Risk Control in ERP Implementations:

The flow-on effect of prior decision making in the control of risks for Project Managers

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Mark Van der klei

University of Canterbury

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Abstract

Enterprise Resource Planning (ERP) systems have been in existence for over 2 decades yet businesses are still losing billions of dollars annually in the implementation of software designed to reduce costs and increase profitability. The inability to manage risks is an area that contributes to these losses, specifically due to uncertain outcomes when dealing with an interconnected construct such as risk, and a research gap at the tactical and operational levels between risks and controls.

A comparative case study approach, encompassing 12 different organisations was adopted to explore emerging patterns at the project implementation level, and from this three contributions emerged. After observing risks behaving in a hierarchical fashion with predictable results, Hierarchy of Risk models representing different implementation stages were constructed. Although these models are still in their formative stages, it may prove useful in furthering our understanding of the close inter-relationship between different risks, where they occur in ERP implementations and the implications of managerial choice when determining risk prioritisation. A second finding is that no direct linear relationship appears to exist between risks and controls. Rather, this counter-intuitive finding suggests that it is additional factors including risk categories, implementation stages, prior control decision making and the hierarchical flow-on effect of impacts as a consequence of identified risks. Finally, by combining the Hierarchy of Risk models and the risk-to-impact-to-control relationship, a method of reverse engineering portfolios of control was discovered. This potentially offers an explanation as to how portfolios of control can be constructed, and why they are essential in ERP implementations.

Chapter One:

Introduction

1.0 Introduction

Enterprise Resource Planning (ERP) implementations are some of the most complex and risky Information Systems (IS) projects available as they involve an entire organisation committing to a protracted process of business change (Klaus et al., 2000; Robney et al., 2002). ERP systems represent the concept of an integrated system designed to increase efficiency by integrating business processes, and sharing common resources across an organisation (Hanseth et al., 2001; Jones et al., 2006; Markus & Tanis, 2000). While the main reason for implementing these systems was "...to enhance control over processes within an organisation" (Hanseth et al., 2001, pp.35), additional technical and business reasons include improvements in efficiency (Jones et al., 2006) and increases in rationalisation and hierarchical control (Hanseth et al., 2001). This in turn increases the effective management of a number of business functions including cost cutting, increased efficiency and the sharing of common resources (Hanseth et al., 2001; Jones et al., 2006; Markus, & Tanis, 1998). There are also benefits associated with system maintenance as the integrated nature of an ERP means there is only one interface, making it easier to maintain. For this reason, ERP systems are used to replace technological aspects of businesses which may be outdated to reduce maintenance costs and increase the availability of new skills and product support (Brehm et al., 2001; Light, 2001; Markus & Tanis, 2000).

Although these systems appear to offer compelling advantages, the results are often less desirable and include high cost, long installation time-frames and high levels of failure. In 2011, projections of $47 billion of annual revenue yielded disappointing results: 61.1% of projects took longer than expected, 74.1% went over budget and 48% failed to realise at least 50% of the original desired benefits (Panorama Consulting Group, 2011). In addition to implementations that experience the problems listed above, the following list of ERP failures by Kimberling (2011) and the Panorama Consulting Group (2011) highlight the financial implications of these large scale and very public failures (Table 1.1).

Table 1.1: Large ERP failures and / or lawsuits

Year	ERP Vendor	ERP Customer	Value
2011	CSC, BT and Fujitsu	UK Government	$18.7 billion
2011	Epicor Software Corporation	New York City	$760 million
2011	Oracle	Montclair State University	$35 million
2010	IBM and SAP	Queensland Health	$60 million
2010	JDA Software (i2)	Dillard's, Inc.	$246 million
2010	SAP and Deloitte Consulting	Marin County, California	$30 million
2010	Capgemini and SAP	Dorset County in the UK	$25.63 million
2008	SAP	Waste Management	$100 million
2003	EDS	British Sky Broadcasting	$1 billion
2000	Oracle Corporation	Tri Valley Growers	$20 million
1999	SAP, Siebel, and Manugistics	Hersey Foods	$112 million
1999	IBM and SAP	NZ Police	$110 million
1996	Andersen Consulting and SAP	FoxMeyer Corp	$1 billion

(Computer World, n.d; Kanaracus, 2011a; Kanaracus, 2011b; Kimberling, 2011; Krigsman, 2009; Leslie, 2008; Panorama Consulting Group, 2011)

In essence, businesses are losing billions of dollars annually in the implementation of software designed to reduce costs and increase profitability (Zhang et al., 2005).

This research adopts the concept of IT-related risk to ERP implementations, and aims to examine the control of risks at the project implementation level as this has been identified as an ongoing reason for ERP implementation failures (Aloini et al., 2007; Markus, 2000). Here risk is defined as a problem that has not yet happened but may cause an organisation to experience significant negative impacts (e.g. technical, financial, human, operational, or business loss) in the course of implementing an ERP system either internally or externally (Aloini et al., 2007; Sumner, 2000).

The concept of risk is closely related to the concept of critical success factors (CSF), which has already reached significant importance in the field of ERP research (e.g Kuang, 2001; Somers & Nelson, 2004; Sumner, 1999). The use of CSF as a prescriptive means of avoiding risks is however limited. Indeed, this fragmented view on risks has been noted as a missed opportunity and an area of pressing business need (Markus, 2000). In addition, prior research addressing risks in ERP projects has mainly focussed on risk identification and assessment and lacks any prescriptive means of actual risk mitigation. One powerful approach to risk mitigation is exercising control (Du et al., 2007); where 'control' refers to any attempt to motivate individuals to behave in a manner consistent with organisational objectives (Ouchi, 1978).

With this in mind, risk and control have been likened to two sides of the same coin and analysis of one without the other fails to fully address risk mitigation within ERP projects. Indeed the purpose of controls is to mitigate and reduce risks so that they are within acceptable limits (Albadri & Jordan 2003; Gallivan 2001). Thus far, research addressing risks and controls has focussed on IS development teams (Henderson and Lee 1992) and individual software development projects (Choudhury & Sabherwal 2003; Ropponen & Lyytinen, 2000). All of these studies identified a common link between risk assessment, control of those risks and the effects on organisational performance. However, apart from two exploratory conference papers (Vanderklei et al., 2010; Vanderklei, 2013) (see Appendix k & Appendix l for full copies of these papers), there is little on risk and control within the context of ERP projects with its specific characteristics as outlined above. Investigating risk controls is further complicated because, during IT projects, risks do not remain static but change as a function of prior decisions and behaviour (Markus 2000). To further complicate matters, the dynamic nature of risks does not easily lead to a stable risk pattern, as second-order consequences of human problem-solving behaviour might lead people to misdiagnose the causes of problems and apply attempted (control) solutions that actually make the situation worse (Markus & Tanis, 2000).

Methods of controlling risks in ERP implementations are still in the formative stages with studies having concentrated on either risk mitigation at the strategic level (Finney & Corbett, 2007) or risk identification and prioritisation at the tactical and operational levels (Aloini et al., 2012; Sumner, 2000). Part of this can be attributed to the complex interconnected nature of ERP risk factors, where risks occurring early in an implementation have the potential to influence different risks later in that same implementation (Aloini et al., 2012). Additionally, contrary findings about how risks can be controlled (which includes singular and portfolios of control) have contributed to the formative state of theory-based research examining the relationship between risks and controls at the project implementation level (Gopal & Gosain, 2009).

Therefore the following research questions arise:

How does the relationship between different risks change during the different stages of an ERP implementation?

How can Project Managers (PMs) map risks to controls across different stages of ERP implementations?

1.1 Structure of Thesis

The remainder of this thesis is structured as follows. Chapter 2 provides a theoretical background of the key constructs, and will be used to define and explore our understanding of ERP systems, risks, controls, risk management and stages of implementation in the context of ERP projects. This is followed by an explanation of the methods used in the collection and codification of data, the criteria used in the selection of organisations and personnel to interview, individual case descriptions and limitations. The risks identified in each of the cases and a compiled risk registry make up the findings section and will be analysed in the discussion using the contextual lens of the research questions. This is followed by conclusions drawn from the discussions and the identification of any areas that may benefit from future research.

Word count: 48,875

(Excluding Table of Contents, Abstract, References and Appendices)

Chapter Two:

Theoretical Background

2.0 ERP Systems

Enterprise Resource Planning (ERP) systems have been part of the corporate landscape since the late 80s and were described by Davenport as being the "most important development in the corporate use of technology" (Davenport, 1998 pp 1). Although ERP systems started appearing at this time, earlier evolutions included Capacity Requirements Planning (CRP) in the 70s and Manufacturing Resource Planning (MRP and MRPII) in the early 80s (Muscatello et al., 2003; Umble, 2003). These Enterprise systems (ERP, CRP and MRP) evolved in response to the problems associated with data duplication and loosely coupled systems offering organisations few methods of analysing data (Rizzi & Zamboni, 1999). ERP systems have maintained a major presence (while retaining the ability to evolve over time) because ERP systems are neither company nor technology specific. Rather ERP is the term assigned to integrated computer software systems designed to connect multiple parts of the business together. Essentially data gathered in one area of a business can be made accessible and comparable to other business units enabling a finer degree of analysis to be conducted (Markus & Tanis, 2000). Specific characteristics of ERP systems include:

Integrated – the system is seamless and data passed from one area of a business to another without repetitive input.
Packages – leased rather than bought from a vendor and produced as a one size fits all. This means that a company can either change the software to suit the organisation or will have to change the organisation to fit the software.
Best practices – ERP solutions are up to date industry best practices based on feedback, experience and exposure to successful companies
Some assembly required – some degree of business process analysis and redesign will be required for installation. Companies wishing to install ERPs will also need to produce and update interfaces into other systems, be they legacy or customised.
Evolving – because of their universal use they will face a number of upgrades and updates during their lifetime.
(Markus & Tanis, 2000)

While there are similarities between the characteristics of ERP products themselves, variations based on which component to implement do occur and these variations in-turn

influence the selection process when determining the most suitable ERP product to use (J Verville, 2003). These variations become more apparent when we consider the broad functionality supported by various ERP packages (Table 2.1)

Table 2.1: Functions supported by ERP packages

Financials Functions supported by ERP systems Accounts receivable and payable Asset accounting Cash management forecasting Cost-element and cost-centre accounting Executive information systems Financial consolidation General ledger Product-cost accounting Profitability analysis Profit-centre accounting Standard and period-related costing	Operations and Logistics Inventory management Materials management Plant maintenance Production planning Project management Purchasing Quality management Routing management Shipping Vendor evaluation
Sales and Marketing Order management Pricing Sales management Sales planning	Human Resources Human-resource time accounting Payroll Personnel planning Travel expenses

(Umble, 2003)

Based on the large array of options available, deciding which solution is a best fit for the business involved is of vital importance and incorrect choices have been identified as a major component in ERP implementation failure (Verville & Halingten, 2002).

While this may give the impression that one ERP package with all of the above listed functionality has the capacity to fit any environment, this is not true. Different systems contain different core components, complexity, are capable of different levels of customisation and consequently differ significantly in cost (Scheer & Habermann, 2000). A package that contains high levels of functionality, require high degrees of customisation and IT knowledge to implement and run, and cost millions of dollars to implement would not be appropriate for a small to medium business with middle to low levels of internal IT expertise. To facilitate different requirements, different ERP systems contain different levels of complexity and functionality, and have been broken into a number of different tiers levels, each encompassing different organisational profiles and vendors. An example from Panorama Consultancy Group (2011) of a three tier structure with vendors can be seen in table 2.2.

Table 2.2: ERP systems listed by tier

Sample Vendors		
Tier 1	**Tier 2**	**Tier 3**
SAP	Epicor	ABAS
Oracle	Sage	Activant Solutions Inc.
Oracle eBusiness Suite	Infor	Baan
Oracle JD Edwards	IFS	Bowen and Groves
Oracle Peoplesoft	QAD	Compiere
Microsoft Dynamics	Lawsons	Exact
	Ross	Netsuite
		Visibility
		Blue Cherry
		HansaWorld
		Intuitive
		Syspro

(Panorama Consulting Group, 2011)

While this provides a listing of the different products and their approximate classifications, no mention is made of how these classifications were made. There are a number of methods used internationally which include estimating requirements based on revenue, number of employees, number of concurrent users, and number and location of sites (Burns, 2011; "ERP: What Tier are you in?," n.d.; Robinson, n.d.). Differing studies using different criteria have failed to advance our understanding as shown in table 2.3 which looks at the different definitions used in the UK and USA.

Table 2.3: Different Tier definitions

Tier	UK			USA		
	Concurrent Users	Employees	Revenue (in millions)	Concurrent Users	Employees	Revenue (in millions)
Tier 1	100-1000+	1000+	200+	n/a	500+	200+
Tier 2	50-500	200-2000	100-500	n/a	50-500	10-200
Tier 3	30-200	50-1000	20-200	n/a	1-50	1-10
Tier 4	1-40	20-200	1-50	n/a	n/a	n/a

(Robinson, n.d.) ("ERP: What Tier are you in?," n.d.)(Burns, 2011)

This problem extends to New Zealand and Australia as an overall lack of peer reviewed definitions exist on how ERP packages are defined. One explanation is that the demarcation

between tiers has been blurred as ERP companies adapt their products to encompass small to medium enterprises in an effort to enlarge market share (Rashid et al., 2002). The ability to cater to different markets does not appear to have assisted organisations wishing to embark on an ERP implementation with software selection as inadequate selection remains a major cause of ERP implementation failure (Aloini et al., 2007).

While the main reason for implementing these systems was "...to enhance control over processes within an organisation" (Hanseth et al., 2001, pp.35), additional technical and business reasons include improvements in efficiency (Jones et al., 2006) and increases in rationalisation and hierarchical control (Hanseth et al., 2001). This in turn increases the effective management of a number of business functions including cost cutting, increased efficiency and the sharing of common resources (Hanseth et al., 2001; Jones et al., 2006; Markus & Tanis, 2000). There are also benefits associated with system maintenance as the integrated nature of an ERP means there is only one interface, making it easier to maintain. For this reason, ERP systems are used to replace technological aspects of businesses which may be outdated to reduce maintenance costs and increase the availability of new skills and product support (Brehm et al., 2001; Light, 2001; Markus & Tanis, 2000). Unfortunately, the benefits outlined have failed to manifest themselves in all instances with the number of failed implementations still encompassing a major proportion of these projects. While there are business benefits to be made from implementing an ERP solution, they are still proving to be risky projects.

Extending the definition of risk provided in the introduction, ERP systems act as activity based control systems where input into the system will result in statistical outputs allowing control to be exercised. During the implementation of an ERP, this formal structure is not in place and therefore an activity view of control is neither appropriate nor possible at this time. Rather, a behavioural view of control is most appropriate (Soh et al., 2010). This implies that when a controller exercises control over a controllee, they are taking some action in order to regulate or adjust the behaviour of the controllee (Kirsch, 1996). The behavioural view further presumes that the controller uses certain control mechanisms to exercise control within given situations (e.g. implementation dates, procedures) (Soh et al., 2010) and that risk is not treated as a rational choice and probability concept, but associated with the threat of a bad outcome. It also suggests that decision makers tend to act in a loss-aversive manner instead of a rational one (Lyytinen et al., 1998). Risk is a necessity for continuous business

improvement, and the purpose of risk management is not to eliminate all risks but to help managers make sense of their situations by identifying the risk, assess its impact, exclude bad choices and intervening to reduce, or avoid the risks (Bancroft et al., 1998; Lyytinen et al., 1998).

Although the concept of control is established and has been used to examine outsourcing (Gopal & Gosain, 2009) and software development (Harris et al., 2009), methods of controlling risks in ERP implementations are still in the formative stages (Aloini, 2012; Sumner 2000). While control modes can be categorised as Formal (Behavioural and Output) and Informal (Clan and Self) (Kirsch, 2004), specific controls that are useful in managing IT-related risks are as varied as the risks themselves (Markus & Tanis, 2000). Aloini et al., (2012) and Lyytinen et al., (1998) examined a variety of risk management models and theories (e.g. PRINCE2, PMBOK, The Australian Standard, PRAM, RAMP, SHAMPU, SAFE, Boehm's Software Risk Approach and others) and concluded that despite great variations and drastic differences, managerial risk strategies share a standardised format. These include "how to inquire and observe, how to organise and interpret observations, and how to subsequently launch managerial action" (Lyytinen et al., 1998, pp. 236). The Lyytinen et al., (1998) Risk Management Approaches Model (Figure 2.1) was constructed using this standardised format and is a socio-technical, control-centric model with the ability to foster decision-making in situations where complete information is not always available (Alter & Sherer, 2004). This model depicts one event or state (risk) and three ideas and principles (risk identification and analysis, heuristics, and risk resolution and control) which collectively make up the risk control process. Attention shaping and intervention planning components guide the process by linking risks to potential managerial interventions with the help of heuristics (Lyytinen et al., 1998).

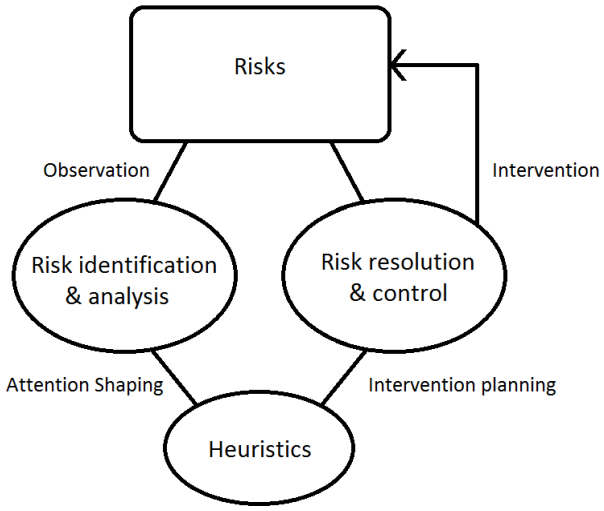

Figure 2.1: Risk Management Approaches Model
(Lyytinen et al., 1998, pp. 236)

2.1 Risk identification and analysis

The first principle of risk identification and analysis in the Risk Management Approaches Model has received extensive coverage (Aloini et al., 2012). ERP implementations represent an excellent context for examining the interplay between different risk factors, because they cross departmental boundaries (Vandaie, 2008), and are prone to risks (Aloini et al., 2012). Two methods associated with risk identification and analysis in ERP projects are Critical Success Factors (CSF) and Risk Factor (RF) analysis. Although studies have been conducted which group CSF and RF analysis as interchangeable (Aloini et al., 2007), there have been a number which treat them as two separate literary tracks covering similar concepts, and while this apparent cross-over has ensured the topic is covered extensively, it has led to some degree of confusion over what each term actually means. The following section will examine what each of these terms covers and explore similarities and differences between the two.

2.3 Critical Success Factors in ERP implementations

CSF research in management literature can be traced back to the early 60s when Daniel (1961) looked at the informational needs of managers from different industries and determined that their information needs were not being met. Specifically, the information passed on did not assist in making managerial decisions. Daniel concluded that factors critical to the success of the business from the perspective of the manager, should be used to customise the data flow so that the information received was useful. In turn this would assist

by reducing the overall amount of data and consequent clerical duties, allowing managers to become more productive in their given areas. This was further augmented by Rockart (1979) in the late 70s who studied the day-to-day data needs of chief executives. Rockart (1979) found that the nature of executive positions meant that there were frequent changes to data requirements, and could be attributed to changes in industry, stage of growth, location, strategy and the perspective of the researcher (Dezdar & Sulaiman, 2009; Rockart, 1979). Although Rockart describes CSF as a management tool that centred on "…information needs for management control…", no mention is made of methods of control available to those managers (Rockart, 1979, pg88). One problem identified when trying to consolidate CSF research was identified by Dezdar and Sulaiman (2009) when they examined the different classifications used to describe CSF (a full list of classifications by Dezdar & Sulaiman (2009) can be found in Appendix). Table 2.4 shows the many different categories given to Top Management Support and Commitment, the highest ranked CSF in the Deldar and Sulaiman study (A full list of the CSFs and different classifications used can be found in Appendix f).

Table 2.4: Different CSF Classifications used to describe 'Top Management Support and Commitment'

Critical Success Factor	Different Classifications used to describe this CSF
Top management support and commitment	Top management/executive involvement Top management/ executive commitment Top management/executive awareness Top management/executive participation Company-wide support Company-wide commitment Dedicated resources Employee recognition and incentive Funds support

(Dezdar & Sulaiman, 2009)

Using Dezdar & Sulaiman's (2009) classification as a guide, a comparison was done of CSF research completed by Nelson & Somers (2001) (Appendix g), Finney & Corbett (2007) (Appendix h), Nah et al., (2003) (Appendix i) and Akkermans & van Helden (2002) (appendix j). Each of these studies compiled findings from a mix of primary and secondary research and proposed a list and ranking system of CSF within ERP projects. These studies have been compared in the following table (Table 2.5).

Table 2.5: Comparison of CSF rankings between different studies

Critical Success Factor categories (Dezdar & Sulaiman, 2009)	Somers & Nelson (2001)	Finney & Corbett (2007)	Nah et al (2003)	Akkermans & van Helden (2002)	**Critical Success Factor rankings**		
					Lowest ranking	**Highest ranking**	**Average ranking**
Top management support and commitment	**1, 12**	**1, 26**	**1**	**1, 12**	**1**	**1**	**1.00**
Project management and evaluation	**5**	**6, 8, 14, 18, 24**	**4, 7**	**5**	**4**	**6**	**5.00**
Business process reengineering and minimum customization	16, 17	3, 4	4, 5, 8	16, 17	3	16	9.75
ERP team composition, competence and compensation	**2, 13**	**5, 9, 16, 24, 26**	**3**	**2, 13**	**2**	**5**	**3.00**
Change management programme	**7, 19**	**2, 13**	**5, 7**	**7, 19**	**2**	**7**	**5.25**
User training and education	14	4	12	14, 15	4	14	11.00
Business plan and vision	**4, 15**	**6, 8, 11, 14, 25**	**7**	**4**	**4**	**7**	**5.25**
Enterprise-wide communication and cooperation	3, 6	11	6	3, 6	3	11	5.75
Organizational culture	23	27	1, 5	23	1	27	18.5
Vendor support	9, 20, 21	27	6	9, 20, 21	6	9	18.75
Software analysis, testing and troubleshooting	11	19, 21, 22	9, 10	11	9	19	12.5
Project champion	10	10, 26	2	8	2	10	7.5
Careful Selection of ERP Software	8	15	12	10, 18	8	15	11.25
Use of consultant	22	7	3, 6, 10	22	3	22	13.5
Appropriate business and IT legacy systems	23	12, 20	9, 11	23	9	12	16.75
System quality	23	17	4	23	2	17	16.75
User involvement	23	23	12	23	23	23	20.25

(When a study had multiple risk factors capable of being compared with the Dezdar and Sulaiman (2009) list, all risks that fell within that category were listed with their respective risk rankings. When comparing for lowest, highest and average rankings with items containing multiple numbers, the lowest number was used.)

Possibly the most obvious finding is that apart from five categories which consistently ranked within the top ten across all of the studies, there appears to be little cohesion between the other factors in these studies. The top five CSFs are listed in table 2.6.

Table 2.6: Top ranked CSF by average across different studies

CSF	Average CSF rating
Top management support and commitment	1
ERP team composition, competence and compensation	3
Project management and evaluation	5
Change management programme	5.2
Business plan and vision	5.6

(Akkermans & van Helden, 2002; Dezdar & Sulaiman, 2009; Finney & Corbett, 2007; Nah et al., 2003; Somers & Nelson, 2001)

When examining the data sources of these studies, the differences appear to be a natural extension of Rockart's original work (1979). It was noted that different companies within different industries, stage of growth, location, project, strategy and stakeholder group will produce different CSF (Rockart, 1979). It may be that this analysis has identified CSF specifically relating to ERP projects and removed the additional variables associated with the specific businesses involved. While at face value this may appear a possible explanation, research looking at key issues for IT executives has identified additional variables which have been shown to influence the factors deemed critical to IT Executives on a yearly basis. Established research by the Society of Information Management (who have examined key issues for IT Executives since 1980) have found that although certain key issues remain at the forefront of IT Executive concerns, the priority with which they are placed can and frequently change from year to year.

If we look at table 2.7, the ranking of Business Process Re-engineering is either very low (third in the studies by Finney & Corbett, 2007 and Nah et al., 2003) or very high (16 or 17 in studies by Akkermans & van Helden, 2002 and Somers & Nelson, 2001).

Table 2.7: Rankings of Business process reengineering

Critical Success Factor categories (Dezdar & Sulaiman, 2009)	Somers & Nelson (2001)	Finney & Corbett (2007)	Nah et al (2003)	Akkermans & van Helden (2002)	**Critical Success Factor rankings**		
					Lowest ranking	**Highest ranking**	**Average ranking**
Business process reengineering and minimum customization	16, 17	3, 4	4, 5, 8	16, 17	3	16	9.75

Table 2.8: Top 10 IT Management Concerns between 2003 and 2010

IT Management Concerns	2010	2009	2008	2007	2006	2005	2004	2003
Business Productivity and cost reduction	1	1	7	4				
Business agility and speed to market	2	3	13	17	7		5	7
IT and business alignment	3	2	1	2	1	1	1	1
IT reliability and efficiency	4	6						
Business process re-engineering	5	4	18	15	11	5	10	10
IT strategic planning	6	7	3	8	4	4	4	2
Revenue-generating IT innovations	6	8						
IT cost deduction	8	5	7	4				
Security and privacy	9	9	8	6	3	2	3	3
Globalization	10	15						

*cells with blank data indicate that the issue was not asked in that year's survey

In table 2.8, Business Process Re-engineering has fluctuated in popularity between a high of 18 in 2008, to a low of 4 in 2009 with differing values in the years preceding. Without confirmed statistics on the year/s the data was gathered for the studies, or the Business Process Re-engineering ranking for those years, it may be that this could have been an influencing factor based on the year the data was gathered. Irrespective of the reasons for the ranking differences, there is enough evidence to suggest that an approach looking solely at frequency to determine the ultimate rankings of CSF over a prolonged period may be too simplistic an approach. Based on the literary findings, the disparities found would suggest that additional research examining CSF rankings involving additional constructs will add significantly to this area.

2.3 Risk Factors in ERP Projects

As has already been noted, there are a number of studies which have identified CSFs and collated them into lists and this same treatment (although to a lesser degree) has been afforded risk analysis in ERP projects. Like CSFs, comparisons were made between different risk factors in an effort to find the most common risks occurring in ERP projects and create a master list on which ERP implementation can be based (Aloini et al., 2012; Sumner, 2000). Apart from the reoccurring issues with categorisation as noted by Dezdar & Sulaiman, if we compare the Dezdar & Sulaiman CSF (2009) categories with that of Sumner (2000), the similarities between CSF and Risk factors appear to be quite strong (Table 2.9).

Table 2.9: Comparison of CSF to Risk factors

CSF	Risk Factors
Top management support and commitment	Lack of senior management support
Project management and evaluation	Lack of full time commitment of customers to project management and project activities
Organizational culture	
Change management programme	Lack of proper management control structure
Business plan and vision	
Enterprise-wide communication and cooperation	Ineffective communication
ERP team composition, competence and compensation	Lack of business analysts with business and technical knowledge
Business process reengineering and minimum customization	Failure to redesign business processes
Project champion	Lack of champion
Vendor support	Failure to mix internal and external expertise effectively
User training and education	Insufficient training and reskilling Lack of sensitivity to user resistance
Careful Selection of ERP Software	Failure to adhere to standardised specifications which the software supports
Appropriate business and IT legacy systems	Attempting to build bridges to legacy applications
Software analysis, testing and troubleshooting	
System quality	
Use of consultant	Insufficient 'internal' expertise
User involvement	Insufficient training of end users
(Dezdar & Sulaiman, 2009)	(Sumner, 2000)

While the two lists of factors compare, fundamental differences can be found in the way the factors are framed and their application. Framing represents the delivery of the choices in either a positive or negative manner (Zickar & Highhouse, 1998), and is in line with the assessment given by Alter and Sherer (2004) when describing ERP critical success factors as factors that increase the chances of a positive outcome, and ERP risk factors increase the chances of a negative outcome. The second way that risk analysis differs is that the following studies have placed less emphasis on ranking risks by frequency, but rather have analysed risks based on a number of different criteria including risk categories and the stage in which they would be expected to occur within an ERP implementation (Sumner, 2000).

One additional form of analysis draws on the interconnected nature of risks and proposes a hierarchy of risks, where a risk appearing early in an ERP implementation can have a direct effect on risks at later stages. The Hierarchy of Risks structure was tested against a single case and delivered promising results with further research proposed (Aloini et al., 2012).

Based on a comprehensive literature review and an empirical investigation of multiple case studies, Sumner (2000) identified both risk factors and risk categories associated with ERP projects (Appendix d), thus refining the general concept of IT-related risks towards ERP-

related risks. These include factors associated with organisational fit, skill mix, management structure and strategy, software systems design, user involvement and training, technology planning, project management and social commitment (Sumner, 2000). As a consequence of the ERP focus, and identification of ERP specific risk factors and categories, the risk factors and categories as described by Sumner (2000) will be used in this research. The categories and definitions of each of the risks identified in Sumner (2000) are as follows:

2.3.1 Organisational Fit

This first category refers to all risks associated with the organisational environment, including changes of scope or objective.

1. Failure to redesign business processes to fit the software

ERP systems are highly complex, and some debate exists between the need to customise the software to the business or the business to the software (Luo & Strong, 2004; Markus & Tanis, 2000). Business process redesign is essential (Aloini et al., 2007), and in instances where customisation is unavoidable (especially when a process is deemed by a business to be a competitive advantage), IT has been identified as a valuable tool to enable this to happen (Tsai et al., 2010).

2. Failure to follow an Enterprise-wide design which supports data integration

This risk refers to the need to have a co-ordinated process when it comes to ERP implementations instead of separate modular implementations where the intention is to couple the different components after go-live.

2.3.2 Skill mix

This category includes both insufficient numbers of staff, as well as skill shortages of those staff present.

3. Insufficient training and reskilling of IT workforce

This is an area that is often underestimated as the requirements to both budget and time are often higher than expected. This risk encompasses all training

requirements needed to ensure IT staff are trained in the use and development of the new ERP initiative (Sumner, 2000).

4. Insufficient 'internal' IT expertise

Internal IT expertise refers to the needed internal IT skills of the project team (Aloini et al., 2007). Peng and Nunes (2004) identified that members of the senior management team are also affected because they are neither experts or users so will typically lack systems experience.

5. Lack of business analysts with business and technical knowledge

Business analysts with business and technical skills have a large bearing on the success of the project (Aloini et al., 2007). Additionally project team members need to have a deep knowledge of the processes.

6. Failure to mix internal and external expertise effectively

External consultants are necessary to the success of an ERP implementation as they fill in any skill gaps and the relationship will be long term and inter-dependant (Brehm & Markus, 2000). As a consequence, it is important to form a skill balanced team of internal and external experts as the engagement of external expertise plays a major role in diminishing risk (Aloini et al., 2007).

7. Lack of ability to recruit and retain qualified ERP systems developers

This risk encompasses two aspects important to an ERP project. The first is recruitment, and looks at the ability of an organisation to find appropriately trained staff for the ERP implementation. This can be difficult as staff with the required skills can be hard to find, and when found can demand high wages. The second component is retention, and involves the use of incentives and bonuses to keep qualified ERP systems developers in the business. The benefits of retention can be felt in ongoing implementations as experience is important in ERP implementations (Parr & Shanks, 2000)

2.3.3 Management structure and strategy

This category includes all risks associated with the senior management team

8. Lack of senior management support

Empirical evidence examining project implementations in general have identified strategic issues associated with senior management support to be most important at the beginning of the project (Parr & Shanks, 2004). Further research suggests that Strategic support is essential throughout the life of a project (extending past go-live) and ensuring that support is present is essential to its success (Aloini et al., 2007; Peng & Nunes, 2009; Pinto & Slevin, 1987).

9. Lack of proper management control structure

Proper management control structure is used to identify systems in place to avoid excessive amounts of duplication of effort (Sumner, 2000). Poor controls can significantly affect project success, especially in the early stages of an implementation. Tools to aid in this process include risk management activities (i.e. risk registries), but only if done correctly (Aloini et al., 2007). Risk registries have also been credited as creating an illusion of control if not used correctly (Drummond, 2011).

10. Lack of champion

A Project Champion is vital to a projects success, especially in both the early stages, and during the implementation. Their role is to lead the project, with one identified key function being as a driver for end user training (Aloini et al., 2007)

Appointment of a Project champion needs to be early and they need to be empowered to be able to make decisions (Parr & Shanks 2000).

11. Ineffective managerial communication

Communication is a necessity on all levels, with clear articulated goals and vision to be effective (Aloini et al., 2007). One method of instigating

communication at the managerial level is with risk registries. Unfortunately risk registries are often seen as an administrative overhead for project managers and are either not used, or not used to the full extent (Patterson & Neailey, 2002).

2.3.4 Software systems design

This encompasses all risks associated with scope and requirements

12. Failure to adhere to standardised specifications which the software supports

Failure to adhere to standard specifications by introducing systems modifications can lead to failure (Markus & Tanis, 2000). If modifications are required, it needs to be planned from the beginning of the project to be effective, or it can lead to problems (Aloini et al., 2007)

13. Lack of integration

The project needs to be based on an enterprise wide design. Any attempts to implement separate functionality with the goal of eventual integration should be avoided (Sumner, 2000).

2.3.5 User involvement and training

Factors involving users and they interact with the project including communication, participation and training can all affect an ERP project.

14. Insufficient training of end users

End user training is important for the success in ERP system implementations success (Aloini et al., 2007) but insufficient training can be bought about by initial failures, leading to a lack of confidence and higher levels of user resistance to the system (Peng and Nunes, 2009)

15. Ineffective end user communication

End user communication achieves goals outside of the obvious requirement to keep users informed. Aloini et al (2007) stated that communication is a

necessity, and that end user communication has the ability to improve users' expectations, and also helps in planning for training.

16. Lack of full time commitment of customers to project management and project activities

This risk covers both a lack of individuals being release for the project, and personnel with inadequate skills being allocated to the project team. (Parr & Shanks, 2000)

17. Lack of sensitivity to user resistance

User commitment is essential and this can be fostered by managing resistance (Aloini et al., 2007). There are increased chances of resistance at go-live because of factors such as an unwillingness to change (Peng & Nunes, 2009).

18. Failure to emphasise reporting

The ability to produce reports is a fundamental component of ERP systems, and ensuring end user participation in the generation and design of reports is essential (Sumner, 2000)

2.3.6 Technology planning / integration

This is the only technical risk category and encompasses technological risks which include ways in which the technology fails to meet requirements.

19. Inability to avoid technological bottlenecks

Technological bottlenecks occur when organisations wishing to retain and interface multiple systems experience delays when attempting to bridge the ERP system with legacy applications. (Sumner, 2000)

20. Attempting to build bridges to legacy applications

This can lead to problems with non-engagement as users continue to use the old systems (Aloini et al., 2007)

(Sumner, 2000)

As indicated in the introduction, IT related risks are highly dynamic in the sense that they vary throughout a project as a function of prior decisions and behaviour, which might lead to unintended behaviour and consequences (Alter & Sherer, 2004; Markus, 2000). With ERP implementations in particular, residual risk might increase over time (contrary to conventional IT projects) as ERP systems tend to be continuously enhanced and further integrated with other systems, increasing complexity, which in turn increases their failure-proneness (Markus, 2000).

2.4 Risks across the different stages of an ERP implementation

The process view of ERP implementation sees implementations as a sequence of stages where the outcome of each stage can be examined, as well as the cumulative outcome across all of the stages (Markus & Tanis, 2000; Somers & Nelson, 2004). Many different models of ERP implementation have been created (see Parr & Shanks (2000). This research is using the enterprise systems experience cycle by Markus and Tanis (2000), which includes a planning stage as well as a post-implementation stage (see Figure 1). The purpose of this framework was to explain ERP success, which also makes it very useful in trying to understand actions and effects related to ERP failure and associated risks in each stage. The four stages of this model are:

Project Chartering: This stage details the activities performed prior to project and funding approval. Activities include business case development, ERP selection, identification of the project manager and scoping documents which include proposed budgets and timeframes (Parr & Shanks, 2000). Typical risk factors comprise the lack of top management support and championship and the lack of a proper management structure for the project (Sumner 2000). This is also confirmed by Nah and Delgado (2006) and Parr and Shanks (2000), who found that top management support and championship was the most important activity during this stage. Other risks include selection of inappropriate software, inadequate contracting with vendors and consultants, Failure to recognise the need for business change, underestimating change management requirements, misunderstanding of reporting requirements (Markus & Tanis, 2000)

The Project (Configure and Rollout): This stage is focused with getting the system and end users up and running (Markus & Tanis 2000). Parr and Shanks (2000) found that it was

crucial to have a balanced project team and the best people available in this stage. This stage is marked by its focus on the hard, technical tasks of installing the system rather than softer social tasks such as change management. Typical risk factors to be addressed are failure to redesign business processes, failure to follow an enterprise-wide data design, lack of business analysts, failure to adhere to standardized specifications and the lack of data integration (Sumner 2000). Additional factors include inadequate IT training, project team not representative of the entire organisation, poor training, external experts with inadequate knowledge and inadequate end-user training.

Shakedown: The shakedown stage includes all those activities associated to the system going live in an organisation until all initial problems have been resolved. It ends when normal operations resume and control is passed from the project team to the respective operational managers (Markus & Tanis 2000). In this stage any control issues unresolved from earlier stages would appear, typically taking the form of performance issues and disruptions in productivity (Muscatello & Parente, 2006). Typical risk factors include insufficient training and re-skilling of the IT workforce in new technology, insufficient internal expertise and failure to mix internal and external expertise effectively (Sumner 2000). Additional factors include business disruption, difficulty diagnosing performance problems, building and maintaining workarounds, data input errors, inadequate end user training.

