $p = 0.000$ ) and (2) *ineffective user participation* ( $T_b = 0.566$ ,  $p = 0.000$ ). The association between dysfunctional project teams and ineffective project management is understandable.

Table A4.22: Inter-correlation matrix for factors inhibiting IS development

Factors inhibiting IS development		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Inadequate developer knowledge of system context	1	1.00													
Ineffective communication between developers & users	2	<b>.428</b>	1.00												
Ineffective management of changes	3	<b>.497</b>	<b>.502</b>	1.00											
Ineffective project management	4	<b>.319</b>	<b>.425</b>	<b>.462</b>	1.00										
Ineffective functioning of project team	5	<b>.494</b>	<b>.475</b>	<b>.545</b>	<b>.566</b>	1.00									
Ineffective user participation	6	<b>.377</b>	<b>.587</b>	<b>.372</b>	<b>.438</b>	<b>.566</b>	1.00								
Lack of top management support	7	<b>.365</b>	<b>.314</b>	<b>.443</b>	<b>.359</b>	<b>.455</b>	<b>.393</b>	1.00							
Not using a standard method of development	8	<b>.282</b>	<b>.310</b>	<b>.386</b>	<b>.417</b>	<b>.501</b>	<b>.359</b>	<b>.488</b>	1.00						
Political manoeuvring or disagreements	9	<b>.228</b>	<b>.254</b>	<b>.356</b>	<b>.282</b>	<b>.380</b>	<b>.356</b>	<b>.431</b>	<b>.310</b>	1.00					
Poorly defined or changing user requirements	10	<i>.198</i>	<b>.362</b>	<b>.360</b>	<b>.377</b>	<b>.488</b>	<b>.411</b>	<b>.307</b>	<i>.221</i>	<b>.385</b>	1.00				
Resource or time constraints	11	<i>.163</i>	<i>.102</i>	<b>.238</b>	<i>.158</i>	<i>.158</i>	<i>.138</i>	<i>.157</i>	<i>.078</i>	<i>.202</i>	<b>.306</b>	1.00			
Technological problems	12	<b>.442</b>	<b>.256</b>	<b>.351</b>	<i>.201</i>	<b>.348</b>	<b>.259</b>	<b>.426</b>	<b>.347</b>	<b>.243</b>	<i>.213</i>	<i>.188</i>	1.00		
Unrealistic user expectations of system	13	<b>.250</b>	<b>.285</b>	<b>.305</b>	<b>.282</b>	<b>.372</b>	<b>.372</b>	<b>.304</b>	<b>.321</b>	<b>.307</b>	<b>.382</b>	<i>.196</i>	<b>.367</b>	1.00	
User resistance	14	<b>.222</b>	<b>.310</b>	<b>.265</b>	<i>.207</i>	<b>.264</b>	<b>.409</b>	<b>.267</b>	<b>.258</b>	<b>.442</b>	<b>.278</b>	<i>.174</i>	<i>.187</i>	<b>.510</b>	1.00

Bold  $p < 0.01$ ; Italics  $p < 0.05$

An exploratory principal component factor analysis (with varimax rotation) was conducted to see if there were any dimensions underlying the 14 inhibiting factors. The analysis converged in 8 iterations, extracting three components with an eigenvalue of greater than one, which accounted for 63.8% of the total variance. However, the resulting structure does not appear adequate for most of the factor items. Using conventional loading criteria of 0.50 or more on one component and no more than 0.35 on any other component, only 8 of the 14 factors loaded unambiguously (Table A4.23). Components 1 and 3 lack conceptual clarity and are not logically interpretable. Component 2 reflects the role of users in IS development, and is consistent with a similar component produced in the equivalent factor analysis for factors facilitating IS development.

Table A4.23: Rotated component matrix for factors inhibiting IS development

Factors inhibiting IS development	Component		
	1	2	3
Technological problems	<b>0.769</b>	-0.048	0.265
Lack of top management support	<b>0.684</b>	0.211	0.327
Not using a standard method of IS development	<b>0.675</b>	0.307	0.072
Inadequate developer knowledge of the system context	<b>0.660</b>	0.360	0.105
Ineffective management of changes resulting from system implementation	0.636	0.422	0.254
Ineffective functioning of the project team	0.604	0.585	0.273
Ineffective user participation in development process	0.179	<b>0.811</b>	0.328
Ineffective communication between developers & users	0.329	<b>0.773</b>	0.102
Ineffective project management	0.471	0.600	0.179
Resource or time constraints	0.204	-0.158	<b>0.738</b>
User resistance	0.002	0.466	0.659
Political manoeuvring or disagreements within the organisation	0.330	0.264	<b>0.621</b>
Poorly defined or changing user requirements	0.192	0.388	0.621
Unrealistic user expectations of the system	0.257	0.333	<b>0.613</b>

The relative ranking of the factors inhibiting IS development in this study and comparable factors in prior empirical studies from a range of countries is shown in Table A4.24. Where possible, the responses of IS and project managers were used as the basis for comparison.

Overall, the results of the current study show a reasonable degree of consistency with the prior studies (Table A4.24). Looking first at the more highly ranked factors in this study, both *resource or time constraints* and *poorly defined or changing user requirements* display considerable variation in importance in prior studies, although both are ranked highly in the other New Zealand study (Verkerk et al., 2000). *Ineffective project management* and *ineffective management of change* are also generally ranked highly in prior studies. Of the middle ranked factors in this study, *unrealistic user expectations* also tends to be of moderate importance in prior studies (although low in Finland and New Zealand). *Inadequate developer knowledge of the system context* shows mixed importance in prior studies, while *political manoeuvring or disagreements* is only rated lowly. In contrast, *lack of top management support* is generally given high importance in other studies (although not in the prior New Zealand study). Of the lower ranked factors in this study, *ineffective user participation* and *user resistance* tend to be ranked more highly in other studies. The low rankings for *ineffective functioning of the project team*, *technological problems*, and *not using a standard method* are largely consistent with other studies. Interestingly, the current study is consistent with the other New Zealand study (Verkerk et al., 2000) across 4 of the 5 common factors.

Table A4.24: Comparative ranking of factors inhibiting IS development

	NZ	NZ	NZ/UK	Global	UK	Ireland	Finland	Hong Kong	US	US	US
	This study IS executives	Verkerk et al. (2000) IS & other executives	Yetton et al. (2000) IS managers	KPMG (2005) ?	Wastell & Sowards (1995) IS directors	Barry & Lang (2003) Developers	Schmidt et al. (2001) Project managers	Schmidt et al. (2001) Project managers	Schmidt et al. (2001) Project managers	Jiang & Klein (2000) Project managers	Standish Group (1995) IS executives
Total number of factors ranked	14	10	12	?	7	14	23	14	17	12	10
Resource or time constraints	1	3	5		7	1, 2, 8, 10	7, 15	15	13	3	6, 9
Poorly defined or changing user requirements	2	1, 2	6	1	1	4, 3	9	8	14		2, 3
Ineffective communication between developers & users	3										
Ineffective project management	4	5		2	4		1		5		
Ineffective management of changes resulting from system implementation	5						4		3	4	
Inadequate developer knowledge of the system context	6						3	13	11	7	
Unrealistic user expectations of the system	7	9				5	23	9	7		7
Political manoeuvring or disagreements within the organisation	8				5		22	10	16		
Lack of top management support	9	4		3			2	1	1		4
Ineffective user participation in development process	10	7	11		3		11	2	6	8	1
Ineffective functioning of the project team	11		7, 12							5, 12	
User resistance	12		9				8	3, 4	4	6	
Technological problems	13		10		6		13	12	12	1, 9	10
Not using a standard method of IS development	14					14		14		10	

Overall, the 14 inhibiting factors listed in Table A4.21 tend to be of lower average importance (less than 4 on the 5-point scale) than the 12 facilitating factors listed in Table A4.15. This suggests that, overall, factors facilitating IS development outcomes were perceived as more influential than factors inhibiting development in the IS projects surveyed. To test this, ten of the factors in each of Table A4.15 and Table A4.21 that form pairs of parallel opposites were tested for differences using a Wilcoxon signed-rank test. The difference between each pair of factors was found to be significant ( $p < 0.001$ ). A similar result was found in a survey of New Zealand organisations involved in IS development where respondents gave significantly higher ratings to the importance of factors in IS success than they did for factors in IS failure (Hood, 1999). Hood put this down to developer optimism.

Interestingly, the facilitating and inhibiting factors for each of the 10 matched pairs tended to be given comparable relative rankings of importance in Table A4.25. Equivalent (but opposite) factors were given the same relative ranking in 7 of the 10 cases, including the top 6 factors.

Table A4.25: Relative rank order of 10 matched pairs of factors

Factors facilitating IS development	Rank	Factors inhibiting IS development	Rank
Adequate resources or time	1	Resource or time constraints	1
Well-defined user requirements	2	Poorly defined or changing requirements	2
Effective developer-user communication	3	Ineffective developer-user communication	3
Effective project management	4	Ineffective project management	4
Effective management of change	5	Ineffective management of change	5
Adequate developer knowledge of context	6	Inadequate developer knowledge of context	6
Effective functioning of project team	7	Ineffective functioning of project team	9
Top management support	8	Lack of top management support	7
Effective user participation	9	Ineffective user participation	8
Use of a standard method	10	Not using a standard method	10

Non-parametric correlations were performed comparing the factors facilitating IS development and those inhibiting IS development. The inter-correlation matrix is shown in Table A4.26. Only a few of the factors are associated at a significance level of  $p < 0.05$ . The strongest correlation was between *adequate resources or time* and *resource or time constraints* ( $T_b = 0.320$ ,  $p = 0.001$ ). The correlation between *top management support* and *lack of top management support* ( $T_b = 0.233$ ,  $p = 0.008$ ) was similarly significant. The correlation *well-defined user requirements* and *resource or time constraints* was also strong ( $T_b = 0.251$ ,  $p = 0.007$ ).

Data for each of the 14 factors in Table A4.21 were analysed to investigate whether or not an association existed with organisation size, size of IS function, and business category (public vs. private sector). Tests of association using Kendall's tau found a significant positive association between *user resistance* and organisation size ( $T_b = 0.224$ ,  $p = 0.011$ ), suggesting that this factor played a more important role in inhibiting IS development in projects in larger organisations than in smaller organisations. Similar tests found a significant positive association between size of IS function and *poorly defined or changing user requirements* ( $T_b = 0.185$ ,  $p = 0.046$ ). Chi-square tests found no significant association between any of the 14 factors and business category.

Chi-square tests were performed on the data for each of the 14 factors to see if there was any association between them and whether or not an organisation used a standard method. As before, this statistical analysis should be treated with a degree of caution as the relatively low number of non-users ( $n = 9$ ) meant that at least half the cells had expected counts of less than 5. Two significant associations were observed. These were with *ineffective project management* ( $X^2 = 17.890$ ,  $df = 4$ ,  $p = 0.001$ ; Cramer's  $V = 0.439$ ), and *ineffective functioning of the project team* ( $X^2 = 14.329$ ,  $df = 4$ ,  $p = 0.006$ ; Cramer's  $V = 0.397$ ). Standard method users tended to place higher importance than non-users on these two factors. These are the equivalent (opposite) factors to two of the three factors facilitating IS development found to have a significant association with method use. Standard method non-users ranked not using a standard method as either not important or only slightly important (a rating of 1 or 2 on a 5-point scale;  $n = 7$ ).

Table A4.26: Inter-correlation matrix for factors facilitating and inhibiting IS development

	Inadequate developer knowledge of system context	Ineffective communication between developers & users	Ineffective management of changes	Ineffective project management	Ineffective functioning of project team	Ineffective user participation	Lack of top management support	Not using a standard method	Political manoeuvring or disagreements	Poorly defined or changing user requirements	Resource or time constraints	Technological problems	Unrealistic user expectations of the system	User resistance
Adequate resources or time	.009	.121	.059	-.050	-.077	.073	-.132	-.049	-.031	-.102	<b>.320</b>	-.023	.035	.098
Adequate developer knowledge of system context	.132	-.012	-.041	-.135	.089	-.033	-.030	-.064	-.028	.009	.018	.137	.051	-.038
Effective communication between developers & users	-.105	.109	.068	-.019	-.022	.002	-.115	-.098	-.022	.087	.183	-.133	.168	.090
Effective management of changes	-.141	-.102	.123	-.039	-.086	-.171	-.121	-.150	.074	-.011	-.019	-.065	.014	-.010
Effective project management	-.082	-.086	-.040	.137	-.017	-.084	-.019	.024	-.047	.028	.070	.016	.110	.047
Effective functioning of project team	-.083	-.127	-.086	-.074	.011	-.125	-.072	-.121	-.065	-.092	.009	-.107	.110	-.063
Effective user participation	-.040	.054	.045	-.014	-.044	-.023	-.117	-.086	-.124	-.055	.050	-.209	.040	-.104
Top management support	-.063	-.041	.130	.044	-.053	-.073	<b>.233</b>	-.036	.119	.051	.153	.053	.158	.100
Use of a standard method	-.086	-.133	-.008	-.046	-.072	-.112	.044	.106	-.053	-.006	-.002	.070	.115	-.020
Use of external consultants	.002	.116	.168	.159	.055	.028	.139	.123	.125	.144	.075	.109	.206	.102
User commitment or buy-in	.061	.051	.055	.039	-.068	.034	-.096	-.031	-.019	.046	.018	-.203	.052	.126
Well-defined user requirements	.028	.015	-.037	.094	.017	.042	-.167	-.098	-.124	.075	<b>.251</b>	-.126	.050	.033

Bold p<0.01; Italics p<0.05

Four respondents specified and rated their own factors inhibiting IS development. One respondent listed a factor (poor project management by the vendor) related to the factor *ineffective project management* already listed in the question; his or her ratings of the two factors matched. Additional factors inhibiting IS development identified by respondents are listed in Table A6.27.

Table A6.27: Additional factors identified by respondents

Other factors inhibiting IS development	Number of responses	Rating
Evolving business priorities	1	3
Licensing issues	1	3
Ineffective training	1	4

#### A4.3.8 Organisational understanding of successful IS development

Participants were asked whether or not their organisation had a formal or commonly agreed understanding of successful IS development. Of the 105 respondents who answered this question, 61 (58%)

respondents said their organisations had such an understanding, but only 57 provided details of what that understanding was. Of these, 14 did not provide a specific definition, but noted the use of a definition in a documented policy or procedure. The remaining 43 respondents provided descriptive definitions of successful IS development. Analysis of these definitions identified a range of constituent elements (see Table A4.28). As one respondent qualified, “these are determined on a project by project basis”.

Table A4.28: Elements in definitions of successful IS development (n=43)

Successful IS development	Number of respondents (%)
Meets specified objectives and requirements	33 (77%)
Delivered within budget	25 (58%)
Delivered on time	23 (53%)
Delivers business benefits	10 (23%)
User satisfaction	5 (12%)
Delivered within quality specifications	5 (12%)
Return on investment	3 (7%)
Other	2 (5%)

The three most common elements identified were meeting specified project objectives or requirements, delivery within budget, and delivery on time. These elements were often associated in individual definitions. For example, the definitions provided by 18 respondents included all three elements. A further five respondents had both within budget and on time as part of their definitions. These definitional elements match the highest ranked factors highlighted by respondents for both facilitating IS development (*adequate resources or time* and *well-defined user requirements*) and inhibiting IS development (*resource or time constraints* and *poorly defined or changing user requirements*).

The relative dominance and association of these traditional measures of IS development success is interesting, if not unsurprising, given that these measures are well rehearsed within the IS practice literature (e.g. Johnson, 1999; Johnson et al., 2001; Standish Group International, 1995, 1999, 2001) and that the survey was targeted at IS management. A recent international survey confirms the use of these traditional measures of IS success, with 75% of responding organisations using ‘to specification’ as part of their success measure, 67% using ‘on time’, and 65% organisations ‘on budget’ (KPMG, 2005).

By comparison, delivery of business benefits, a more strategic measure of success, was included in only 10 definitions. Interestingly, four of these occurred in definitions with two or three of the traditional elements of within budget, on time and/or meeting objectives. Two of these respondents emphasised that delivery of business benefits were considered the more important. User satisfaction was even less frequently represented in the definitions provided by respondents. Two of these occurred in definitions that included all three traditional elements.

Other minor elements occurring in these definitions of successful IS development included return on investment, delivery within quality specifications or without significant errors, and controlling scope. One respondent noted that a project’s success was “usually based on common consensus”. This respondent noted that a lack of success was “more clear-cut” in that such a project would have been abandoned. It should be noted however, that this may not always be the case. As is commonly observed in the IS literature and IS practice, less than successful projects may continue to be developed, may be only partially abandoned or may be redefined (Martin & Chan, 1996; Pan et al., 2004). As one respondent noted, “We just have no tolerance of unsuccessful projects, i.e. we work on them until they deliver what was required”.

It is well recognised within the IS literature that success is a multi-dimensional construct, with inter-related technical, economic, behavioural, psychological and political dimensions (see Section 3.4). However, this was not the case with many of definitions given by survey respondents, which tended to reflect an IS development/management bias. Even so, there were several definitions that incorporated wider elements in addition to the traditional elements. Perhaps, changes in the organisational context, such as an increasing emphasis on linking IS and business strategy and on increasing business ownership of IS projects (both of

which were observed in this study, see next section) may see more organisations expanding their definitions or understandings of successful IS development (Markus & Mao, 2004), to include other elements such as delivery of business benefits, realisation of strategic objectives, or user satisfaction (Hood, 1999; Karlsen et al., 2005; KPMG, 2005).

#### A4.3.9 Anticipated changes in IS development

Respondents were asked to identify any likely changes in IS development in their organisations in the following three years, in terms of general changes and in relation to the use of standard methods and user participation. Table A4.29 summarises the comments made by 63 respondents on anticipated general changes to IS development. Of these respondents, 21% indicated that no change was expected. Two of the most common expected changes were an increase in IS development (often because of the need to replace or integrate legacy systems or to migrate to new architectures), and an increase in outsourced development. The latter is consistent with an established trend towards outsourcing IT operations in New Zealand (Bell et al., 2003; Bland, 2005; Greenwood, 2006; Hind, 2002) and overseas (Colquhoun & Paredes, 2004; Santosus, 2005). The popularity of outsourcing may in part reflect a shortage of IT skills (MIS New Zealand, 2006; Paredes, 2005).

Table A4.29: Changes to IS development in general (n=63)

	Number of respondents (%)
No change	13 (21%)
Less IS development	2 (3%)
More IS development	7 (11%)
More outsourced development	8 (13%)
More in-house development	3 (5%)
More packaged solutions	4 (6%)
Development moving off-shore	2 (3%)
More local development (compared to offshore)	1 (2%)
More focus on business outcomes	10 (16%)
Increased requirement for accountability	4 (6%)
Closer involvement with external business partners	2 (3%)
Improved project management	4 (6%)
Increased IS control of IS projects	4 (6%)
Change in development techniques or tools	2 (3%)
Changes arising from a change in company ownership	1 (2%)

Another common anticipated change mentioned by respondents was an increasing requirement for IS development to meet business needs or benefits. This was referred to in terms such as IS development being “driven for business benefit”, “focus[ed] on business outcomes”, “better align with real business needs”, and “more strategically aligned”. As one respondent summarised, this reflected a “stronger focus on business processes driving the development of systems, rather than the other way around”. Linking IT and business strategies or objectives (Reich & Benbasat, 1996) has emerged as a key concern of senior IS managers in both New Zealand and overseas (Bennett, 2006; Bhargava, 2006; Bland, 2005; Chang, 2006; Hind, 2002, 2005; KPMG, 2005; Paredes, 2006), and seems to reflect the demands placed on IS by the modern business. Alignment of IS with business strategies may enable better IS project outcomes to be achieved (Chang, 2006; Cosgrove Ware, 2002; Martin & Chan, 1996). Added to this, organisations also expect evidence of the financial or business benefits of IS projects (Chang, 2006; Hill, 2002; Hopfner et al., 2006; KPMG, 2005;

McBride, 2004), in line with the increased requirement for accountability reported by some respondents (Table A4.29).