Onwards and upwards: This has been identified as the stage in which the benefits of an ERP system implementation will be felt within an organisation. This stage takes the organisation from the commencement of normal operations to eventual replacement – be that with an upgrade or different product. Typical activities during this stage include continuous business improvement, additional user skill building and assessments of the post implementation benefits. The degrees in which businesses engage in system enhancement appear unknown. Parr and Shanks (2000) noted that there was no marked enhancement phase in the implementations they examined with the possibility that this may be a common occurrence. Failure to embark on product enhancements was considered a common risk, and includes other such as insufficient documentation and loss of knowledgeable personnel (Parr & Shanks, 2000).

2.5 Heuristics

Heuristics is introduced as the intervening principle because complex situations as experienced in ERP implementations will seldom provide all the necessary information (Lyytinen et al., 1998). Heuristics as a concept can roughly be defined as a 'rule of thumb' and the term denotes a solution to a situation where all required information may not be available. When similarities to other resolved situations are discernible, aspects of that solution can be used instead of a logarithmic approach which requires all conditions to be met.

Lyytinen et al., (1998) further describe the process as both objective and subjective. Objective analysis describes the process of acting upon what can be seen (Wolf, 1978), and is the trigger mechanism in the idea or principle of observation. Subjective analysis is based on continuous learning and experience (Wolf, 1978), and describes the process of matching risks to risk resolution and control techniques using heuristics as a lens to focus personal experience or interpretation (Lyytinen et al., 1998).

When searching for empirical research on the use of heuristics or any other interceding constructs between risk and control, a review of risk management literature in ERP implementations by Aloini et al., (2007) compiled a list of types of project failures and noted an intermediary of 'effect' in the correlation between risks and why they fail. 'Effect' is used as an identifier for factors which could impact an implementation (e.g. budget exceeded) (Aloini et al., 2007), and is similar in definition to the Lyytinen et al., (1998) use of 'impact' analysis. These two terms are used interchangeably and denote a many-to-one relationship in which each risk may have many impacts on a business and these will lead to specific types of project failure (Aloini et al., 2007). While no connection is made between risks, impacts and controls, the use of heuristics as a lens is an area where further research may increase our understanding of the relationship and bridge the gap between risk identification and risk control. It is for this reason that the concept of heuristics marries so well with risk management encompassing risk control (Lyytinen et al., 1998), and why this model was chosen to examine the relationship of risks and controls in this research. Additionally, impact analysis will also be explored as a potential interceding construct in an attempt to give this relationship structure as project managers are familiar with the term and have used that analysis in risk registries to calculate risk severity by the assignment of a numerical value (Patterson & Neailey, 2002).

2.7 Risk resolution and control

A link between risks and controls was established by examining statistics relating to IS project failures and concluding that the failure rate could be diminished if projects improve their usage of controls (Liu et al., 2008). Risks and controls have also been envisioned as being different sides of the same coin, and the purpose of controls is to mitigate and reduce risks so that they are within acceptable limits (Moller, 2005; Gallivan & Depledge, 2003).

2.7.1 Control in ERP projects

Similar to risks a behavioural view of control is adopted. This view implies that when a controller exercises control over a controlee, the controller is taking some action in order to regulate or adjust the behaviour of the controlee (Kirsch 1996). The behavioural view further presumes that the controller uses certain control mechanisms in the exercise of four different modes of control, which may broadly be divided into formal and informal controls (Kirsch 1997). Each control mode can be implemented through multiple control mechanisms and combined into a portfolio of control (Choudhury & Sabherwal, 2003, Kanellou & Spathis, 2011; Kirsch, 1997). It should also be noted that the same general control mechanism can support more than one control mode (Table 2.10). Formal controls are comprised of two modes, output and behavioural based controls. Output controls are mechanisms in place that define appropriate output targets (e.g. sales targets) and are concerned with what has been done as opposed to how it is done. Behavioural controls are different in that the outcome is of secondary importance to the method in which it was achieved and details an approach or set of instructions which are designed to result in a standard set of outcomes (e.g. procedures and instructions) (Choudhury & Sabherwal 2003; Eisenhardt 1985; Elofson 1994). Informal controls consist of clan and self-control. Clan control is likened to the cohesive practices of a group and is typified by the degree to which all members of a group are committed to achieving group goals (Ouchi, 1979). Self-control is solely reliant on an individual's ability to monitor and control their own behaviours, with appropriate rewards and sanctions as required (Albadri & Jordan 2003; Harris et al., 2009).

The concept of control is an established area of research and has featured in a number of studies examining outsourcing and software development (e.g., Choudhury & Sabherwal 2003; Dibbern et al., 2008; Eisenhardt, 1985; Harris et al., 2009; Liu et al., 2008). However, methods of resolving identified risks in ERP projects by exercising control is still in the

formative stages with studies having concentrated on either risk mitigation at the strategic level or risk identification and prioritisation (Aloini et al., 2012). Within risk management, control has been described as a stage following risk assessment (Du et al., 2007). In general, the types of control potentially useful in managing IT-related risk are as varied as the risks themselves (Markus, 2000). This is further complicated by the fact that control attempts are not invariably successful as they vary greatly according to the context, what type and to what extent control has been used (Remus & Weiner, 2012). Nevertheless, perceived control should be seen as a powerful factor influencing both risk perception and decision-making (Du et al., 2007).

Table 2.10: Control mechanisms

Control mode	Control mechanism	Examples of control mechanism
Outcome control	Mechanisms to explicitly specify desired outcomes that were assessed later Mechanisms (including IS) to evaluate the quality and timing of outputs delivered by the vendor	Defined target implementation date and/or budget Expected level of performance Defined project milestones
Behaviour control	Mechanisms by which the controller explicitly specified rules, procedures, or processes for the controlee to follow Mechanisms to facilitate direct observation of the controlees behaviour IS designed to help the controller monitor behaviour of the controlee	Development methodology Job description Supervisor-subordinate hierarchy Work assignment Rules & procedures
Clan control	To promote shared goals To promote and assess adherence to shared beliefs and values	Coalitions of individuals with shared ideologies Socialization Hiring & training practices Implemented rituals and ceremonies
Self control	To encourage or motivate the controlee to exercise greater self-control	Individual empowerment Self-management Work autonomy (who / how) Self-set goals, self-monitoring, and self-rewarding

(adapted from Kirsch (1997) and Choudhury & Sabherwal (2003)

While there is a gap in identifying and selecting control modes for mitigating risks within ERP projects, prior literature on control in IS development, such as Choudhury and Sabherwal (2003) and Elofson (1994) can assist in selecting appropriate controls. One problem found with control selection was the unpredictable effect that controls implemented for one risk may have on another. Indeed it was found that some control measures in place have the ability to control more than one risk and that the same risk may be controlled in two different ways by different organisations (Gopal & Gosin, 2009; Lyytinen et al., 1998). This hierarchical concept has not, however, been explored thus far in research. Gopal and Gosin (2009) explored outsourcing and the performance effects of controls and found that controls implemented for one risk may have negative effects on another risk. Conversely it is argued that some controls can be put in place to control more than one risk (Lyytinen et al., 1998). While these individual control modes have specific characteristics with regards to the properties of the risks they address, the use of multiple controls or portfolio of controls has been identified as an important concept (Kirsch, 1997). Control portfolios are the use of multiple controls at the same time to control risks, and can include the use of formal and informal control mechanisms simultaneously (Gopal & Gosain, 2009). Furthermore, Kirsch (2004) explored the dynamics of control during large IS projects and found that control is exercised differently for each stage following certain patterns, such as “collective sense

making" "technical winnowing" and "collaborative coordinating". More importantly, some factors trigger changes in control choices from one project stage to another and emerging issues in one stage trigger changes to controls in other stages. Even though this research was based on custom-developed applications, these finding may also have important implications for this research, in particular with regard to similarities in terms of the scope of large IS projects and as some of these factors, such as performance problems are often perceived as risks.

2.8 Summary

The literature review on risk, control and ERP implementation projects shows that in each single field there is already a significant volume of research, which could frame the underlying research questions of this study and help explaining the findings. In particular, Markus and Tanis (2000) Enterprise System Experience Cycle will be used to frame the investigation of risk controls according to different stages and changes across stages, the conceptualization of risk management by Lyytinen et al. (1998), the comprehensive list of risk factors compiled by Sumner (2000) will be used to further explain how risk control is exercised in each stage, and why control changes across stages.

Chapter Three:

Research Design and Methodology

3.0 Research Model

From the literature review the following model has been developed to describe the constructs of ERP implementation stages, their associated risks and means of controlling/resolving that risk (Figure 2). This model combines stage transition and iteration when examining risks and controls in relation to the stages of an ERP implementation. The stage transitions are illustrated in the progressive steps going from stage 1 "project chartering" through to stage 4 "onwards and upwards" and include unidentified risks. Iteration is used to step through risk identification at each of the different ERP implementation stages and when a risk is discovered, either an appropriate control measure is found to counter this risk or in certain circumstances it is left uncontrolled and is addressed at a later stage. The inclusion of unidentified and uncontrolled risks in stage transition is based on Sumner (2000) where it was found that unidentified or unaddressed risks had a cumulative effect on successive stages in an ERP installation.

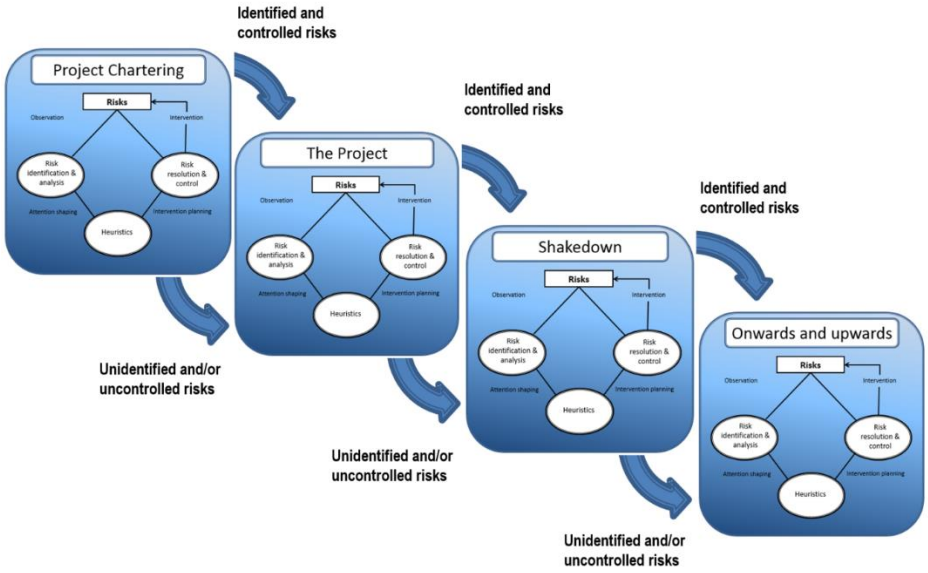

Figure 3.1: Proposed research model

A qualitative research design is applied by answering questions about how and why organisations exercise control in regards to identified risks during different stages of an ERP project. This approach is in line with previous research in this area (Kirsch 2004; Sumner 2000) and will draw upon the processes described in Eisenhardt (1989). In line with Kirsch (2004) this approach can be characterized as "soft positivism", described as a means of revealing both "*pre-existing phenomena and relationships*" as well as the ability to "*surface*

other constructs..., in the manner of interpretivists or grounded theorists" (pp. 378).As this research is designed to investigate pre-existing phenomena (e.g. ERP risks and controls) whilst retaining the ability to explore additional constructs (e.g. how risks and controls relate), this approach was deemed most appropriate. A comparative case study strategy, as used by Robey et al., (2002) was also adopted because of the difficulty found with identifying the boundaries between ERPs and their implementation contexts, and the enhanced ability to examine phenomena across different cases.

In total, 15 face-to-face interviews were conducted comprising 12 different personnel from 12 different organisations, and these interviews were divided into two groups. Three exploratory interviews were conducted in the development of the interview protocol and were used to clarify the research questions, refine the scope of the research and remove any disconnect between the many different academic definitions used and those used in practice. An example of this was the need to include more definitions (e.g. control and risk) and the preference of 'impact' as opposed to 'effect' when describing how risks can influence the business. The developed interview schedule (see Appendix a) was guided by the principles proposed by Langley (1999) and Yin (1994), and incorporated Sumner's (2000) risk categories and the Lyytinen et al., (1998) Risk Management Approaches Model.

3.1 Data Collection

The findings were collected using three methods

* Interview - Semi-structured questionnaire
* Interview – Structured questionnaire
* Documentation

The following tables summarises information about the companies (Table 3.1 and Table 3.2). While some of the company information was sourced directly from the respondents, a majority was sourced externally prior to the interviews and confirmed during. These included physical sites, employee numbers, company age and industry. It should be noted that the Group 1 interviews do not contain ERP or Model Used information. This was because these initial interviews were used in the formulation of the interview schedule and as a means of gaining feedback from highly experienced practitioners to see how well academic understandings and definitions fitted with real world practice.

All interviews (with permission from interviewees) were recorded with notes and observations made in an attempt to ensure accuracy of information. Internal documentation was also obtained which was used to augment the notes taken.
Due to technical difficulties, one of the interviews failed to record (Case 7 (ITM6)) but notes were made directly after (within 15 minutes) when the technical problem was discovered.

3.2 Interview selection criteria

The selection process used to identify personnel suitable for interview selection was based on a number of criteria. The overlying prerequisites were that the interviewees had to have been involved in some aspect of risk control within tier one or tier two ERP projects completed either after 2007 or currently still in progress. While it was not a requirement, it was found that all participants had been involved in successful implementations and these were chosen by the participants as the focus of the interviews.

The only participants where this was not their last implementation were ITM3 and ITM6. ITM3 was in the initial stages of the implementation and ITM6 had been involved with two consecutive implementations that were completed closely together. The first of which was a

successful local installation and the second an unsuccessful off shore implementation (both of which were discussed).

As with ITM6, a majority of the participants had also been involved with multiple projects (both ERP and other implementations) during their careers (see Table 3.2) and these experiences were noted and explored during the interviews. Most noteworthy was that while all interviewees (except consultants) held senior management roles within their respective companies, all participants had adopted Project Management roles during the ERP implementations. This allowed them to work closely with the projects as well as retaining access to executive level information, giving them the unique opportunity to observe and participate at both the Executive and project team levels (Table 3.2).

3.3 The Interviews

The interviews were broken into two groups

Group 1: Exploratory interviews used to map the subject area and create the interview schedule

Group 2. Interviews using the developed interview schedule

Table 3.1: Interview Group 1

Exploratory interviews used to map the subject area and create the interview schedule

Interview I.D	**Job Title**	**Project Role**	**Industry**	**Previous Experience**	
				ERP Systems	Other systems
ITM1	Group IS Manager	Project Manager	Construction	10**	50+
ITM2	IT Director	Project Manager	Software Development	5**	50+
ERPC1	Senior ERP Implementation Consultant and ERP company Director	External Consultant	Technical Services	50+	10**

Table 3.2: Interview Group 2

Interviews using the developed interview schedule

Interview I.D	**Job Title**	**Project Role**	**Industry**	**Installations in current company**	**Previous Experience**	
					ERP Systems	**Other systems**
ITM3	Managing Director	Project Manager	Wholesale Trade	3	5**	50+
ITM4	IT Manager	Project Manager	Manufacturing	3	3	50+
ITM5	IT Director	Project Manager	Manufacturing	12	15**	50+
ITM6	IS Manager	Project Manager	Wholesale Trade	1	1	50+
ITM7	IT Manager	Project Manager	Manufacturing	1	10**	50+
ITM8	IT Manager	Project Manager	Wholesale Trade	3	10**	50+
ITM9	IT Manager	Project Manager	Manufacturing	1	1	50+
ERPC2	Senior Consultant	Project Manager	Manufacturing	1	50+	50+
ERPC3	Senior Consultant	Project Manager	Manufacturing	1	50+	50+

* approximate estimations given by respondents

3.3.1 Group 1: Exploratory interviews used to create the interview schedule

The exploratory stage included interviews with the Regional IT Director of a large multi-national construction company, the Regional IT Director of a large multi-national software development company and an ex-Director \ Senior ERP consultant from one of the large ERP vendors. These interviews were used to test the many theories used in the construction of this research and in the creation of an interview schedule (see Appendix a) which was used in the second group of interviews. In particular areas explored were the definition of ERP systems, how these ERP systems were implemented (any implementation models used), risk categories, control mechanisms and methods, how these concepts relate to each other and any opinions or observations these individuals had regarding their experiences.

3.3.2 Group 2. Interviews using the developed interview schedule

The interviews conducted using the interview schedule were held with 9 participants over a course of 12 interviews which on average took just under 2 hours each. Each participant was encouraged to draw upon their previous experiences with these experiences explored in the nature of semi-structured interviews. The following is an outline of each company with details on the nature of the project they faced, the ERP system and implementation methods used and any identified critical success factors.

* Indicates the use of a pseudonym to describe the company name and / or the Project Manager interviewed

3.4 Case descriptions

The first section contains details of the business cases for implementation, and identifies ERP system selection, implementations models used and Critical Success Factors

The second section contains the actual risks (events) and controls as recalled by the interviewees.

The final section will be used to display collated data from organisational documentation; predominately risk registers detailing risks, the controls used to mediate these risks and the heuristic bonds bridging risks, impacts and controls. This section was augmented with data from the interviews in an attempt to further confirm the findings through triangulation.

Table 3.3: Organisation descriptions

Project	Locations	Employees	Industry	ERP	Company Age (yrs)	Model Used
ITM1	Multi-national	5,000+	Construction	-	20	-
ITM2	Multi-national	20,000+	Software	-	20	-
ERPC1	Multi-national	10,000+	Consultancy	-	20	-
ITM3	Multi-national	100	Textile	Custom	10	Prototype
ITM4	Multi-national	50,000	Building	SAP	100	Bancroft
ITM5	Multi-national	700	Manufacturing	JD Edwards	100	Bancroft
ITM6	Multi-national	30,000	Wholesale	SAP	80	Bancroft \ Ross \ PPM
ITM7	Multi-national	800	Textile	JD Edwards	100	Prototype
ITM8	Multi-national	500	Manufacturing	Tier 2	30	PPM
ITM9	Multi-national	350	Manufacturing	JD Edwards	50	Prototype
ERPC2	Multi-national	150	Agricultural	Lawsons	10	Bancroft \ Ross \ Markus and Tanis \ Custom
ERPC3	Multi-national	100	Building	JD Edwards	50	Bancroft \ Ross \ Markus and Tanis \ Custom

* Indicates the use of a pseudonym to describe the company name and / or the Project Manager interviewed

3.4.1 Case 4 (ITM3)

Company Name - **Textile Trading International (TTI)***

Interviewee - **Mr Tony Holder***

This interview was conducted with Mr Tony Holder*, the regional site Managing Director of the wholesale trade company Textile Trading International*. TTI have approximately 50 full time staff and have been operating for over 10 years as an international textile wholesale operation with offices in New Zealand and the UK. Mr Holder joined the company six months prior to the ERP implementation and was the major driving force behind the adoption of an ERP system within that company. The main reason given for the haste was that there were no integrated systems in place with all pricing and stock control done via MS Excel spread sheets requiring data to be entered multiple times by different operators. The systems in place had evolved over a number of years and was recognised as a major business risk by the managing director, in particular it had been identified as being directly responsible for the lack of control by the managers over the financial position of the company. This lack of control was deemed directly responsible for sales and currency trading losses experienced within the company. The solution sought was to implement an ERP system to allow greater control by the company with different ERP solutions evaluated by the Managing Director and UK based IT Manager including SAP, Oracle and custom solutions. Which option to choose was identified as another major risk as none of the options explored had any experience in this business arena so picking companies based on prior successes was not possible. Nor were they able to contact or identify software solutions used by their successful competitors as although some initial software development had occurred in the area of ERPs, development of existing systems had stopped in the 90s and what little existed was already in use and did not offer a business solution to the problems faced nor a means of fostering any competitive advantage. This was especially critical because this area of the textile industry had been in decline and had not been particularly successful. What was identified as needed was to *"change the paradigm a bit and that meant understanding exactly what and why and how"*.

After analysing SAP and Oracle it was determined that there would be little benefit to implementing an off-the-shelf product as the modules selected and the customisation required to get the ERP system and the business processes aligned would potentially be the same as a

custom build. Additionally due to the lack of experience in this field there was still the possibility that the fit might not reflect optimum business practices resulting in compromises and the further possibility of greater business process changes required. An additional problem was that technical resources for implementing SAP or Oracle could potentially balloon the costs of the implementation to a figure far in excess of any perceived ROI to be gained from such a system.

An alternative custom solution was found in the shape of a local software development company. Software Development are a development company that had enjoyed a long working relationship with the Managing director, especially in his previous capacity managing software development at another company. Although during his time this relationship did not extend to the role of a client, a high degree of trust had been established. While this relationship was one of the reasons for their inclusion as an ERP option, unanimous agreement was needed from both the Managing Director and the IT Manager before a decision would be made, and the IT manager had already established a preference for either SAP or Oracle to be implemented. Being from the UK he had no experience with this local company and minimal knowledge of the language used so a high degree of scepticism existed that they would be able to outperform either of the 2 ERP specialist companies. He had previous experience with implementing ERP systems (SAP) in the past and was aware of the huge implications and ramification of a wrong choice. On the deciding 2 week visit over from the UK, a meeting was arranged 2 days before the IT manager was to return to the UK to visit this company to assess them as an option. While they were classed as a custom software company, the solution proposed was not a complete new build but rather based on existing modules created by Software Development and already successfully in use at other companies. The existing modules consisted of an entire financial layer and base behavioural modules with additional behaviour required dependent on the identified business processes currently in place. While showing both the Managing Director and the IT manager their system, Software Development struck a chord with the IT manager when they demonstrated a solution that they had implemented successfully into bakeries. The IT Manager had personally been involved with such a project earlier in his career in the UK which had failed due to specific required business processes which were unable to be mapped with the tools available in the solution used. Seeing first-hand how innovatively Software Development had solved the problems the IT manager had previously though insurmountable, the trust the Managing Director had in them as a solution provider and the

high degree of access to both Software Development and external programming resources convinced the IT manager that Software Development were a serious contender. Their 30 minute meeting turned into a 3 hour demonstration with the IT manager downloading a copy of their software the next morning, and made the decision to use them soon after. The decision to use Software Development was made and implemented in a 2 stage process. Stage 1 was a preliminary prototyping stage which would encompass the creation of a prototype module containing desired functionality of an area identified as being potentially the most difficult to create, Stage Two was the actual implementation.

ERP system

Textile Trading chose a custom ERP solution for two major reasons. The first was that there appeared to be no ERP solutions specifically designed for their industry so any off-the-shelf solution would lack best industry practices.

> *"…the systems that were there were variations of stock systems that other people had built and they're taken to a certain degree but…stopped development of them about 15 years previous."*

The second reason given was that all off-the-shelf solutions would require extensive amounts of unknown customisation resulting in a solution that still may not have offered a complete fit.

> *"If we had picked up an existing package and implemented it, we think we would have ended up with a particular … stock focus, not a sales focus, which is where we want it to be and secondly, we wanted to be able to understand why things were like they were.*

It was envisioned that customisation would also have implications on implementation costs which would require continuous modifications.

> *…"We evaluated a package and the people said that they could modify it for an hourly rate, but they didn't actually know what we wanted modified and the specification of what they had was such that we couldn't tell what they had and I don't think they actually knew what they had either and so we ended up deciding that it was better just to start from scratch and … work from there."*

They performed a series of implementations, the first of which was in New Zealand. This first project was new for the company and treated as a pilot implementation with the option of rolling out to other locations if it was successful

"It was a pilot…and we wrote the system from scratch."

Although Mr Holder had not had experience with ERP systems prior to the implementation, he had made a point of finding out about other implementations

"…I spoke to a lot of people about what they're doing and where they're at and …I see these guys installing big ERP systems and they go on and on and on."

and this knowledge forewarned him about issues associated with off-the-shelf ERP systems. Additionally he had worked in a software development company and this made him aware of other viable alternatives

"…I think most ERP systems are a mix of existing modules that have to be plugged together and the plugging there's almost as much writing of software code as there is in writing it from scratch."

Implementation Model

Although Tony did not have a formalised implementation plan in mind when implementing the ERP system, he did have an idea of what needed to be achieved

"…So did I have a step plan – not actually. I had a plan that said, "Identify the modules. Specify the requirements of the modules. Get the software developed and test it and do some back to back work to make sure the results are coming out okay and then work out what the data is that we're bringing across and work out a conversion strategy to get it across at the end of the period and then go for it"

Based on the loose plan described, the method resembled that of a prototype model which included the following steps:

1. Gather requirements
2. Rapid development (3 months)
3. Evaluation
4. Implementation and testing

Within the overall framework these were the steps identified

1. Identify the modules
2. Specify the requirements of the modules
3. Get the software developed
4. Test it
5. Convert data and import
6. Go live

The initial prototype was developed just prior to writing and included development of an aspect of the business they deemed to be the most complicated.

> *"…when we first started we weren't sure whether we could make the thing work or not, so … we specified a prototype and we prototyped what we thought was one of the hardest parts of the system to do…"*

The reasons given for this were twofold. The first was that the project would get terminated if the prototyped component did not work.

> *"…if the prototype didn't work we were going to kill it off"…*

The second was to see how well the implementation company worked with Textile Trading and to get some assurances that the implementation company were willing and capable of developing changes and fixes quickly if needed

> *"…that we could get changes – the developers could make the changes at a rate that was acceptable to balancing the risks…"*

As with a prototyping model, the intention of a prototype is to create interactive functionality with little regard for coding best practices (coding designed to lower system overheads and create a security focused infrastructure)

> *"We went to the prototype knowing it was a prototype … we … didn't use that code."*

Critical Success Factors

No formal CSF analysis was carried out at any stage during this implementation. There were however some key areas identified during the implementation that when addressed had

ongoing positive impacts on the implementation. In retrospect they were identified as having been critical in the success of the project.

They included:

- Vendor support
- Careful selection of ERP Software
- Business process reengineering and minimal customisation

3.4.2 Case 5 (ITM4)

Company Name - **Building Supplies International (BSI)***

Interviewee - **Mr John Clarke***

Building Supplies International (BSI) are a multi-national company in the building industry who have been operating for over 100 years and currently have in excess of 50,000 employees worldwide. Mr John Clarke is one of their IT Managers who has assumed the role of one of the project managers for the implementation, with his focus being risk and change control management. This case follows the ERP implementation and resource amalgamation of three satellite offices and was conducted in three parts spanning the first stage of an ERP implementation. Although there was a business need to consolidate SAP resources between different offices, the impetus to proceed was created by the acquisition of one of these Companies from a competitor. With the acquisition comes the loss of access to existing SAP resources and hence the need to implement an ERP solution to accommodate their current needs and to align it with the rest of Building Supplies International.

All offices are currently using SAP and are configured and supported in the following manner (refer to figure 3.2 "Current Situation"). Company A are located in New Zealand and are fully owned by Building Supplies International but have their SAP resources hosted by Company B. Company B are located in Australia, are majority owned by Building Supplies International and in addition to hosting Company A, also host their own SAP resources. Company C are the new addition to the Building Supplies International brand and are fully owned by Building Supplies International. While they currently have their SAP resources hosted by their previous owners externally, it will change in the near future as intellectual rights to that environment are lost (Figure 3.2). While the core ERP implementation is set to be completed on Company C, the proposed solution is to integrate all three companies into a data centre located in Australia as shown in figure 1 "Desired Outcome". This will include finding an existing data centre to host their hardware, moving SAP resources for Companies A and B and recreating the SAP environment for Company C in that Data centre. SAP personnel will be sourced from Company B to administer the environment with business processes examined and redesigned over the three companies to enable systems integration.

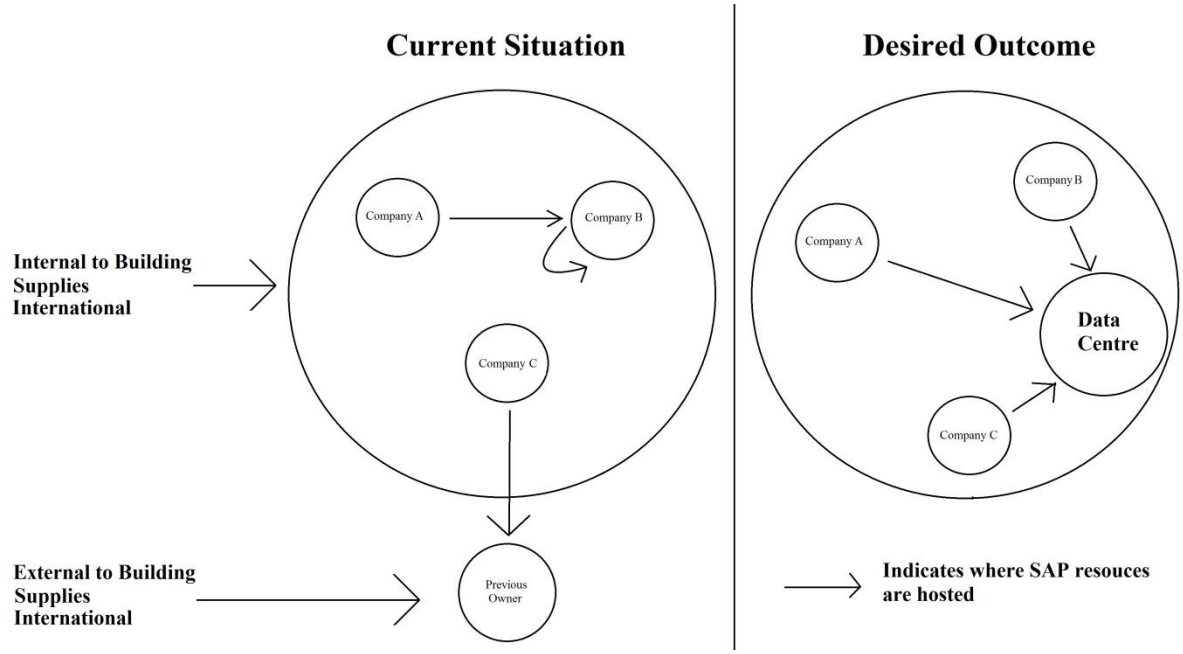

Figure 3.2: Current Situation and Desired Outcome in the analysed ERP implementation.

The default implementation model for both SAP and Building Supplies International is the Bancroft Model (1996). The project is currently in transition between Planning (Project Chartering) and the As Is analysis (Project) stage and has included input from the steering committee, CIO advisory team and the Board of Directors from all three companies involved. The project is currently scheduled to be completed late 2011 with the first stage encompassing the data centre setup and migration scheduled to cut over mid-2011.

ERP system selected

This company is an established SAP organisation with corporate licenses and internal SAP expertise.

> *"SAP is a global standard for [Building Supplies International]"*

As a consequence, no selection process was undertaken.

Implementation Model

Building Supplies Ltd is a SAP site so use the Bancroft model for their implementations. There were never any disputes as to which model to use as SAP specifies explicitly the steps identified in the Bancroft model as default in all implementations. The only point of contention for Building Supplies Ltd was the use of external support for the implementation

project. The companies wishing to provide support for the implementation informed Building Supplies Ltd that they would be running the implementation their way and that they would be bringing in their own processes and structures for the implementation.

"… didn't want to know how we do things… their theory is if they come into a project they take control…"

Building Supplies Ltd refused saying they had sufficient internal experience to perform the implementation on their own.

"… we say these are the rules and … this is how we configure SAP…"

Critical Success Factors

Building Supplies Ltd have a highly formalised project structure which incorporates lessons learnt on previous implementations to determine critical factors for their company when implementing new ERP systems. These critical factors are deemed so important that if they are not signed off at the beginning of the project, the project will not be allowed to proceed.

"… We have to make sure everyone agrees…"

The way that they approach a project is that critical success factors form the basis of their expected outcomes and they use this process to establish their benchmarks for evaluating the success of the project

" … critical success factor …you …normally do it at the beginning of the project … because it defines what the business wants to get out of it … what we are doing is designing the end goal … "

One indication of their intention of setting the platform of control in the initial stages of the implementation was with the establishment of a number of behavioural controls in the form of procedures

"…Yeah, at the start it will be a lot of procedural work…."

Two areas which were considered critical to the success of the project and were part of the project setup were with the project champion and use of consultants.

An appointed project champion prior to the start of the project is a mandatory component of their ERP projects and emphasises the importance that signing off of critical factors is to all projects

> *"If we can't name who the person's going to be … the champion, we don't go ahead…"*

The use of external consultants was not considered a priority for BSI. They have a company-wide open license and have been using the solution for a number of years internally. This has enabled the business to have sufficient in-house experience and resources to undertake the project and to not have to fully engage external contractors. This has led to problems because in their dealings with consultant companies large enough to handle such a project, they have found they are not generally willing to do so if they are not in control

> *"… their theory is if they come into a project … they take control and we said, "No, we're in control. You're going to be there to help us". And they said, "Oh no, we're not interested"..."*

3.4.3 Case 6 (ITM5)

Company Name - **R&D Manufactures***

Interviewee - **Mr David Johnson***

Mr David Johnson is the IT Director of a research and design company R&D Manufactures, a company manufacturing specialised technical equipment to a global market. R&D Manufactures began trading over 100 years ago and were bought by Global Products (not real name) in the 70's to be the manufacturing arm of their business. Although still owned by their parent company, R&D Manufactures operate under a different name and sell their products internationally to not only their parent company, but competitors as well. This is due to the specialisation of their products and longevity of the company resulting in R&D Manufacturing being one of only two major specialist manufacturing companies in this area internationally.

Mr Johnson joined the company in the early 2000's to lead the selection and implementation of a new ERP system. The company was using an MRP system and had decided to upgrade due to the age and maintenance requirements which included a Cobalt database backend. With no company standard on system requirements it was up to the implementation team to select and implement an ERP system specifically based on their requirements. This lack of ERP standard was a deliberate companywide decision and all regional units are given the opportunity to evaluate and implement systems that would best suit their specific needs based on market configurations and funding models. Although there has been a move towards centralisation and standardisation of IT systems and processes, evaluation and implementation of ERP systems is still made at the regional level. After evaluating three separate products, JD Edwards was eventually selected and implemented with subsequent implementations occurring throughout New Zealand and Australia.

ERP systems

The key reasons given for the need for a new system were product rationalisation

> *"…one of our issues is we carry too much of too many different things, so…production rationalisation is something that we are…looking at."*

and eradication of data duplication and financial savings.

"…we believe we can save $100 million…through standardising systems and centralising or changing reporting lines and structures – we've got a lot of duplicity in our organisational structure."

The process taken when choosing which system to implement was done in a thorough and methodical manner. The company were aware that there was a strong possibility that any system chosen would be rolled out to other offices so there was a need to ensure that any choice would be compatible and cost effective. The commitment to this process was signalled with the hiring of the new IT Manager whose major focus was to replace the existing legacy system

"I was brought…in…to find a system to replace…our old legacy…ERP. It wasn't really an ERP, it was more of an MRP system – a very…early stage transactional processing system built on a cobalt database."

The short listed products were chosen based on systems currently in use in their European and American offices, with the final selection being JD Edwards.

"We issued an RFP to…a specialised manufacturing tool…in Europe. Oracle…and we also went to J D Edwards as being the third."

Since that selection and successful first implementation, JD Edwards has been successfully implemented in an additional twelve sites with further planned.

Implementation Model

Although there have been a number of different implementations within the business with different implementation partners who have used their own implementation processes

"…we've had different methodologies for the [different] projects…"

the variations appear to be based on the same model – namely the Bancroft model

"… [all implementations were] essentially the same; it's a waterfall process of assess requirements…and then detailed process mapping of 'as is' and 'to be' and then prototyping of the system against the 'to be' process, testing and go live."

While the ERP implementation model was formulated and implemented at the insistence of their external partners, the long-term benefits to the business have manifested in their ability to better self-manage further projects

> *"[for our] first two implementations…we had to rely on a whole lot of people and external help to get that done, but by the time we got to Australia we knew and my team and our business knew a lot more about how to roll out and manage implementations."*

Critical Success Factors

CSF analysis was a factor in all of the nine implementations carried out by this company, although to varying degrees. In the initial project it was understood that they lacked internal resources and was the reason for David's initial employment

> *"I was initially brought on to lead the selection of a new ERP…"*

While this approach was sound, there were pitfalls identified with this approach. Namely that although David was an employee with previous ERP experience, his experience within the business was limited and this was identified as being critical to how effective he would be able to function as the leader of the new implementation. With this in mind David was bought into the business with sufficient time to become accustomed to the internal culture and to gain an understanding of what, how and why things were done as they were.

Other critical factors identified were the use of external expertise in the form of consultants and the need for a high quality system. These two factors led into each other and were derived from their requirement to be Sarbanes Oxley compliant.

3.4.4 Case 7 (ITM6)

Company Name - **Wholesale Traders (WT)***

Interviewee - **Mr Tony Smith***

Mr Tony Smith* is the CIO of Wholesale Traders*, a wholesale trade organisation which has been operating nationally since the early 20's and employees over 30,000 people. Wholesale Trade evolved over time through growth and acquisition to the point where a number of different systems were in use offering very little managerial control at the executive level. Issues of cost control were identified in both production and delivery. In addition to this, inefficiencies were noticed with sporadic orders from smaller customers resulting in multiple deliveries and a general lack of control over transportation costs. To remedy this lack of control the implementation of an ERP system was proposed and a number of different options were explored with SAP eventually chosen.