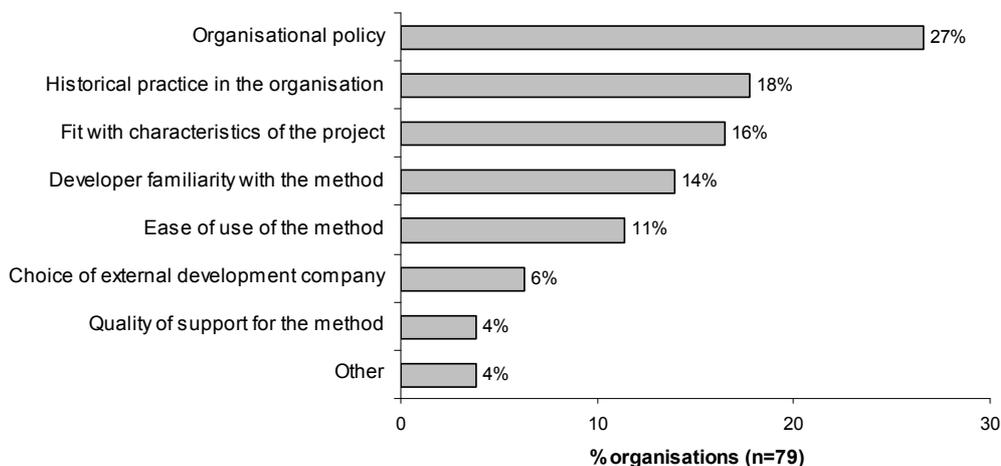
#### A4.4 The Nature of Standard Method Use in IS Development

Of the 101 respondents to the survey who had conducted IS projects in the three-year timeframe, 92 had used a standard method to some extent. These respondents were asked to provide additional information on the nature of standard method use in their actual IS projects. Only 80 respondents provided usable responses to this part of the questionnaire, and their responses form the basis of the following analysis. Information collected included: the most common reason for selecting the method(s) used (Question 10); the most common origin of the method(s) used (Question 11); the names of any commercial or published methods used (Question 12); the level of detail provided by the method (Question 13); whether or not the method was adapted (Question 14); and the benefits and limitations of using a standard method (Questions 15 and 16 respectively). Further, all respondents (whether standard method users or not) were asked to identify any changes in the use of standard methods they expected to see in their organisation over the following three years (Question 25).

##### A4.4.1 Reasons for selecting the method used

Of the 79 respondents who provided a reason for selecting their standard method(s) (Figure A4.16), only 16% chose their method(s) because of the fit of the method with the characteristics of the project, supporting Chatzoglou (1997, p. 256), who suggested that “developers are using methods for all sorts of reasons ... other than the right one (that is, suitability for the type of project they are currently working on)”. Just over half of the respondents (51%) chose their standard method(s) for organisational reasons (because of organisational policy, historical practice within the organisation, or the choice of an external development organisation). A further 15% chose their method(s) for reasons related to the characteristics of the method (ease of use or quality of support) and 14% because of developer familiarity with the method. Close to a decade on, this echoes Chatzoglou & Macaulay’s (1996, p. 218) observation that: “in many cases, a methodology is chosen not because of its characteristics or advantages over other methodologies, but simply for reasons of history and familiarity”.

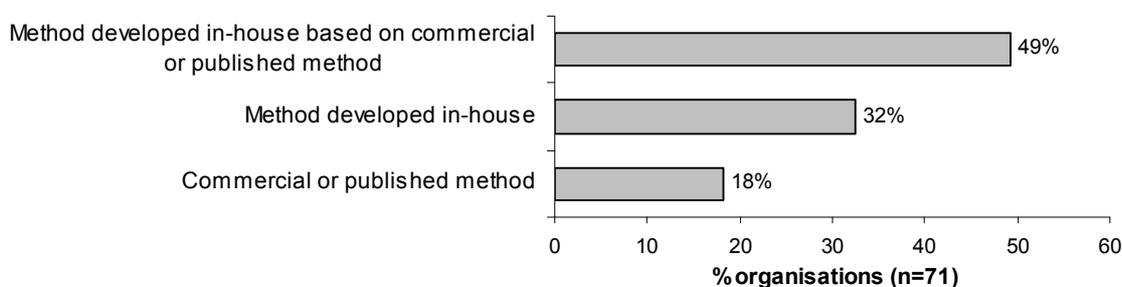
Figure A4.16: Reasons for selecting the standard method used



#### A4.4.2 Origin of the method used

Of the 71 respondents who provided information on the origin of the standard method(s) used in their projects, the most common origin was the organisations themselves – most methods were developed in-house (81%). The majority of these (60%) were based on a commercial or published method. Although only 18% used a commercial standard method as published, overall in 67% of the responding organisations a commercial or published method was used in some form. These findings are consistent with earlier empirical studies (Table A4:30), which show that a high proportion of organisations tend to develop their standard methods in-house (42% to 89%, with an average of 63%), rather than using commercial methods as published. Commercial methods (in some form) are being used by the organisations in this study (67%) in proportions comparable to some prior studies (Fitzgerald, 1998a; Russo et al., 1996) but not others (Iivari & Maansaari, 1998). In contrast to other empirical studies (Fitzgerald, 1998a; Fitzgerald et al., 1999; Russo et al., 1996), this study found that in-house methods were more commonly based on a commercial method than not, although not to the same level as Iivari & Maansaari (1998).

Figure A4.17: Origin of the standard method(s) used



The preference for in-house methods may arise because they are often perceived to be cheaper, more flexible, and more relevant or suited to a given organisational context than commercial methods (Fitzgerald et al., 1999; Kiely & Fitzgerald, 2002, 2003). Even so, commercial methods formed the basis of the majority of in-house developed methods used by organisations in this study, suggesting that these organisations perceive some value in using elements of commercial methods rather than developing their methods from first principles.

Table A4:30: Comparative origins of standard methods

Origin of standard method	This study	Prior studies
% organisations using in-house standard methods	81	42 to 89 (Barry & Lang, 2001, 2003; Fitzgerald, 1998a; Fitzgerald et al., 1999; Hardy et al., 1995; Iivari & Maansaari, 1998; Kiely & Fitzgerald, 2002; Rahim et al., 1998; Russo et al., 1996; Wastell & Swards, 1995) ( $\mu=63$ $\sigma=16$ )
% organisation using commercial method in some form	67	41 (Fitzgerald et al., 1999) 58 (Russo et al., 1996) 64 (Fitzgerald, 1998a) 91 (Iivari & Maansaari, 1998)
Of the organisations using an in-house method, % organisations using in-house methods based on commercial method	60	34 (Fitzgerald et al., 1999) 45 (Fitzgerald, 1998a) 47 (Russo et al., 1996) 93 (Iivari & Maansaari, 1998)

### A4.4.3 Names of commercial or published methods used

Thirty-five respondents supplied the names of commercial or published standard methods that had been used in the IS projects in their organisation over the three-year timeframe. While 24 respondents specified only one method, eleven reported using between two to five commercial or published standard methods. These respondents all previously reported typically using an in-house method based on a commercial or published one. In contrast, all nine respondents who previously reported typically using a commercial method provided the name of only one method. The implication is that the organisations using a commercial method seem to use it exclusively, while half of those organisations developing their own method based on a commercial one either derive their method from a variety of commercial methods or possibly use commercial methods only in certain circumstances.

As can be seen in Table A4.31, the reported standard methods generally fell into three main groups. The largest group were derived from a vendor or other organisation (including government organisations). These are fairly well spread across a range of sources, including software vendors, enterprise systems vendors, consulting organisations, government agencies, and standards bodies. Another group of standard methods comprised those built around particular approaches to the IS development process. Again, these are fairly well spread across a range of approaches, but dominated by Rational Unified Process and the Waterfall method.

Table A4.31: Commercial or published standard methods used (n=35)

Commercial or published standard methods used	Responses
<i>Methods derived from organisations</i>	
Vendor methods (e.g. PeopleSoft, PWC, Accenture, CapGemini, Ernst Young)	6
Enterprise systems' methods (e.g. SAP, Express, MRP)	4
Oracle	4
IBM	3
Government agencies (e.g. Controller & Auditor-General, SSC/Treasury, NASA)	3
ISO	2
Other	1
Total	23
<i>Methods related to development approaches</i>	
Rational Unified Process	6
Waterfall	5
Agile Development	3
RAD	3
SSADM	2
Total	19
<i>Project management methods</i>	
PMI/ PMBOK	7
BearingPoints	2
Prince	2
Other	2
Total	13
<i>Other standard methods</i>	
	3

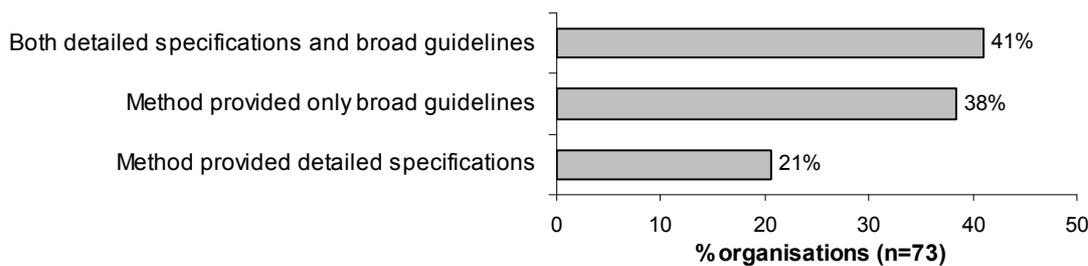
The third group of methods reported comprised project management methods. Seven of the twelve respondents who specified these also reported using standard methods from the other groups (i.e. they had used either or both standard methods and project management methods in their IS projects). The inclusion of project management methods among the list of reported standard methods is interesting and probably reflects changing IS development practices, such as higher levels of package acquisition or outsourced development, where the emphasis shifts from traditional standard development methods to project management. Certainly, the value of using a formal project management method and related project management practices is recognised in both the IS literature and IS practice (e.g. Gowan & Mathieu, 2005; Johnson et al., 2001; Keil et

al., 2002; Schmidt et al., 2001; Standish Group International, 1999). As one survey respondent commented, “Project Management and getting the right people (particularly from within the business) to project manage any IS project is key (above all else).”