ERP systems

Wholesale Traders embarked on an ERP implementation for two major reasons

1. Need to update current software which did not afford sufficient reporting to allow a complete picture to be draw of the state of the business
2. The need to implement a system which would remove the silo mentality which had been allowed to grow as a consequence of disparate systems which were loosely coupled.

The systems in place had been allowed to expand manually as the company had grown to the point where information was scattered and getting a complete snapshot of the company's performance was not possible.

The selection process involved in picking their ERP was extensive and involved the evaluation of three different products

- SAP
- JD Edwards
- 2nd Tier product aimed at their industry

One of their primary considerations was the ability of the software to be able to be rolled-out to retail outlets with whom they supplied. These outlets would not have end users with high levels of technical ability and would need to have a system in place that could effectively be used without extensive intervention. These outlets would also be paying for the system themselves so another factor to be considered was cost as they would be operated as standalone systems tied into the main ERP.

Implementation Model

The implementation model used was adapted from their external consultants and was a variation on the Bancroft Model which included the As Is and To Be stages.

Critical Success Factors

Wholesale Trades found the process of critical success factor analysis to be more of an academic exercise, and that they pulled into the project most of the major critical success factors that affect most projects. From this pool they were able to dismiss some and those that were left were moved into the risk registry so they could be continually monitored.

While CSF enjoyed limited use as a managerial tool, initial analysis was used to create what was understood as the objective of the implementation, namely to create a system capable of providing accurate timely information for decision making purposes.

3.4.5 Case 8 (ITM7)

Company Name - **Textile Manufactures International (TMI)***

Interviewee - **Mr Kevin Turner***

Mr Kevin Turner* is the IT Manager of Textile Manufactures*, a multi-national company which has been operating for over 100 years and has offices in New Zealand, Australia, United Kingdom, USA and China, and employs over 800 people. Although all offices operate under the same banner, individual regions are left to operate as standalone units making their own decisions on software and systems. Although it was the intention to roll out the selected ERP system to change the business process design and move away from a silo mentality to more of an integrated approach to all of the regions, this was quickly abandoned as strong and compelling arguments were made in opposition. Primarily these arguments centred on cost related issues as IT was still viewed as a cost centre and the benefits to be gained from implementing a large system when a lower cost system would do was such that unanimous agreement was not gained. There was discussion about the functionality, or rather lack of, the lower cost systems would provide but the structure of the company meant that these decisions could not be forced through so this resulted in a continuation of the status quo. Although not desirable this did have the effect of simplifying the situation so that any potential implementation issues from other sites could be ignored allowing the implementation team the ability to concentrate on the individual site. The reason given for the need to implement a new ERP system was the lack of control with product costs and pricing resulting in unknown losses and less that accurate profit results. Prior to the ERP system they had used legacy systems for approximately 14 years with one IT person in place as administrator. This lack of IT focus was seen as impairment to the business progressing so were all

Mr Kevin Turner was bought into Textile Manufacturing specifically for the ERP project, starting initially as a business analyst and moving into the Project Management role for the implementation. Throughout the process they were assisted by Deloittes who acted as their implementation partner. RFP's were requested from three companies, SAP, JD Edwards and one other. The number was reduced to two (SAP and JD Edwards) with their relative merits relevant to this project evaluated. Kevin had worked with SAP in his previous employment and was well aware of the product and the methods of implementation used and this

information was used to reduce the selection to the eventual candidate – JD Edwards. SAP was removed from contention because of the scope of the product, the resource requirements needed for the implementation and the degree of in-house skills required maintaining the product post-implementation. SAP was deemed to be too big a product (especially as there were no other sites to consider) and Kevin was convinced that it was not a match for Textile Manufactures culture and users – simply put "it was going to be too much for the business". Using this Kevin convinced the rest of the selection panel that this was the case.

At the ownership level it was common knowledge there was interest in a buyout of the company and that they were currently in the due diligence stage. After presenting their decision about ERP choice, members of the ERP selection committee were bought before their potential parent company to debate their choice as the parent company were using SAP. Having been involved with both successful and unsuccessful ERP implementations, Kevin as a member of the selection committee was aware of the implications of changing ERP choice after due diligence so challenged both the suitability for their site and the assurances given to them by their potential parent company of the costs in terms of installation and degree of support they would receive. After some terse discussions JD Edwards was implemented successfully within the business. The buyout from the parent company was not successful (due to reasons other than ERP selection) and the company were happy with their ERP choice and felt somewhat justified in their strict adherence to the selection process.

ERP systems

Selection of the ERP system to use was identified as a major component of the implementation and a factor that would have huge implications on the success of the project.

Although their existing personnel were involved with the selection process it was expected that those with intimate familiarity with the business would probably not have had exposure to different Tier one products, and as such would need a high degree of guidance when being asked to select the product that best matched their business.

"So you know if you've got someone who has been a legacy system for 14 years and you throw in an implementation team expected to make decisions on a tier one product you know it's just a recipe for disaster. But the … consultants we had surrounding them at the time were the conduits to making those decisions and then above that it was project management and programme management…you know what you know. "

With this in mind Kevin's experience placed a major part in the selection process

"So I started off as a Change Management Analyst, then … a Warehouse Business Analyst and then … a Freelance Contractor … and then to their SAP applications team."

As a consequence of his experience with SAP and the selection process undertaken in the RFP, he was able to discern early on in the process that SAP would not be a good fit with the organisation.

"We initially had them at the start of the RFP and then I sort of convinced the guys that for this business - this culture, our users - it was going to be too much..."

The reasons given to the business for the recommendation to not use SAP were due to its complexity and cost

"…my background in SAP helped and again to bring something like that into the business like [Textile Manufactures] I just said, "We're setting ourselves up for failure", not just the ongoing operation costs but they are highly consumable…"

While this was confirmed in the RFP process there was opposition to this from the company currently in the due diligence process of buying Textile Manufactures. Because they had SAP in place it was assumed Textile Manufactures would also pick that product to increase compatibility between the companies and to reduce any further costs and interruptions should they have to change to SAP in the future.

"So at the 11th hour once we had already gone down the path of the three preferred vendors – the final preferred vendor, business case and justification why, the CFO and I got hauled up to [the perspective parent company] to explain why we were going down this path and not SAP…"

Textile Manufactures and Kevin however were adamant that JD Edwards would be the best fit for their business and engaged in vigorous debate to ensure the process was upheld and the product chosen implemented.

"…with the CEO we had a fair amount of debate over his approach in all of this and bypassing the due diligence that we had taken on it, so he eventually backed off, but it was a real tense time..."

Implementation Model

The model used for the implementation was a compilation adapted by their implementation partner

"[Our implementation partner] had a model… it was a rapid implementation in nine months. "

One of the advantages of this method as touted by their partners was its hands-on approach which emphasised continuous improvements

"… very hands on in terms of that continuous improvement type of methodology … "

Although it resembled the Bancroft model in that it incorporated the "as is" and "to be" stages

"… we did the planning, we did a bit of 'as is' and 'to be' business process…"

there were similarities from a strategic point of view with the Markus and Tanis model

"…that was what we call the 'terms of reference', but it was really a project charter."

Even with this basis they still considered themselves to be "lucky" that the implementation succeeded.

"… we're a bit lucky in that … we were a little bit over budget…on the scale of things we were pretty happy with that, but…there's no guarantee you're going to get that same result…"

Critical Success Factors

One problem identified with consultant firms specifying critical success factors applicable to an organisational project is one of logistics. With only a limited time on site it was understood that external consultants would not be able to identify critical success factors for their business

"… you only give these guys a day on site to understand your business…they don't have enough time to lift the covers…"

Textile Manufactures found that the only way for them to effectively establish critical success factors for the project was to go through a question and answer process establishing what was important to the business

"I wasn't prepared to go through and write a document line for line, so I went to market, got something pre-loaded around software RFI [Request for Information] RFP's [Request for Proposal] … and just went through. So there were three different parts: there was a survey, there was the RFI and there was the final RFP. So with the survey I just walked around with that document and said, "Guys, tick off what's not relevant,"

From that process they felt they were able to effectively establish what was critical and subsequently referred back to this as a valuable part of their initial analysis

"… That was quite good and we used that to refer back to as well…"

3.4.6 Case 9 (ITM8)

Company Name - **This and That Manufacturing (T&TM)***

Interviewee - **Mr John Broadman ***

This and That Manufacturing* are a multi-national apparel manufacturing company with offices in New Zealand, Australia and China. Although operating under the same banner, all offices operate as separate businesses and only share data at the corporate level, with the data shared being predominately accounting data in the form of inter-business charges relating to staffing allocations. This silo mentality (resulting in a lack of big picture awareness amongst staff) was indicative of the job requirements. The nature of the work dictated that employees were more creative than technical and resulted in problems with the creation of technical super-users and the overall emphasis technology played within the business. This had a secondary effect of engaging staff without any business process exposure resulting in difficulties when trying to design how a new system should work within the business. The scepticism relating to the benefits IT can bring to the business had not been helped by a number of high level failures with different systems implemented in the past. Mr John Broadman took on the role of IT manager just prior to the ERP implementation and was aware of the credibility issues IT were facing as a direct result of underperformance in the past. They already had an ERP system in place but found their current tier one solution to be overly complicated to operate (a 50 page manual was used solely for invoice input), highly expensive to maintain and at over 14 years old, in dire need of updating both in software and hardware configurations. Another driving force had been recessionary pressures placed on the business which had resulted in a 50% reduction in workforce. Simply put, the system in place was too old, too big, too complicated and too expensive to be able to justifiably continued use. The solution found was to downgrade the ERP system for a tier one solution to a tier three solution specific to their industry. This had the added benefit of requiring less modification and potentially fixing some of the issues they were experiencing with the current system's inability to cope with industry specific requirements. The project plan was to replicate the key functionality present in the SAP system into the new ERP system with a projected five year payback period. One of the key CSF's identified at the onset of the project was that of "project creep" where the original scope of the project is allowed to grow as more functionality is added during an implementation. To achieve the payback period and restore IT confidence project creep from additional functionality requirements during

implementation were taken directly to the executive team with an overview of the impact of those changes. As 99% of requests were turned down for the project and put aside as future modifications possibilities, John was able to keep the project within the required timeframe.

While this project was a success, a subsequent implementation within the same year at a different office using the same technology failed and these two projects were used as comparisons during the interview. The main difference identified between the projects was staff commitment and buy-in. In the first implementation the prize was a move to a better system with high levels of commitment from all concerned. The staff did not like the current system and were aware they were moving to a system that would be easier to use, the executive team were committed to realising the business benefits and the IT manager was determined to make the first implementation in his office a success. After the success of the first project the system and its configuration were rolled out to some of the satellite offices in an effort to reduce costs associated with software maintenance and licensing. A second project went well but a third project resulted in an implementation which was deemed to have failed.

In this third office, they already had an ERP system in place which had been designed for that specific business. Although this system was not viewed as a viable candidate elsewhere, it was well suited to what they did and universally liked. Members of staff were given the opportunity of viewing the new system and it was unanimously agreed that the new system was not as good as the old. While there was commitment to making the project happen at the executive level, it was accompanied by a sense of complacency because it was thought less would be needed as implementations had all been successful up to this point. A market upturn had also created increased pressure on the implementation team to spend less time on the project as other areas of the business were getting busier and staffing numbers still remained low. This manifested itself in a number of ways which when viewed in hindsight had been critical in the project failing, these included

Lack of internal resources included both team member availability for the implementation and that of the project managers. John's time involvement was reduced further by increased commitments within the business and John felt burnt out by the requirements of the previous fast implementations where he had been required to fulfil all rolls within the implementation team in addition to his own within the organisation. Resistance to change was a major factor in the failure of the third implementation due largely to the perception of the product being of

less value than the system already in place, and the lack of drive at both the executive and project implementation levels.

ERP systems

This company had an existing SAP ERP solution in place and although the system was working.

> *"…the solution we had was working…"*

they decided to move away from that solution due to a number of different reasons. At the forefront was the issue of cost. In addition to the on-going support costs, low levels of both IT investment and internal levels of IT knowledge had resulted in the system being allowed to age to the point where significant resources would have been needed to get the system up to date. The attraction of moving away from their pre-existing ERP was made easier by the feeling that their ERP did not fit well with their organisation

Implementation Model

The implementation model was based around a need to implement quickly. While no definitive business reason was given to John for the three month implementation timeframe, examination of previous IT projects sheds light on the very tight timeframes given. Prior to John's employment there were a number of failed IT projects and confidence in their ability to deliver a project with such wide business ramifications was not high

> *"…so there was a perception that IT had failed in the past and I think that was one of the reasons why there was a "These are the dates,""*

Critical Success Factors

Prior to this position, John had worked in the UK on complex implementations (while large, not ERP) and had subsequently completed post graduate qualifications in project management so was aware of critical success factor analysis.

> *"…I've looked at a lot of that research into the critical success factors…"*

Even so CSF analysis was not formally utilised because of the perceived difficulties identified with this approach

"…critical success factors are things that you should be able to plan right at the start as to how you are going to get around all of those…in practice I think that that is very, very difficult …"

The difficulties stemmed from the lack of common overall process awareness within the business. With high levels of staff turnover, awareness of the data and informational needs of those in other areas of the company was almost universally non-existent.

"…so the company halved in size. Our staff turnover had risen a bit and because of that we were getting a lot of people in without the knowledge …"

the usefulness of identifying CSF without being able to identify measures the business can take to ensure things got done was of limited value.

"…it wasn't something where I formally … went to a Consultant … and said, "Right, give us a list of the CFS and look through them," but yes, certainly it comes from your experience and … that would be what really drove the risk register."

Another problem was that John felt there was not a lot of useful literature on the subject due to the contrary and often time's ambiguous information available.

"…the other thing is a lot of the literature on project management doesn't necessarily agree and a lot of it is not very specific…"

The ability to provide measures to prevent problems proactively was identified as a construct requiring a combination of history about how the business operates and how the product will affect a business.

"…most of those do come … from history from projects, knowing that if you don't do that, it's not going to happen…"

In this project a clear distinction was made between CSF and risks. Anything that would affect the project or would be needed to correct the project to ensure a successful outcome was placed in the risk log.

"…that is actually the function of the risk log. That's pretty much exactly what should go in the risk log, something that is going to put the project at risk…by definition you're asking, "Is it something that will put the project at risk?"…"

3.4.7 Case 10 (ITM9)

Company Name - **Industrial Manufactures* (IM)**

Interviewee - **Mr Stephen Lee ***

Industrial Manufactures* are a manufacturing company that have been operating for over 75 years. They had used a custom application which was managed by their existing IT Manager but with his impending retirement and lack of both internal and external resources to maintain the system, an alternative was needed. Mr Stephen Lee was employed specifically to implement the new system with his role to change post implementation to IT Manager.

ERP systems

The selection of ERP centred on a detailed RFP process which was sent out to five different vendors. The requirements were for each of the vendors was to demonstrate a solution to a core business problem deemed the most difficult by Industrial Manufactures. These demonstrations were presented to 25 different members of staff who were pulled out specifically for this task. Although the time commitment from staff was large, this was done with the expressed purpose of ensuring full commitment from staff after it was made plain by Steve that IT would take responsibility if it didn't work however if the system did not fit it would be the businesses responsibility.

Implementation Model

Their chosen model was one that both the external consultants and organisation agreed upon, and was a hybrid adaptation of a number of models including the Bancroft et al. (1998) as-is and to-be stages. Which implementation model to use was highly important for IM as within the company it was acknowledged that even with a good product, a bad implementation will result in a bad product

> *"…we put it all to one side and didn't look at the software again and concentrated on the implementation part because it doesn't matter how good your software is, if it is implemented badly then you get a bad system."*

After evaluating implementation teams, they changed their choice of product because of the implementation team that came with the model. While they had a preference for SAP as a

product, it was felt that the implementation team and model would not be compatible with their organisation

> *"…we don't want the SAP implementation people, we want the JDE implementation people. And we ultimately wanted JDE's implementation people with the SAP software but that was never going to happen because they don't know the software so we went JDE. All over implementation. And fit to our business."*

Critical Success Factors

Critical success factor analysis was not formally done at the beginning of the implementation.

> *"We didn't identify them* [critical success factors] *formally…"*

They did however get some direction advice from their consultants on some aspects of project management

> *".....having mile stones, and making sure you have very much agreed business requirements…"*

3.4.8 Case 11 (ERPC2)

Company Name - **Primary-Business (PB)***

Interviewee - **Mr Bob Scambury***

Primary-Business (PB) are an organisation dedicated to consolidating and processing primary products in a rural setting. Although quite a young company, PB had expanded rapidly and from an information and technology usage perspective, had resulted in the development of isolated systems necessitating the manual transfer of data. This process resulted in delayed and error prone data being used to make business decisions, an unacceptable option for key stakeholders charged with the continued growth of the company.
Lawson's had been selected to handle the financial management components of PB, and as a result of the success of this system it was decided to utilise Lawson's for a majority of their other organisational information needs. Mr Bob Scambury was engaged as a project manager to assist the internal project manager with the implementation.

Although Lawson's is used as the main system, different systems are still used in other areas of the organisation and it is their intention to migrate all systems to using the one ERP in the future.

ERP systems

While this was a full implementation, PB had already installed Lawson's ERP to handle the financial components of the business, so the selection of which ERP solution to use was never in doubt.

Implementation Model

The different stages used in this project were

1. Strategy
2. Selection
3. Scope
4. Reiterating through a cycle of prototypes, build and test
5. Go-live

This method was described as the prototyping method, and when questioned about the use of this methodology, Bob responded that many of the decisions you need to make are made for you in rapid prototyping.

> *"…there are quite a few people that use it for ERPs because a lot of the decisions make themselves. They can be made very easily by a consultant without consulting or asking a lot of questions…"*

This situation suited environments where the level of experience internally was not conducive to high levels of accurate requirements gathering during the planning stage

> *"…People just didn't understand enough about the system to come up with a sensible answer, or come up with the wrong answer and we would have to backtrack it…so we would ask them what they need and then go away and configure it and present it back to them and say that this is the system actually working - if this is what you wanted? And nine times out of 10 it is so you can effectively worry about the other 10% at another time …"*

In this case however, it is not a pilot prototype where you present a prototype and if it works build the system for real. Rather they built up the system as they went, getting an incremental sign-off after demonstrating usability and look.

> *"… its not like a pilot implementation, its building up a configured system…"*

While they used prototyping in this implementation, overall there is no one method that the consultants are required to use, and the decision is based on the experience and composition of the organisations project team.

> *"…so we would work with the vendors on their approach…we do have our own methodology but in practice the real methodology we use will depend on the experience and skills of the team members in the implementation…"*

Critical Success Factors

Critical success factors were outlined in the documentation and explained as a generic list that can be used as a means of assessing the project. It was explained that the following list was not a complete list of all possible CSFs as they will vary from project to project, but it was a "good starting point". The factors included

- Managing the risks involved
- Communication

- Firm, realistic requirements
- Project planning and monitoring

- Experience of project management
- Appropriateness of skills of project team
- Project team morale
- Project team resources – quantity, skill and power
- Contractual relationship with supplier

- Adequate formalised testing

- Organisational change management
- Clear business objectives and outcomes
- Committed ownership
- Senior management buy-in and trust
- Managing the expectations of stakeholders
- Appropriate functionality in software

- Extent of user involvement

- Establishing linkages with other projects

The factors that they applied to this project

3.4.9 Case 12 (ERPC3)

Company Name – **All About Construction (ABC)***

Interviewee - **Mr Vince Boyes***

ABC are an international company in the construction industry, with offices throughout Australasia, Europe, Asia and the US. With multiple divisions and a number of different businesses within each division, ABC are a large company with a high number of different solutions in place. This case centres on one of those companies within a division and examines a major ERP upgrade. The system in place was a number of years old and a number of versions out of date, and the resulting solution was a major upgrade project which share many of the characteristics of a companywide ERP rollout. Although a number of decisions have been already made which include a preselected ERP solution and much of the business process reengineering and other design work, as with other companywide rollouts there are still aspects of design and reengineering which need to be completed.

> *"*[the risk management process] *does apply to both, just to a lesser extent on some of that design stuff. …"*

Mr Boyes is a functional consultant with extensive experience both in New Zealand and off-shore

> *"…That's been here in New Zealand and off-shore as well…"*

who was contracted as a project manager and was charged with guiding the internal project manager through the process, which included risk management activities such as risk registry, scope and milestone monitoring.

ERP systems

The existing system was SAP, and as this was an upgrade no additional selection process was needed.

Implementation Model

While the contracting firm had a formal model available, it was not used in this case. ABC had an existing preference and which model used during the project was not that important to the contractors.

"…We've always taken those sorts of things [implementation models] *to be used as a guideline but not necessarily followed to the 'T'…"*

While the model for this upgrade was already established, when asked about other projects and the models used Vince explained that the model they would normally use was a prototyping model and had been designed for smaller economic environments such as New Zealand. It did not have the high overheads as would be seen in larger environments such as the USA.

"…What we find is that a lot of those model are very useful when you have a very, very large implementation, in the states you have implementation of 40,000 people …it's just a different level here in New Zealand"

When deciding whether that model is appropriate in other implementations, Vince commented that the model is determined to a large degree by the organisations needs and product selection, with another important criteria being cost

"…some clients are not prepared to pay for it, in term of some of the analysis you need to go through…."

Two aspects of ERP implementations which were consistently identified as areas of cost cutting were

1. Reducing the scope of the project
2. Not continuing with improvements to the system post implementation

Cutting back on the scope of the project was customarily done but splitting the project into different implementation - do this now, and do that in the next stage

"…It gets pulled back because they get the final cost … into stage 2. The problem with that is that stage two never happens because they have spent so much money on getting the ERP system in, that they are starting to balk at the cost of doing on-going work…"

The problem with this approach is that companies that have balked at the cost of the initial implementation seldom continue and finish the different stages

"…Companies are not following up with that post implementation improvements that would give them that added value…"

The gains from the additional enhancements is where the real value is added and the ROI can be realised. This is an aspect of implementations that

"A lot of education needs to go into telling them …that the systems is not done. They need to … look at putting enhancements into it and building on that… it seems to me that there has been a reluctance to do this from some organisations…"

Critical Success Factors

No formal critical success factor analysis was completed on this project.

Chapter Four:

Findings

4.0 Overview

The research findings have been divided into two parts with part one (Interview Findings) examining the data gathered during the semi-structured component of the nine interviews, and compiled using the Sumner (2000) risk factor definitions.

Part two (Risk Registry Findings) is made up of the compiled risk registries and features risk registry entries from both organisational risk registries and additional analysis gathered from the case interviews. The risk registries were compiled using the Sumner (2000) risk factor and risk category definitions with the Lyytinen et al., (2000) Risk Management Model used as a coding framework.

4.1 Interview Findings

4.1.1 Case 4 (ITM3)

Company Name - **Textile Trading International (TTI)***

Interviewee - **Mr Tony Holder***

Risks

There was an overarching risk control strategy in place throughout the life of this project. This strategy was built on the belief

> *"…that if we were working with a product that enabled us to modify things quickly and we were working with developers who could modify things quickly … then we would get away with it."*

1. Failure to redesign business processes

This company had operated in a silo mentality environment since it began and redundant processes were evident throughout the business

> *"…you ended up asking an awful lot of questions …; why do it that way; why don't you do it this way, because that doesn't seem to make sense? And a lot of the things didn't make sense, but it was just the way that they had been taught and the way it continued on …"*

Due to this silo mentality, if information was being processed incorrectly the only personal able to tell were the users.

> *"…often you would get, "This isn't right". "Why isn't it right"? "I don't think that's the right answer". "What is the right answer"? "I'm not sure". "Okay, well let's sit down and work through this".*

Business process reengineering was therefore a priority for the business and one of the driving forces behind the project

> *"…So my business problem was that about 10 percent of the system's knowledge underpinning my business was on the IT system and about 90 percent of it was on spreadsheets that individual people knew how to run… I think it was incredibly high risk because you were so dependent on individuals to know what they were doing and*

to factor things in and that was the prime motivation for installing an ERP system. We had so much off our main system that our business was at huge risk."

This risk remained prevalent throughout the project. The reluctance to share information due to the assumption that the new system would fail and a lack of knowledge of how their role impacted other functions within the organisation were major contributing factors. Through perseverance the vendors succeeded in understanding the technical aspects of the business to the point where inaccuracies were found in published technical specifications within the industry

"…we found a bug in the [technical] calculations … which everybody else has in their system … we found … and … fixed … 150 years of everybody else doing it wrong … "

5. Lack of business analysts with business and technical knowledge

Although Tony had knowledge of both the business and the technical solution, he was the only one and this resulted in problems with some of the fundamental coding used in the system. The codes used were created at the prototyping stage, changed straight after and then changed again two years after implementation as they were still not working

"The coding system that we put into place for product coding changed completely after that prototype, we had it completely wrong and it was a fundamental of the system, our initial thinking wouldn't have worked and so we had to modify that and to be fair after we went live – about two years after we went live, it still wasn't working quite right and we had to modify it again or refine it…"

2. Failure to follow an Enterprise-wide design which supports data integration

Going from systems and processes that were inefficient and inaccurate to an integrated environment posed a major problem when moving data across from one system to another.

"…the biggest risk was actually getting the data off our old system and getting it across in a timely enough manner so that we could start again …"

This was accentuated by the reluctance of their previous software supplier to assist in the process which meant they had to work it out for themselves.

"…because you're moving off your [old] system they're not really terribly interested in helping you, so you had to actually work out for yourself what everything meant…"

8. Lack of senior management support

While this project did not suffer from lack of a champion with John and the IT manager driving the project forward.

"…I was the guy, 'the champion' and he was probably the '2IC champion…"

one problem that did come up was their inability to force the financial controller to submit the chart of accounts.

"…the Financial Controller for the group decided that he didn't have time to do it and he had to get really monstered in to it – screaming match stuff… he was told he had a deadline for doing it; he didn't do it; we pushed him; he didn't get there and so I put the chart of accounts together for the company which really upset him and backed him into a corner and then he came up with his own. But that was about three weeks from going live date and that put real pressure on us, because that is something that should have been done a lot earlier, but he was dragged, kicking and screaming into it."

14. Insufficient training of end users

Although there was an emphasis on starting the training of staff early on in the implementation

"[Staff] *got involved in the prototyping stage and then probably the three months prior to going live … "*

problems occurred, especially in the later stages of the implementation because the modules they were using to train staff were test modules which frequently contained problems

"…you would get a cut of the system and things weren't quite right and you know you sort of go through staff giving up…"

which led to problems trying to engage the staff .

"Problems arose trying to engage and train staff on test modules as these modules frequently broke down. This coupled with a resistance to change resulted in steps being taken to ensure staff are taught how to use it…"

Even with this emphasis on training before go-live there was still resistance because of the assumption that the system would fail.

"Some of them did and some of them were dragged kicking and screaming to it and it probably wasn't until we went live – in fact, it was probably about two or three weeks after we went live that they realised that it wasn't going to go away. You know people always think…I've heard the computer systems don't work, so this will be another one of them and so it will go away before I need to learn it"

There was still end user issues relating to using the system after go live

"…everybody wanted assurance of what they were doing was right and they weren't stuffing anything up…"

17. Lack of sensitivity to user resistance

Problems occurred with getting staff to fully engaging in the training, especially in the later stages of the implementation because the modules they were using to train staff were test modules which frequently contained problems.

"…you would get a cut of the system and things weren't quite right and … staff [were] giving up…"

which led to problems trying to engage the staff .

"Problems arose trying to engage and train staff on test modules as these modules frequently broke down. This coupled with a resistance to change resulted in steps being taken to ensure staff are taught how to use it…"

While steps were taken to ensure staff participated

"They were forced into it …"

there was still resistance

"Some of them did and some of them were dragged kicking and screaming to it and it probably wasn't until we went live – in fact, it was probably about two or three weeks after we went live that they realised that it wasn't going to go away. You know people always think, Oh it won't work you know - I've heard the computer systems don't work, so this will be another one of them and so it will go away before I need to learn it"

18. Failure to emphasis reporting

While reporting was identified as an important part of the ERP system, there was no effort made to generate reports at all throughout the project as report generation was not identified as a priority

"… there was a couple of areas where we just printed a report and faxed it for the first few weeks, because it wasn't a priority… there were other priorities to get fixed."

The reason this was not a priority was because of the software and architecture used in the creation the system. The system structure made it easy to create custom reports

"… So we knew that we could get anything we wanted [out of the software], *you could generate your own reports…"*

and this effectively eliminated this risk from affecting the outcome of the project.

4.1.2 Case 5 (ITM4)

Company Name - **Building Supplies International (BSI)***

Interviewee - **Mr John Clarke***

Risks

This company was in the first stages of the implementation when the interviews were done and covers the risks they were experiencing at the time. Even though the structures bought into their ERP projects are highly formalised, address multiple critical factors and constantly monitor risks throughout the project, it was acknowledged that risks will still get missed during any implementation

> *"…they always slip through…"*

Part of this acceptance was based on the knowledge that it would not be a short term project and would need constant monitoring to ensure that it would result in a successful outcome

> *"…I'd say we'd probably be looking at three years before we're actually stable …."*

Additionally, although this implementation is a priority, the advancement of technology and the longevity of the project mean that outside influences will always be a factor. It is because of these outside influences that this implementation is constantly being tested with issues relating to scope and creeping requirements

> *"…So these are some of the risks that we've got to decide; do we bring them into the project or do we shelve them off to one side and accept the fact that it's going to cost us a fair bit of money later?"*

At this stage of the project the focus is on establishing the scope, setting up procedures to determine how things are to be done and determining what factors are to be used when determining the success of the project at its completion

> *"… we'll probably be targeting the major risk and the major risks are personnel – sort of requirement explosion … people just demanding more and more things. So we have to make sure that once we make a definition of the statement of requirements and we really define what the end goal is going to be, then there has to be a really big change control over the top of that … saying, "If you want to deviate from that it has to … be signed off by the steering committee … "*

Indeed it is their preference to do it this way as the systems and templates they have in place have been developed with their own business processes in mind so any customisation done to adapt the modules to the business has already been done.

"… this is how we configure SAP… "

1. Failure to redesign business processes

The new acquisition was originally part of another company and although they also used SAP, the resources associated with support and systems were tied to their previous company. This has resulted in the need to

"…recreate the environment from what's in people's heads and what's on their notes to match what it needs to be now…"

Due to the nature of the business problem they were trying to fix, redesigning the business processes was an important part of the new configuration. While they were able to progress with two of the properties under review, the lack of senior management commitment from the third property was causing uncertainties in their ability to plan and predict resources needed for the remaining components of the project.

"…they are saying, "No, we don't want to be in the project…""

4. Insufficient 'internal' expertise

While one of the goals is to retain the knowledge internally

"…what we are trying to do is do it more with internals ... to keep the knowledge…"

The possibility that specific internal resources will not be available may result in the need to find additional resources to complete the project

"…if they are not in the picture we have to resource a whole lot of SAP consultants…and the market … is really, really tight and they have will have no expertise about the [BSI] *standards …"*

6. Failure to mix internal and external expertise effectively

While initially not an issue with the original scope work, changes been brought about after the original scope was completed by the introduction of Unicode as a compulsory element of

SAP configurations in the near future mean that they may not have sufficient internal resources to complete the project.

> *"… new functionality that's in … SAP …called Unicode …that they are going to make compulsory … "*

As a decision has yet to be made to determine whether this will be done now or as a separate project at a later stage, as much information as is possible has been gathered and presented to the project champion to push through. The two alternatives are to incorporate the new standard into the project which will have implications on time frames and cost or to leave the implementation as it currently stands and change over after the project is complete. The latter option will also result in additional expenditure as it will require significant additions to the budget has already been processed and approved. While it is possible to push these changes out the increase in costs becomes significantly larger if this were to be done at a later stage and those in-charge of the financial aspects of the project are trying to draw a line in the sand.

> *"…because they keep saying, Right, that's the budget you've agreed to and that's what you have to stick with. We're saying, Okay, That's the budget that we agreed to on these assumptions. Now these assumptions are changing…"*

Of significance to this risk is that if they decide to proceed with expanding the project to include the changes, they may not have sufficient internal resources to handle the project from this point forward and may need to rely on an external consultant company.

7. Lack of ability to recruit and retain qualified ERP systems developers

The initial planning and critical success processes included the need to actively retain identified super users associated with the project.

> *"…the whole aim of it is to have these people working on projects so when the projects have finished they know all the knowledge and they move into the operational one…"*

While this focus has not changed, external forces have changed the current situation beyond the ability of the project team to be able to control. The company yet to join were to be used as the resource for SAP personnel but natural attrition and the organisations lack of willingness to replace the personnel due to project uncertainty have put this plan in doubt.

"…because time has dragged on so much, a lot of the resources from the other company … are all leaving …they haven't been replacing … so it's created problems… So once again the budget goes up because you have to replace it with external consultants."

Until the final organisation decides to join or not, replacements for natural attrition will not be made so this has been identified as a risk that will need to be controlled irrespective of the outcome.

8. Lack of senior management support

Top management support and commitment was a difficult proposition in this project because of the complicated nature of the ERP implementation proposed. This project involved the integration of three different properties, each with their own set of processes and differing commitment levels.

"… it's our biggest risk at the moment… "

The third company do not have unanimous support for this project and as the Board of Directors need unanimous support for this to go ahead they could potentially stall the project.

"…they have to have a unanimous agreement in order to sign these sorts of propositions … "

9. Lack of proper management control structure

Due to the intricate nature of the implementation (as it involves the amalgamation of three properties) management control structures were an unknown complication and how information was to be disseminated was an evolving system tailored to how the project presented itself.

*" … looked after it from a central strategic and message thing **…** so you define it all and … one from each company … delivers the individual message … "*

Because of the uncertainty a number of rumours had surfaced speculating on whether the project would be proceeding or not, milestones and how the project would be structured

"…there's some rumours coming out that have said, "Oh this is our go live date", and we've said, "Well, no one should be saying that…"

11. Ineffective management communication

A major problem with a project of this size is establishing effective communication channels

"…that's the problem with a project this size…they all work on separate components and then they all talk amongst each other within the applications and infrastructure and then I've got to make sure that they are talking to each other at the next level up …"

12. Failure to adhere to standardised specifications which the software supports

While this was not initially an issue with the implementation, changes to the software with regards to the introduction of Unicode compatibility as compulsory within SAP configurations now means that the original templates are no longer usable as a long term solution.

"… new functionality that's in … SAP …called Unicode …that they are going to make compulsory in the next year or two, so if we don't do it now we're going to have to upgrade to it later which is going to cost us …"

Changes also to the hardware specifications within the organisation have resulted in a companywide preference for one hardware platform with the system having been originally installed on another. It was originally decided to stay with the installed platform to reduce testing requirements as it was shown to have worked.

"…Forget the standard, let's just get what we have got - use that and keep the system as it is and then we don't have to go back and test to see if some of the bugs were getting in…"

As the project has progressed it has now becoming apparent that they will not be able to retain their current implementation so they are currently deciding whether to stay with the current hardware preference or move to the company standard which would remove a layer of difference with corporate support.

"…Well, if we're going for a brand new system we may as well then get into the standard…"

The decision to move from one to the other however is not a fait accompli but will be evaluated on its merits to the project. The reason they can truly objective is because the project champion has the authority to override the standard

"…the guys are more comfortable with the ones they're using and [our project champion] says "Oh it's not a really hard and fast standard…"

15. Ineffective end-user communication

The problems associated with establishing who is going to be in the project is also affecting communication -

"…HR here won't communicate, because they don't know the full details of the plan because nothing has been finally decided…"

Although this approach is accurate it fails to address the issues relating to user involvement

"…I said, "You need to communicate if you want people to be involved… you have to communicate what it is you are trying to do and why and then you will get their buy-in and then you'll get their … acceptance…"

Communication has been identified as a major component in the minimisation of risks

"…communication really is your biggest thing of minimising risk because in anything – everything you look at the one key word is communication and that's all going to fail if you don't talk to each other …"

The main reason this is a major risk is not as a consequence of what is said, but rather what is not. If gaps are left in communication then informal information will be passed to fill those voids in the form of speculation and rumour.

"This is happening and these are the reasons why it's happening", otherwise they'll start talking … and they'll fill in the void. They'll hear rumours and they'll start filling it up with incorrect information and that's the bigger risk, so you're better to tell them..."

Due to this communication lines have been set up to pass on information in a timely and accurate manner to the staff involved

> *"The model may be better if [it is] looked after … from a central strategic and message unit. So you define it … and set it all up, but have one from each company who actually delivers the individual message … "*

16. Lack of full time commitment of customers to project management and project activities

There are high compliance requirements requested by both internal and external bodies

> *"… in the States they've got Sarbanes Oxley, in Europe they have got something else… we've got audit type ones... we've got health and safety. I mean that takes a lot of staff away…"*

This is compounded by the requirements of the day to day requirements of the business

> *"…I've … got a problem … at the moment, he says, "We need to get as many people as we can put in the project". And I said, "Right, we are starting to need these people. Oh, we've got month end coming soon and then we've got financial planning and then we've got budgeting". And he says, "Oh, we've got to make sure we don't interfere with those". I said, "You can't have it both ways"…"*

And the result is staff members who are unable to fully commit to the project, with implications further on.