#### A4.4.4 Level of detail provided by the method

Information about the level of detail provided by the standard method(s) used in their IS projects was given by 73 respondents (Figure A4.18). The prevalence of methods that include broad guidelines for development (79% of respondents) fits with the argument that methods should provide guidance to inform and support developers (Fitzgerald, 2000; Fitzgerald et al., 2002; Vidgen et al., 2004). Even so, the proportion of organisations who reported having methods with detailed specifications (62%) suggests that some people believe that the detail may be of value. For example, detailed prescriptions may be thought of as being invaluable to less experienced developers (Fitzgerald, 1997, 1998b, 1998c; Fitzgerald et al., 2002). However, Hidding (1997) points out that it may not be so much the level of detail that is important as the type of information that is available. Further, just because the detail is there, does not mean to say that it is being used, or used effectively, as methods are often adapted to suit the project or are not used rigorously (Eva & Guilford, 1996; Fitzgerald, 1998a; Hardy et al., 1995; Kiely & Fitzgerald, 2002; Russo et al., 1996).

Figure A4.18: Level of detail provided by the standard method



#### A4.4.5 Adaptation of the method

Respondents were asked to indicate to what extent standard methods were used as specified, or were adapted or used in part. The distribution of usable responses is shown in Table A4.32. While 81% of the respondents to this question indicated that standard methods tended to be used as specified, only 18% claimed to always use their method(s) as specified. This figure is comparable with the majority of values reported in the literature (Table A4.33), which range from 6% to 42%, with an average of 19%.

Table A4.32: Extent of adaptation of standard method

Extent of adaptation of standard method	Number of organisations				
	n†	Never	Sometimes	Often	Always
Standard method was used as specified	67	0%	19%	63%	18%
Standard method was adapted or used in part	68	3%	34%	50%	13%

† Excludes any ‘Don’t know or Not Applicable’ responses

Table A4.33: Prior reported extent of method adaptation (as % organisations that use standard methods)

Study	Country	Used as specified (%)	Adapted to project or not used rigorously (%)
(Eva & Guilford, 1996)	UK	17	83
(Hardy et al., 1995)	UK	12	88
(Kiely & Fitzgerald, 2002)	Ireland	19	76
(Fitzgerald, 1998a)	Ireland	42	58
(Russo et al., 1996)	US	6	94

Sixty-three percent of respondents claimed that they regularly (often or always) adapted their standard methods or only used them in part. Only 2 (3%) organisations stated that they never adapted their method(s) or used them in part. This is inconsistent with the 18% who reported that they always used their methods as specified. The intention of the question was that the two options would be considered as mutually exclusive. However, analysis of the results shows that 13 respondents combined an 'Always' response for one option with a 'Sometimes' or 'Often' response for the other option. This suggests the possibility of measurement error, in that at least some respondents did not perceive the options as mutually exclusive. For example, it is possible that the answers of some respondents reflected the use of part of a standard method, but as specified. For comparative purposes, the figures reported for this study (Table A4.32) suggest that somewhere between 82% and 97% of respondents at least sometimes adapted their method(s) or used them in part. This is consistent with the values reported in prior studies (Table A4.33).

Overall, the results of this survey suggest that a large proportion of organisations at least sometimes adapt their methods to specific projects or do not use them to the letter. For example, one respondent commented that sometimes the standard method was "used more at the beginning, and then as we got closer to the deadline we tended to do things quicker and less rigidly". Taylor (2000) suggests that New Zealand organisations tend to follow an ad hoc, pragmatic approach to development.

#### A4.4.6 Benefits of standard methods

Respondents were asked to indicate their level of agreement with various positive statements drawn from the literature about the use of standard methods in their IS projects undertaken over the three-year time frame. Statistical data for each statement is presented in Table A4.34, and the relative level of agreement of respondents with the statements is shown graphically in Figure A4.19.

The mean ratings for all statements are above the neutral value of 3, implying that these respondents (who had used a standard method to at least some extent) tended to agree with these benefits of standard methods. Further, there were very low levels of disagreement reported, with no more than two respondents disagreeing with the top seven statements. The mean ratings and levels of agreement obtained in this study compare closely with those obtained by Rahim et al. (1998) (where the mean rating varied from 4.30 to 3.57) and Hardy et al. (1995) (where the % agreement ranged from 96 to 60%), respectively. It seems that organisations that use standard methods for IS development are confident of the benefits of doing so.

Almost all respondents (90%) agreed that standard method use *facilitated successful IS development*<sup>3</sup>. Two other statements focusing on definitional aspects of IS success, standard methods *ensured the developed IS met user requirements* and *led to delivery of a high quality system*, also ranked highly. Interesting, not one respondent disagreed with the latter statement. The respondents also tended to agree that use of a standard method assisted in aspects of the IS development process, particularly in relation to *requirements definition*, *project control*, and *communication between developers and users*. Overall, respondents were less convinced that using a standard method *allowed movement of developers between IS*

<sup>3</sup> This contrasts with the lower rating given to the importance of *use of a standard method* in facilitating IS development in Question 7 earlier. This can probably be explained (at least partially) by the non-responses to this question of the respondents who never used a standard method, and the different measurement scales used.

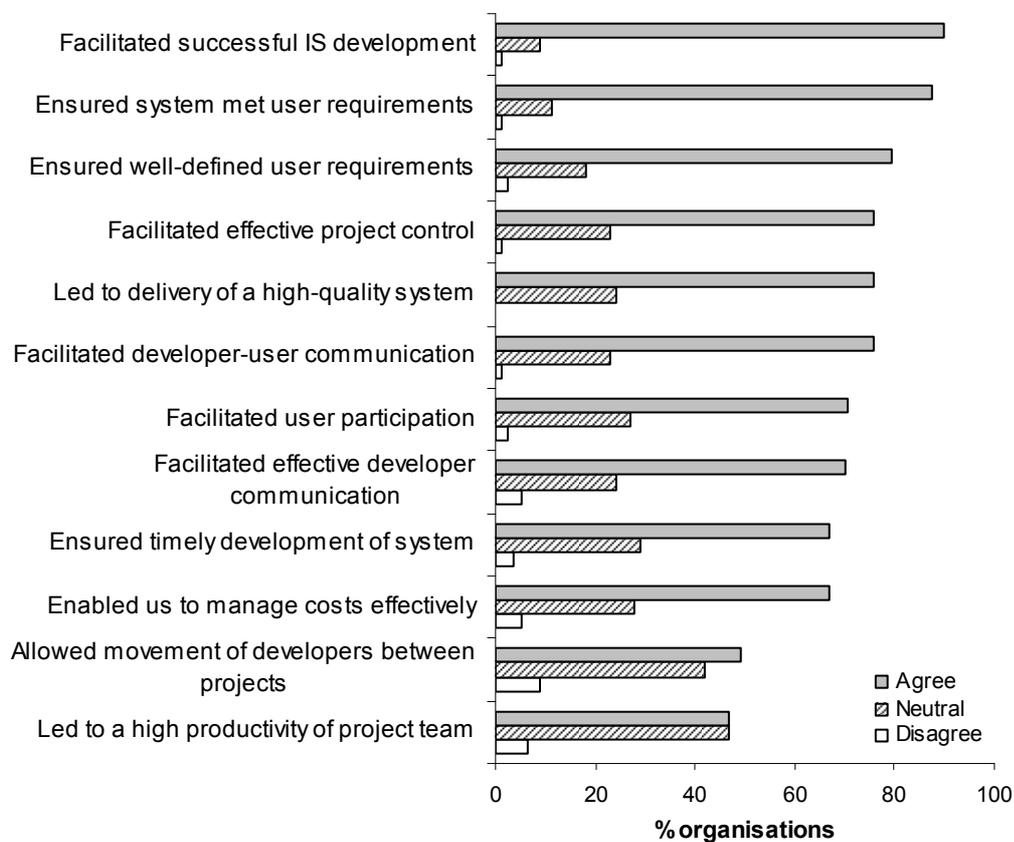
projects or increased productivity of the project team. The latter result could reflect the stronger influence of factors other than standard method use on project team performance (Guinan et al., 1998).

Table A4.34: Agreement with positive statements on standard methods

Use of a standard method ...	n†	% Agree*	Mean§	Median
Facilitated successful IS development	78	90	4.06	4
Ensured the developed system met user requirements	79	87	4.08	4
Ensured well-defined user requirements	78	79	3.97	4
Facilitated effective project control	79	76	3.96	4
Led to the delivery of a high-quality system	79	76	3.92	4
Facilitated effective communication between developers and users	79	76	3.87	4
Facilitated user participation in development process	78	71	3.78	4
Facilitated effective communication among developers	74	70	3.73	4
Ensured timely development of the system	79	67	3.73	4
Enabled us to manage costs effectively	79	67	3.73	4
Allowed movement of developers between projects	67	49	3.45	3
Led to a high level of productivity of the project team	77	47	3.52	3

† Excludes any 'Don't know or Not Applicable' responses  
 \* % respondents who agreed with the statement (chose 'Agree' or 'Strongly Agree')  
 § Values assigned to ratings: 1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neutral', 4 = 'Agree' and 5 = 'Strongly agree'

Figure A4.19: Relative agreement with positive statements on standard methods



Two respondents specified other benefits that they associated with the use of standard methods. These were: enabling the project to be broken down into manageable pieces and enabling risk management (both of which were rated as 'Strongly agree').

A comparison of the empirical literature (Table A4.35) shows that the importance of standard methods to *ensuring that the developed IS meets user requirements* identified here is supported by other studies (Hardy et al., 1995; Rahim et al., 1998). Also as in this study, Fitzgerald (1998a) found that Irish IS managers perceived the project management role of standard methods as being of high importance. The same result was reported in a later study by Kiely & Fitzgerald (2002). In contrast, the Rahim et al. (1998) study found that project control was perceived to be the least important benefit. The highest ranked benefits in their study, the role of standard methods in improving productivity (see also Johnson & Hardgrave, 1999), facilitating communication with users, and enabling user participation, were ranked as relatively less important in the current study.