4.1.3 Case 6 (ITM5)

Company Name - **R&D Manufactures***

Interviewee - **Mr David Johnson***

Risks

Risks were handled using a formal and systematic approach. A risk registry was created with risks being ranked numerically based on the probability of a risk happening and its potential impact. The senior management team would then meet regularly

> *"We had a steering group that would review this risk register … and would only review changes in risks…each week…if it increased and then every month. Otherwise we would manage and review all other risks … and make sure the mitigations were still accurate."*

8. Lack of Senior Management Support

Although this was never a risk, there was a concerted effort to keep the senior management team engaged by ensuring that they remained informed and involved in the ongoing risks surrounding the implementation. This support was carried over to weekly meetings where all members of the steering group would meet to review how the project was going and deal with issues as they arose

> *"We had a steering group that would review this risk register every week that we met and we would only review change in risk. Like anything increasing in risk we would review that normally – that was a mandatory thing each week for risk if it increased and then every month. Otherwise we would manage, review all other open scores above six and make sure the mitigations were still accurate…"*

4. Insufficient 'internal' expertise

Insufficient internal expertise was identified early as a potential major risk due to the external requirements relating to certification

> *"…we needed to be completely Sarbanes Oxley compliant before we went live and a lot of the Sarbanes Oxley stuff is around your controls and your processes and your IT infrastructure and your security model…"*

After analysing the internal resources it was found that the external requirements could not be met with internal resources. To remedy this external assistance was sought to provide guidance and structure initially and as a consequence latter implementations were able to rely on internal staff to a large degree

> *"*[for our] *first two implementations…we had to rely on a whole lot of people and external help to get that done, but by the time we got to Australia we knew … a lot more about how to roll out and manage implementations."*

6. Failure to mix internal and external expertise effectively

With the engagement of external expertise, the risks associated with mixing external with internal resources became paramount. While the assistance was needed on this project, future projects dictated that there was a business need to empower those working on the project to up-skill, allowing future projects to succeed with lower levels of external assistance.

> *"*[for our] *first two implementations…we had to rely on a whole lot of people and external help to get that done, but by the time we got to Australia we knew and my team and our business knew a lot more about how to roll out and manage implementations."*

7. Lack of ability to recruit and retain qualified ERP systems developers

As a consequence of the high levels of external expertise it was anticipated that this would pose a problem with staff allocated to the project both during and after the project. During the project a risk identified was the potential to lose project knowledge if staff members were to leave.

14. Insufficient training of end users

While issues relating to user training were alleviated in subsequent implementations by the organisations ability to use other successful implementations as reference points

> *"They don't actually have to wait until they go live before they can do training they just go to another office."*

the initial installation posed problems due to the high level of business and technological changes required within the business

"… replace…our old legacy…ERP. It wasn't really an ERP, it was more of an MRP system – a very…early stage transactional processing system built on a cobalt database."

16. Lack of full time commitment of customers to project management and project activities

Although the project was of paramount importance to the business and was illustrated by the levels of senior management commitment, the day to day running of the business still required attention and enabling staff the ability to dedicate their time to the project was a juggling game

"… a lot of what the steering group was doing was dealing with the Project Manager's complaints about not getting enough resource for doing certain aspects of the [project] *– so its shuffling, "Who can do this task to allow this person to get on and do this task"*

4.1.4 Case 7 (ITM6)

Company Name - **Wholesale Traders (WT)***

Interviewee - **Mr Tony Smith***

Risks

The risk registry was used as a tool to assist with the project. The primary goal was to remove assumptions because they were dealing with so many people with a lot of institutional knowledge and they knew they would need a control repository. From this repository managers would go back to their own groups to find out more, and to determine if it was a risk to them and its affects. Each manager would then go out of their way to ensure they were not the "weak links".

While a risk registry was used extensively within the executive team, another key method of keeping on top of risks was the use of "Management by Walking Around". This management style was used extensively to monitor how things were going on the front line by talking to influential users and using their perspectives to determine if things appeared to be working. While their perspectives were not used to drive the project they were used to determine how the changes were being perceived and to implement changes as needed.

1. Failure to redesign business processes

This was treated as a major risk throughout the project because of the silo mentality that had existed within the business. This was further complicated by the "ERP terrorists" who saw the project as a waste of time and were able to influence others to their way of thinking. This led to lower levels of co-operation in some areas which manifested itself as insufficient information on how things were currently done.

Although this knowledge gap had the potential to cripple the project, measures were taken to eliminate this from affecting the project in a critical way. "ERP terrorists" were identified and attempts were made to win them over to the project. Any areas that contained these personnel were identified and additional analysis was performed to ensure information was correct.

4. Insufficient ‘internal’ expertise

This was identified early in the project with external contractors bought in to drive the project towards completion. As well an immediate issue, insufficient internal expertise was identified as an ongoing issue as the level of IT competence within the business was acknowledged as being weak. The business was aware of the levels of ongoing maintenance and improvements that would need to be done in the following months and possibly years.

Due to the lack of in-house expertise, there was a high reliance on external consultants to support and direct the project. This direction included the implementation model to be used, and tools (including the risk registry) used during the project to ensure things ran smoothly.

Lack of senior management support

Top management support was never an issue with this project. From the outset the attitude was almost that of a loss-averse mind-set where each manager would keep abreast of the risk registry to avoid risks in their area of management. If a risk in their area became medium to high then they would actively pursue the cause of the risk and attempt to resolve it before the next meeting. If no resolution was found, the risk would be bought up in the next management meeting and different control strategies would be discussed with agreed strategies implemented.

Lack of champion

This was not an issue in this implementation even though a project champion was never formally chosen. The sense of ownership fostered at the executive level was carried though the project, reinforced by the weekly meetings and peer expectations.

Lack of full time commitment of customers to project management and project activities

This was identified early in the project and steps were taken to ensure that this would not become a factor. It was decided that members of the project team would be available exclusively for the project for a minimum of three days per week for the life of the project. Any other duties outside of the project had to fit into the two remaining days per week as the ERP implementation was the top priority.

4.1.5 Case 8 (ITM7)

Company Name - **Textile Manufactures International (TMI)***

Interviewee - **Mr Kevin Turner***

Risks

Many of the risks identified in the implementation were viewed initially as critical success factors and monitored throughout the implementation process. A risk registry was not created until 3 months prior to go-live (when they started doing training) and was used to identify areas that needed to be monitored after go-live

> *"…we did a risk register… to say, "Hey at go live we think these are the areas that are going to need review"…"*

Almost all of the risks in the register were identified as human resource and training issues so an attempt was made to move the responsibility of auctioning the risk register to the Human Resources (HR) Department. This was consequently ignored and without executive pressure to action was not referred to again.

> *"…the risk register which we sent to the Steering Committee and HR in particular, "Here's a risk register, you go and look after it," and we even weighed it … in terms of what the risk meant to the business and then handed it over and nothing really got done with it either, so you know it was a bit disappointing."*

One interesting facet of the implementation was the way in which risks and issues were handled throughout the life of the implementation. During the initial chartering and project stage they were handled by the Steering team. After the project went live and they entered the shakedown stage, the implementation team proactively went into the workforce and supported the users to ensure problems got fixed quickly

> *"…so initially at the start they walked the floor and they were out there and they were supporting …"*

After this shakedown stage ended the implementation team took a step back and they moved into more of a structured response using a help desk format

"…when it was getting into operational proper then it was, "That's your mechanism go through the help desk. Escalate it there and we'll resolve it..."

Failure to redesign business processes

This was addressed at the beginning of the process as part of the extensive planning or project chartering that was done.

Failure to follow an Enterprise-wide design which supports data integration

While the design was not an issue, they were aware from the start that data integration was going to be an issue because of the disparate systems in-place. This did not influence their approach to the implementation as it was always intended to be a system implementation which would require the business needing to change process as opposed to the new system being required to match the current business process configuration.

Data cleaning was a big problem and although a lot of time and resources were allocated, it turned out to be larger than had been anticipated.

"…that's where we started to realise just what was going on in the system…so many areas…that could go wrong...so yeah, data cleansing was massive."

One aspect which proved troublesome was the matching of data codes, names and data types between different business units. Prior to the ERP each business unit operated independently

"…a big part of that was we actually changed our numbering conventions through that… because of the silo business approach they would have a part that was this naming convention. This one would have another part – different naming convention and you would sit there and look at them and go, "What is that you know it just doesn't make sense?" - the units and the measure are all over the place."

Insufficient 'internal' expertise

This was addressed with a combination of active recruiting and the use of external consultants to fill the gaps identified. Recruitment was identified early as a requirement as there was only one IT person in an administrative role and the requirements of the new system dictated the need for more personnel with a variety of skill sets.

Lack of business analysts with business and technical knowledge

This again was addressed by the active recruitment process undertaken at the beginning of the implementation.

Failure to mix internal and external expertise effectively

This was part of the plan which involved recruitment and implementation partner selection. It was always intended that members of staff selected to be part of the implementation team would be up skilled by external partners so that super-users would be created.

Lack of ability to recruit and retain qualified ERP systems developers

Not only was this not an issue with this implementation, it was identified and monitored throughout the life of the implementation which resulted in this becoming a highly successful component of the entire implementation.

> *"…a good thing that happened was once we disbanded the implementation team they went into operational roles… So we went through the implementation delivery and then moved into that operational role and we did that with everyone on the project team… One of the guys on my team, who was in charge of the supply chain …SAP background, is now in the Supply Chain Manager's role in the business. .."*

Lack of senior management support

As an international company the initial idea had been to use this implementation as a test rollout. This proved troublesome however and was the motivation behind the move away from a corporate rollout to more of a localised implementation. The reason for this was that at the international level there was reluctance to move to a common platform because there was an existing platform in place at one of the other main sites (although it was a lower tier alternative) and other parties were not prepared to spend the additional funds required to achieve this

> *"…so they were there challenging the huge price wide approach right away."*

The nature of the organisation It quickly escalated so was scaled back to being a local installation only. From a local perspective a project management team was created to push the implementation through.

"…it was the … Project Management Team … who would sit down and escalate and expedite any issues, but the main sponsors were the CFO and CO. So the CO was from an operational side of the business - making sure that everyone was on track with what we were trying to achieve here and the CFO obviously around the business plus the financials. …"

This was done not because of reluctance on behalf of the senior management team but rather because of their collective lack of experience

"… they were senior managers but they hadn't been exposed to ERP implementation of this size, so it was a real education …"

Lack of proper management control structure

Change management was handled by the project steering team. There was an effort to move the responsibility to HR as many of the issues arising were personal related but that did not happen

" I tried to push it out to HR and of course they didn't have a bar of it, so I ended up wearing that one"

The project may have suffered from lower levels of pain had HR been involved as the areas identified as being of concern were based around people and processes

"…there was … pain and that come post go live. So the change management stuff… was people and process. But again it still gets lumped into it – ERP implementation."

Insufficient training of end users

While training was viewed as a major component of the integration, it was at the lower end of the priority list and moved to suit business needs

"…training just gets pushed back and back…"

When it did happen however it was co-ordinated throughout the business to ensure maximum coverage

"…we got buy-in from operations to do it. They mixed it in with their day to day requirements. We did get good feedback in terms of - you know so we took them out of the environment put them in a classroom environment, it was a train a trainer type approach. Did really good surveys and got really positive feedback to the point where that was seen as a real success."

Even with this success however there were still problems at go live with using the new system. This was put down to a necessity for the users to just use the new system and get used to it.

"…it's just time on the system because they go through all the user acceptance testing, the training and stuff … Our training was really, really good, yet some of them just couldn't understand, it was still too conceptual."

Lack of full time commitment of customers to project management and project activities

It was felt that this was done especially well, in fact to the point where they though they may have spent too much time on this aspect. The reason for this was that the business bought in employees who would be using the system to assist in the evaluation of the products when the respective companies did their presentations

"…when the guys come down to their offsite vendor presentations we pulled out warehouse staff, sales clerks, purchasing people and said, "This is the system that you could be using, tell us your feedback." "

It was felt however that this time had additional benefits in regards to end user buy-in.

"So you know you've got that buy-in right from the get go. They felt like they were part of the process."

Lack of sensitivity to user resistance

There were efforts made to try to be sensitive to possible resistance and this was done in two ways. The first of which was to involve the users in all aspects of the project starting with the product selection. The second was to identify key users whose influence could propagate a negative attitude towards the new implementation. A term given to these users was "Implementation Terrorist"

"…we identified key people in the business …who… had an influence…if we've got issues we'll just go straight to [them] *and work with* [them] *on the issues, because if we resolve that then that's 75 percent of the problem fixed…"*

One aspect of user resistance they addressed head on was the perception that the new system was not performing. It was being blamed for constraining the business and was a very difficult problem to diagnose. As a consequence of the noise being generated this became a high priority problem. The way this was resolved was to bring in external auditors to evaluate the system to find out what the problems were and to get them fixed as soon as possible. What was found was that the problem was not system related but rather people and processes. After this was presented to the board the problem disappeared overnight.

"…That was a common theme … we were hearing back, "The system is constraining the business". So we said, "Fine, we are going to go out and we are going to get independents to come in and run an audit." … we got two guys … and their findings were that the issues that were being experienced were 80 percent people and process. So … we went back to the Board with that …and from that moment on the noise almost disappeared overnight. So … we did have technical issues which you would expect but not to the scale that people hang their hats on and say, "It's the system's fault."

4.1.6 Case 9 (ITM8)

Company Name - **This and That Manufacturing (T&TM)***

Interviewee - **Mr John Broadman ***

Risks

John's working background and formal qualifications steered him towards formalised structure which included the use of a risk registry.

> *"…it's something that I think is pretty important and some of it also just comes down to the templates that you use for your project documentation I guess."*

The problem encountered was that John was the only one to use the registry so its usefulness as a tool used to keep all senior members of the organisation informed was negligible.

> *"A risk log is useless unless the business actually takes notice of it and that is a bit of an issue that I had in this project."*

Interestingly this implementation was deemed a success even though many of the risks identified were not resolved during the implementation and continued to be a problem after completion.

> *"… some of the risks … were at the top of the risk log throughout the entire project and that has actually come back to haunt us a bit, because the effort from that department wasn't put in; they are still actually behind…"*

Part of the success of the project was attributed to luck

> *"Most of the risks were not dealt with properly. We were just lucky to a large degree…"*

Failure to redesign business processes

The intention was to go with the recommended processes as the systems they had in place offered little competitive advantage and was almost universally disliked by staff

> *"…we were coming from two separate systems anyway … no one liked them either, so it was quite easy to say, "Right we are just going to go to this system and we are just going to use whatever process they recommend for that situation."*

The reason this was not envisioned to be a problem was that the processes in place were mapped before the new implementation and very little complexity was found

> *"…though our business has got some complexity most of the processes actually I think can be mapped relatively easily, so we were very confident that there weren't going to be any issue…"*

Although the system was easy to map, one obstacle found was that although users knew the systems well they had not been exposed to other environments so were not aware of any better ways of doing things.

> *"…it was a company where people had been working there for a majority of over 10 years, well quite a few over 20 years, so they had never known any other systems. So getting them to explain what they do and possibly even working out what would be better for the business is almost impossible because they don't know anything else."*

Insufficient 'internal' expertise

This was always going to be an issue with staff turn-over as knowledge of the internal system was low

> *"…we don't have that knowledge in the business…"*

As a consequence of this they were unable to get a lot of input from staff so chose to dictate the process to staff

> *"…so we pretty much … dictate the process - define a project team and then dictate from there how it's going work …"*

One area where they struggled was in the creation of super-users. They felt that this was due to the lack of expertise within the business as a consequence of high levels of staff turnover, redundancies which had removed much of the middle management and some of the more experienced members of staff and that IT competence was not a requirement for new members of staff.

> *"…one of my big struggles is trying to … get super users in place with the system so all questions aren't coming straight to me…"*

Unfortunately because of this IT were inundated with problems. As this was an issue for all three implementations it was thought that this attributed to the failure experienced in the third implementation – namely burnout.

Failure to mix internal and external expertise effectively

This was well done in this implementation primarily because of the solution they chose. As it was industry specific they felt comfortable that any changes they required would not be misunderstood and would result in what was needed

> *"…the consultants did understand* [our industry], *so when we were saying to them, "We want this," they actually understood.*

The reason this was emphasised was because this had not been the case in the past and it had caused long term problems which they did not wish to encounter again

> *"… one of the big issues we've had in the past with solutions like this is where the implementers don't understand your business. I mean it's so easy for a developer to completely misconstrue a requirement, go away and develop it and come back with something different. We didn't have that issue here…"*

Lack of senior management support

Although there was an understanding that the senior management team needed to be behind the implementation

> *"I think the management team understood that they needed to be behind it…"*

They still struggled to engage the senior management team. This was in part attributed to the overall lack of IT knowledge as a majority of those in senior management had extensive backgrounds in sales with very little IT knowledge.

> *"The Executive Team … they are salespeople, they are not really interested in projects like this, so we did struggle to get them engaged much at all. "*

Lack of proper management control structure

This was a very real problem and was attributed to the state of the business at the time. Due to the economic downturn much of the middle management were made redundant which included the HR functionality

"…when they reduced staffing they pulled out pretty much all of the middle management, all the training function, the HR function went…"

Insufficient training of end users

Training was a real issue for the business and stemmed in part from the lack of senior management commitment. Without that support staff did not feel the need to commit either and this resulted in widespread reluctance.

"…getting them engaged in this project was almost impossible…"

This reluctance extended to system usage after training. Staff refused to use the system and without the push from above felt this was justified as there was a chance the project wasn't going to work anyway.

"…I had trained the same people three times because each time we trained them they just refused to use the system after that and just totally forgot it. So it's that kind of – trying to actually get one of the end users to actually go through the process and say, "Well actually I like that. I don't like that," pretty much impossible. We really, really struggled on that as a business…"

Lack of feedback resulted in the organisation having to dictate what was going to happen with little regard for any user resistance.

"…Right, I'm going to get some of the key corporate users in. We are going to say this is how it's going to work. We are going to then train people. If there are any big issues that come out of that training then we'll address them…"

Ineffective end-user communication

End user communication was only seen as an issue because it was not two-way. They had determined that with low levels of user feedback and low levels of senior management engagement that the process was going to be more dictatorial as a result

"…Ineffective end user communication – well that was an issue throughout …"

Lack of full time commitment of customers to project management and project activities

Lack of commitment was an issue not only with staff being allocated, but also with those running the implementation.

"…we are pretty resource tight and I didn't have the ability to assign a separate Project Manager or give up my day job while I was doing this project …"

Lack of sensitivity to user resistance

Sensitivity to user resistance was dictated by lack of senior management support and the lack of technical ability within staff. As there was little of either they resigned themselves to having to force the implementation through

"…users do feel a bit that the system is imposed on them, but … you just can't get feedback from them. So that actually kind of mandated a bit that we pretty much had to put something in, then monitor it to a degree …."

They were aware that this could result in some serious issues but had to push through to ensure that the implementation went ahead

"…we were totally insensitive to user resistance. That was actually deliberate because we fully expected a lot of resistance and our strategy was just completely override it…"

Failure to emphasis reporting

While reporting was seen as an important feature, it was put aside because the software was industry specific and offered a lot of the reports needed as standard

"…reporting was something that we kind of pushed off to one side … because it was a [industry] specific solution it did have quite a lot of reporting built in that could do the majority of what users needed…"

Even so problems were experienced because of the lack of feedback and buy-in from staff. This took the form of employees not giving the initial mock reports any seriously thought which resulted in the final reports not offering sufficient data

"…So it actually goes as far as to mock up the report for them …" Okay, here's the sales report you're going to get." When it was delivered it was still, "No, that's not what I want," what was delivered was exactly what was mocked up…"

One reason given was the lack of understanding of the wider business

"…we do have quite a divide between the people who would be looking at the reports and the people who are kind of entering the order and actually understand what's going on behind the scenes a bit better…"

This was not an issue in the following implementations because the work done resulted in higher levels of understanding

"…the implementation that went after this one, with that project I did have more of an idea…"

Attempting to build bridges to legacy applications

Due to the lack of senior management support and the problems experienced with the authority of the project champion the accounts department were able to override the IT department and announced that they would retain a legacy system which they were still using.

"…Everyone else is quite happy that they be switched off, but its finance and it doesn't matter how much you say, "Tell us what you need - we'll get it all out and then you can switch the system off." It's always, "But we might need something else," and yeah, it's very frustrating…"

Although in previous implementations cost has been successfully used to justify the need to turn off legacy systems, this system is an internal resource which required no additional overhead costs to keep running. As such the accounts department have used this successfully to justify their decision as updating the system would be costly and time consuming and the disruption could be avoided if the status quo was retained.

There has been a couple of times when I've been able to … fully switch the system off, mainly where there's a huge cost to maintaining it. In this case, it's kind of seen as…not really costing anything…"

The problem is that the system is obsolete and could fail at any time which would require either a replacement system or the data to be moved and made available somewhere else (if possible) at short notice which could prove costlier and more of a business interruption than if the process were managed.

"….but …it could still die at any point. At the moment its still working, but I'm not going to guarantee that it will work tomorrow…"

4.1.7 Case 10 (ITM9)

Company Name - **Industrial Manufactures* (IM)**

Interviewee - **Mr Stephen Lee ***

Risks

One of the control devices they used in the implementation was the risk registry.

> *"…the risk register is just one of those devices which is no different to signing off one of the stages or signing off different things so it is just one of those controls."*

While there were good reasons for using a registry, some of the administrative overheads made its use seem like more of a chore than as a useful implementation device

> *"It's almost used as a show piece for the steering committee.*

The reason for this observation was that those on the implementation team were completing an administrative task that added to their workload with very little gain as it just slowed a process that they were doing already

> *"…So you evaluate your risks – either high medium or low or give them a rating of 1 to 20 and then you monitor them as you are going through. It's good to keep track of it but (my view anyway) is that you instinctively do it anyway…"*

The ratings given to the impacts were done in two stages. The first was to identify what the impact of a risk was going to be, and then it was assigned a numerical value based on the number and severity.

> *"…people in the business understand the impact quite easily so they don't tend to say what the impact is, they tend to say what the risk is, what the mitigation steps are going to be – they don't really say what the actual impact is. We didn't record it in our risk register."*

Failure to follow an Enterprise-wide design which supports data integration

Due to the amount of modification and redesign of the system required by the business, it took approximately 4 months before they discovered a problem with some of their financial figures. The figures were balancing at the executive level, but when finance drilled down some of the accounting figures were being lost.

"…at a high level it was balancing, but at the low level when you try to look at work in progress and transactions, it was just missing in the breeze…"

This was attributed directly to the system modifications carried out

"…This was directly because of the way we modded it…"

Failure to mix internal and external expertise effectively

The biggest problem they had was that IM knew what they wanted but didn't know the software, and the consultants knew the software but didn't know the business. While this is not unusual it did take some time to get it right

"…one of the biggest challengers we had here was that we knew what we wanted but didn't know the software and they knew the software but didn't know the business, so it took a while to get on the same page…"

They found their mix worked very well which resulted in a smooth go-live,

"…in general we had a good go live. We went go live and from day one we could dispatch and ship out orders, had no real issues and everyone was smooth …"

This was mainly because of the implementation consultants they had chosen. It worked so well in fact that the consultants were able to move offsite three days after go-live because there were not any major issues, and most small issues had been resolved.

"…the Consultants disappeared offsite 3 days after going live and we were by ourselves."

Lack of ability to recruit and retain qualified ERP systems developers

The project manager was employed specifically for the ERP implementation. To ensure the highest calibre of applicant, the business ensured there was a progression plan after the implementation, which was to take over the role of IT manager

"…I was employed to be the project manager for the ERP, and now I'm the IT manager. So the plan was to always take over from the IT Manager at the end of the project…"

The reason given was that the business had identified that they wanted continuity after the project to ensure the project manager was completely committed to the project and cared not only about the success of the project, but the ongoing health of the business.

> *"…the business identified that they wanted some continuity after the project so they had a progression plan for me which formed part of the incentive for me. If there had not been a progression plan after the project I wouldn't have come…"*

As well as the project manager, the project team were assembled specifically for the project. One key difference was that the project team encompassed existing members of staff and it was not always a case of voluntary participation, especially as many had been doing their existing jobs for many years and had never done anything like this before.

> *"…They have never done it before. Some of these people are dragged out of the same role they have been doing for the last 20 years and we dragged them kicking and screaming (or it was pretty close) and told them that this is your baby so make it work."*

After the project was completed, most project team members were absorbed back into the business

> *"We took them back into the business...one or two went into different roles but the key people went back into their roles. They are still seen as the super users …"*

The reason that some changed and some remained in their old jobs was primarily to do with how they handled and enjoyed change.

> *".....some people hate it...they went back to their comfort zone I guess. Whereas other people go "I like this" and my career and my opportunities have opened up and a couple of people have obviously moved on, as you do. "*

Natural attrition was the reason given for those that moved on. They lost some key members of staff but were fairly philosophical and attributed it to natural attrition, which was always viewed as an ongoing factor

> *"...We had the same sort of attrition from the project – you lose a couple of key people and there is nothing you can do about that. It's just life…""""*

Lack of senior management support

They identified this risk at the beginning of the project worked on it to ensure it never was a problem

> *"…the* [senior managers] *bought into the project way back here and they knew what the risks was and we didn't have it…if we needed something it just got done…the business knew it was the number 1 project…"*

Senior management commitment continued after the go-live stage, which included on-going steering committee meetings to monitor the implementation

> *"…we kept steering committee meetings up and the project meetings for a good 2 or 3 months afterwards to try and identify any issues we could have had…"*

Lack of champion

The champion was identified before the start of the implementation

> *"…We identified the champion before the project… and it was not his sole job but a key part of his role. Any road blocks that came up …he could steam roll them through…"*

Although the champion stayed on throughout the project, a contingency plan was made in case another champion was needed

> *"…There was a contingency plan there in case he left but he didn't…"*

Failure to adhere to standardised specifications which the software supports

This was a determining factor when it came to selection of ERP system, implementation team and implementation model. For IM they considered their production methods to be a competitive advantage and needed a system that would enable them to keep that advantage. While it was acknowledged that there are risks to this approach, this was how they chose to continue and needed a product and team that could deliver

"We got the impression from them (and it would have been viewed as either a good thing or a bad thing) that it's either our way or the highway which would have put us on a particular track. As was said before, we are not vanilla. Every business is different and you have to divert from that vanilla and we felt they were constantly trying to pull us back. In some areas that was good, but in some that was bad. Especially where we think we have a competitive advantage…"

While there was the intention of limiting the modifications as much as possible to avoid added complications and cost \ time over-runs, the business reasons to introduce modifications was there

"At the steering committee we decided we were not going to do any mods. So we pushed [back] on every mod but unfortunately there were genuine business cases why we had to mod the system.

The modifications required now make it difficult with upgrades but that was an acknowledged consequence of the path they chose

"…we have a lot of mods in key areas which now makes upgrading difficult. It's now a difficult process because we now have to retrofit the mods…"

Insufficient training of end users

With so many of the business users being involved in the project, end-user training was not an issue.

"We had train the trainer to mitigate risk, we had experts and we trained them and they went out and trained the uses."

Lack of full time commitment of customers to project management and project activities

In the initial demonstration stage the business committed 25 people from all aspects of the business to be present

"We had no less than 25 members of staff at the presentation…"

The reason that this level of commitment was shown was because Steve made it very clear to all of the organisational units that this software would affect them and that it would happen

irrespective of what they did so if they wanted some input into how it worked they needed to be present.

> *"I made it very clear at the beginning…to try to mitigate risk…it's your decision so it's your software, your company…"*

The commitment levels shown were indicative of the overall drive of the business to get it right first time

> *"…Although it was a large commitment, at the end of the day it's a small commitment if you get it wrong…"*

Lack of sensitivity to user resistance

User resistance is not just restricted to end-users of the finished system. In this project it was recognised that those members of staff selected to participate in the project would need incentives to be able to make it through the implementation process.

> *"…You're grabbing someone from production … and saying you're going to be working over here for 6 months … in this project – they don't know IT, they don't know the processes involved, they're outside their comfort zone and they all get stressed. So you are asking a lot from a personal perspective and a lot of commitment and we put incentive bonuses around that…."*

4.1.8 Case 11 (ERPC2)

Company Name - **Primary-Business (PB)***

Interviewee - **Mr Bob Scambury***

Risks

In general terms, risks within ERP implementations were viewed by Bob as being repetitive

> *"I've been involved in a number of other projects … so I've seen it at various levels and they seem to make the same mistakes again and again…"*

And the value of having an experienced implementation team is that there is a higher chance that someone on that team has experienced one of the many things that can go wrong

> *"… Experience is being able to recognise your mistakes when you make them again…"*

That is where project teams without experience can run into difficulties, even with external help. While good intentions exist and a genuine desire to do the right thing can be present, without that internal experience to drive what needs to be done, identification of impending problems will not always result in action

> *"The same mistakes are made again and again and if you can spot them, you can do something about them. We put them on the table as risks but they don't seem to do anything with them. They put them on the table and recognise them as risks and say this and this and this but they never seem to let it influence their behaviours or give things the urgency they need at the right time."*

Even implementation teams with experience can have mixed results. This can be due to

> *"…different results come out … because maybe one area was covered better and someone was experienced in that area or it wasn't such a big concern such as data conversion or integration …"*

This is not helped by the view that tools such as risk registries, which are created to aid in this process, are seen as more of an administrative overhead

"I think the risks registry is seen as an administrative thing as they feel they have to dream up some risks to go in there."

A problem found with the generalisation of risks into categories however, is that each implementation will produce individual risks which need to be addressed and can be problematic if they are slotted into a category

"I wonder if it is irrelevant … generic risks like "reporting not getting the attention it deserves" …. Maybe we should be focusing more on specific risks for that particular project…"

Even with the accurate identification of risks for a particular implementation you still run the risk of identifying symptoms as opposed to the root cause of risks. An example of this is in the breakdown of the relationship between the project team and the vendor.

"…the relationship between the project team and the vendor failing, those sorts of risks are often underreported or underestimated because they are not self-reporting…"

This situation can lead to the manifestation of other problems occurring and attempts made to address these risks being unsuccessful, leading to increased levels of confusion over appropriate controls for specific risks.

A majority of the risks identified were categorised as people related

"… Because they are similar projects e.g. they are package implementations, and there is a fairly standard methodology for implementing them – human factors come into it more than technical factors."

This is because the actual setup of the software can be a relatively quick process

"…configuring software doesn't take long, I can configure most of the applications in a couple of days – even the complex ones…"

Failure to redesign business processes

This was a problem not because of a lack of intent, but rather because the internal users lacked the training and familiarity with the processes and tools available in the redesign

process. What was to be redesigning and to what degree was something that was identified as needing to be done in the scoping stage.

> *"…There are a lot of decisions you can and should make in the scoping document up front to make things so much easier when it comes to redesigning things…"*

And the scoping document was viewed as an important control mechanism

> *"…We spent a lot of time checking out the scope and making sure it was adequate and covered everything that was required…"*

PB experienced this risk when the vendor wanted to do things differently to what PB wanted. Due to the engagement of experienced ERP implementation experts into their project team, PB knew the positive and negative implication of that change and decided to push it through.

> *"… In the prototyping* [stage] *things* [decided in the scoping stage] *became a little too hard for them…so we just pushed them to do them…"*

Failure to follow an Enterprise-wide design which supports data integration

Data integration was seen as a common problem in implementations, with integration of existing data always taking longer than expected

> *"…data is always bad in the old system…and therefore integration always takes longer than expected and is always more complicated."*

In the case of PB they had some unique data integration issues and as a consequence of their planning process and set go-live date, had to go live with a system that was not quite as ready as they would have wished.

> *"…and it put the pressure on them to go live with things that weren't quite ready…"*

Insufficient training and reskilling of IT workforce

This was identified early as a potential problem so steps were taken to ensure the right skills were there from the beginning of the project

> *"…we hired people with the right skills..."*

Insufficient 'internal' expertise

In this implementation the internal expertise was a driving force behind the methodology used. Overall however there is no one method that they have to use, and the decision is based on the experience and composition of the project team.

> *"…so we work with the vendors on their approach…we do have our own methodology but in practice the real methodology we use will depend on the experience and skills of the team members in the implementation…"*

Lack of business analysts with business and technical knowledge

This risk featured in the implementation and had a negative effect on business process redesign. Without personnel skilled in the use and design of effective work processes they stood a great chance of getting the initial planning and scoping documents wrong

> *"…the planners weren't sufficiently trained or experienced…so that was a concern…"*

A control put in place was to assign a senior manager to oversee the process, but they were reassigned for business reasons and this had the effect of slowing down the planning process.

> *"…This was identified and a senior manager was supposed to be working with them but got put onto other things…so that was another reason why they were so slow on the planning front…"*

Failure to mix internal and external expertise effectively

While they did not experience any of these problems in this implementation, the relationship between the organisation and the vendor was regarded as critical and Bob described the breakdowns in this relationship as often being under-reported in the context of project problems or failures.

> *"…the relationship between the project team and the vendor failing, those sorts of risks are often underreported or underestimated because they are not self-reporting…"*

By self-reporting, Bob alluded to the point that no-on wants to admit that they were in the wrong, especially in projects of this size and complexity. From his experience he had come

across situations where reasons for implementation problems or failures (which include technical issues) have originated from the breakdown of this relationship

> *"…they can say that the software didn't work or the vendor didn't do enough, and if you dig down deeper you find that software works somewhere else and that vendor has worked somewhere else as well so there was something about that project that made it go wrong…"*

Lack of senior management support

Senior management support and the effectiveness of a project champion were viewed as closely related and have the potential to impact each other significantly.

> *"…I think one of the biggest risks in organisations is themselves…management that gets frustrated…"*

Having a management team that are aligned with the implementation was identified by Bob as essential and was the case with PB. The project champion had the full support of their CEO and was able to drive the project and the executive team towards their shared goal. While they were a new team together, they had a mix of experience and enthusiasm so were able to negotiate risks by being there to address them when they occurred

> *"…we had quite an active steering team who included senior managers and we tried to use that team to get the business focused…"*

One problem that did occur was that managers were pulled away from the project during the project build which had the potential to derail the project. This was quickly addressed and the project was able to continue on track

> *"…this happened during the prototype when various people were not there…we had to put the facts on the table…"*

Lack of champion

While the presence of a Project Champion is essential, they must also have the authority and backing from the very top of the organisation for it to be effective. This was not a problem at PB.

"…there was good sponsorship and good support for the project team, there was also good encouragement and a bit of pressure from time to time to get things done…"

Ineffective management communication

While this was a relatively small implementation

"…this was only a small implementation so that helps…"

This risk did manifest itself in the implementation stage

"…this came up during the implementation…people had different perceptions of what was happening and we had to facilitate some discussion to make sure everyone was on the same page…"

While the initial scoping document was not a problem, the breakdown in communication appeared to occur as a natural consequence of the project due to its long nature and the natural variations in individuals ideas based on personal experiences and understandings.

"…everybody is busy and frustrated and the system seems to be going slower and everything is taking longer it should and there are errors all over the place. People start blaming each other and not doing things they should be doing and then people come to a view of what the system is doing…and who should be doing what and because everybody has different experiences and different understandings they are often never on the same page as to what the solution should be…"

The method used to resolve this was through regular meetings to reinforce what was happening, explain what was needed and why.

So we have an active steering team that meet each week and we have other meetings around that where we, for example, look at the planning system and look at the problems, what were the issues and how they should be solved and pull everybody together…"

While this occurred in the PB implementation, Bob explained that in his experience, this naturally occurs in most ERP projects.

"…virtually every project there are tears, people upset, frustrated and wanting to throw the system and the consultants…this is where we calm them down and refocus them …"

Failure to adhere to standardised specifications which the software supports

This is a problem that can be traced back to the sales presentations of the vendors.

"…if the system can do things in a particular way that's not the best way of doing things, as a vendor you don't say "yes you can do it that way but it is not the best way", rather you say "yes you can do that".

One of the side effects of this can be the selection of an unsuitable system which can increase the chances of failure

"…you are essentially setting yourself up for failure…"

While Bob, as a consultant, is always concerned about this risk, it never transpired in the PB implementation. As a control they would normally build in tests to check if this is going to affect the project

"…that is something we are always concerned about. That never transpired as a risk but we would normally build in tests to check the site…"

Lack of integration

This occurred as a consequence of third party interfaces which were not sufficiently tested and failed against internal testing.

".. this came up during the build and test, some of the integrated points weren't delivered in the way they should have been and were delivered late…the supplier didn't test it sufficiently enough "

Insufficient training of end users

This risk manifested itself in the implementation, but was expected due to the tight time frames and problems with the availability of training for staff

"…we knew this was going to be a problem because of the tight time frames and the availability to actually get training…"

Although insufficient training of end users is quite a common problem, there are a number of different aspects to this issue. Organisations will underestimate the amount of time needed to complete this process

"…It's the learning curve. Organisations always underestimate how long [the new system] *will take to learn. This includes the software and getting their heads around the new way of doing things..."*

This applies to the training needed during the project

"…This is during the implementation project and is about getting up to speed on how the systems works."

it is not just an allocation, top down problem. Users are required to participate and devote time to ensuring they know how to use the new system

"People never dedicate enough of their time own time to being trained…"

As a consequence, after go live users are unsure if what they are doing is correct, or if it will crash the system. In these instances, they will fall back on how things were done in the past

"When they go live people won't follow the new procedures…you can prepare all the documentation you like but they won't read it, rather they will try to do it the old way…"

Ineffective end-user communication

This occurred as a consequence of the problem experienced with management communication

"…same sort of thing as with management communication, end user communication falls over as well… everyone is too busy and end users get too confused and frustrated … to hear the messages clearly…you just have to work through it"

Lack of full time commitment of customers to project management and project activities

This occurred at multiple times during the implementation and was a consequence of normal business activity. When a business installs a new system, the company still needs to operate so time demands from other areas are always there. There were two way that they tried to control this. The first was to emphasise the importance to priorities this activity due to the short time frames available for the installation

> *"…are not always emphasising the priority of the tasks or the urgency in particular and …there are only so many weeks to complete this and … the time goes quickly…"*

The second was to acknowledge the situation, try to come up with some practical solutions and make compromises when no other options are available

> *"…you also need to come up with some practical solutions to resourcing problems, and sometimes you have to be pragmatic and make some compromises*

Lack of sensitivity to user resistance

User resistance is a normal consequence of this type of project due to its scope, size and organisational impact.

> *"People don't like to change how they do things so there is always user resistance…"*

This was a factor at the go-live stage of the PB installation and came about during the interactions between the project implementation team and the new system users. When the project team fixed issues they expected users to change immediately

> *"…we fixed this and now you should be doing it …"*

What the implementation team have to be mindful of is that the users levels of familiarity is quite a bit less than their own and that they are just trying to do their jobs while also trying not to break the new system

> *"…you have to be a little bit more understanding of the users…"*

Failure to emphasis reporting

This was an issue at the implementation stage.

"…We identified that they didn't have enough reports and hadn't made enough progress…"

The person in charge of the reports did not believe them as they had already created a large number of reports ready to go

"…I have a list of reports I will produce…"

This was by no way unique to this project and typifies the problems with insufficient experience in that you don't know what you don't know. While the reports manager may have completed the list of reports requested for go-live, the reports needed and those requested will not always match as users may not fully understand their needs.

"That's a mistake that everyone makes, there are never enough reports done for go – live…"

4.1.9 Case 12 (ERPC3)

Company Name – **All About Construction (ABC)***

Interviewee - **Mr Vince Boyes***

Risks

Failure to mix internal and external expertise effectively

One area where this mix can be difficult is with project managers. Frequently two project managers are assigned to an implementation, one internal and a consultant. The internal project manager has knowledge of the business but is reliant on the consultant project manager for information on implementation methods and models and specific technical details about the new software.

> *"…Quite often the client project manager has had no exposure so it is a learning exercise for them…"*

Lack of senior management support

This upgrade was a necessity and was

Insufficient training of end users

A client manager was responsible for training the end users and while the manager processed a clear understanding of the system, some of the finer details regarding reasons for specific configuration choices were not known to him. As a consequence, there was the potential for users to become resistant to using the new system (as opposed to the old working system) as changes could appear unreasonable in isolation.

> *"…I would have been able to explain it better with more reasons why. This wasn't too great an issue but it was there…."*

One method used by Vince to mitigate this was to be present in the group training sessions, and to offer information if the questions required any advanced understanding

> *"…When I was in the room …I would say something like "this is the reason why we are doing it this way", or "this is cause and effect"…"*

Whether this was effective or not was debateable as the training was quite intense and the finer detail offered potentially did not make understanding the use of day to day functionality any easier

> *"…At the same time, the person going through the training had so much going through their head at the time that it probably went over them…"*

Lack of full time commitment of customers to project management and project activities

Not having the full complement and commitment of employees for an ERP implementation is unfortunately a reality for smaller businesses. This can make things difficult as staff are forced to split their time between their day-to-day activities and the requirements of the project

> *"…Because a lot of the places are small, they don't have a large number of staff. People are still required to do their day to day jobs and if they don't have enough time it becomes a problem….There are some projects where they have backfilled for staff and that does make life a lot easier…"*

Having enough people available for the project is not the only cause of problems when it comes to committing staff to a project. Not having staff members with the necessary knowledge and skills available to participate in the project can also cause problems, especially when it comes to testing necessary functionality

> *"…The quality of the people doing the testing can be mixed, and the quality of the results can be mixed … the best people you want are the probably the best people in the organisation but they are sometimes not the ones who can get released so you get someone … who doesn't have that company knowledge which can have an impact further down the track, especially if the organisation doesn't validate … data for the design* [stage]*…"*

This is especially true in the early design parts and applied to the last project

> *"…I did all that* [the configuration] *because they didn't any power users or super users with the ability to do it…"*

The way found to mitigate this was to ensure qualified members of the organisation attend prototyping sessions to check and validate any work done

> *"…you have to try to get that business buy-in. They are coming along to the prototype sessions and validate the work a junior person has done…to ensure it is a valid process…"*

Failure to emphasis reporting

While this was identified as usually occurring later in the project, the aim was to introduce report writing as early as possible to try to mitigate this risk. Additionally some of the system configuration was based on the reporting needs of the users so establishing this early would set the scene for the implementation.

> *"…That was always one that would quite often feature later in the project but I always try to bring it …forward …because that will dictate what you need to put into the system…"*

Sometimes bringing it forward was not an option. The reason for this was that for users to be able to accurately describe the reports they wanted, they had to have an understanding of how the system worked and the underlying processes involved. This level of understanding is not there at the beginning of the implementation and sometimes it was necessary to leave it until later in the implementation.

> *"…The users just couldn't grasp the … whole system … to be able to make any decisions around reports because they hadn't got to grips with the underlying … processes. So sometimes we didn't have a choice but to leave it til later…"*

Attempting to build bridges to legacy equipment

Interfaces to legacy equipment happens at a later stage when employing prototyping

> *"… We will worry about the interface at a later stage …"*

This is because in a prototyping situation, the initial prototyping done is to model existing processes and connecting to other systems is secondary

"…If I look at prototypes, because you don't have the interfaces considered even at the prototype stage…you knew that they were there but you are only prototyping the business processes, you worry about the interfaces at a later stage. When you get down to the detail some of it can be difficult"

4.2 Risk Registry Findings

The detailed risk registry (Appendix b) is a compilation of the risk registries received and the findings from the semi-structured interviews. This was done to confirm the findings by matching what was recorded in risk registries with what was gathered in the interviews in an effort to achieve confirmation through triangulation. Table 4.1 contains the headings and both the information they contain and if that information was derived from information received or analysis done.

Table 4.1: Definition of risk registry headings

Heading	Information contained and how that information was derived
Case & Risk No.	This identifies both the case and the source this information was drawn from. **(R)** = indicates this information came from the risk registry **(I)** = this information was gathered from the interview
Risk:	In both the Risk Registries and interviews, the risk definitions were those used by the organisations.
Identified Risk Factor:	Each risk was categories by the researcher using the definitions set out in Sumner (2000) and defined in the theoretical background.
Description	Further description of the risk if needed
Stage risk was addressed:	The identification of where the risks were addressed was completed by the researcher through analysis of the risk, impacts to the business and the controls used. This was done using the Markus and Tanis (2000) model as a framework for analysis.
Business impacts:	This information was supplied by the organisation and pulled directly from the risk registries or from the interview data.
Controls used:	As with the business impacts, this information was also pulled directly from the risk registries or from the interview data.
Risk category	As with identified risks, each risk was categories by the researcher using the definitions set out in Sumner (2000) and defined in the theoretical background.

In appendix b, risks and controls have been listed by the project stage in which they occurred as described by Markus and Tanis (2000). Further classification work has been done in appendix c, where the risks and controls have been sorted using the Risk Categories (as described by Sumner, 2000), and within the Risk Categories, by Project Stage (as described by Markus & Tanis, 2000).

Chapter Five:

Discussion

5.1 Overview

This discussion is broken into three sections. The first section will examine the relationship between different risks in ERP implementations and looks to answer the first research question

> *How does the relationship between different risks change during the different stages of an ERP implementation?*

Section two will include analysis of the relationship between risks and controls, and seeks to answer the second research question

> *How can Project Managers (PMs) map risks to controls in ERP implementations at the project management level?*

The final section will encompass any further findings which emerged from the data.

5.2 Hierarchical (Risk to Risk) Relationships

When performing axial coding on the data gathered, it was found that certain risks appear to be interrelated. While the interrelated nature of risks has been hinted at over the years (Aloini et al., 2007; Parr & Shanks, 2000; Peng & Nunes, 2004; Sherer & Alter, 2004; Sumner, 2000) and more recently explored in a single case study by Aloini et al., (2012), the full extent of the relationship is still not known.

While it would be of great value to statistically validate current findings, and was noted by Aloini et al., (2012) as a future extension of their work, they also stated that their research was a starting point from which further research should be done. For this research it is hoped that further exploration using empirical data gathered through multiple case studies may assist in broadening and enhancing our knowledge of this relationship.

In an effort to achieve the highest levels of corroboration, only risks that were identified as occurring in five or more of the nine interviews was explored. The method used to rank the risk factors was to determine the number of different cases that the individual risks featured in the empirical findings. Identified in table 5.1 are all of the risks from Sumner (2000) and their respective rankings based on the cases in which they were mentioned.

Table 5.1: Summary of Risks per case study

Risks	Ranking	Case No
1. Failure to redesign business processes	**B**	4, 5, 7, 8, 9, 11,
2. Failure to follow an Enterprise-wide design which supports data integration	C	4, 8, 10, 11,
3. Insufficient training and reskilling of IT workforce	D	8, 11,
4. Insufficient 'internal' IT expertise	**B**	5, 6, 7, 8, 9, 11,
5. Lack of business analysts with business and technical knowledge	C	4, 8, 11,
6. Failure to mix internal and external expertise effectively	**A**	**5, 6, 8, 9, 10, 11,12**
7. Lack of ability to recruit and retain qualified ERP systems developers	D	5, 8, 10
8. Lack of senior management support	**A**	**4, 5, 6, 7, 8, 9, 10 ,11**
9. Lack of proper management control structure	C	5, 8, 9,
10. Lack of champion	D	10, 11
11. Ineffective management communication	D	5, 11,
12. Failure to adhere to standardised specifications which the software supports	D	5, 10 ,11,
13. Lack of integration	D	8, 11,
14. Insufficient training of end users	**A**	**4, 6, 8, 9, 10, 11, 12**
15. Ineffective end-user communication	C	5, 9, 11,
16. Lack of full time commitment of customers to project management and project activities	**A**	**5, 6, 7, 8, 9, 10, 11, 12**
17. Lack of sensitivity to user resistance	C	8, 9, 10, 11
18. Failure to emphasis reporting	C	4, 9, 11, 12
19. Inability to avoid technological bottlenecks	-	-
20. Attempting to build bridges to legacy applications	D	9, 12

(**A = 7 + | B = 5 – 6** | C = 3 – 4 | D = 1 - 2)

From those findings, in total six risks were identified as having been discussed in five or more cases and have been ranked by frequency and included for further analysis (Table 5.2).

Table 5.2: The top risks mentioned in the case studies (score of B and above)

Risks	Ranking	Case No
8. Lack of senior management support	**A**	4, 5, 6, 7, 8, 9, 10, 11
16. Lack of full time commitment of customers to project management and project activities	**A**	5, 6, 7, 8, 9, 10, 11, 12
6. Failure to mix internal and external expertise effectively	**A**	5, 6, 8, 9, 10 ,11, 12
14. Insufficient training of end users	**A**	4, 6, 8, 9, 11, 12
1. Failure to redesign business processes	B	4, 5, 7, 8, 9, 11,
4. Insufficient 'internal' IT expertise	B	5, 6, 7, 8, 9, 11,

(**A = 7 + | B = 5 – 6** | C = 3 – 4 | D = 1 - 2)

After determining which risks to examine, the same manner was employed to determine which stages to explore. Table 5.3 drew data from the interview schedule (appendix a, page 5) and displays both the cases and rankings by implementation stage that the specific risks were mentioned.

Table 5.3: Summary of Risks discussed per Project Stage

Risks	Project Chartering		Project		Shakedown		Onwards and upwards
	Ranking	**Case No**	**Ranking**	**Case No**	**Ranking**	**Case No**	
1. Failure to redesign business processes	**B**	4, 8, 10, 11, 12	**B**	5, 7, 8, 9, 10, 11	D	4, 8	-
2. Failure to follow an Enterprise-wide design which supports data integration	D	7, 11	**B**	4, 5, 8, 9, 11	D	7, 8	-
3. Insufficient training and reskilling of IT workforce	C	8, 9, 11, 12	**B**	4, 5, 8, 9, 10, 11	C	4, 7, 8, 10	-
4. Insufficient 'internal' expertise	C	4, 8, 9, 12	**A**	**4, 5, 7, 8, 9, 10, 11**	D	8	-
5. Lack of business analysts with business and technical knowledge	**B**	4, 8, 9, 10, 11, 12	**A**	**4, 5, 7, 8, 9, 10, 11**	D	7, 8	-
6. Failure to mix internal and external expertise effectively	**B**	4, 7, 8, 9, 12	**B**	4, 5, 8, 9, 11	D	8	-
7. Lack of ability to recruit and retain qualified ERP systems developers	D	7, 9	**B**	4, 5, 10, 11, 12	C	4, 8, 10	-
8. Lack of senior management support	**B**	4, 7, 8, 9, 11, 12	**B**	4, 5, 8, 9, 11, 12	C	4, 8, 9	-
9. Lack of proper management control structure	**B**	4, 7, 8, 9, 11, 12	**A**	**4, 5, 8, 9, 10, 11, 12**	C	4, 8, 9, 10	-
10. Lack of champion	**A**	**4, 5, 7, 8, 9, 11, 12**	**B**	4, 5, 8, 9, 11, 12	C	4, 8, 9	-
11. Ineffective management communication	**B**	7, 8, 9, 11, 12	**A**	**4, 5, 7, 8, 9, 10, 11, 12**	C	4, 7, 8, 10	-
12. Failure to adhere to standardised specifications which the software supports	C	8, 9, 11, 12	**A**	**4, 5, 7, 8, 9, 10, 11, 12**	D	4, 8	-
13. Lack of integration	C	8, 11, 12	**A**	**4, 5, 7, 8, 9, 10, 11**	C	4, 8, 9	-
14. Insufficient training of end users	D	8	**A**	**4, 5, 8, 9, 10, 11, 12**	**B**	4, 7, 8, 9, 10	-
15. Ineffective end-user communication	C	4, 8, 11	**A**	**4, 5, 7, 8, 9, 10, 11, 12**	C	4, 7, 8, 9	-
16. Lack of full time commitment of customers to project management and project activities	C	4, 7, 11, 12	**B**	4, 5, 9, 11, 12	C	4, 9, 10	-
17. Lack of sensitivity to user resistance	C	4, 8, 12	**A**	**4, 5, 8, 9, 10, 11, 12**	**B**	4, 7, 8, 9, 10	-
18. Failure to emphasis reporting	**B**	8, 9, 10, 11, 12	**A**	**4, 5, 8, 9, 10, 11, 12**	**B**	4, 7, 8, 9, 10	-
19. Inability to avoid technological bottlenecks	D	4, 8	**A**	**4, 5, 8, 9, 10, 11, 12**	C	4, 7, 8, 9	-
20. Attempting to build bridges to legacy applications	C	8, 11, 12	**B**	4, 5, 8, 10, 11, 12	D	4, 8	-

(A = 7 + | B = 5 – 6 | C = 3 – 4 | D = 1 - 2)

Of note in Table 5.3 was that the project managers had not experienced any risks in the final stages of the Markus & Tanis (2000) model – Onwards and Upwards. This was not necessarily because it did or did not happen, but rather that the project managers interviewed were not involved with the risk management activities in that specific stage of their organisations ERP initiative.

The benefit of the Markus and Tanis (2000) model in this research is its control centric design, which has enabled the findings to be delineated by changes in control. While this allows a greater strategic view of the entire process, the implementation models identified in the interviews as used by the project managers were operational and ended when the system was stable after go-live. As a consequence, none of the project managers spoke of further risks encountered after the systems was stable and operational. This is an area that would benefit from future research. From these tables, the risks and respective project stages to be analysed are as follows (Table 5.4)

Table 5.4: The six most frequent ERP implementation risks, and the most frequent project stages they were observed.

Risk Category	Risks	Project Chartering	Project	Shakedown	Onwards and upwards
Management structure and strategy	8. Lack of senior management support	B	B	-	-
User involvement and training	16. Lack of full time commitment of customers to project management and project activities	-	B	-	-
Skill mix	6. Failure to mix internal and external expertise effectively	B	B	-	-
User involvement and training	14. Insufficient training of end users	-	**A**	B	-
Organisational fit	1. Failure to redesign business processes	B	B	-	-
Skill mix *	4. Insufficient 'internal' IT expertise (strategic level)	-	**A**	-	-
Skill mix *	4. Insufficient 'internal' IT expertise (operational and tactical levels)	-	**A**	-	-

* The Skill Mix risk "14. Insufficient 'internal' IT expertise" was analysed in a different manner than all other risks in table 5.4. Two distinct findings surfaced in the interviews when discussing internal IT expertise, that being 'strategic IT expertise' and 'operational and

tactical IT expertise'. The findings were so different and distinct that to enhance clarity they were separated and analysed as two different categories.

5.2.1 The Project Chartering Stage

8. Lack of senior management support – (Project Chartering)

1. Failure to redesign business processes to fit the software

For business process redesign to be successful, senior management must support the initiative by committing resources and their time to the project (Parr & Shanks, 2000). Case 4 (ITM3) and Case 5 (ITM4) both experienced issues with redesigning their business processes due to lack of senior management support, in Case 4 this was because staff were not being released and Case 5 was due to uncertainty over the scope of the implementation.

3. Insufficient training and reskilling of IT workforce

For training and reskilling of the IT workforce, Case 5 (ITM4) needed senior managers to commit resources to the project to allow staff to be released and budget commitment for training to commence.

4. Insufficient 'internal' IT expertise (strategic level)

Insufficient internal IT expertise also extended to the expertise of the senior management group, and Cases 8 (ITM7) and 9 (ITM8) both experienced problems with low levels of IT knowledge in the senior management team. The low levels of IT expertise have resulted in low levels of senior management input and reduced levels of commitment as senior managers were not able to help push the project forward.

4. Insufficient 'internal' IT expertise (operational and tactical levels)

With uncertainty surrounding what resources would be released, determining what internal IT resources would be available at the tactical and operational levels for the project was not possible in Case 5 (ITM4).

5. Lack of business analysts with business and technical knowledge

Senior managers need to be on board prior to the start of an ERP project to proactively start building internal skills in both business and technical analysis. This extends past employing new technical personnel, to up-skilling those within an organisation with business skills or allowing new personnel enough time to become familiar with the business. This was an issue

in Case 4 (ITM3) where coding systems used by the organisation had to be changed within the system three times to reflect the business needs.

7. Lack of ability to recruit and retain qualified ERP systems developers

The recruitment and retention of qualified ERP systems developers was a predefined goal in four of the different cases examined (Case 5 (ITM4), Case 6 (ITM5), Case 8 (ITM7) and Case 10 (ITM9)). The creation and support by senior managers of incentives and other bonuses was imperative, with project members welcomed back into the organisation at completion. Case 5 (ITM4) ran into problems because senior managers had yet to decide on the scope of the project so users were uncertain of their futures and this led to staff with ERP skills leaving.

9. Lack of proper management control structure

Due to the intricate nature of the implementation, the control structures in Case 5 (ITM4) were unable to be formalised and had to wait until agreement could be reached by the senior management group.

10. Lack of champion

While a champion was in place in Case 5 (ITM4), they had no authority over the separate senior management teams and this effectively stalled the project. This lack of authority also caused issues in Case 4 (ITM3) where financial manger refused to supply the chart of accounts because the project was not a priority. This is in contrast to Case 9 (ITM8) where the champion was identified early and had the authority to steam roll the project through when needed. This positive backing also happened in Case 11 (ERPC2). Right from the beginning of the implementation, it was recognised that the project champion had to have the backing and support of senior managers to be effective. In Case 5 (ITM4), a Project Champion was a requirement for any project, and if one was not found at the beginning of the project then the project was cancelled. Therefore, all members of the senior management team were aware of the need for a project champion and there was an expectation that one of them would take the lead.

11. Lack of senior management communication

In Case 5 (ITM4), the project was very large and included geographically diverse management teams. Not only did communication avenues need to be set up but they also needed senior managers to support the initiative and use those channels for project communication.

12. Failure to adhere to standardised specifications which the software supports

Case 10 (ITM9) encountered issues with modifications and although they had a no change policy, business requests to add alterations to the system setup were approved. Case 5 (ITM4) also encountered this issue, but not quite in the same manner as Case 10 (ITM9). They had pre-existing templates for system configuration and had no desire to change the way SAP was implemented within the company. A change in the way the software stored data (Unicode) was a requirement for the later versions of SAP, and resulted in the need to change the templates created. They needed senior managers to commit to the changes and drive them through if they were to be successful and not exceed budget and time requirements. The other alternative was to ignore the change, go with the company standard and push the change through at a later stage as a new project. They had presented the alternatives to the senior management team and were awaiting their decision.

15. Ineffective end-user communication

As a consequence of the lack of senior management support, communication to end-users in Case 5 (ITM4) giving details of the project and its effect on the organisation have not been finalised. This has led to informal information in the shape of rumours being circulated and ultimately led to increases in user resistance.

16. Lack of full time commitment of customers to project management and project activities

High staffing requirements due to high levels of compliance (which include Sarbanes Oxley) lead the functional units to put pressure on the senior management team in Case 5 (ITM4) to release staff from the project to complete their daily duties. This ultimately leads to staff who are unable to commit to the project. This also occurred in Case 6 (ITM5) and Case 11 (ERPC2). Both projects had initial and ongoing commitment from senior managers but during the projects, in Case 6 (ITM5) users were pulled away from the implementation and in Case 11 (ERPC2), it was the managers who were being pulled away. While there were some

real business reasons to do this, they both recognised the problems this could cause but referred to it as a juggling game. Cases 8 (ITM7) and 9 (ITM8) did not encounter problems, in fact they reported that internal commitment to their respective projects was very high. In Case 8 (ITM7), staff were allocated to the project right from the initial presentations made by the ERP vendors, to be able to provide timely feedback to ensure the correct ERP system was selected. Case 9 (ITM8) went further and ensured ongoing commitment to the project was outlined as a requirement of the management team and was successfully carried through from Project Chartering to The Project and beyond.

17. Lack of sensitivity to user resistance

In Case 9 (ITM8), a lack of support from the financial controller had a flow-on effect of increasing user resistance from within his department. This made it difficult for the project manager to gather all required information in the scoping stage.

Analysis

Risk Factor View (figure 5.1)

In Figure 3, the structure appears uniformed and hierarchical. Senior management support is influenced by strategic internal expertise which has a flow-on effect to 12 of the 19 remaining risk factors (Sumner, 2000)

Risk Category View (figure 5.2)

When stepping back one level and examining the risks by category (Figure 4) an even split between categories is present. Of note is the influence on an implementation that the skill mix at the strategic level plays. Other than that we see an even distribution of risk categories all being driven by Management structure and strategy.

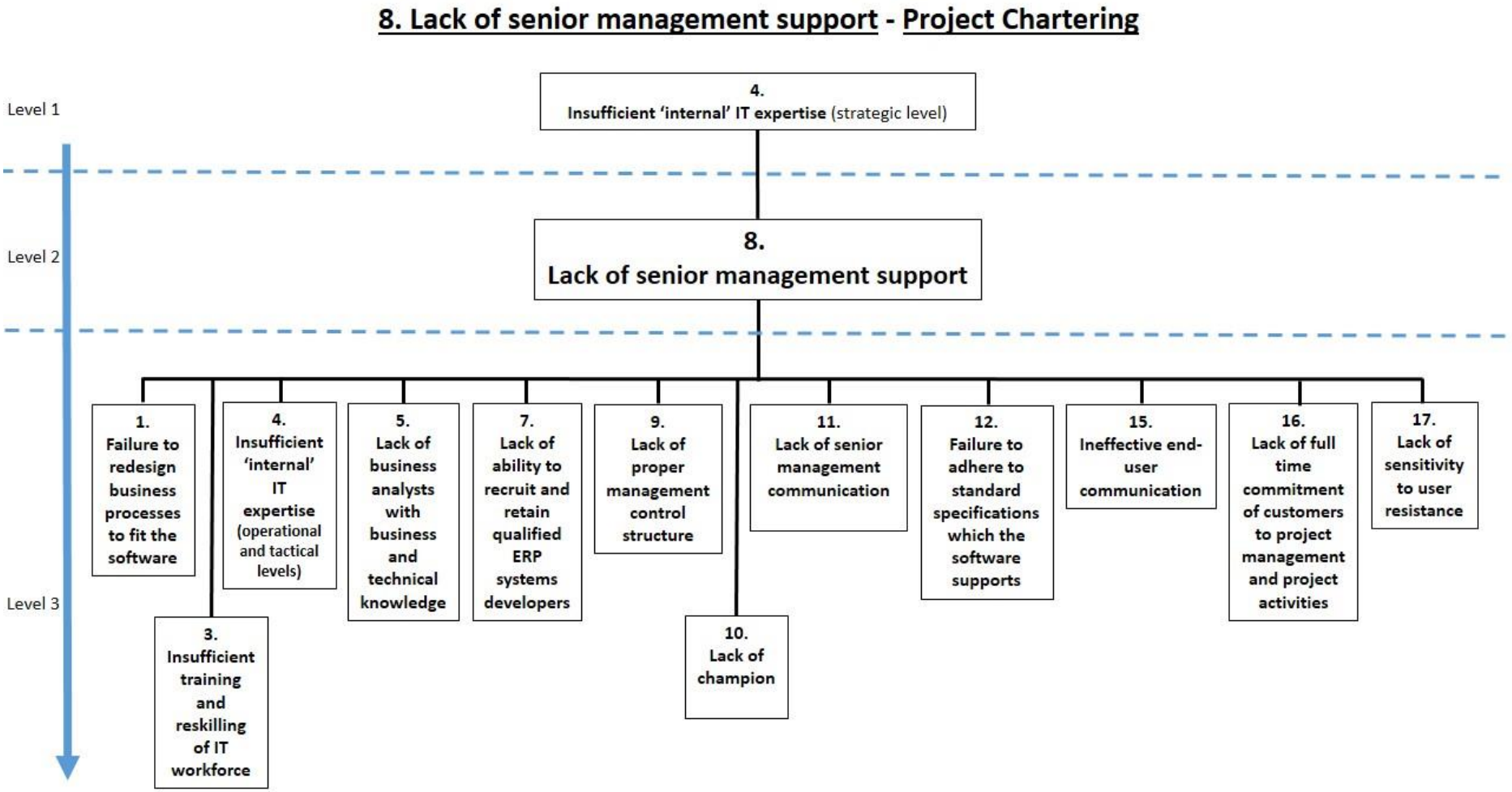

Figure 5.1: Relationship between '8. Lack of Senior Management Support' and other ***risk factors*** *at the Project Chartering stage*

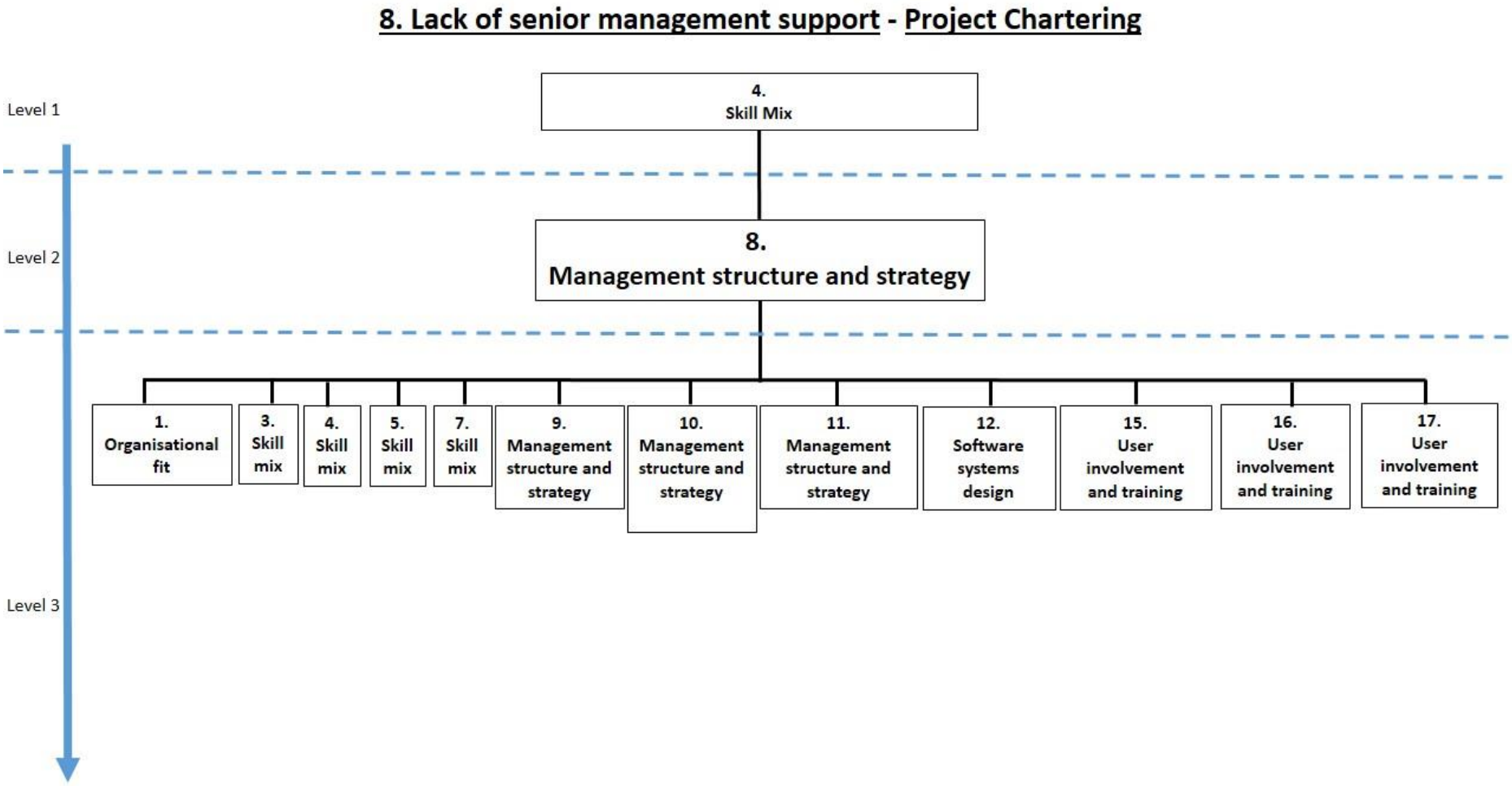

Figure 5.2: Relationship between '8. Lack of Senior Management Support' and other ***risks categories*** *at the Project Chartering stage*

6. Failure to mix internal and external expertise effectively- (Project Chartering)

4. Insufficient 'internal' expertise

Due to this silo mentality, if information was being processed incorrectly in Case 4 (ITM3), the only people able to tell were the users. Unfortunately they were unable to explain why as they did not have an understanding of the wider business and it had an impact on the effectiveness of the external consultants to gather the required information. To avoid this, Case 9 (ITM8) proactively employed a project manager specifically for the ERP implementation.

5. Lack of business analysts with business and technical knowledge

This was one of the main contributing factors why Case 9 (ITM8) relied heavily on external expertise. They knew what they wanted but didn't know the software and were reliant on the consultants who knew the software but not their business.

16. Lack of full time commitment of customers to project management and project activities

Mr Boyes Case 12 (ERPC3) had experienced problems mixing sufficiently capable internal expertise with external experts, not because internal expertise was insufficient but because the business was unable to commit the super-user staff to the project.

Analysis

Risk Factor View (figure 5.3)

In figure 5, 'Failure to mix internal and external expertise effectively' was noted as being at the bottom of this structure and was influenced by the existing abilities of internal resources, and the businesses commitment to resourcing the project. Low levels of internal skill married with low levels of commitment resulted in difficulty .with mixing internal and external expertise.

Risk Category View (figure 5.4)

In the risk Category view (figure 6), we see only two categories present, skill mix and user involvement and training. There appears to be a flow on effect between different skill categories that may be mediated with greater levels of user involvement and training.

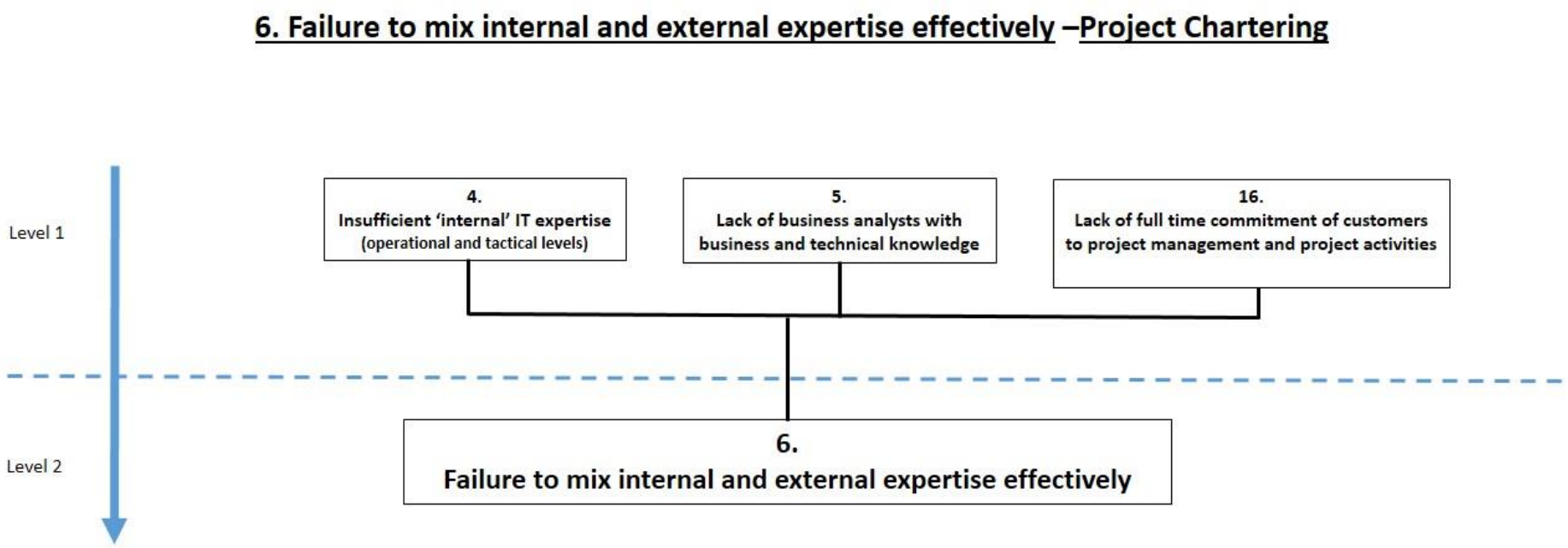

Figure 5.3: Relationship between '6. Failure to mix internal and external expertise effectively' and other ***risk factors*** *at the Project Chartering stage*

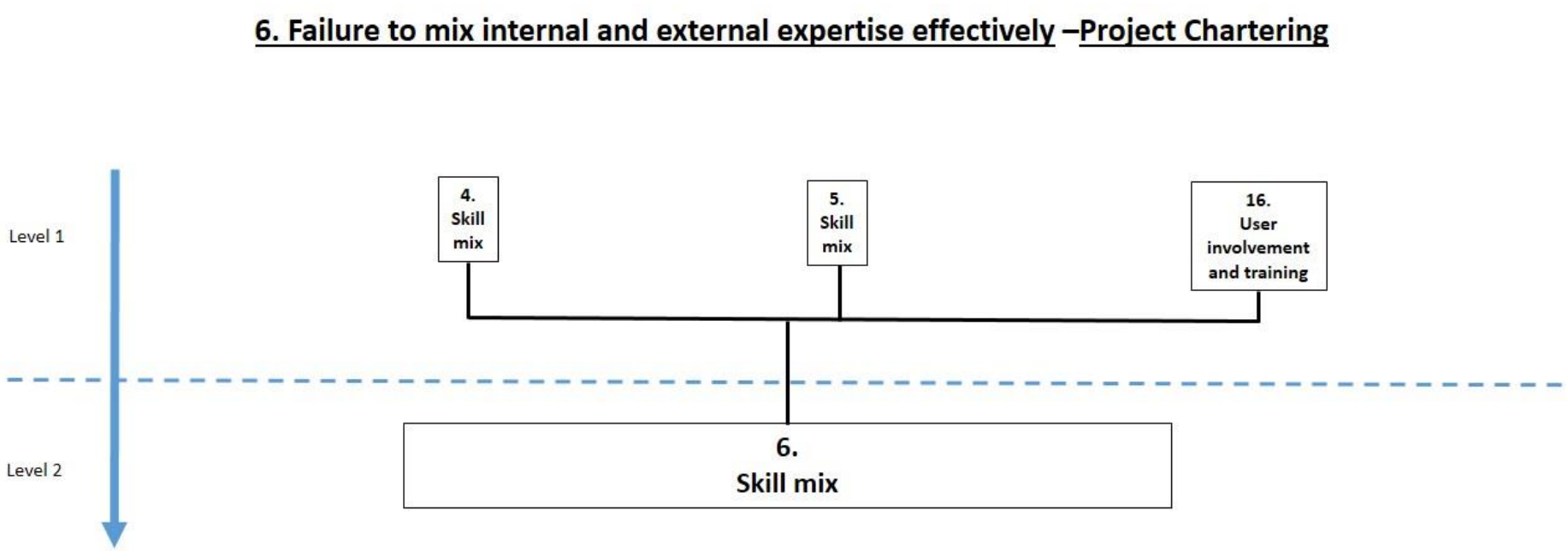

Figure 5.4: Relationship between '6. Failure to mix internal and external expertise effectively' and other ***risk categories*** *at the Project Chartering stage*

1. Failure to redesign business processes to fit software - Project Chartering

4. Insufficient 'internal' expertise

This was identified as a risk in Case 11 (ERPC2) because internal operational staff did not have the expertise or familiarity with the processes and tools available to the business to accurately engage in the redesign process and was mediated by the effects of consultants with external expertise.

5. Lack of business analysts with business and technical knowledge

This tied in closely with lack of internal IT expertise in Case 4 (ITM3) and stemmed from the silo nature of the organisation. With very few staff having an understanding and overview of the organisation due to lack of exposure, process redesign was affected. Case 11 (ERPC2) had a similar experience and described their business environment where low levels of IT skills tied with a lack of business knowledge were evident.