Table A4.35: Comparative benefits of standard methods (in relative order of method users' level of agreement)

Role of standard method use	This study	Hardy et al.(1995)	Rahim et al. (1998)	Fitzgerald (1998a)	Johnson & Hardgrave (1999)
Total number of factors ranked	12	8	9	10	9
Facilitated successful IS development	1				
Ensured the developed system met user requirements	2	3	4	*	
Ensured well-defined user requirements	3				6
Facilitated effective project control	4		9	1	
Led to the delivery of a high-quality system	5	4	7	*	
Facilitated effective communication between developers and users	6		2		7
Facilitated user participation in development process	7	5	3		
Facilitated effective communication among developers	8		5	*	
Ensured timely development of the system	9	8		*	8
Enabled us to manage costs effectively	10			*	
Allowed movement of developers between projects	11			*	
Led to a high level of productivity of the project team	12	6	1		3
* Surveyed but not reported					

#### A4.4.7 Limitations of standard methods

Respondents were asked to indicate their level of agreement with various negative statements drawn from the literature about the use of standard methods in their IS projects undertaken over the three-year time frame. Statistical data for each statement is presented in Table A4.36, and the relative level of agreement of respondents with the statements is shown graphically in Figure A4.20.

The mean ratings for all statements are below the neutral value of 3, implying that respondents tended to disagree with these negative statements about the use of standard methods. This is consistent with the overall beneficial perception of the use of standard methods identified above. However, it should be noted that compared to the rating of positive statements, respondents' ratings of the negative statements were more widely spread across the range of possible responses. What these results suggest is that, although these published limitations may occur on a case by case basis, they are not of sufficient magnitude to adversely influence the respondents' overall perceptions of standard method use in their IS projects.

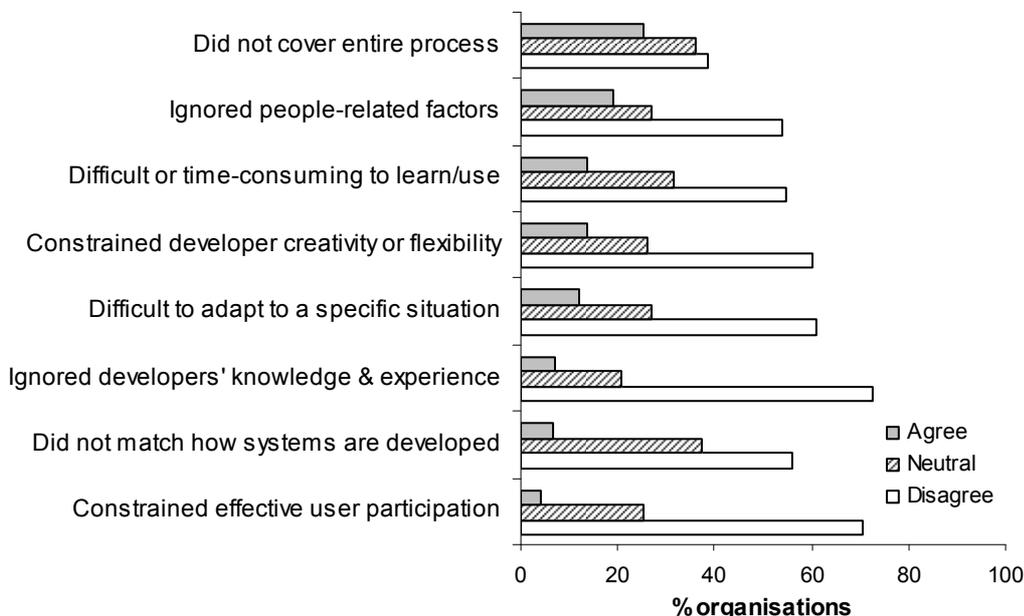
Respondents agreed most (25%) with the statement that suggested that the standard methods that they used in their projects *did not cover the entire development process*. Overall, respondents seemed ambivalent about this statement, with 36% neutral and only 39% disagreeing. Fewer respondents (19%) agreed that standard methods *ignored people-related factors*. There was some agreement that standard methods were *difficult or time-consuming to learn or use*, *constrained developers' creativity and flexibility*, and were *difficult to adapt to a specific situation*. Respondents disagreed most with the statements that suggested standard methods inhibited *developers from using their knowledge or experience* and *constrained effective user participation*.

Table A4.36: Agreement with negative statements on standard methods

Use of a standard method ...	n†	% Agree*	Mean§	Median
Did not cover the entire development process	75	25	2.84	3
Ignored people-related factors in development	74	19	2.58	2
Was difficult or time-consuming to learn or use	73	14	2.53	2
Constrained developer creativity and flexibility	73	14	2.48	2
Was difficult to adapt to a specific situation	74	12	2.51	2
Ignored developers' knowledge and experience	73	7	2.21	2
Did not match how systems are actually developed	75	7	2.44	2
Constrained effective user participation in the development process	75	4	2.21	2

† Excludes any 'Don't know or Not Applicable' responses  
 \* % respondents who agreed with the statement (chose 'Agree' or 'Strongly agree')  
 § Values assigned to ratings: 1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neutral', 4 = 'Agree' and 5 = 'Strongly agree'

Figure A4.20: Relative agreement with negative statements on standard methods



One other limitation that a respondent associated with the use of standard methods was the difficulty of getting user buy-in to the process (rated as 'Agree'). Another respondent specified increased development costs due to lengthy management processes. This is comparable with the statement *was difficult or time-consuming to learn or use* listed in the question. The respondent gave both statements the same rating.

A comparison of these results to the reported empirical literature (Table A4.37) shows that the highest ranked limitation of standard method use in this study, that the standard methods *did not cover the entire development process*, is consistent with Hardy et al. (1995) and Rahim et al. (1998), who also reported

relatively high rankings for similar statements. The relatively high ranking reported in this study for standard methods being *difficult or time-consuming to learn or use* is consistent with other empirical studies that highlight the perceived negative effect of standard method use on project development times (Fitzgerald, 1998a; Hardy et al., 1995; Kiely & Fitzgerald, 2002; Rahim et al., 1998), or that standard methods can be cumbersome (Barry & Lang, 2003; Fitzgerald, 1998a) or require extensive training to use (Rahim et al., 1998). The low ranking given in this study to the perceived limitation that the standard method *did not match how systems are actually developed* is consistent with Barry & Lang (2003), but contrasts with the findings of Fitzgerald (1998a).

Table A4.37: Comparative limitations of standard methods (in relative order of method users' level of agreement)

Role of standard method use	This study	Hardy et al. (1995)	Rahim et al. (1998)	Fitzgerald (1998a)	Kiely & Fitzgerald (2002)	Barry & Lang (2003)
Total number of factors ranked	8	7	4	10	3+	6
Did not cover the entire development process	1	2	3			
Ignored people-related factors in development	2			*		
Was difficult or time-consuming to learn or use	3	1, 6	1, 2, 4	1, 2	2	1, 3, 4, 6
Constrained developer creativity and flexibility	4			*		
Was difficult to adapt to a specific situation	5			*		
Ignored developers' knowledge and experience	6			*		
Did not match how systems are actually developed	7			3		5
Constrained effective user participation in the development process	8					

\* Surveyed but not reported

#### A4.4.8 Anticipated changes in standard method use

All respondents to the survey were asked to comment on anticipated changes to the use of standard method within their organisations in the following three years. Of the 69 responses to this question (Table A4.38), 29% indicated that there would be little or no change to current practice in this area. Three of these respondents did not use a standard method – and have, therefore, indicated that they will continue not to use a method. Only one respondent envisaged less use of standard methods, commenting that the single reported instance of standard method use in his or her organisation was atypical.

The majority of respondents (70%) indicated that standard method use would increase in some way in their organisations over the following three years. These responses were analysed and grouped into five categories comprising more frequent use of standard methods, the continuous improvement or refinement of existing standard methods, and the expected introduction of standard methods in organisations (including three non-users of a standard method), more formalised use of standard methods (sometimes explicitly in order to increase control of aspects of IS projects or outsourced development), and use of a greater variety of types of standard methods (possibly depending on the nature or size of the IS project).

These results are consistent with other recent empirical studies, which found that standard method use was unlikely to decrease and that relatively large proportions of organisations intended to increase their use of standard methods (Barry & Lang, 2001; Fitzgerald, 1998a; Schambach & Walstrom, 2002-2003). Certainly, it would seem that the practice of standard method use is institutionalised in the majority of organisations that participated in this survey, and that many of them perceive some value in using standard methods.

Table A4.38: Changes in standard method use (n=69)

Anticipated changes	Number of respondents (%)	
Little or no change		20 (29%)
Less use of standard methods		1 (1%)
More use of standard methods		48 (70%)
More frequent use of methods	10 (14%)	
More formal use of methods	10 (14%)	
Refinement of existing methods	12 (17%)	
More types of methods used	6 (9%)	
Introduction of standard methods	10 (14%)	

The comments of two respondents highlighted the influence of the development environment on standard method use. One respondent noted that the use of a standard method was “embedded in the culture” of the organisation. The other respondent noted that because “we typically outsource development, [we] would always look for a structured methodology.”