6. Failure to mix internal and external expertise effectively

In an attempt to combat the negative effects on business process redesign from insufficient internal expertise and lack of business analysts with business and technical knowledge, both Case 4 (ITM3) and Case 11 (ERPC2) engaged external consultants to provide the needed expertise required to redesign business processes successfully.

12. Failure to adhere to standardised specifications which the software supports

The business processes in place were identified as a competitive advantage for Case 10 (ITM9) and although there was a no change policy in place to minimise changes, a high number of modifications were made after presenting the Management team with business decisions to incorporate the changes.

17. Lack of sensitivity to user resistance

Case 7 (ITM6) found that user resistance can lead to problems with business process redesign by the emergence of 'ERP Terrorists', who see the project as a waste of time and not only offered lower levels of co-operation, but also influence others to their way of thinking. In Case 7 (ITM6), they proactively identified these people and found that if buy-in was achieved

with these ‘ERP Terrorists’, they would use their influence to promote the project and lower levels of user resistance occurred.

Analysis

Risk Factor View (figure 5.5)

In figure 8, ‘Failure to redesign business processes to fit the software’, like ‘Failure to mix internal and external expertise effectively’ was noted as being at the bottom of this structure. It was influenced by the existing abilities of internal resources, and the businesses commitment to resourcing the project. Low levels of internal skill married with low levels of commitment resulted in difficulties mixing internal and external expertise.

Risk Category View (figure 5.6)

In the Risk Category view we see a distinct separation of risk categories. Skill mix features prominently in the risks yet skill mix does not have any effect on any other risks except skill mix or organisational fit.

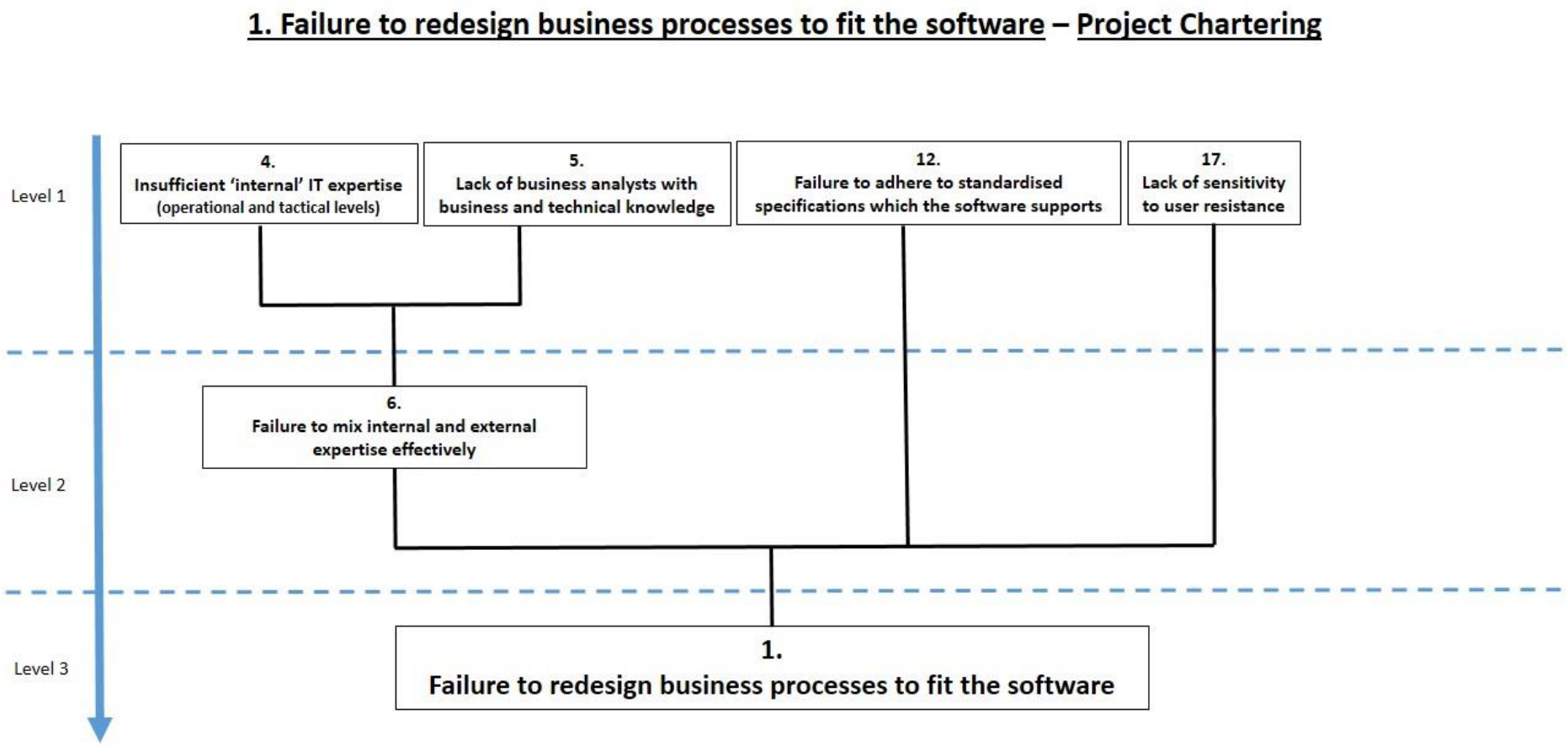

*Figure 5.5: Relationship between 'Failure to redesign business processes to fit the software' and other **risk factors** at the Project Chartering stage*

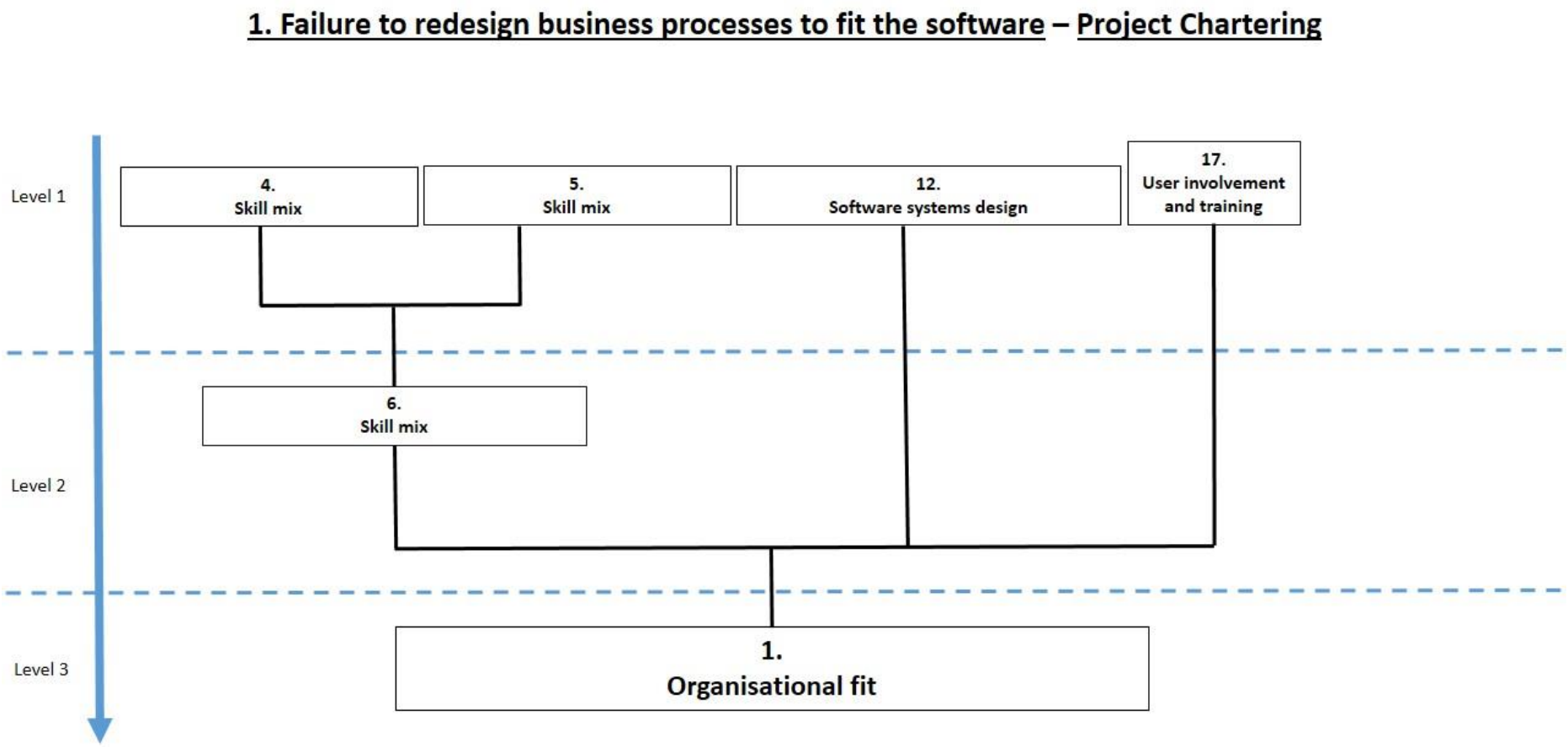

Figure 5.6: Relationship between 'Failure to redesign business processes to fit the software' and other ***risk categories*** *at the Project Chartering stage*

Project Chartering

The three risks examined during the Project Chartering stage were

- **Lack of senior management support**
- **Failure to mix internal and external expertise effectively**
- **Failure to redesign business processes**

All three of the finding have been combined in figures 5.7 and 5.8, and we see the compiled results in a hierarchical structure. Of the 20 risks identified by Sumner (2000), 15 feature in the first stage of the risk management model.

Risk Factor Analysis at the Project Chartering Stage (figure 5.7)

Specific observations include the broad number of risk combinations that can affect other risks, most prominent being the influence senior management support has at the Project Chartering stage of an ERP implementation (Parr & Shanks, 2000). As has been noted, *Lack of senior management support* is constantly identified as the top CSF or risk in ERP implementations (Aloini et al., 2012; Finney & Corbett, 2007; Nah et al., 2003; Somers & Nelson, 2001; Sumner, 2000), and certainly the most important activity in this stage (Nah & Delgado, 2006; Parr & Shanks, 2000). Based on these findings, managers need to be on-board from the beginning to increase the chances of a successful outcome. While *lack of senior management support* has the potential to directly influence most risks in the Project Chartering stage, there are also a number of indirect flow-on effects that can be attributed to senior management support, most notable those that flow through to the redesign of business processes. These include

- **Lack of senior management support** for the project can have a flow-on effect of increasing user resistance of those involved in the redesign process.
- Senior managers allowing or stopping system modifications to be made.
- Senior managers not addressing the lack of internal IT skills at the operational and tactical levels by employing new staff, and failing to ensure external expertise is used to address any internal skill shortfalls.
- By senior managers not addressing the issues relating to **lack of analysts with business and technical skills**, and not addressing the shortfall with external expertise.

- Senior managers either committing the wrong people, or not committing enough people to the project, and either not addressing the shortfall with external expertise or not being sensitive to any resistance this may cause.
- By senior managers ineffectively communicating to end users about the project and what it entails or requires, and then not being sensitive to the resistance this causes.

Additionally, while five risks were identified as having a direct or secondary effect on business process redesign, when the three individual risks were combined that number jumped to nine with additional levels of complication as a flow-on effect of interactions with other risks.

This figure also highlights the dangers of lower levels of engagement with members of the senior management team in the initial stages of an ERP implementation. Lower levels of engagement occurred in a number of projects where low levels of internal IT skills were present at the strategic level, and those not directly involved with the project either did not engage or felt excluded because of their inability to influence or add to the project on a technical level. What comes through strongly in this research is that the majority of risks affecting ERP projects at the Project Chartering stage are people, as opposed to technical, issues. One successful method used to ensure senior management engagement was the use of risk registries. Although this was seen as an administrative overhead by project managers, their use as means of facilitating managerial communication was invaluable in projects where low levels of internal IT expertise existed at the strategic levels.

What was unexpected was the lack of flow-on effect from the risk factor '**Lack of Project Champion**'. A Project Champion, like senior management support, is described as one of the key factors in an ERP implementation (Aloini et al., 2007) but in these examples their influence at the Project Chartering stage was limited. This may be an anomaly with the cases examined (as all were successful) or an actual facet of the project chartering stage. Irrespective of the reason, this finding would benefit from further research.

Risk Category Analysis at the Project Chartering Stage (figure 5.8)

The following observations were noted in figure 5.8

In the examples given, skill mix does not flow into any other risks except Organisational fit. Apart from the one exception, if there is a flow on effect from a skill mix category, it is into another skill mix category.

In the four possible pathways involving user involvement and training between '8. Management structure and strategy' and '1. Organisational fit', in only one instance does it flow into something other than user involvement and training.

Between **8. Management structure and strategy** and **1. Organisational Fit,** six of the seven possible pathways included **Skill mix, User involvement and training** or a combination of the two**.**

Also of note is that at the project chartering stage, none of the risks identified were of a technical nature (Software systems design or Technology planning / Integration). This may be as a result of dealing only with successful projects but it fits with the observation of one of the consultants interviewed. Case 11 (ERPC2) observed that

> *"…Because they are similar projects e.g. they are package implementations, and there is a fairly standard methodology for implementing them – human factors come into it more than technical factors."*

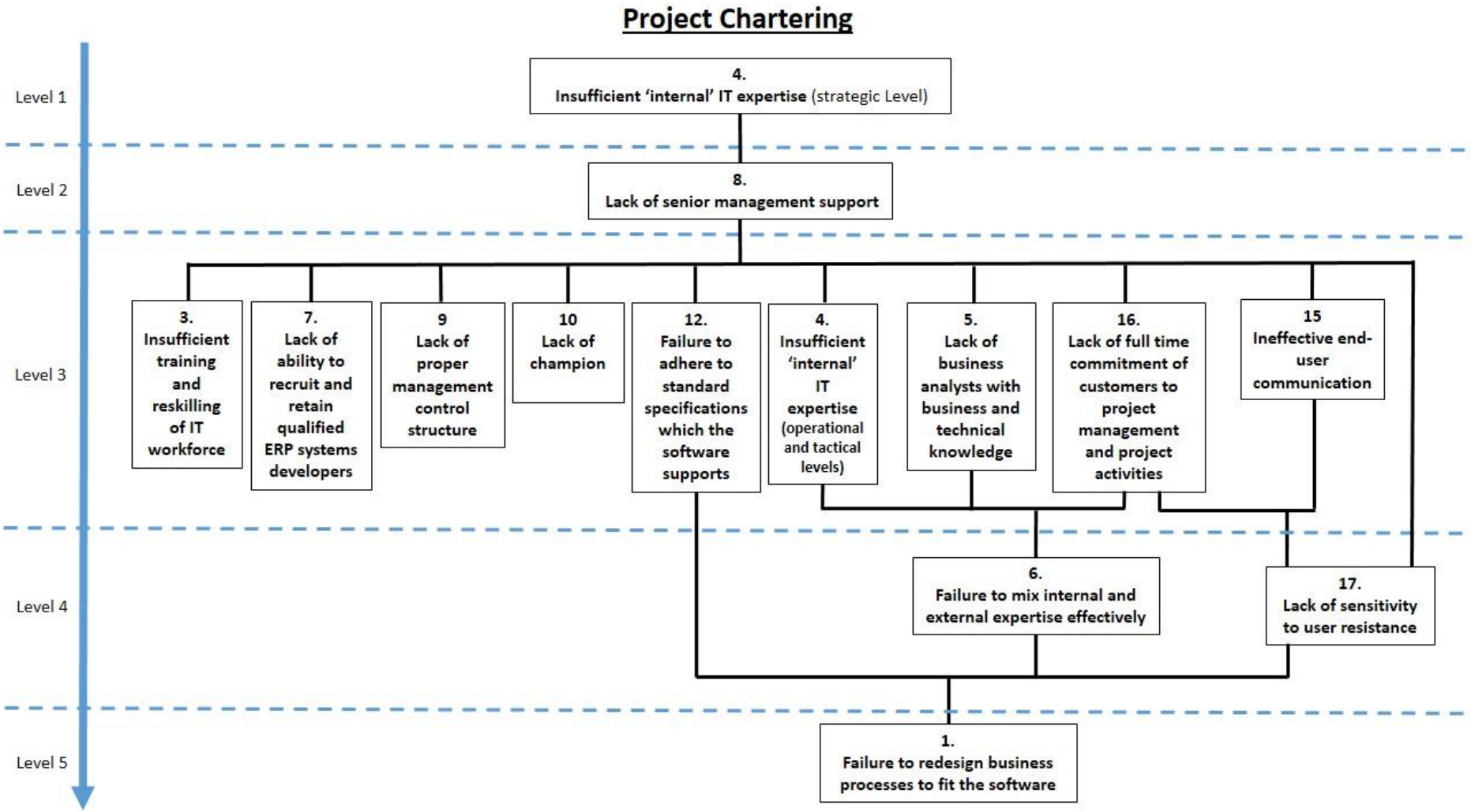

*Figure 5.7: Relationship between different **risk factors** at the Project Chartering stage*

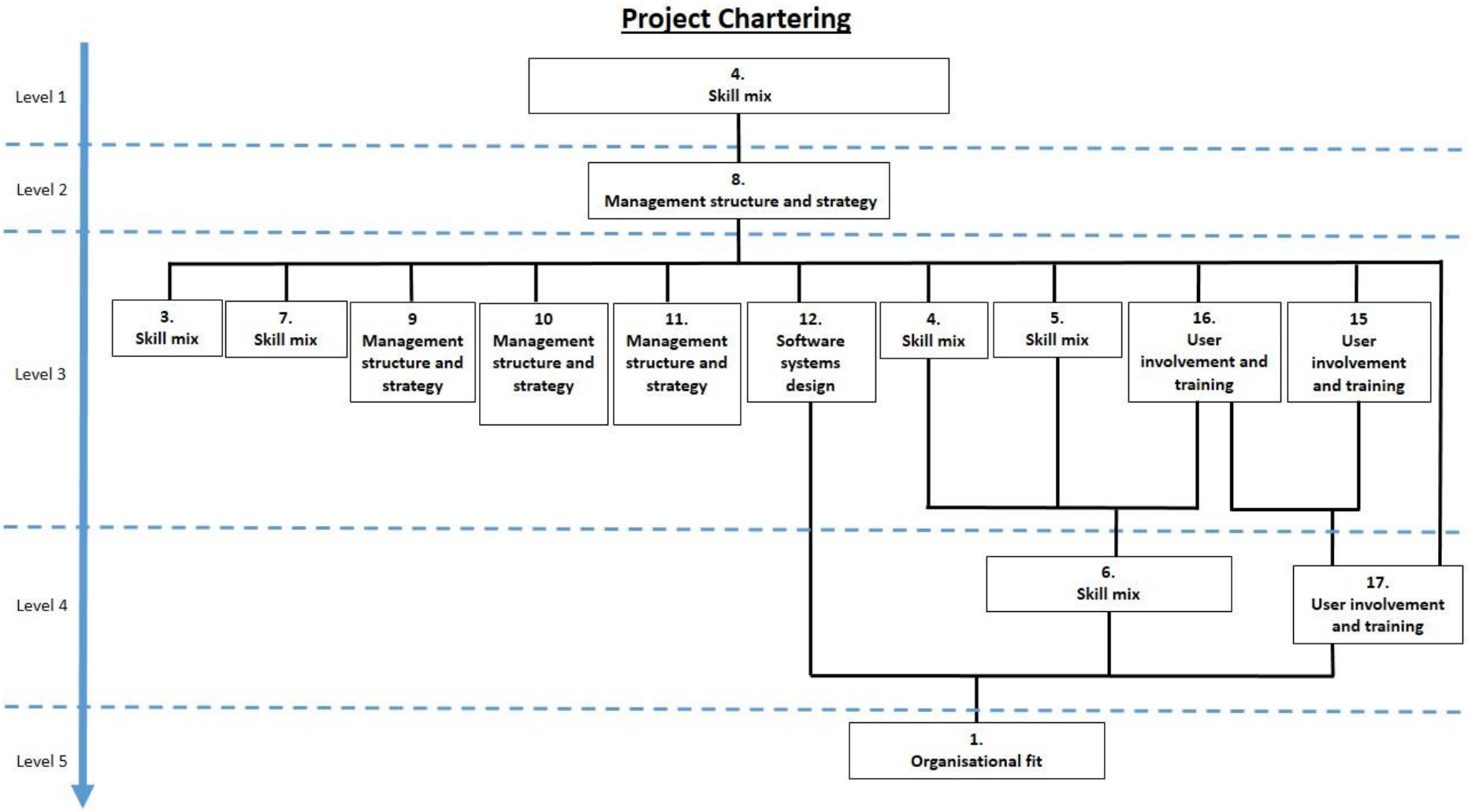

*Figure 5.8: Relationship between different **risk categories** at the Project Chartering stage*

5.2.2 The Project Stage

8. Lack of senior management support – The Project

6. Failure to mix internal and external expertise effectively

This was done well in the earlier projects at Case 6 (ITM5) as there had been little internal expertise. High levels of senior management support were given in the engagement of consultants, and this proved to be successful and resulted in future projects requiring lower levels of assistance.

11. Lack of senior management communication

In Case 6 (ITM5), 7 (ITM6), 10 (ITM9) senior management communication had been identified as very important. This communication channel was seen as essential when attempting to ensure senior management support and buy-in. One problem encountered was that many of the senior management teams had very little technical knowledge so making the communication highly technical would have had the opposite effect of potentially disengaged managers. One tool used in these implementations to encourage communication and allow non-technical managers to provide valuable input was through the use of the risk registries. Risk registries were used in these organisations to inform and encouraged a sense of ownership and buy-in from the senior management team. Case 9 (ITM8) and Case 11 (ERP2) both experienced issues with project related senior management communication and support, additionally both projects had risk registries in place but neither were used by the senior management team.

16. Lack of full time commitment of customers to project management and project activities

While support was there from senior managers in Case 6 (ITM5), it was still a juggling game to enable the right staff to be available for the project. In Case 8 (ITM7), as with the Project Chartering stage, staff were allocated to the implementation throughout the project stage and this resulted in a positive buy-in and lower levels of end-user resistance from staff. An ongoing commitment in Case 9 (ITM8) was outlined as a requirement of the management team and was successfully carried through from Project Chartering to the project and beyond.

17. Lack of sensitivity to user resistance

In Case 4 (ITM3), due to problems with the training environment, staff were reluctant to do any training because it frequently would not work. In the end they had to force them to participate as they had no other choice. In Case 9 (ITM8), a lack of support from the financial controller had the flow-on effect of increasing user resistance from within his department. That lack of overall buy-in was a problem during the implementation, and continues as user resistance has transformed into lack of use and subsequent lack of integration. This also affected report writing as users did not analyse their needs sufficiently to enable the project manager to produce the needed reports during the project stage.

18. Failure to emphasis reporting

This was a secondary effect of lack of senior management support leading to increased user resistance which affected the project managers ability to produce the required reports during the project stage in Case 9 (ITM8).

Analysis

Risk Factor View (figure 5.9)

In figure 12, the flow on effect from 'Lack of senior management support' in the Project stage was not as extensive as it was in the Project Chartering stage. One possible conclusion is that when observed in isolation, less risks appear to be affected by senior manager's decisions in the project stage as most of the decisions on what to do have already been made in the Project Chartering stage.

Risk Category View (figure 5.10)

In the risk category view (figure 13) only two type of risks appear to be influenced by senior management support, skill mix and User involvement and training. Both are present but in the interview results, neither influenced the other. As with findings at the Project Chartering stage, the support needed in an ERP project from the senior managers appears to be people related, not technical.

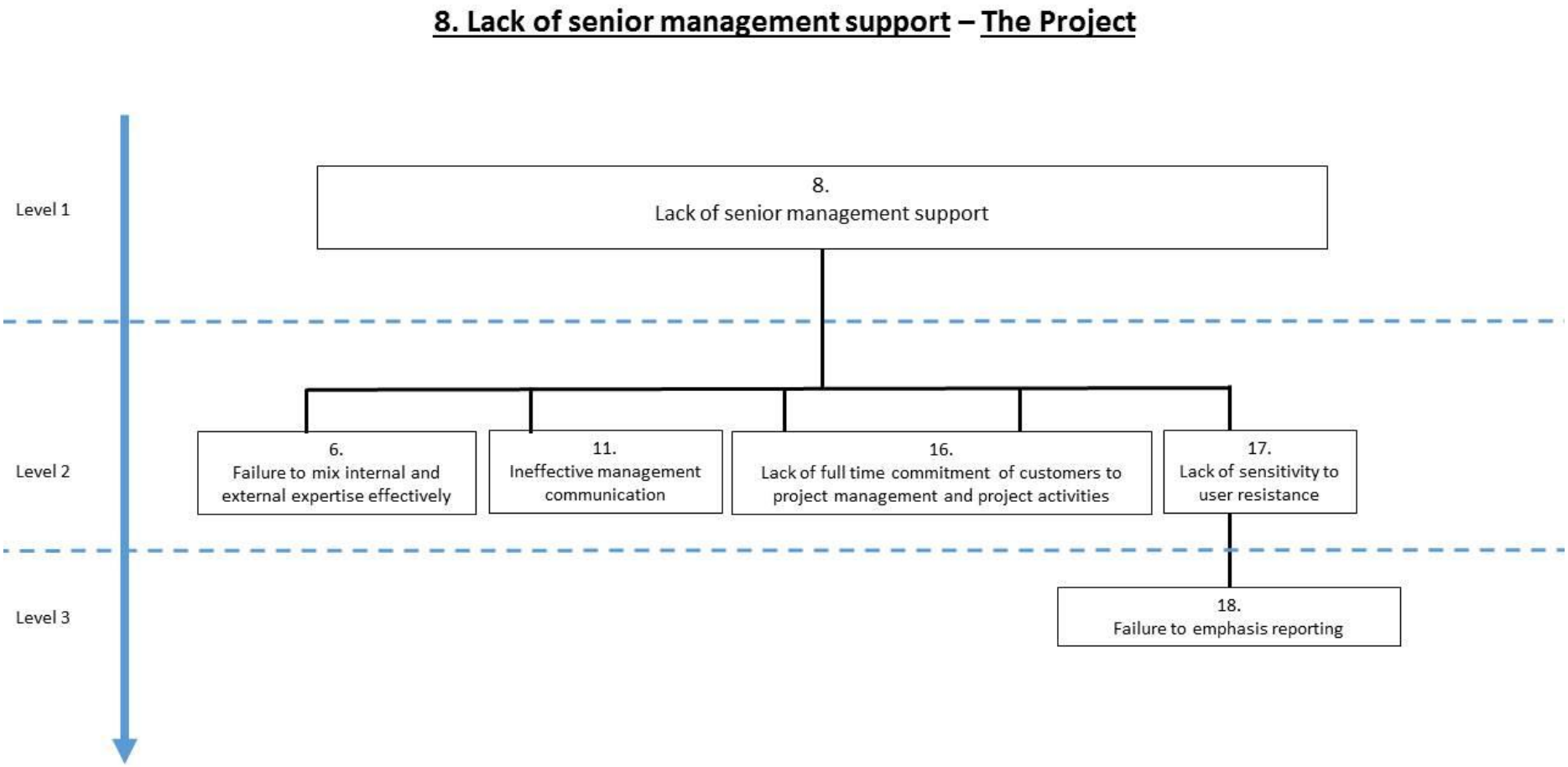

Figure 5.9: Relationship between 'Lack of senior management support and other ***risk factors*** *at The Project stage*

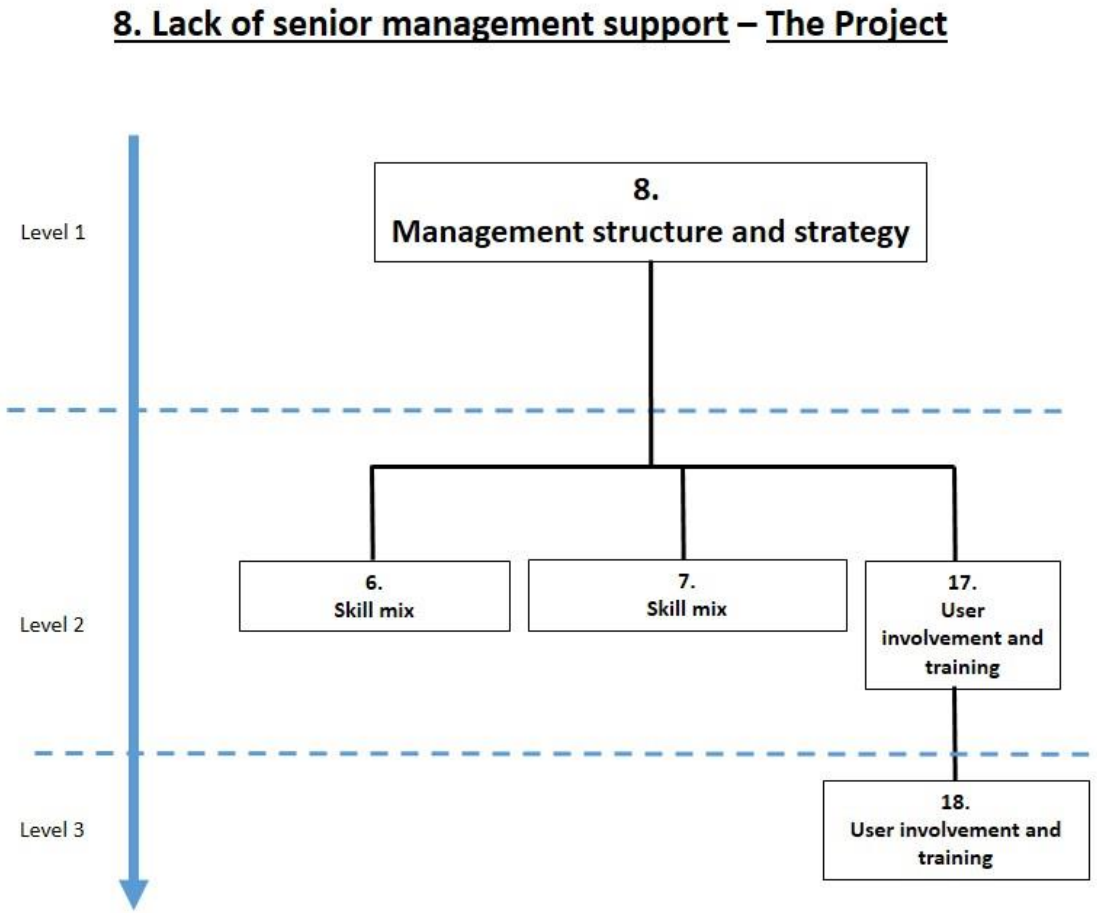

Figure 5.10: Relationship between 'Lack of senior management support and other ***risk categories*** *at The Project stage*

16. Lack of full time commitment of customers to project management and project activities - The Project

4. Insufficient 'internal' expertise

While they had sufficient internal expertise in Case 12 (ERPC3), they were unable to commit super-users to the project which had the potential to cause problems with implementation of the project.

7. Lack of ability to recruit and retain qualified ERP systems developers

Although training and reskilling of those on the project team exposed them to new skills and opportunities, most people on the project team in Case 9 (ITM8) went back to their old roles. While they became highly valued super-users, some of those on the project team did not enjoy the experience and were happy to return.

8. Lack of senior management support

The need for a high level of commitment from staff to the project was identified and provisions were made in Case 7 (ITM6). Senior managers committed all project staff for three days per week for the life of the project. Senior management support was also high in Case 8 (ITM7). It was so high in fact that it was almost regarded retrospectively as too high as large numbers of staff were committed for long periods of time to project activities. Senior management support in Case 10 (ITM9) was also extensive and allowed the project to get all the human resources it needed to get the implementation completed successfully. At the other end of the scale, Case 9 (ITM8) suffered from a lack of full time commitment in not only staff allocations, but also at the project management level as the project manager was required to fulfil his daily activities as well as those of the project manager for the ERP implementation.

17. Lack of sensitivity to user resistance

With staff being allocated to the project from its inception, user resistance in Case 8 (ITM7) was reduced as staff members bought in to the project, and felt that they were part of the process. In Case 10 (ITM9), not all users selected for the project did so voluntarily. Many had not been involved in a project like this before and felt out of their depth but were told that they were on the team as they were the most knowledgeable and were therefore needed for

this project. One method used to mitigate user resistance was to offer incentives to project staff as it was acknowledged that it would be difficult for them.

18. Failure to emphasis reporting

Report writing was a put off in Case 9 (ITM8) because the solution they chose was industry specific and many of the required reports were included in the chosen ERP solution. Even so they still experienced problems trying to engage staff to advise what information they required. The only project to identify report writing as a strength was Case 34 (ITM3). The solution they chose allowed users the ability to easily construct reports as needed, so a formal process was never needed.

Analysis

Risk Factor View

In figure 14, commitment to an ERP project has the ability to influence internal IT expertise and retention of qualified ERP systems developers.

Risk Category View

In the risk Category view (figure 15) we see the flow-on effect of user involvement and training to both risks within the same category, and to skill mix risks. We also see again the direct influence managerial support has on the people related aspects of an ERP implementation.

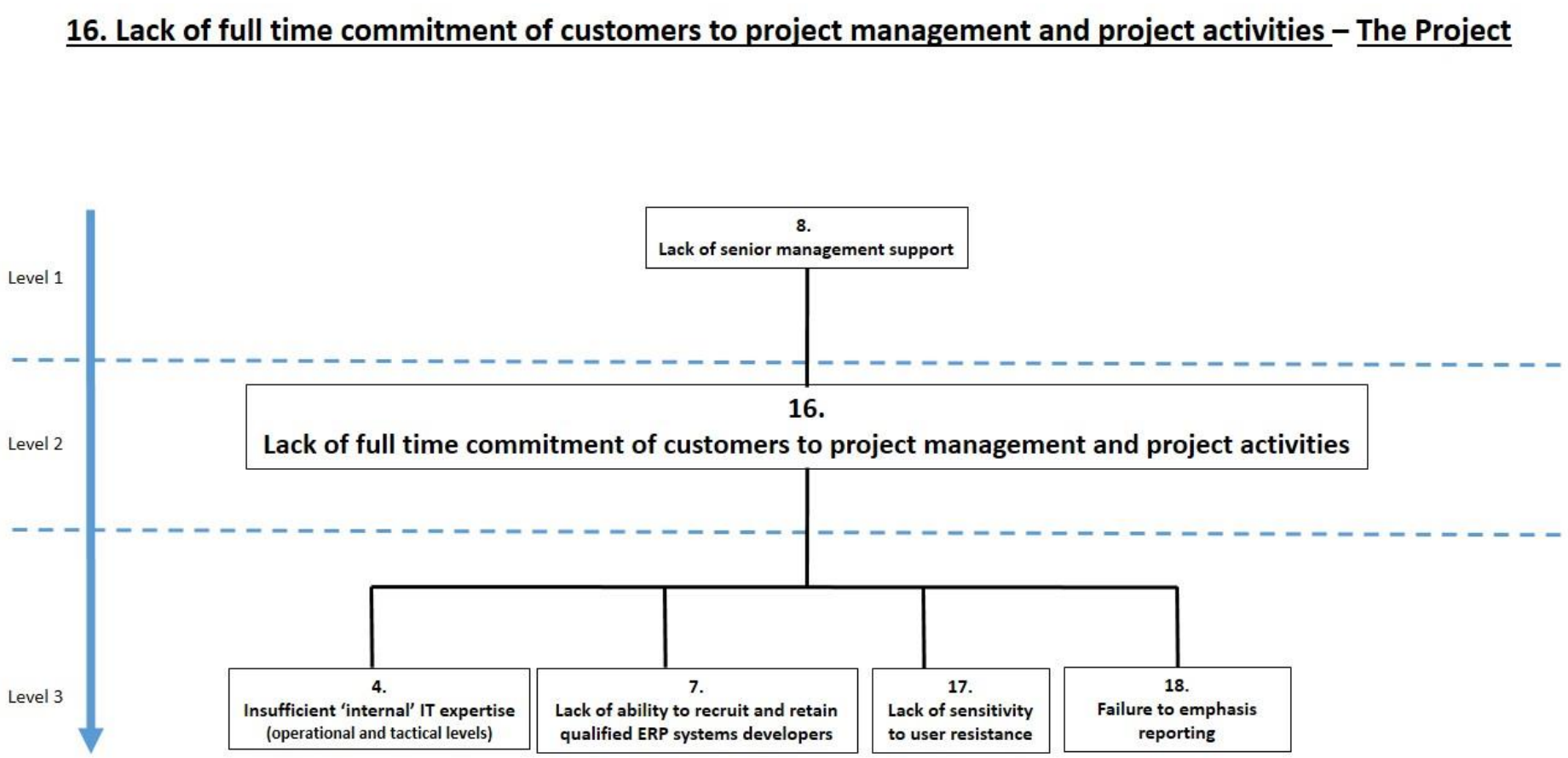

*Figure 5.11: Relationship between 'Lack of full time commitment of customers to project management and project activities' and other **risk factors** at The Project stage*

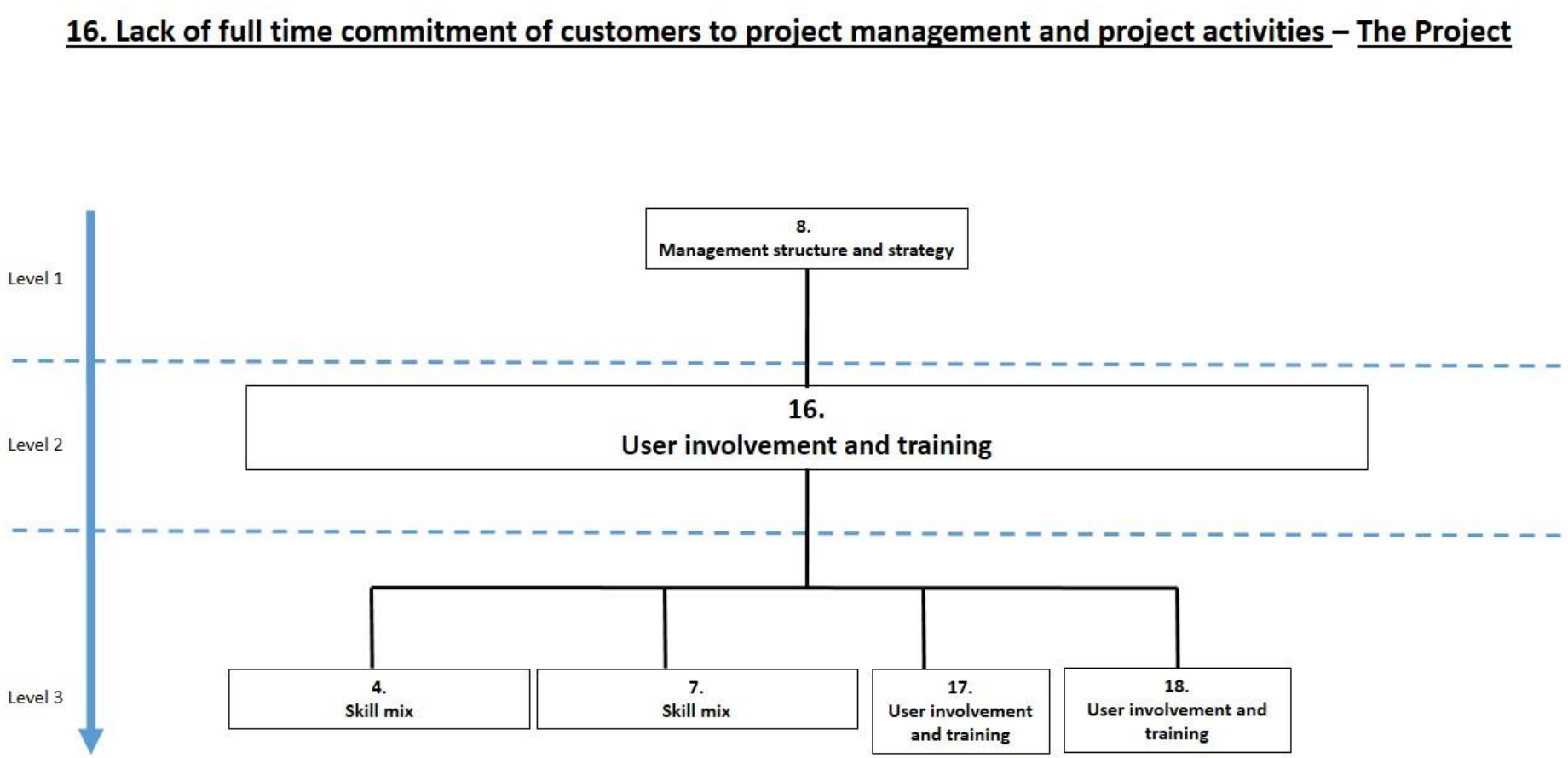

Figure 5.12: Relationship between 'Lack of full time commitment of customers to project management and project activities' and other ***risk categories*** *at The Project stage*

6. Failure to mix internal and external expertise effectively – (The Project)

3. Insufficient training and reskilling of the IT workforce

In Case 6 (ITM5), training and reskilling the IT workforce was of paramount importance. This was because the company had committed to additional rollouts and it was their intention to use the staff from the first implementation in a higher capacity in subsequent implementations. External experts were bought in to fill the gap in the initial implementations, until internal resources could be up skilled.

5. Lack of business analysts with business and technical knowledge.

During the project stage in Case 6 (ITM5), the lack of business analysts had implications on the extent of external resources required to complete the implementation. External experts were consequently charged with not only guiding the organisation through the implementation, but also training the project team to ensure the business were able to build internal resources with business and technical knowledge.

7. Lack of ability to recruit and retain qualified ERP systems developers

This tied in with the up skilling of existing IT staff in Case 6 (ITM5). They needed to be able to retain the trained staff to ensure they had sufficient internal IT resources and analysts with both business and technical knowledge. With higher retention rates, there was a reduced need for external resources.

Analysis

Risk Factor View

In figure 16, we see a high correlation with the structure of the same risk in the project chartering stage. The same structure exists where the risks identified as directly relating to 'Failure to mix internal and external expertise effectively' are all influencing, as opposed to being influenced by, the examined risk.

Risk Category View

In the risk Category view (figure 17) we immediately see a very interesting situation where all risks identified are skill mix category risks. This differs slightly with the same risk in the project chartering stage where although the structure and number of risks was the same, in the project chartering stage one of those risks was a user involvement and training risk. With

such close similarities, this difference would benefit from a closer examination to confirm both the similarities, and the differences.

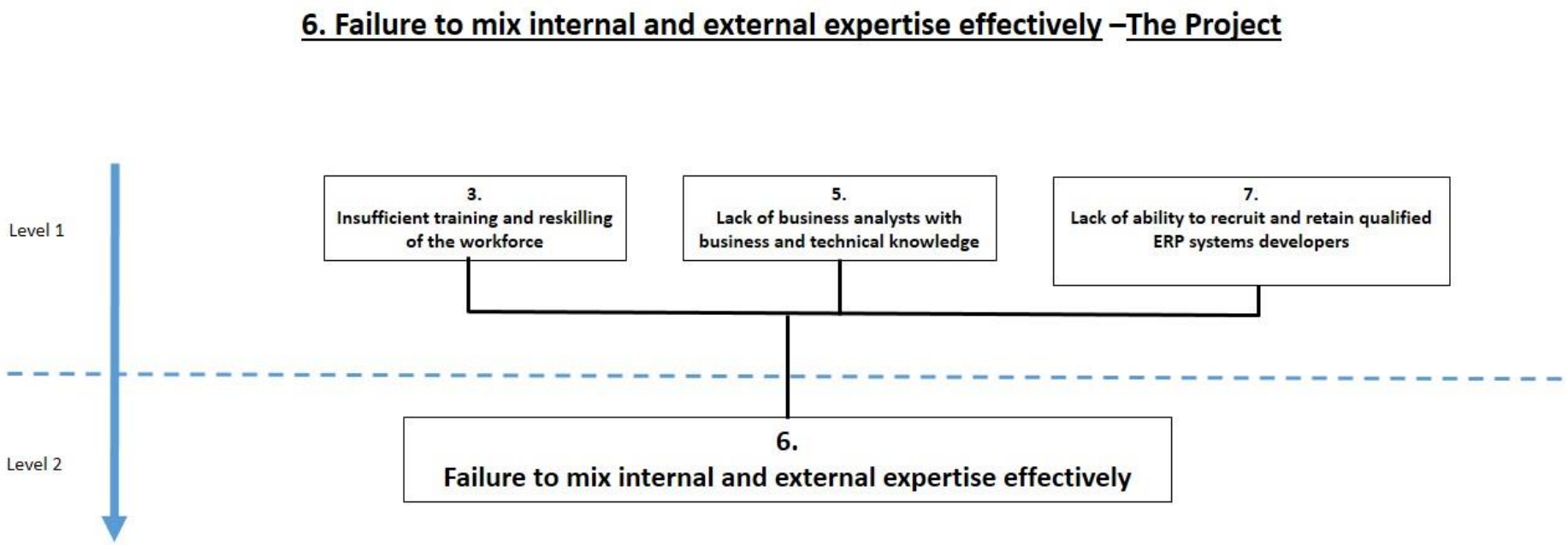

*Figure 5.13: Relationship between 'Failure to mix internal and external expertise effectively' and other **risk factors** in The Project stage*

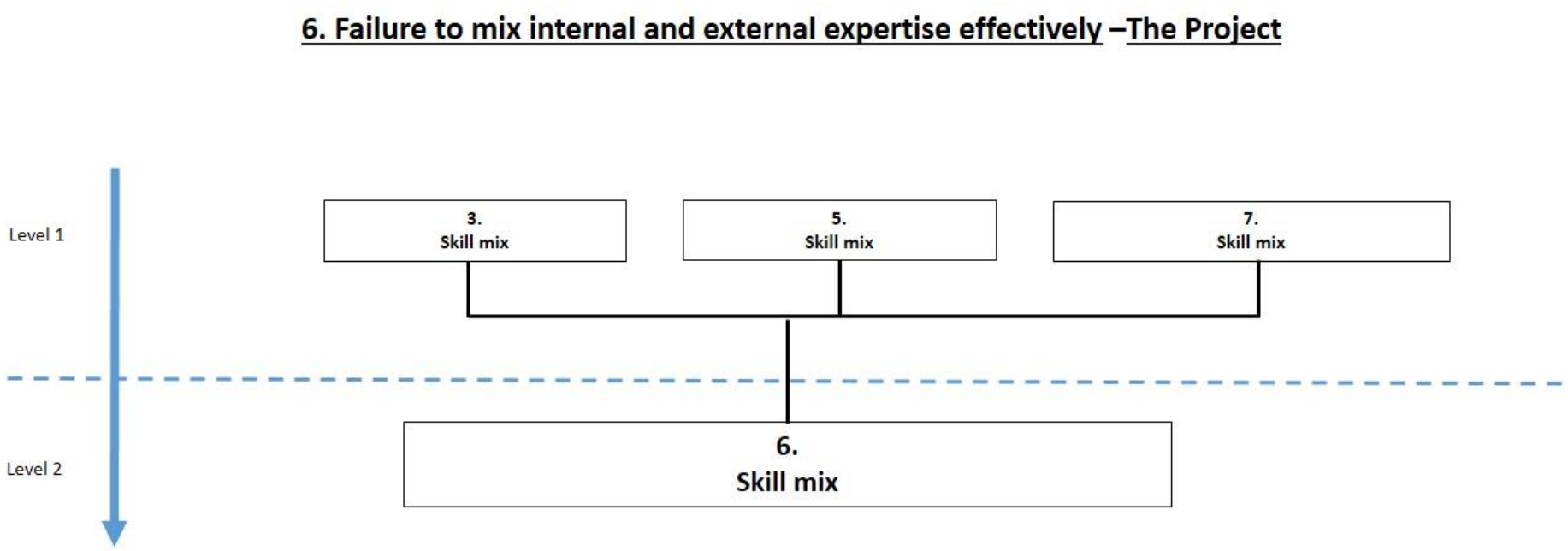

Figure 5.14: Relationship between 'Failure to mix internal and external expertise effectively' and other ***risk categories*** *in The Project stage*

14. Insufficient training of end users – (The Project)

8. Lack of senior management support

Training end-users was very difficult in Case 9 (ITM8) and stemmed from the lack of support given to the project by the senior management team. Without the drive from above, end-users felt empowered not to have to make themselves available for training as there was the possibility that the project would fail. In addition to that, the senior account did not release staff for training.

16. Lack of full time commitment of customers to project management and project activities

With so many users committed to the project, training was never an issue in Case 10 (ITM9) and included a number of different approaches including train the trainer (where internal experts were trained and then went out to train the users). Although there was commitment in Case 11 (ERPC2), insufficient end-user training was always going to be a risk in this project because of the short time frame available for this training to be completed.

17. Lack of sensitivity to user resistance

End user training was not successful in Case 9 (ITM8) as end-users lacked the push from above to engage in training, and felt empowered to resist training efforts. In Case 11 (ERPC3), user resistance become an issue because the training personnel were internal and didn't have a full grasp of all of the components of the new system. Therefore when end-users asked pertinent questions about why changes were made, the trainer was not always able to answer them with the detail required and therefore some of the changes from the old working system appeared unreasonable when viewed in isolation (as opposed to the big picture).

Analysis

Risk Factor View

In figure 18, the success of any training of end users is influenced by both the organisations commitment to allow people to be involved, and the commitment from end users to want to be involved. Both of these are influenced by senior management support.

Risk Category View

This situation is similar to the previous risk where the categories of risks between the examined risk and adjacent risks are all the same. Apart from the secondary relationship to management structure and strategy, the major difference is that this risk involves user involvement and training risks, as opposed to skill mix risks. When analysing the structure from the top down, again we see the pattern emerging of risks associated with management structure and strategy influencing people related aspects of the project.

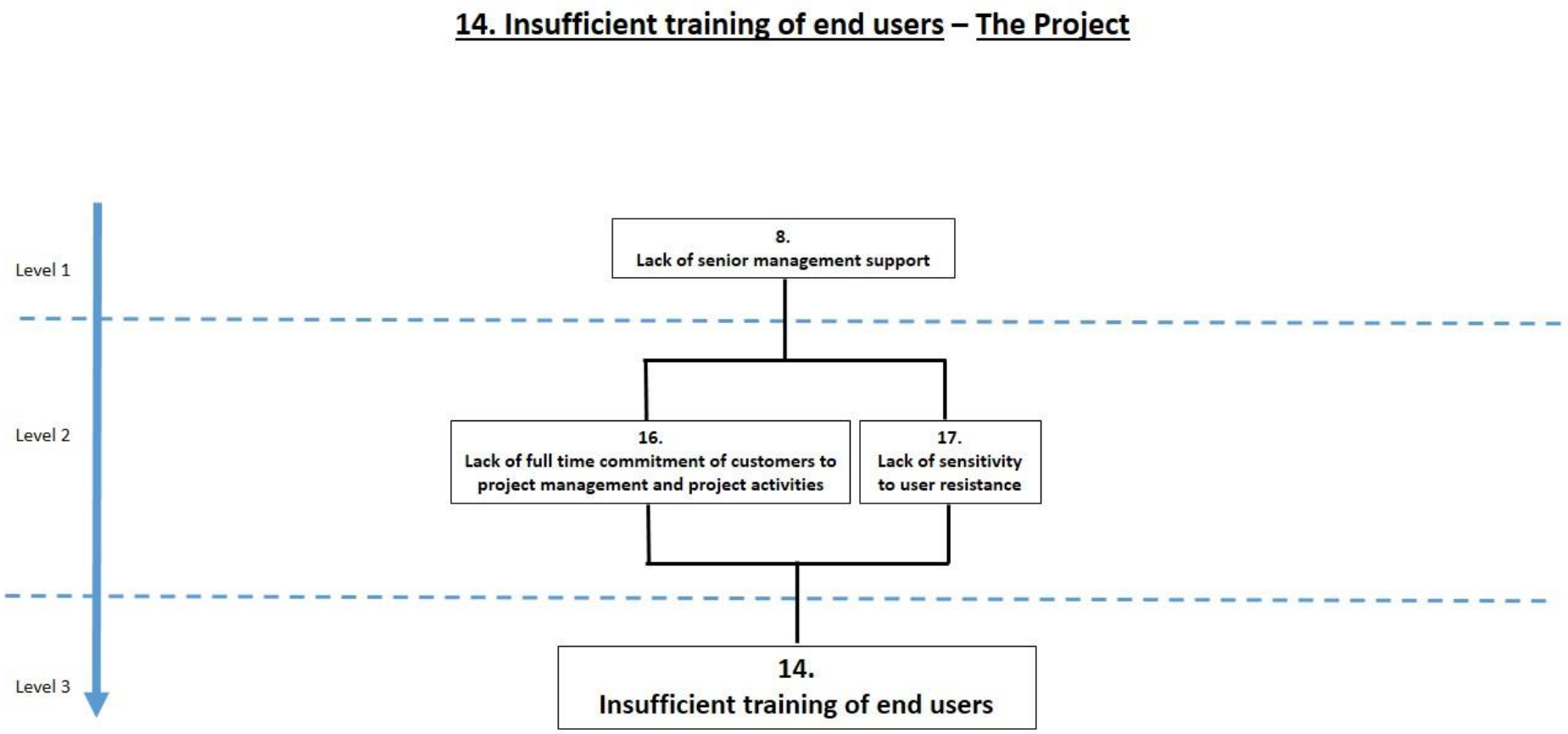

*Figure 5.15. Relationship between 'Insufficient training of end users' and other **risk factors** in The Project stage*

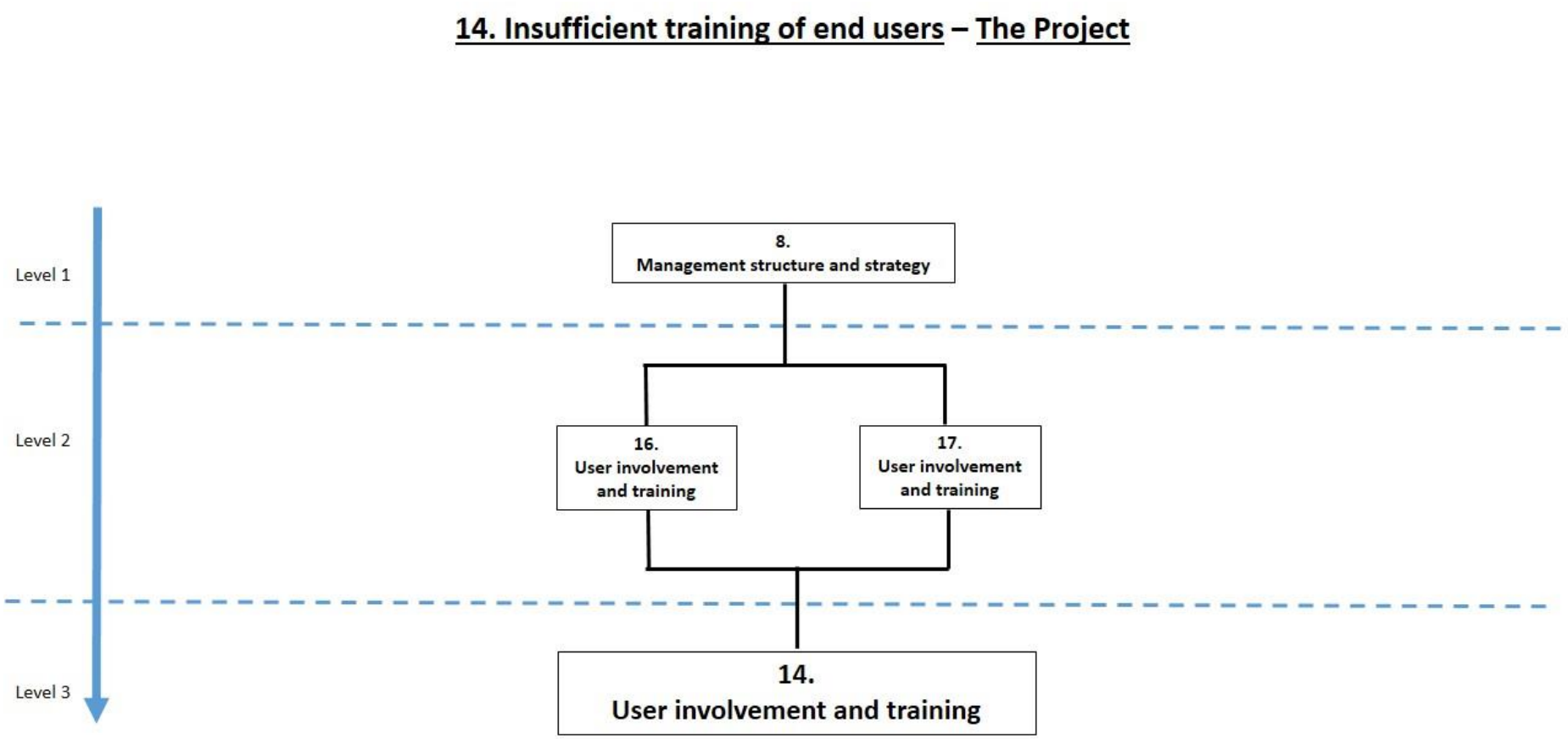

Figure 5.16. Relationship between 'Insufficient training of end users' and other ***risk categories*** *in The Project stage*

1. Failure to redesign business processes to fit software – (The Project)

12. Failure to adhere to standardised specifications which the software supports

Due to the amount of modification and redesign required by Case 10 (ITM9), problems were encountered with subsequent upgrades and patches issued from their software supplier. As the software was no longer standard, the standard patches could not be used without changes being made to accommodate the redesigned structure.

Analysis

Risk Factor View

Analysis of this risk differs considerably between the Project Chartering and the Project stages. In the Project Chartering stage, 'failure to redesign business processes to fit the software' was influenced by five different risks and did not influence any others. In the Project stage, 'failure to redesign business processes to fit the software' was not influenced by any of the other risks, rather the results of the design were recognised as influencing the risk 'failure to adhere to standardised specifications that the software supports'.

Risk Category View

This is the first time any of the technical risks have appeared, and was as a consequence of prior decision making over issues relating to organisational fit. It is possible that this was as a consequence of interviews with only project managers who had been involved with successful projects but nonetheless, is a significant observation.

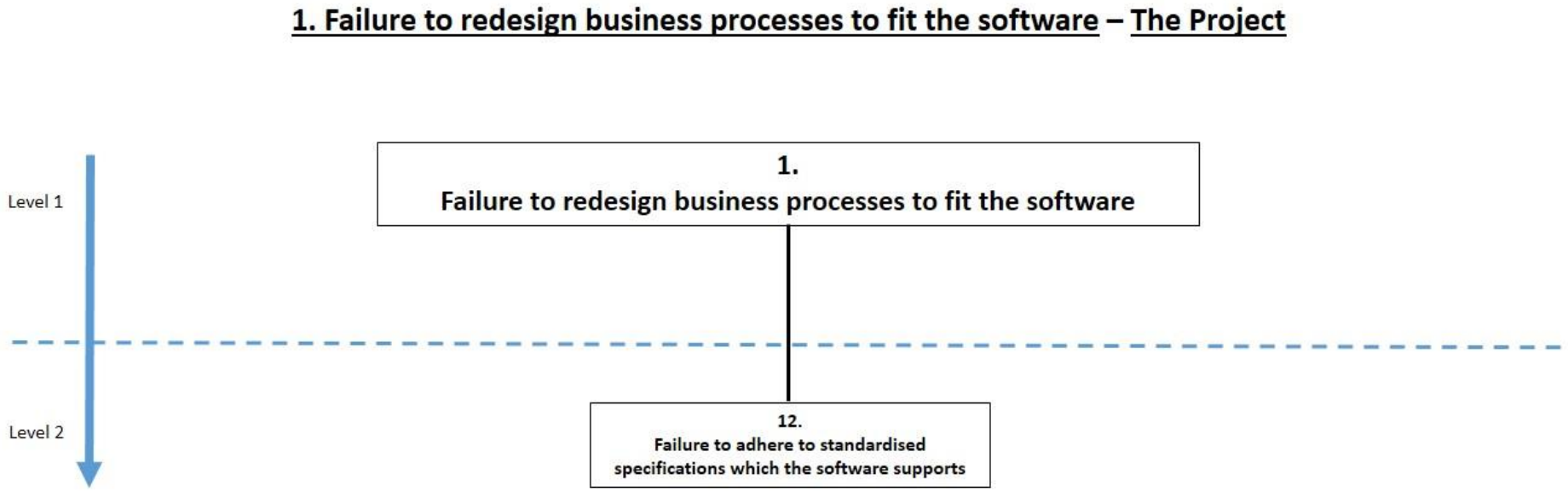

Figure 5.17: Relationship between 'Failure to redesign business processes to fit the software' and other ***risk factors*** *in The Project stage*

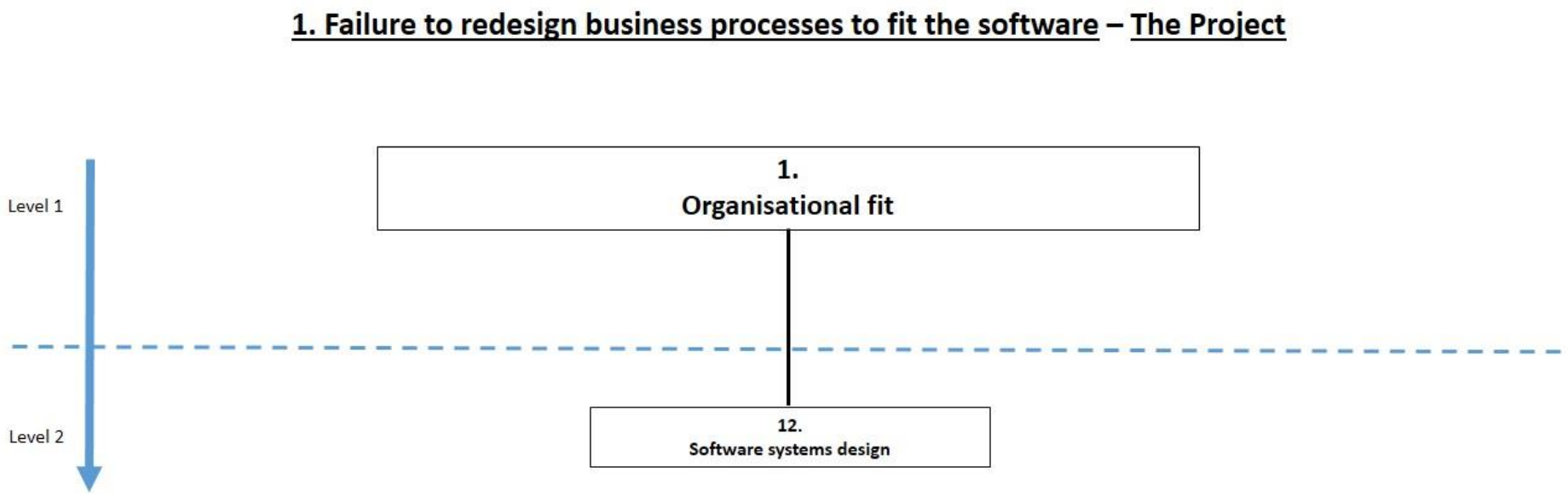

Figure 5.18: Relationship between 'Failure to redesign business processes to fit the software' and other ***risk categories*** *in The Project stage*

4. Insufficient 'internal' IT expertise (strategic level) – The Project

5. Lack of senior management support

Lack of senior management support was always a potential issue for Case 9 (ITM8) because of the lack of IT expertise at the senior management level. The sales focus and general lack of IT expertise resulted in issues with trying to engage the senior management team and a general lack of understanding with the entire process.

Analysis

Risk Factor View (figure 5.19)

As was mentioned earlier, insufficient internal IT expertise appeared to affect the ERP implementation in different ways dependant on whether it was strategic or operational and tactical in nature. For this reason these two categories were split with the following results.

At the strategic level this affected senior management support. With implementations where IT expertise at the strategic level was weak, without specific strategies in place senior management support and senior management engagement was low. Where IT expertise was stronger or tools such as risk registries were effectively used, then engagement and support was stronger.

Risk Category View (figure 5.20

In the Risk Category view, while there is just the single relationship between skill mix and managerial structure and strategy, it is significant as skill mix is the only risk that flows into managerial structure and strategy at any stage of the implementation.

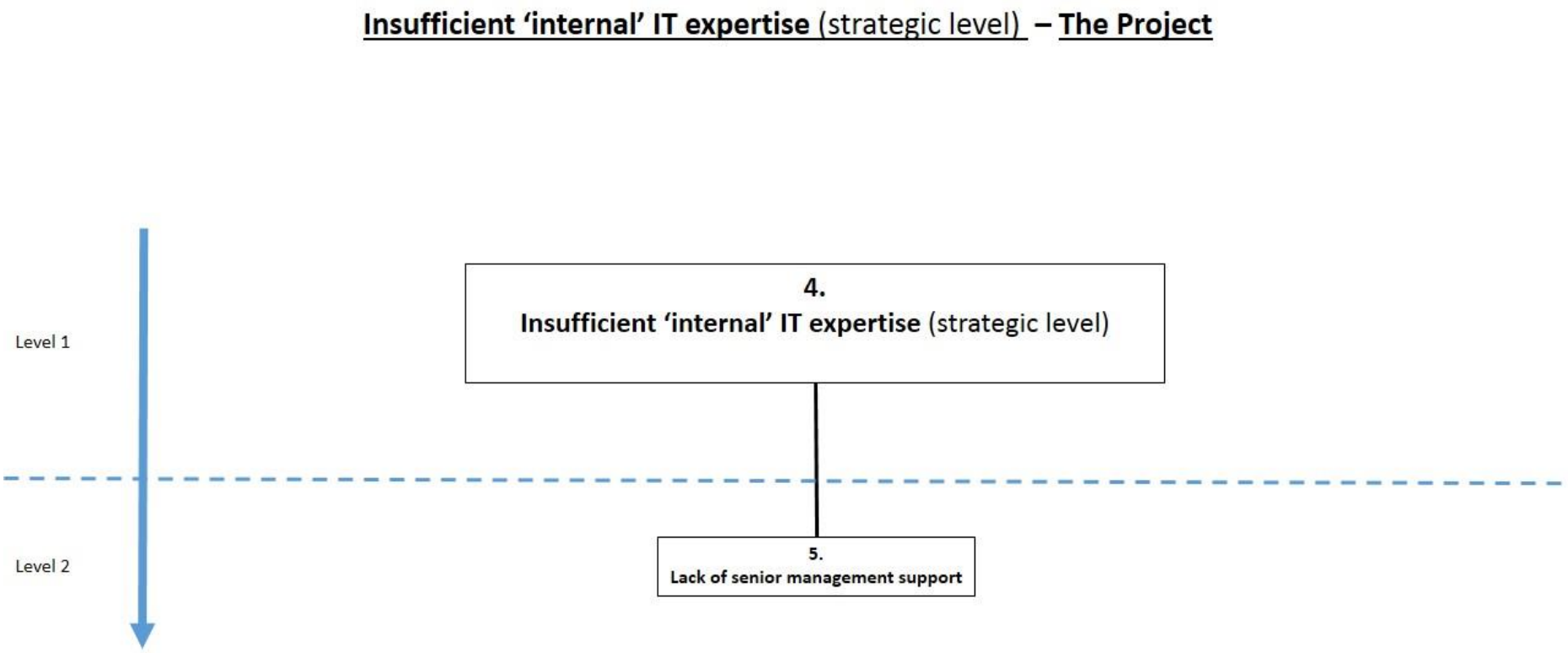

Figure 5.19: Relationship between 'Insufficient 'internal' It expertise (strategic level)' and other ***risk factors*** *in The Project stage*

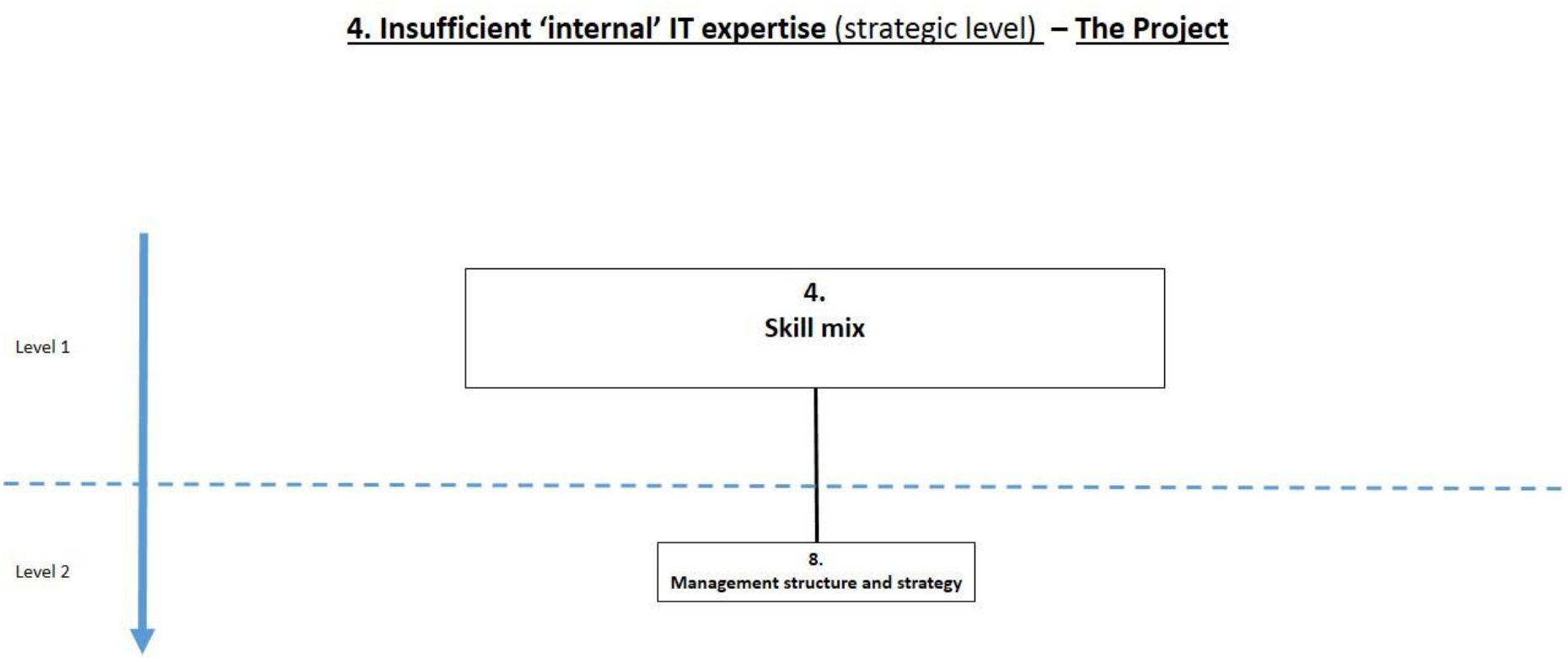

Figure 5.20: Relationship between 'Insufficient 'internal' IT expertise (strategic level)' and other ***risk categories*** *in The Project stage*

4. Insufficient 'internal' IT expertise (operational and tactical levels) - The Project

3. Insufficient training and reskilling of IT workforce

This was an ongoing problem in Case 8 (ITM7) as there were very few IT personnel or super users present. This had been an ongoing problem as they had experienced high levels of staff turnover and new staff members were not required to have high levels of IT and technical knowledge. This resulted in a lack of knowledge of the business and IT systems and a lack of internal users capable or interested in advancing their IT skills. This was in contrast to Case 6 (ITM5) where active training in one implementation enabled them to have sufficient internal resources for subsequent implementations.

6. Failure to mix internal and external expertise effectively

The lack of internal expertise highlighted the need for external consultants to fill the gap in Case 7 (ITM6). This included the need for direction, which included the implementation model to be used, as well as tools (including the risk registry) used during the project to ensure everything ran smoothly. As a consequence of the lack of internal IT expertise, Case 8 (ITM7) chose to go with an industry specific solution to ensure they were able to engage with external experts to complement their lack of internal expertise.

7. Lack of ability to recruit and retain qualified ERP systems developers

Case 6 (ITM5) felt they achieved this successfully as they initially had very low levels of internal expertise when implementing their first ERP system. By actively retaining internal resources they were able to ensure sufficient internal resources were available for the next projects. Cases 8 (ITM7), 9 (ITM8) and 10 (ITM9) all recruited new project managers to cover insufficient internal skills at the operational and tactical levels.

12. Failure to adhere to standardised specifications which the software supports

This was important in Case 7 (ITM6) because insufficient internal expertise was identified as an ongoing issue and the business was aware of the levels of ongoing maintenance and improvements that would need to be done in the following months and possibly years. With

this in mind, a system with minimum modifications was the only option to ensure system requirements did not exceed internal expertise.

18. Failure to emphasis reporting

This was an issue for Case 11 (ERPC2) as the person in charge of reports was under the impression that they had report generation under control. Under examination by the consultant project manager it became apparent that the internal project manager did not have the skills to know that it was not the case and typifies the problems with insufficient experience in that you don't know what you don't know.

Analysis

Risk Factor View

At the operational and tactical levels, IT expertise influences and is influenced by more risks that at the strategic level. IT expertise at the operational and tactical levels are influenced by IT training, and influence mixing of internal and external skills, retention of qualified ERP systems developers, systems modifications and report writing.

Risk Category View

Again we see the high number of skill mix risks that appear in the project stage of the ERP implementation. From analysis of this risk category, the implications of not addressing one of the skill mix categories will result in another risk from the skill mix category manifesting itself. This continues through all three levels until at the final level where it increases to not only influence more skill mix category risks, but also a software systems design and user involvement and training category risks.