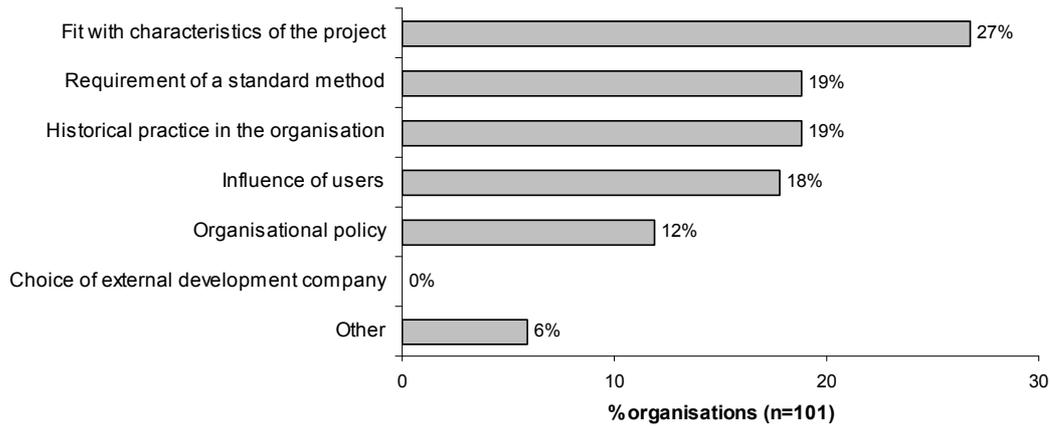
## A4.5 The Nature of User Participation in IS Development

Of the 101 respondents to the survey who had conducted IS projects in the three-year timeframe, all had had users participate in IS development to some extent in at least some of their projects. These respondents were asked to provide additional information on the nature of user participation in their IS projects. Their responses form the basis of the following analysis. Information collected included: the most common reason for user participation (Question 18); the proportion of users who participated (the type of user participation) (Question 19); the roles and responsibilities played by users (the form of user participation) (Question 20); the stages of IS development in which users participated (Question 21); and the benefits and limitations of user participation (Questions 22 and 23, respectively). Further, all respondents were asked to identify any changes in user participation they expected to see about anticipated changes in their organisation over the following three years (Question 25).

### A4.5.1 Reasons for user participation

The most common reason given by respondents for having users participate in their IS projects (Figure A4.21) was because of its fit with the characteristics of the project (27%). This is consistent with the IS literature that suggests that user participation is important with certain types of projects, such as large, technically complex or cross-functional projects (Butler & Fitzgerald, 2001; Cavaye, 1995; Howcroft & Wilson, 2003; Lin & Shao, 2000; Mahmood et al., 2000; Yetton et al., 2000). A further 19% of respondents practiced user participation because it was a requirement of their standard method(s), which typically support some degree of user participation (Cavaye, 1995; Damodaran, 1996; livari, 2004; Kirsch & Beath, 1996; Kujala, 2003; Nandhakumar & Jones, 1997; Roberts et al., 2000). Overall, 31% of organisations reported that users participated in their IS projects for organisational reasons, namely because of organisational policy or historical practice within the organisation. The influence of users was given as a reason for user participation by 18% of respondents. This may reflect organisations where the IS function is regarded as a support service to the business, or where users are politically active or have sufficient influence to require participation. No organisations employed user participation because it was the choice of an external development company.

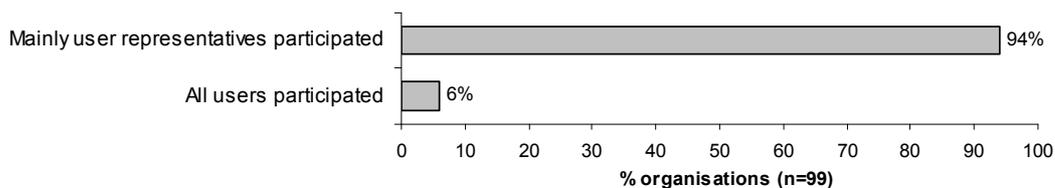
Figure A4.21: Reasons for user participation in the development process



### A4.5.2 Type of user participation

In almost all of the responding organisations (94%), user representatives typically participated in IS development (Figure A4.22). This is consistent with other studies, which acknowledge the difficulties (or impossibility) of involving all users, particularly given the increasing numbers and types of affected users in the modern IS development context (e.g. Cavaye, 1995; Ljung & Allwood, 1999; Markus & Mao, 2004). In only 6% of organisations did all users typically participate in the IS projects undertaken. The six organisations who responded in this way were relatively small (with 200 to 499 FTEs) and undertook a relatively small number of projects (five of them undertook four or fewer projects over the three years). However, their projects ranged in size, with 41% costing more than \$100,000, suggesting that in at least some of the projects full user participation may have involved significant logistical issues (Cavaye, 1995; Markus & Mao, 2004).

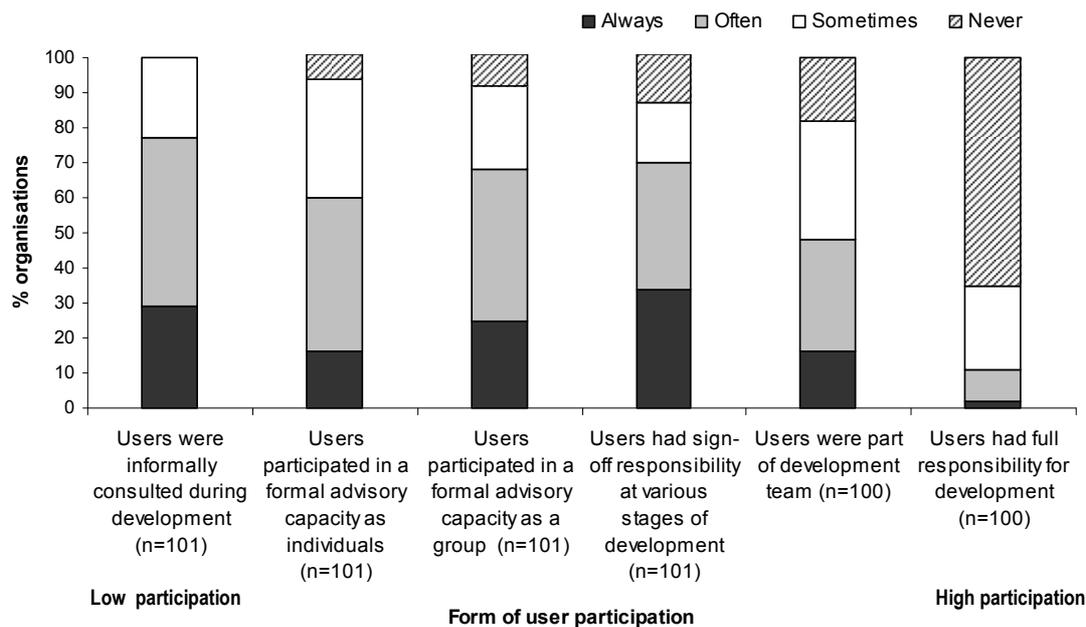
Figure A4.22: Types of user participation



### A4.5.3 Forms of user participation

Respondents were asked to indicate how frequently various forms of user participation occurred. The distribution of responses for this question is presented in Figure A4.23, with the various forms of user participation are ordered from left to right in increasing levels of user participation (and, to some extent, increasing levels of responsibility conferred to the users). The first four forms involve relatively low levels of user participation and, apart from where users have sign-off responsibility, limited accountability. In contrast, user participation and levels of responsibility are higher where users are part of the development team or they have full responsibility for development.

Figure A4.23: Occurrence of various forms of user participation



The proportion of organisations who reported using the latter two forms of user participation (development team membership or full responsibility for development) is noticeably less than the forms with lower levels of participation and responsibility. This is consistent with other empirical studies which report that user-led development is less prevalent than other forms of user participation (McKeen & Guimaraes, 1997; Wastell & Swards, 1995). All but one of the 101 organisations informally consulted users during the development process to some extent. The proportion of organisations not using a particular form of participation increases moving through the range of forms of participation from left to right in Figure A4.23. Notably, 65 (65%) of the organisations never gave users full responsibility for development.

Seventy-seven percent of the organisations informally consulted users during the development process on a regular basis (often or always). Between 60% and 70% of the organisations regularly involved users in a formal advisory capacity and/or gave them sign-off responsibility at various stages in development. Users were regularly part of the development team in nearly half (48%) of the organisations and users regularly had full responsibility for development in 11% of the organisations. The proportion of organisations that always used a particular form of participation varied from 2% where users always had full responsibility for development to 34% where users always had sign-off responsibility at various stages of IS development.

Two respondents specified other forms of user participation that were specific examples of various stages of development when users had sign-off responsibility. The frequency ratings they gave generally matched those that they gave for *users had sign-off responsibility at various stages of development* listed in the question.

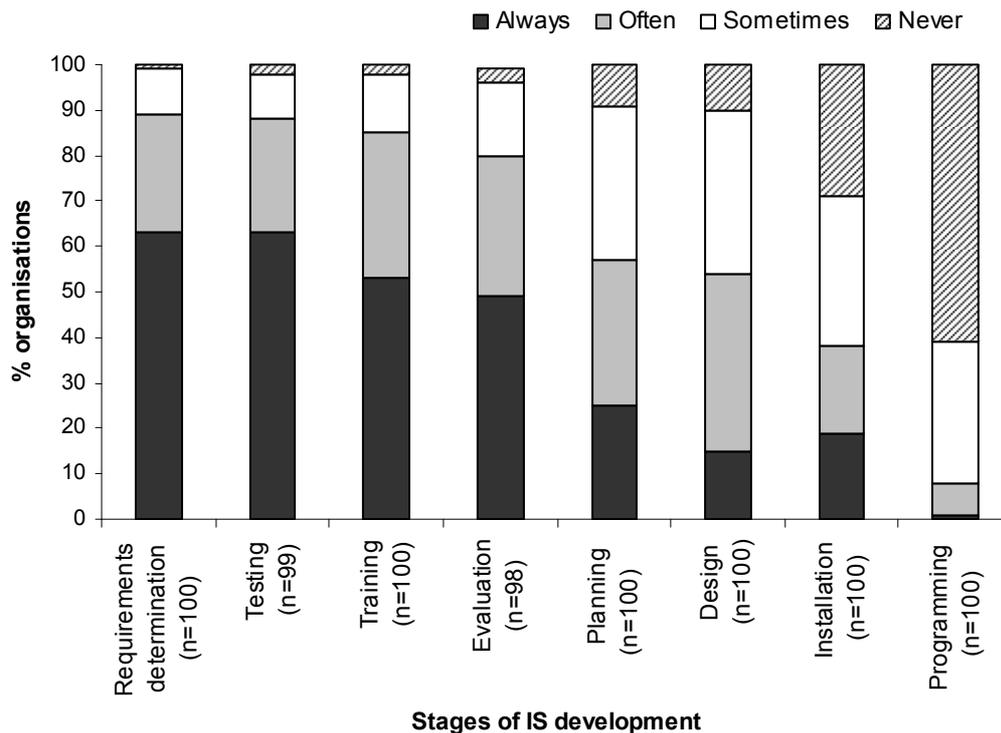
It should be noted that the form of user participation within a given project or organisation does not necessarily bear any relationship to attaining the benefits of user participation. Within the IS literature, it is generally accepted that users need to perceive that their participation (or that of their representatives) is meaningful in order to realise such benefits (Butler & Fitzgerald, 2001; Cavaye, 1995; Hunton & Beeler, 1997; Lynch & Gregor, 2004; Markus & Mao, 2004; Saleem, 1996). While users are more likely to perceive that they have had greater influence where they have had full responsibility for development or been part of the development team, IS projects in which users are consulted and their input seriously considered can still achieve the benefits of user participation.

#### A4.5.4 Stages of IS development

Respondents were asked to indicate how frequently users participated at different stages of IS development. The distribution of responses for this question is presented in Figure A4.24. Users most often participated in requirements determination, testing, training, and evaluation. The majority of organisations (between 80% and 90%) regularly (often or always) involved users in each of these stages of development. This is consistent with reported practice where, apart from the elicitation of requirements, users tend to be involved in the latter stages of IS development. Organisations less commonly involved users in planning, design or installation of IS projects. Just over half of the organisations regularly involved users in planning (57%) and design (54%). Fewer organisations (40%) regularly involved users in the installation of IS projects. As might be expected, only 8% of organisations regularly involved users in the programming for IS projects. These results are consistent with previous empirical IS literature (Butler & Fitzgerald, 2001; Cavaye, 1995; Foster & Franz, 1999; Heinbokel et al., 1996; McKeen & Guimaraes, 1997; Wastell & Swards, 1995).

While Markus & Mao (2004) point out that in the modern IS development context users may also be involved in a wider variety of activities than previously, this was only found to be the case in two organisations in this study, where respondents specified that users often participated in either configuration or organisational change management.

Figure A4.24: Occurrence of user participation in different stages of IS development



#### A4.5.5 Benefits of user participation

Respondents were asked to indicate their level of agreement with various positive statements drawn from the literature about user participation in their IS projects undertaken over the three-year time frame. Statistical data for each statement is presented in Table A4.39, and the relative level of agreement of respondents with these statements is shown graphically in Figure A4.25.

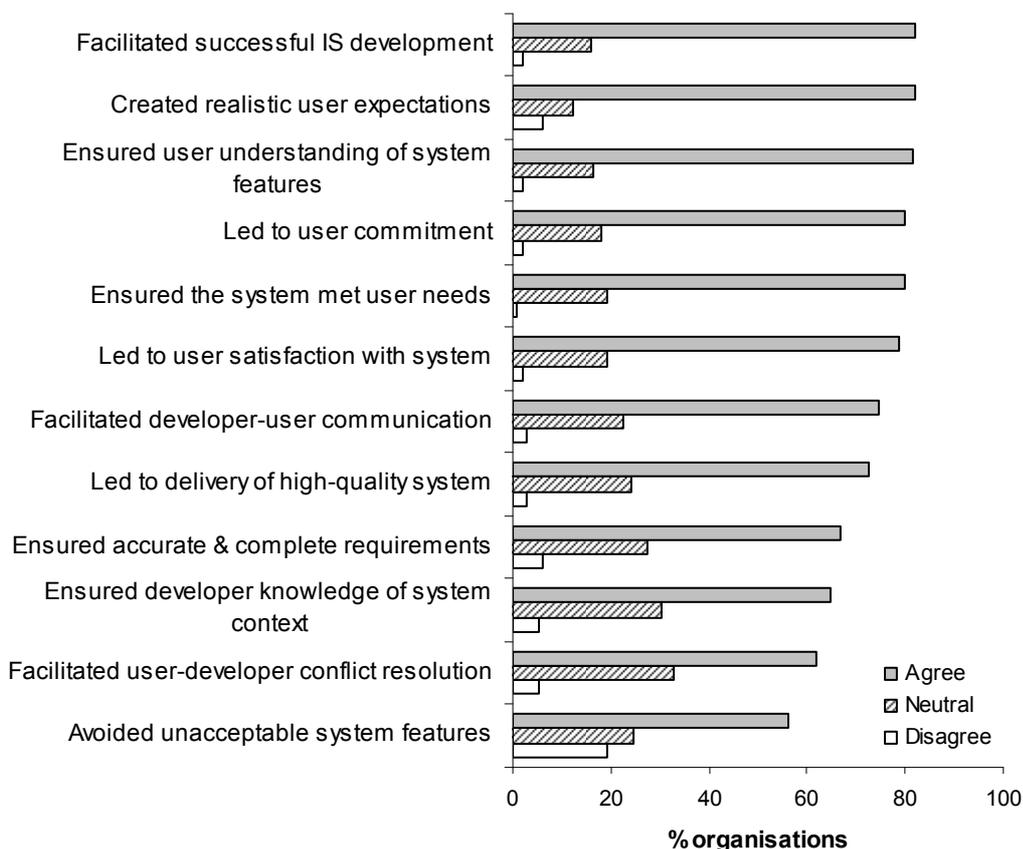
The mean ratings for all statements are above the neutral value of 3, implying that respondents tended to agree with these benefits of user participation. This is not unexpected given the widespread popularity of user participation in practice, the extent of its description and support both in the IS academic and practice literature and its institutionalisation into IS development practice.

Table A4.39: Agreement with positive statements about user participation

User participation in the development process...	n†	% Agree*	Mean§	Median
Facilitated successful IS development	99	82	4.02	4
Created realistic user expectations of the system	99	82	3.98	4
Ensured user understanding of the system features	98	82	3.93	4
Led to user commitment to implementation of system	99	80	4.02	4
Ensured the developed system met user needs	99	80	3.98	4
Led to user satisfaction with the system	99	79	3.95	4
Facilitated effective communication between developers and users	98	74	3.84	4
Led to the delivery of a high-quality system	99	73	3.86	4
Ensured accurate and complete user requirements	99	67	3.73	4
Ensured developer knowledge of the system context	96	65	3.70	4
Facilitated conflict resolution between users and developers	97	62	3.66	4
Avoided unacceptable or unnecessary system features	98	56	3.42	4

† Excludes any 'Don't know or Not Applicable' responses  
 \* % respondents who agreed with the statement (chose 'Agree' or 'Strongly Agree')  
 § Values assigned to ratings: 1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neutral', 4 = 'Agree' and 5 = 'Strongly agree'

Figure A4.25: Relative agreement with positive statements about user participation



The majority of respondents (82%) agreed that user participation *facilitated successful IS development*<sup>4</sup>. As one respondent noted, “It is clear that the projects that had user participation ... from the start have been far more successful”. Meeting user expectations is perceived as an ongoing challenge by CIOs across New Zealand (Bhargava, 2006; Hind, 2002), and the next five highly ranked benefits of user participation focused on aspects of user acceptance of the developed system. These included *creating realistic user expectations of the IS, ensuring the developed system met user needs, and generating user commitment to and satisfaction with the system*. There was relatively less (although still high) support for the benefits of user participation in facilitating the process of IS development, such as by *facilitating effective communication and conflict resolution between developers and users, ensuring comprehensive user requirements and ensuring adequate developer knowledge of the IS context*. Overall, respondents were least convinced that user participation *avoided unacceptable or unnecessary system features*, although over half of the respondents (56%) still agreed with this statement.

#### A4.5.6 Limitations of user participation

Respondents were asked to indicate their level of agreement with various negative statements drawn from the literature about user participation in their IS projects undertaken over the three-year time frame. Statistical data for each statement is presented in Table A4.40, and the relative level of agreement of respondents with these statements is shown graphically in Figure A4.26.

The mean ratings for all these statements are below the neutral value of 3, implying that respondents tended to disagree with all of the negative statements about user participation in the projects reported on in this survey. This is consistent with the overall beneficial perception of user participation identified above.

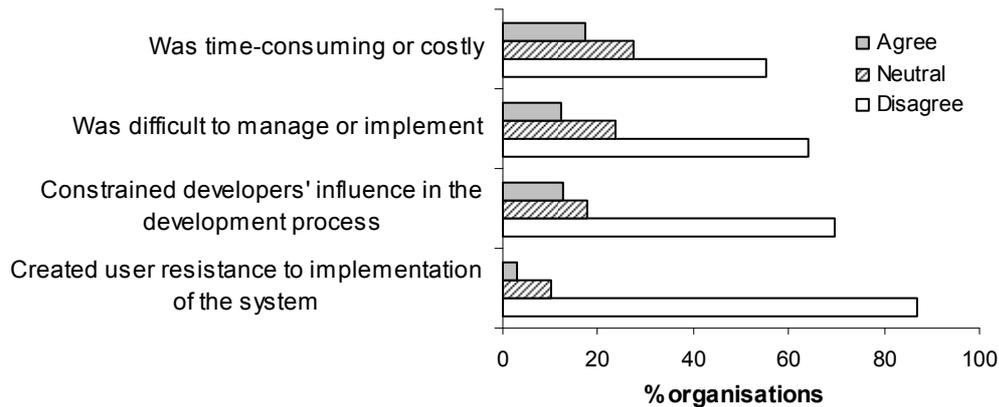
Less than one in five respondents (17%) agreed with the statement that user participation in their projects *was time-consuming or costly*. In fact, over half the respondents (55%) disagreed with this. Similarly, only 12% of respondents agreed that user participation in their IS projects had been *difficult to manage or implement*. While some developers (or the IS function more generally) may endeavour to protect their interests in relation to IS development in a specific project, this was not regarded as an issue by most respondents in this survey, with only 12% agreeing that user participation in their IS projects *constrained developer influence in the development process*. Almost no respondents (3%) considered that user participation in their IS projects actually *created user resistance*. While there is some indication in the IS literature that user participation may produce user resistance in individual IS projects, this would appear to be a rare occurrence based on the results of this survey. In fact, there was relatively strong agreement expressed by the survey respondents that user participation led to user satisfaction with and commitment to the systems developed. This would seem to support McKean and Guimaraes’ (1997) finding of a lack of evidence of dysfunctional effects of user participation.

Table A4.40: Agreement with negative statements about user participation

User participation in the development process...	n <sup>†</sup>	% Agree*	Mean <sup>§</sup>	Median
Was time-consuming or costly	98	17	2.54	2
Was difficult to manage or implement	98	12	2.40	2
Constrained developers' influence in the development process	96	12	2.34	2
Created user resistance to implementation of the system	98	3	1.96	2
<sup>†</sup> Excludes any 'Don't know or Not Applicable' responses <sup>*</sup> % respondents who disagreed with the statement (chose 'Agree' or 'Strongly agree') <sup>§</sup> Values assigned to ratings: 1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neutral', 4 = 'Agree' and 5 = 'Strongly agree'				

<sup>4</sup> This is consistent with the relatively high rating given to the importance of user participation in facilitating IS development in Question 7 earlier.

Figure A4.26: Relative agreement with negative statements about user participation



One respondent specified a limitation (user participation slowed the project down) that was related to the statement about user participation being time-consuming already listed in the question; his or her ratings of the two factors matched. Overall, the results suggest that the time or financial resources required for user participation (e.g. Cavaye, 1995; Ljung & Allwood, 1999) are generally accepted, rather than regarded as a negative consequence of user participation. This is further supported by the fact that a number of organisations intend to continue or increase their current levels of user participation in the future (see below). As one respondent noted, “although participation could be seen as time consuming or costly, it is viewed within our organisation as a positive necessity”.

#### A4.5.7 Anticipated changes in user participation

All respondents were asked to comment on anticipated changes to user participation in IS development in their organisations in the following three years. Of the 66 responses to this question (Table A4.41), 44% indicated that there would be little or no change to the current level and form of user participation. Two respondents (3%) commented that there would be less user participation in future. One of these specifically commented on the need for the IS developers to have “better veto rights on scope creep”. While scope creep might be a function of user participation, it is not necessarily so – it might suggest difficulties in project management rather than being a direct criticism of user participation. In contrast, just over half the respondents (53%) indicated that more user participation in IS development was expected to occur. Some of these respondents also provided information on envisaged changes to the form of participation. Analysis of these responses revealed a number of common themes (Table A4.41).

Table A4.41: Changes in user participation (n=66)

Anticipated changes	Number of respondents (%)	
Little or no change		29 (44%)
Less user participation		2 (3%)
More user participation		35 (53%)
Greater user ownership of projects	7 (11%)	
Creating more formal roles for users	4 (6%)	
Increased use of user knowledge	3 (5%)	
More development work by users	2 (3%)	
More controlled user participation	2 (3%)	

Seven respondents (11%) anticipated a significant change towards ownership of IS projects by users in their organisations. These respondents talked about users as increasingly becoming “owners”, “drivers” and “leaders” of IS development. The language they used included terms such as “influence” and “empowerment”. Business ownership of IS projects ties in with the increased alignment of IT with business reported earlier. Both of these seem to have been topics of discussion in the practitioner literature around the time that the survey was conducted (Bell, 2003). For example, Kumove (2003) argues that business owners should be held (at least jointly) accountable for IS projects, on the grounds that when IT is aligned with business, IS projects are the IS components of business projects. Such arguments also appear in the more recent practitioner literature (e.g. Bell, 2005; KPMG, 2005; Paredes, 2005a). For example, Cramm (2005) argues that for IT to be viewed as a business enabler, the IT organisation needs to delegate to the business control over the ‘what’ of IT (as compared to the ‘how’). By this, she includes deriving IT-enabled business strategies and plans, establishing priorities and service requirements, allocating funding and approving vendors.

Three respondents (5%) suggested that participation in IS development by users would increase due to the need to access their knowledge base. In one case, “this is because the nature of those projects demands extensive knowledge of detailed facets of the company's operating environment, and it will be necessary for us to tap into that knowledge to gain not only a better functional outcome, but also to encourage ownership at the user level.” In another case, it is “critical, given that we don't have an internal IS development team to share and own some of the knowledge”. This latter comment suggests that if the outsourcing of IS development increases, users may become more involved in IS development because of the lack of institutional knowledge and memory among the external IS developers.

Four respondents (6%) talked about creating more clearly defined or formal roles for users in the development process, often including formal approval or sign-off of IS deliverables. Two respondents (3%) suggested that new development tools would allow users to do more development work, including customisation, themselves. Two other respondents (3%) wanted more user participation, but in a controlled way. In one case, apparently, “allowing users sign-off rights tends to slow things down too much”.

Interestingly, one respondent noted that, in his or her organisation, there was a need for “more acceptance by users that it [user participation] is beneficial”. This comment is a timely reminder that users themselves may be reluctant to be involved or may be unconvinced of the value of their participation, and that managers and developers should not take the perceived benefits of user participation as self-evident for all stakeholders in the IS development process.

#### **A4.6 Contribution of Standard Methods and User Participation**

In order to gain an overall picture of the relative benefit of standard methods and user participation, and the importance of organisational issues compared to technical issues in IS development, respondents were asked to indicate their agreement with three statements about the IS projects undertaken over the three-year time frame. Statistical data for each statement is presented in Table A4.42, and their relative agreement is shown graphically in Figure A4.27.

The majority of respondents (94%) agreed that *user participation in the development process was beneficial to IS development* in the projects undertaken by their organisation over the specified time period. This is consistent with (1) the high proportion of respondents (100%) who reported having some level of user participation in at least some of their projects; (2) the relatively high level of importance placed on the role of user participation in facilitating IS development; (3) the level of support that respondents gave to the various benefits of user participation; and (4) the relative lack of support that respondents showed for the various limitations of user participation.

A large proportion (86%) of respondents from organisations that used standard methods also agreed that the *use of a standard method was beneficial to IS development* in the projects undertaken by their organisation over the specified time period. Again, this is consistent with (1) the proportion of respondents (91%) who reported using a standard method in at least part of the development process in at least some of their IS projects; (2) the level of support that method users gave to the various benefits of using standard methods; and (3) the relative lack of support that they showed for the various limitations of using standard

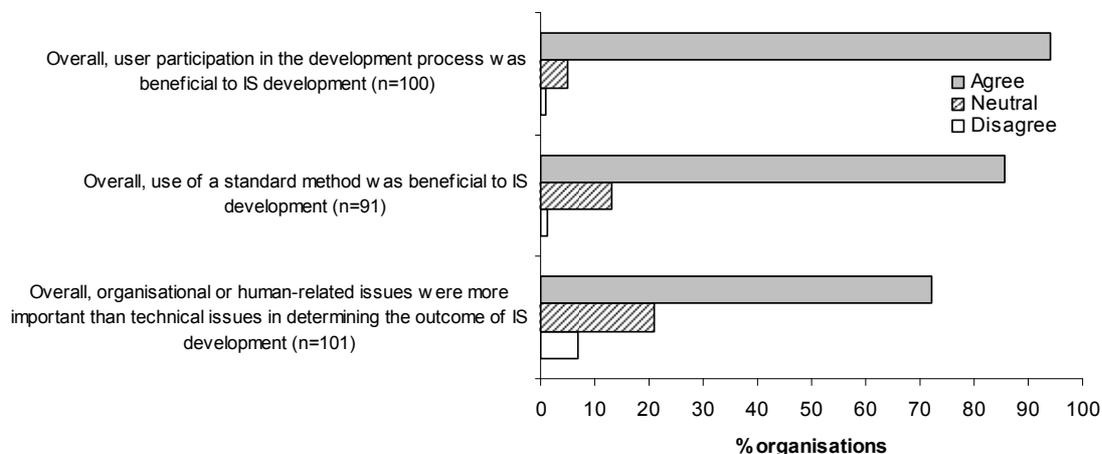
methods. However, it appears to contradict the relatively low ranking given earlier in the survey to the use (non-use) of standard methods in facilitating (inhibiting) IS development. Some of this difference can probably be accounted for by the exclusion of method non-users in this question and the differences in the measurement scales used. The implication is that even though standard methods were not regarded as highly important in influencing IS development, they are still perceived to be beneficial by the organisation in which they have been used. This accords with the observation in the IS literature that, relative to other factors influencing IS development, use of a standard method is not usually been regarded as a primary mechanism for improving IS project outcomes (Barry & Lang, 2003; Mathiassen & Purao, 2002; Warne & Hart, 1996).

Table A4.42: Agreement with statements about IS development

	n†	% Agree*	Mean§	Mode
Overall, user participation in the development process was beneficial to IS development.	100	94	4.39	4
Overall, use of a standard method was beneficial to IS development.	91	86	4.18	4
Overall, organisational or human-related issues were more important than technical issues in determining the outcome of IS development.	101	72	3.96	4

† Excludes any 'Don't know or Not Applicable' responses  
 \* % respondents who agreed with the statement (chose 'Agree' or 'Strongly Agree')  
 § Values assigned to ratings: 1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neutral', 4 = 'Agree' and 5 = 'Strongly agree'

Figure A4.27: Relative agreement with statements about IS development



When questioned about whether *organisational or human-related issues were more important than technical issues in determining the outcome of IS development* in the IS projects undertaken by their organisation over the specified time period, most respondents (72%) agreed that organisational issues were more important. The level of support for the greater importance of organisational issues accords with observations in the IS literature (e.g. Doherty & King, 1998a, 1998b, 2001, 2005; Doherty et al., 2003; Eason, 2001). Within the IS literature, there is evidence that organisations that treat various organisational issues are more likely to enjoy a higher level of IS project success (Doherty & King, 2005; Doherty et al., 2003). Results such as these highlight the importance of research on the processes of social interaction that surround IS development practice.

#### **A4.7 Summary**

The survey has provided an updated assessment of current IS development practices in relatively large New Zealand organisations (with 200 or more FTEs), addressing the second objective of this PhD research, relating to the context of IS development. Particular attention was placed on the use of standard methods of IS development and the participation of users, as potentially significant influences on successful IS development outcomes and important sites for interaction between participants in IS development.

Although the survey results have shown that standard methods and user participation play an important role in IS development in these organisations, there appears to be variations in how these are enacted in practice. For this reason, an in-depth longitudinal case study was also conducted to focus on how such processes are played out in a modern IS development context (Markus & Mao, 2004).

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