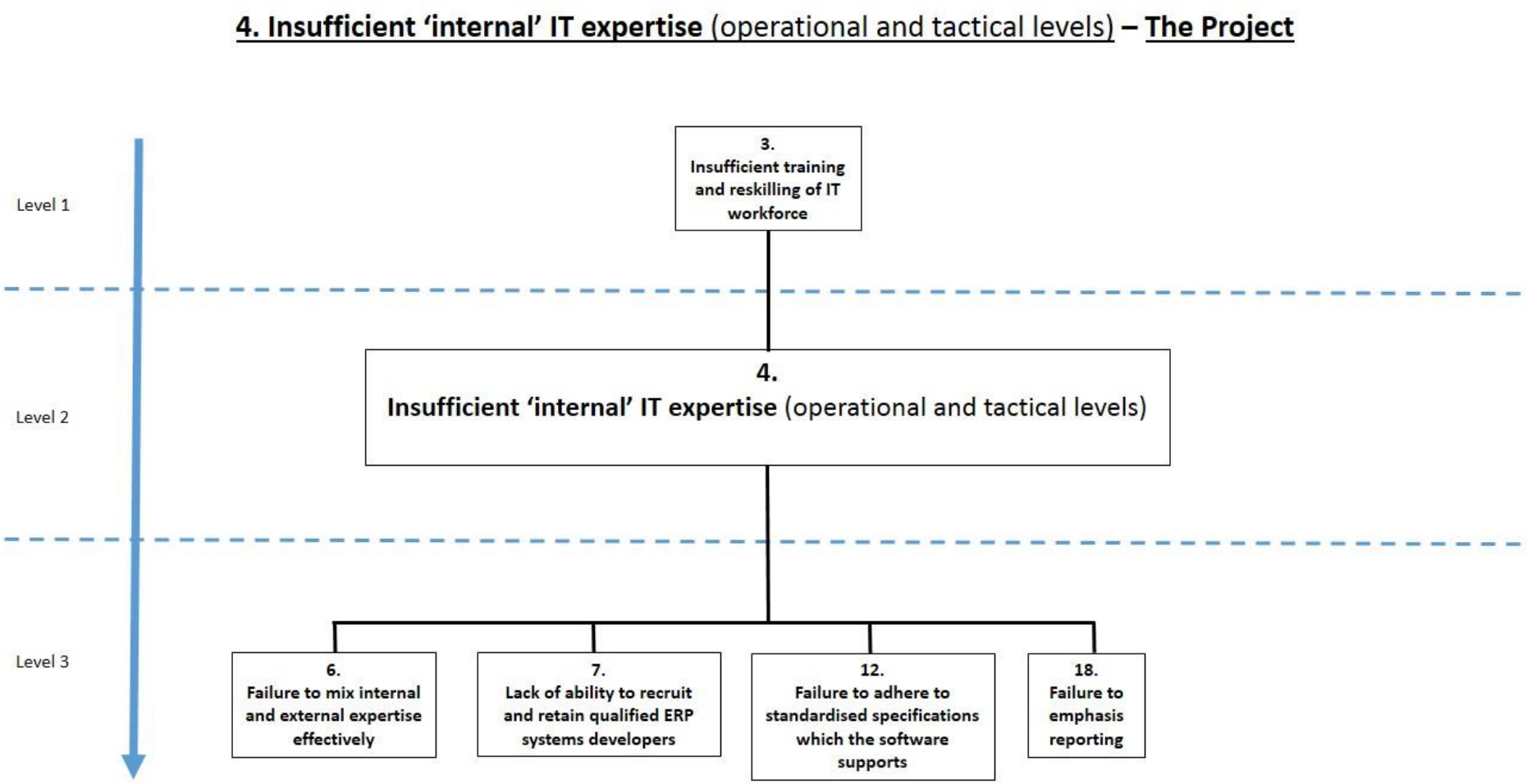

*Figure 5.21: Relationship between 'Insufficient 'internal' It expertise (operational and tactical levels)' and other **risk factors** in The Project stage*

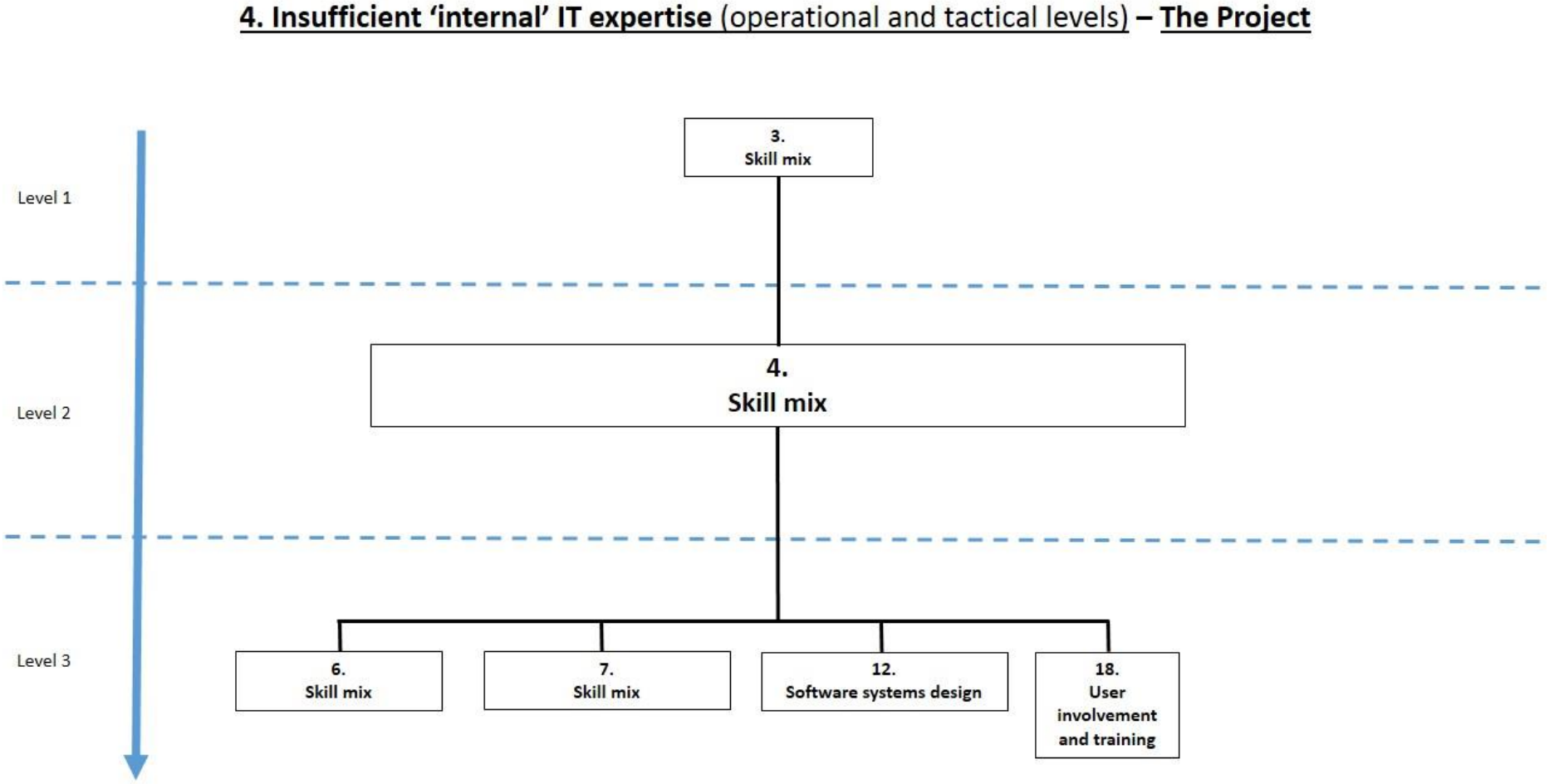

Figure 5.22: Relationship between 'Insufficient 'internal' It expertise (operational and tactical levels)' and other ***risk categories*** *in The Project stage*

The Project stage Analysis

All six risks were examined at The Project stage, with analysis done on both the risk factors and risk categories. The risks examined were

- 8. Lack of senior management support
- 16. Lack of full time commitment of customers to project management and project activities
- 6. Failure to mix internal and external expertise effectively
- 14. Insufficient training of end users
- 1. Failure to redesign business processes
- 4. Insufficient 'internal' expertise (strategic level)
- 4. Insufficient 'internal' expertise (operational and tactical levels)

All of the findings have been combined into hierarchical structures (figure 5.23 and figure 5.24). Of the 20 risks identified by Sumner (2000), 12 feature in the project stage of the risk management model.

Due to the intricate nature of the relationships between the risks in this stage, it was necessary to add risks 3. Insufficient training and reskilling of workforce, and 4. Insufficient 'internal' IT expertise (operational and tactical levels) twice to allow all of the relationships to be mapped. Multiple checks were made to ensure no additional relationships were accidentally created and that all pathways reflect the relationships established at the individual risk analysis levels.

Risk Factor View

The immediate difference between the hierarchical view of risks at the project chartering and the project stages is the complexity of the project hierarchical diagramme. In the Project Chartering diagramme, there were five levels of risks with a majority of these risks (10 of 15) clustered in level three. In the project diagramme, risk frequency per level ranged from one to four. Similarities include insufficient internal expertise (strategic level) at level one and lack of senior management support at level two. There are however a number of differences.

- The Internal IT expertise of senior management no longer influences all other risks as it did in the Project Chartering stage. It is however still the most influential risk in The Project stage as it has the potential to influence directly or indirectly seven of the 12 risks.

- Whereas no other risk at the Project Chartering stage was close to Lack of Senior Management Support when it came to influencing other risks, Insufficient Training and Reskilling of the IT Workforce comes close in the Project stage with the potential to directly or indirectly influence six of the 12 risks.
- In the Project Chartering stage (figure 5.7), 'Failure to Redesign Business Processes to fit the Software' was the only risk not to influence any other risk. The number of risks not to influence other risks increased to four different risks at The Project stage and included:
    - 6. Failure to mix internal and external expertise effectively
    - 12. Failure to adhere to standardised specifications which the software supports
    - 14. Insufficient training of end users
    - 18. Failure to emphasis reporting

This implies higher levels of interconnectedness at The Project stage and higher chances of unpredictable behaviour as a consequence of second or third level influences.

While they did not experience any of these problems in this implementation in case 11 (ERPC2), from previous experience the relationship between the organisation and the vendor was regarded as critical by Bob, and he described the breakdowns in this relationship as often being under-reported in the context of project problems or failures.

> *"…the relationship between the project team and the vendor failing, those sorts of risks are often underreported or underestimated because they are not self-reporting…"*

By self-reporting, Bob alluded to the point that no-on wants to admit that they were in the wrong, especially in projects of this size and complexity. From his experience he had come across situations where reasons for implementation problems or failures (which include technical issues) have originated from the breakdown of this relationship

> *"…they can say that the software didn't work or the vendor didn't do enough, and if you dig down deeper you find that software works somewhere else and that vendor has worked somewhere else as well so there was something about that project that made it go wrong…"*

Risk Category View

When viewing The Project risks by category, what can be seen immediately is the high number of skill mix risks in this stage. Additionally, Skill Mix risks are at the top level and flow not only into other Skill Mix risks, but all other risks except for the one Organisational Fit risk.

While Managerial Structure and Strategy is the dominant risk category in the Project Chartering stage, this research would indicate that Skill Mix risks are the dominant risk category in The Project stage. This hierarchical flow indicates that if the Skill Mix is not right, then they have the potential to affect almost all other risks in this stage.

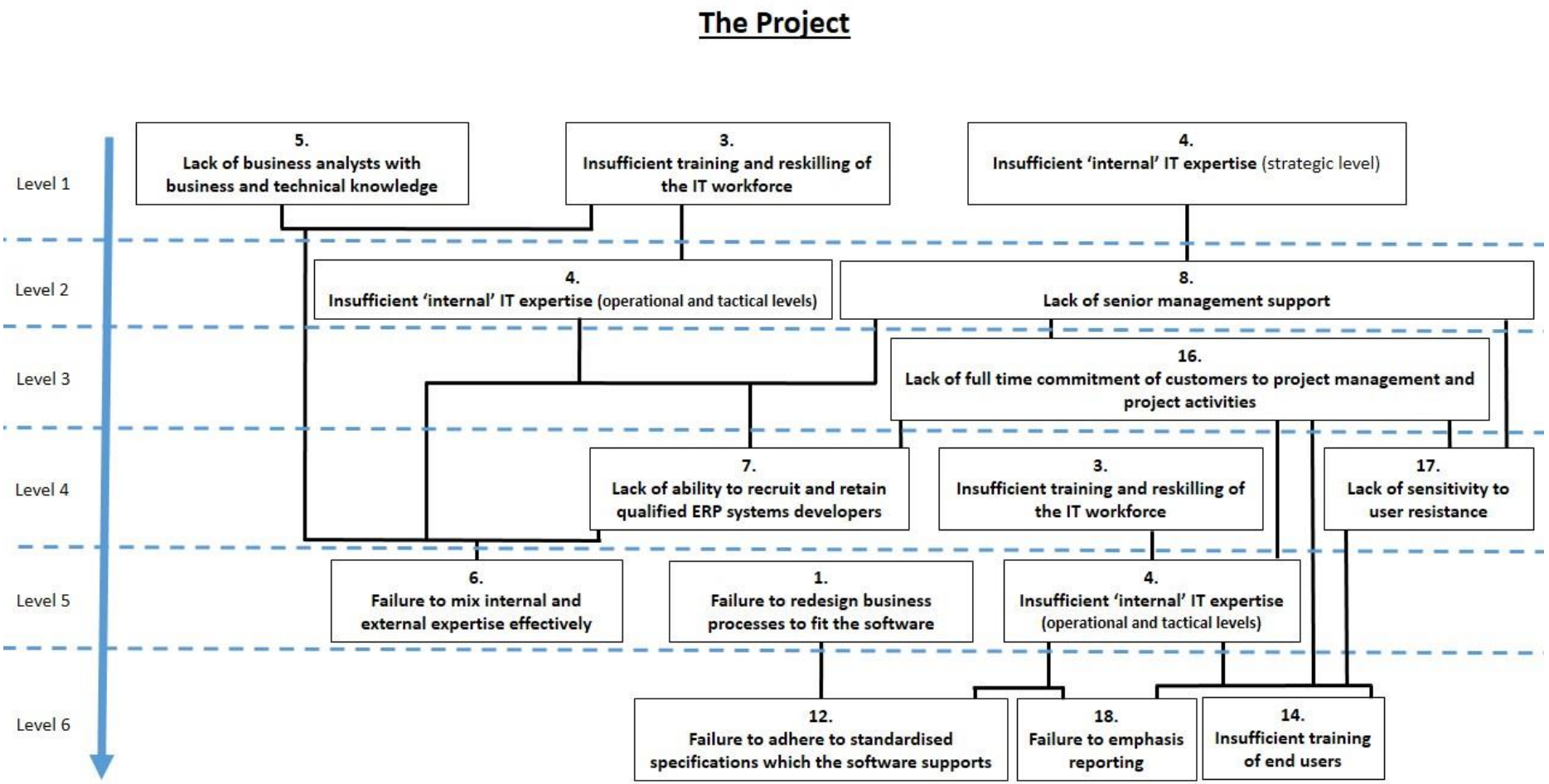

*Figure 5.23: Relationship between different **risk factors** in The Project stage*

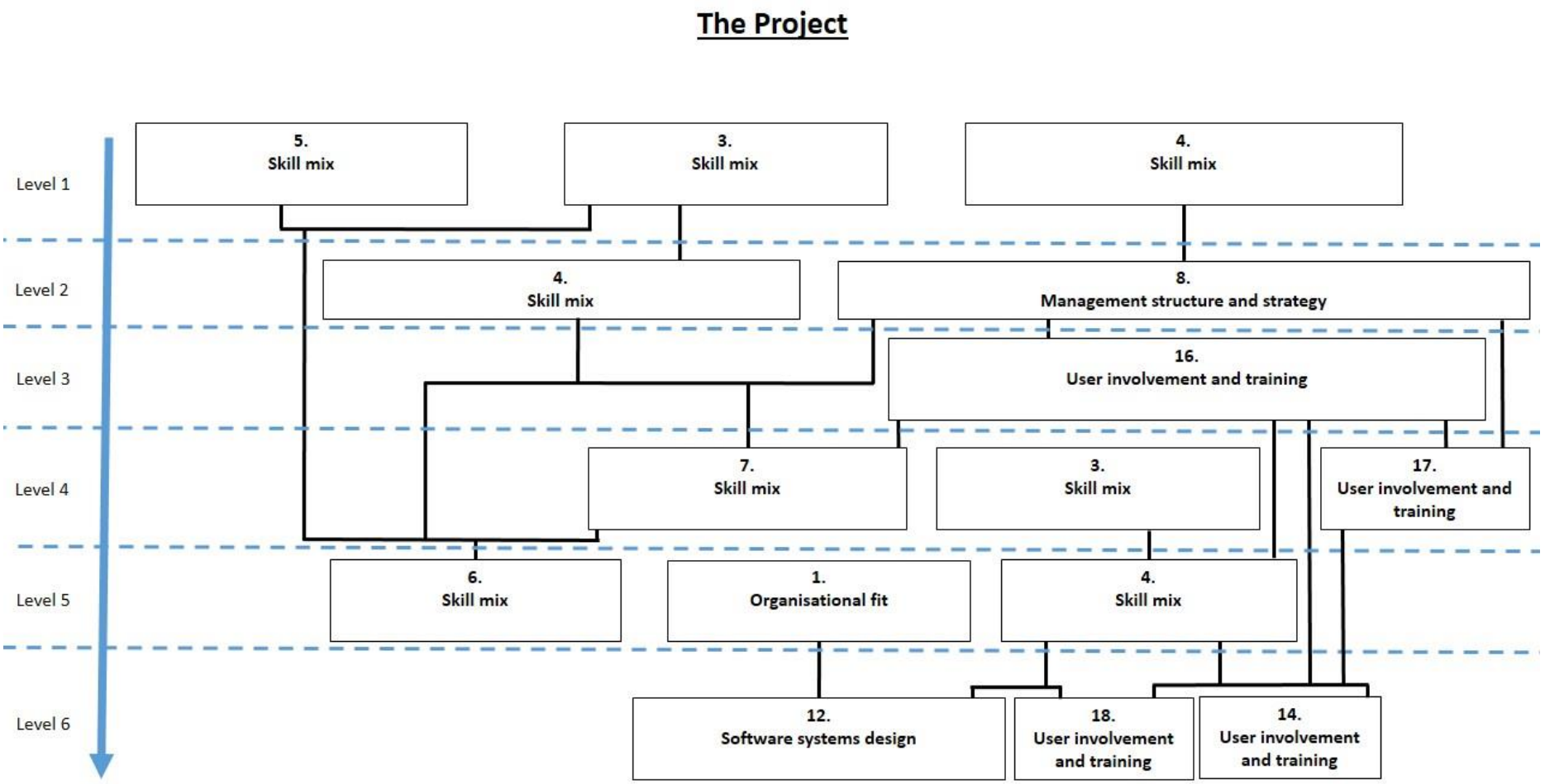

*Figure 5.24: Relationship between different **risk categories** in The Project stage*

5.2.3 The Shakedown Stage

14. Insufficient training of end users (Shakedown)

Lack of sensitivity to user resistance

The end-user training preformed during the project stage in Case 8 (ITM7) was highly successful with positive end user feedback from their classroom style but issues still occurred at go-live. User resistance did not come about because of a lack of ownership, but rather because the difference between the test system and the production environment was too conceptual for many of the employees to grasp. Although they had been trained, they needed assurances that they would not break the system when they tried different functions. User resistance affected end user training in Case 4 (ITM3) as staff did not want to invest time learning how to use a system that they did not believe would work. Case 9 (ITM8) encountered problems with training as a flow on effect of the Lack of Senior Management Support in The Project stage. End users continued to avoid training and use other systems because they were able to do so. The project manager's only option was to force end users to participate but this was not highly successful as users would just go back to what they were doing. In one case, even after three training sessions one person still refused to use the system and had forgotten what had been shown previously.

Analysis

Risk Factor View

Only one risk in the shakedown stage was selected for analysis, and that was 'Insufficient training of end users'. The only risk to influence end user training from the research was 'Lack of sensitivity to end user resistance. That this risk appeared in this stage is not surprising as that was one of the other risks that was identified by five or more project managers in the shakedown stage.

Risk Category View

While there is very little to analyse, similar to earlier User involvement and training risks, there is a flow-on effect between risks in this category. If we check the earlier table (Table 5.3: Summary of Risks discussed per Project Stage) and identify all other risks that were

mentioned five times or more in the shakedown stage, we see that all of these risks observed were User involvement and training risks.

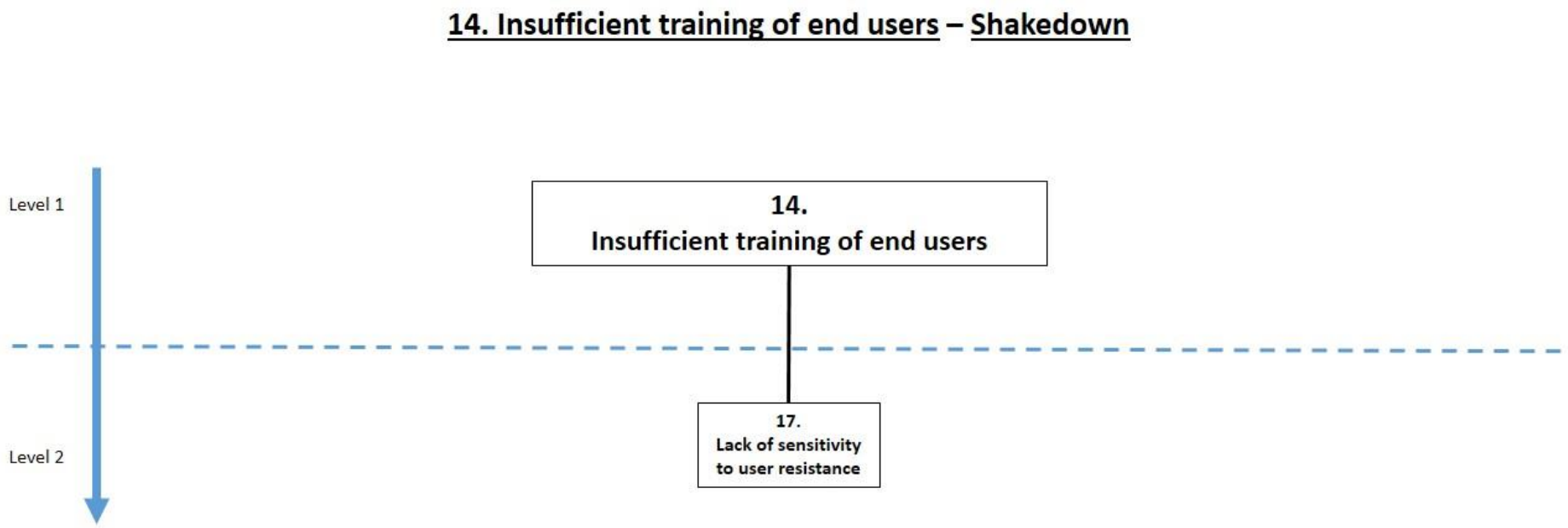

*Figure 5.25: Relationship between 'Insufficient training of end users' and other **risk factors** in the shakedown stage*

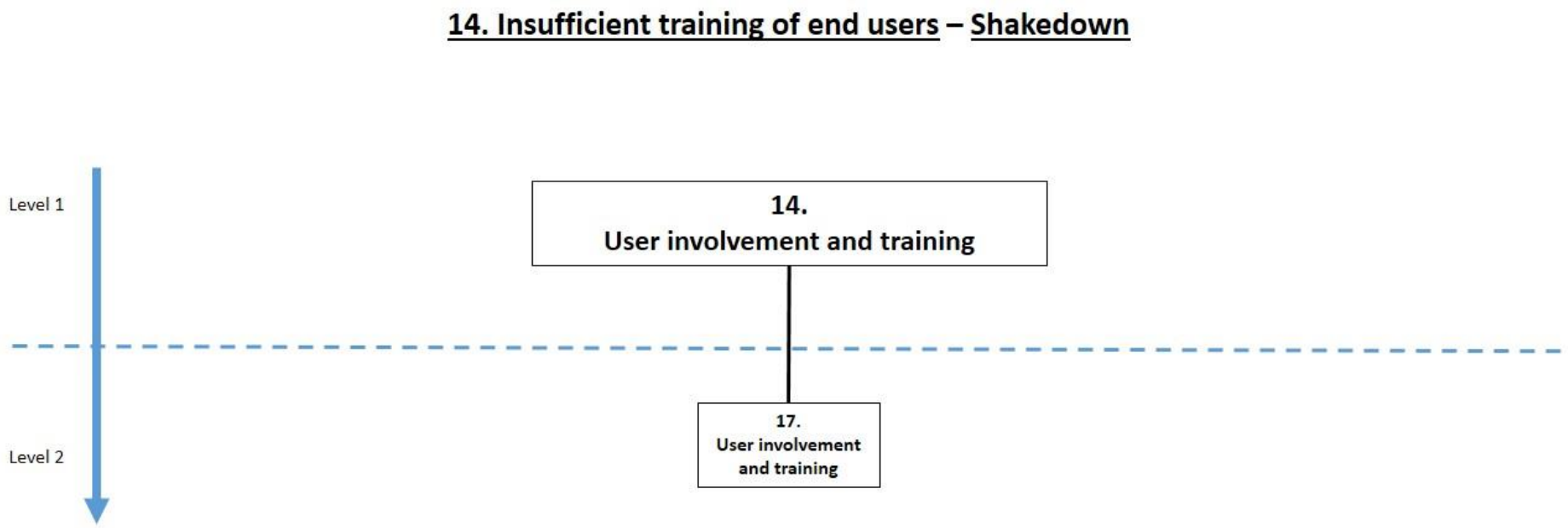

Figure 5.26: Relationship between 'Insufficient training of end users' and other ***risk categories*** *in the Shakedown stage*

5.3 Linear (Risk to Control) Relationship

From the findings there appears to be no direct, observable relationship between risks and controls. The following extract from the compiled risk registry (see Appendix c for the full risk registry) illustrates this point (Table 5.5). While the risks gathered from the compiled risk registry were all identified as risks associated with end user resistance, the unique risk names, descriptions and controls used offer little common ground from which any form of relationship can be established. This finding is in line with current research, and highlights the issues surrounding the different ways risks can be described and categorised in ERP implementations (Aloini et al., 2007; Markus & Tanis, 2000; Sherer & Alter, 2004).

Table 5.5: Sample of ERP risks

Risk number and case	**Risk**	**Description**	**Controls used**
4 Case 7 (ITM6) (I)	ERP Terrorists' resisting the project and influencing others to resist	Personnel within the business who resist the project and who are able to influence others to their way of thinking	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
5 Case 4 (ITM3) (I)	Unable to engage staff due to unstable training environment	The training modules contain bugs and frequently break. This coupled with resistance to change led to higher levels of user resistance.	Train only on stable modules
6 Case 8 (ITM7) (I)	New system not performing	It was being blamed for constraining the business and was a very difficult problem to diagnose. As a consequence of the noise being generated this became a high priority problem.	Engage independent auditors to audit the system to identify the source of the problems

While no direct relationship was observed between risks and controls, what has emerged is the successful use of impact analysis as an intermediary construct to bridge this gap. While impacts as a consequence of risk have been noted (Aloini et al., 2012), the connection between impacts and controls has not. All PMs were questioned about their use of impact analysis, and all stated that it was conducted in some form. Of the 9 cases, three did not record any details and 4 used this analysis as a numerical tool only, a practise in line with the literature review findings (Patterson & Neailey, 2002). The remaining two cases detailed impact analysis and successful controls used, but this was only as an internal reference document for future internal implementations.

The relationship between impacts and controls can be seen when examining the following excerpts from the compiled risk registries (Table 5.6). In this table we have three different risks, Risks one and two identify risks associated with ‘lack of full time commitment’, and

Risk three identifying 'ineffective end-user communication'. While Risks one and two fall within the same risk factor, the impacts and subsequent applied controls are different. Risks two and three are different risk factors but are part of the same risk category, and have matching impacts, and subsequent matching applied controls.

Table 5.6: Sample data_1 from compiled risk registries

Case No	Risk Category	Risk Factor	Risk	Impact	Control Applied
Risk 1: Case 6 (ITM5) (R)	User involvement and training	Lack of full-time commitment of "customers" to PM and project activities	Well-being of team members affected by workload	Team members leave rather than hang around to suffer Stress levels lead to incorrect configuration.	Realistic resource assessment performed prior to each phase to ensure that appropriate resource levels are put in place
					Have some fun
Risk 2: Case 6 (ITM5) (R)	User involvement and training	Lack of full-time commitment of "customers" to PM and project activities	Ongoing changes from within the business resulting in key team members being unavailable	New ERP system fails to enable world class performance objectives **Negative perception of the system** **Delays could occur**	Work closely to ensure effective communication between the business and the project.
					Document "easy wins" and positive feedback back into the business
					Ensure the project is seen to be "in the business"
Risk 3: Case 6 (ITM5) (R)	User involvement and training	3. Ineffective end-user communication	Ad hoc communication to customers whilst sorting the system out	**Negative perception of the system** **Delays could occur** Misinformation leading to a perception that the ERP implementation is a failure.	**Document "easy wins" and positive feedback back into the business**
					Ensure the project is seen to be "in the business"
					Project Champion, PM and Marketing Manager to discuss ongoing messages as events develop

When applying these findings to the Lyytinen et al., Risk Management Approaches Model, a link can be seen between risks that fall into the user involvement and training risk category, risk impacts relating to negative perceptions and delays, and the imposition of controls requiring the project team to portray themselves as a positive part of the business. Heuristically, these controls could now be applied to an ERP implementation should the risk category be user involvement and training and the impact to the business comprise negative perceptions or delays.

A second example from the compiled risk registry (encompassing a different risk category) was found, and is shown in table 5.7. This example is very similar to table 5.6, where three risks were found from spanning two different risk factors. The main difference in this example is that all risks share a business impact, and subsequent control.

All three cases identified the need to 'Sell \ promote post go-live' to negate the business impact of loss of knowledge and when applied to the Lyytinen et al., Risk Management Approaches Model, it is anticipated that other skill mix risk categories that identify an impact of a risk as 'loss of knowledge' can seek to control this by selling and promoting the post go-live project.

Table 5.7: Sample data_2 from compiled risk registries

Case no	Risk Category	Risk Factor	Risk	Business Impacts	Controls used
Case 5 (ITM4) (I)	Skill mix	Insufficient "Internal" expertise	Lack of internal SAP developers	**Loss of knowledge**	**Sell \ promote post go-live project** (stating both benefits and disadvantages to non-participation).
Case 6 (ITM5) (R)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Team members leave during the project	· **Loss of knowledge**	**Sell \ promote post go live**
				· Snowball effect	Change management role impact process in place & procedure well communicated
				· Irreplaceable team members	Focus groups and surveys of Project team members to monitor activities
				· Realisation of operational business	Business support strategy agreed and made public
Case 6 (ITM5) (R)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Project team members not retained after the implementation	· **Loss of knowledge**	**Sell \ promote post go-live project** to carry over to team
				· Increased costs	Succession planning to be done during the project
				· Reliance on external parties	Executive team \ Project Managers to identify and assign IS support plan post go-live

This direct connection between impacts and controls within the confines of the risk category appears to be an extension of the Aloini et al., (2012) research which found a connection between risks and common types of project failure.

One of the problems experienced when attempting to examine the risk registry entries sourced solely from the documentation received was that impact analysis conducted appears to have been conducted to different levels of granularity dependant on the organisation and risk identified. If we look at risks 1 and 3 in table 5.8, we see the risk identified in 3 being very similar to one of the business impacts identified in risk 1. When we examine the controls used for the risks however, we see a similarity in the identified need to seek feedback from the project team.

Table 5.8: Sample1 of risk, business impact, and controls from compiled risk registries

Risk & Case No	Risk	Business impact	Controls	Control Type
1 ITM (R)		**Team members decide to leave the business (and project) assuming that there will be no future role**	Proactively seek feedback from team leaders if any project team members are affected (change manager to attend weekly team leader meetings)	Behavioural
3	**Team members leaving during the project**		Focus groups and surveys of Project team members to monitor activities	Behavioural

While that similarity can be seen, if we examine risks 3 and 4 we see that the business impacts have been analysed to a lower level of granularity than risk 1 and display similarities. In particular the identified need to "sell \ promote post go-live".

Table 5.9: Sample2 of risk, business impact, and controls from compiled risk registries

Risk & Case No	Risk	Business impact	Controls	Control Type
3	Team members leaving during the project	• **Loss of knowledge** • Snowball effect • Irreplaceable team members • Realisation of operational business	**Sell \ promote post go live**	Behavioural
			Change management role impact process in place & procedure well communicated	Behavioural
			Focus groups and surveys of Project team members to monitor activities	Output
			Business support strategy agreed and made public	Behavioural
4	Project team members not retained after the implementation	• **Loss of knowledge** • Increased costs • Reliance on external parties	**Sell \ promote post go-live project to carry over to team**	Behavioural
			Succession planning to be done during the project	Behavioural
			Executive team \ Project Managers to identify and assign IS support plan post go-live	Output

From this analysis, an initial exploratory list of impacts and their respective controls has been compiled. Table 5.10 contains a list of impacts and the controls used in the examined risk registries. The impacts have been grouped into the same categories as used by Sumner (2000) in her breakdown of ERP risk factors.

Table 5.10: Skill mix impact / controls

Impacts	Controls	Control Type
• Team members decide to leave the business (and project) assuming that there will be no future role • Lack of motivation in the project due to uncertainty with the future direction • Final configuration and processes not optimised • Project team members may not "fit in" resulting in them leaving the business • Most knowledgeable staff in the new system may leave	• Proactively seek feedback from team leaders if any project team members are affected (change manager to attend weekly team leader meetings) • One on one discussions with the project team member affected or perceived to be affected by the project • Feedback discussions and action plans developed in conjunction with Human Resources, Functional Reporting Manager and Project Change Manager • Retention plans need to be draw up by the Project Manager in conjunction with the Project Champion and Executive team • Succession planning to be addressed by the project Manager • Regular communication from the project to the business and vice versa	• Behavioural • Output • Output • Output • Output • Behavioural
• Loss of knowledge • Snowball effect • Irreplaceable team members • Realisation of operational business	• Sell \ promote post go live • Change management role impact process in place & procedure well communicated • Focus groups and surveys of Project team members to monitor activities • Business support strategy agreed and made public	• Behavioural • Behavioural • Output • Output
• Loss of knowledge • Increased costs • Reliance on external parties	• Sell \ promote post go-live project to carry over to team • Succession planning to be done during the project • Executive team \ Project Managers to identify and assign IS support plan post go-live	• Behavioural • Output • Output

Impacts	Controls	Control Type
• Incorrect benefits, configuration, quality, performance • Incorrect configuration • Potential failure of the system in "go live" • Incorrect Assess phase output, with knock-on effects throughout • Confusion on "go live" as to which process should be used	• Communicate "no changes" approach to business • Cohesive approach, communication of change, link between project champion and CEO, ensure correct backfill and strong links between project team members and senior management with clear processes defined • Steering team to ensure (at least) monthly confirmation from Project and Senior Management that the correct interface and protocols are in place • Dual review of all documentation by all team members and overall review by entire team throughout project • Control the integration process • Middle managers to be made aware that they need to think about the ERP when making decisions	• Output • Behavioural • Output • Output • Output • Clan
• Risk of mistakes occurring • Burn out of key members	Ensure a work balance is achieved Up-skill business people where appropriate	• Clan • Behavioural

When analysing skill mix impacts and controls, one impact \ control pairing which comes through strongly is loss of knowledge and the need to sell \ promote the post go-live project (Table 5.11).

Table 5.11: Reoccurring Skill Mix impact / control pairings

Impacts	Controls	Control Type
• Loss of knowledge	• Sell \ promote post go-live project to carry over to team	• Behavioural

It is hoped that in future research, this can be further developed by the identification of additional impact to control pairings.

Therefore, in response to the research question

How can Project Managers (PMs) map risks to controls across different stages of ERP implementations?

Project managers may be able to map risks to controls by performing in-depth business impact analysis, and mapping controls directly to the impacts. Current risk management practices suggest converting business impact into a numerical value, and multiplying that value with a probability value to get the overall risk score (Patterson & Neailey, 2002). This research would suggest that more value would be gained from identifying potential business impacts and using that as a decision tool rather than merely estimating their impact as a value.

One additional observation from both of these examples is the use of multiple controls or portfolios of control for each of the identified risks. While this relationship has highlighted certain controls applicable to certain business risks, the need to construct portfolios of control to manage risks in ERP projects is essential to project success (Choudhury & Sabherwal, 2003, Kanellou & Charalambos, 2011; Kirsch, 1997).

5.4 Other points of discussion

5.4.1 Hierarchy of controls

In part one of the discussion section, the hierarchy of risks finding identified a flow-on effect between different risks at different stages of an ERP implementation. The hierarchical structure suggests that if a risk is not controlled, additional risks can occur as a consequence of that uncontrolled risk (be it by choice or omission as per the research model). This flow-on effect appears predictable and confirms previous literature linking the manifestation of negative effects in an ERP implementation if specific risks are not controlled (Aloini et al., 2012; Markus, 2000, Sumner, 2000).

Part two of the discussion section identified a link between risks and controls if the link is based on impacts caused by risks, as opposed to the risks themselves. While further research is required, these findings suggest that the selection of appropriate controls may be possible using this method. Literature on risk control in ESs and ERPs suggest however that

individual modes of control are insufficient and that multiple simultaneous controls or portfolios of control are needed and should be utilised (Kanellou & Charalambos, 2011). A portfolio of control is a collection of different controls that can be applied to a risk and has been empirically found to be highly successful (Kirsh, 1997). While literature suggests that portfolios should be customised for specific risks based on task characteristic, role expectations, and project-related knowledge and skills (Kirsch, 1997), practical methods of constructing these mechanisms, or even understanding why certain combinations of control choices are chosen, is still limited (Remus & Weiner, 2012).

When conducting further analysis on both the hierarchical and linear relationships using the lens of the second research question,

> *How can Project Managers (PMs) map risks to controls across different stages of ERP implementations?*

the following finding (and subsequent method), emerged.

The proposed method to increase our understanding of portfolios of control is to augment the previously discussed Hierarchy of Risks models depicting risk flow to simulate control flow. It was found that while the flow-on effect of risks is downwards, the flow-on effect of controls moves in the opposite direction and appears to hierarchically flow upwards. What is meant by this is that all individual risks have the potential to be mitigated by the application of controls. What has been explored here is the possibility that a lower level risk can be controlled by applying a control for that risk at a higher level.

An example of this can be seen when examining the hierarchical risk relationship for ‘8. Lack of Senior Management Support’ during The Project stage of an ERP implementation (figure 5.27). This diagramme features the hierarchical components examined in the previous section and includes control choices from Case 9 (ITM8). What was found was that for a risk to successfully negate the flow-on effect of successive risks, it needed to encompass not only the primary control specifically implemented for that risk, but any primary controls applicable to risks that connect hierarchically at lower levels. In this way controls can be visualised as flowing in an upward direction.

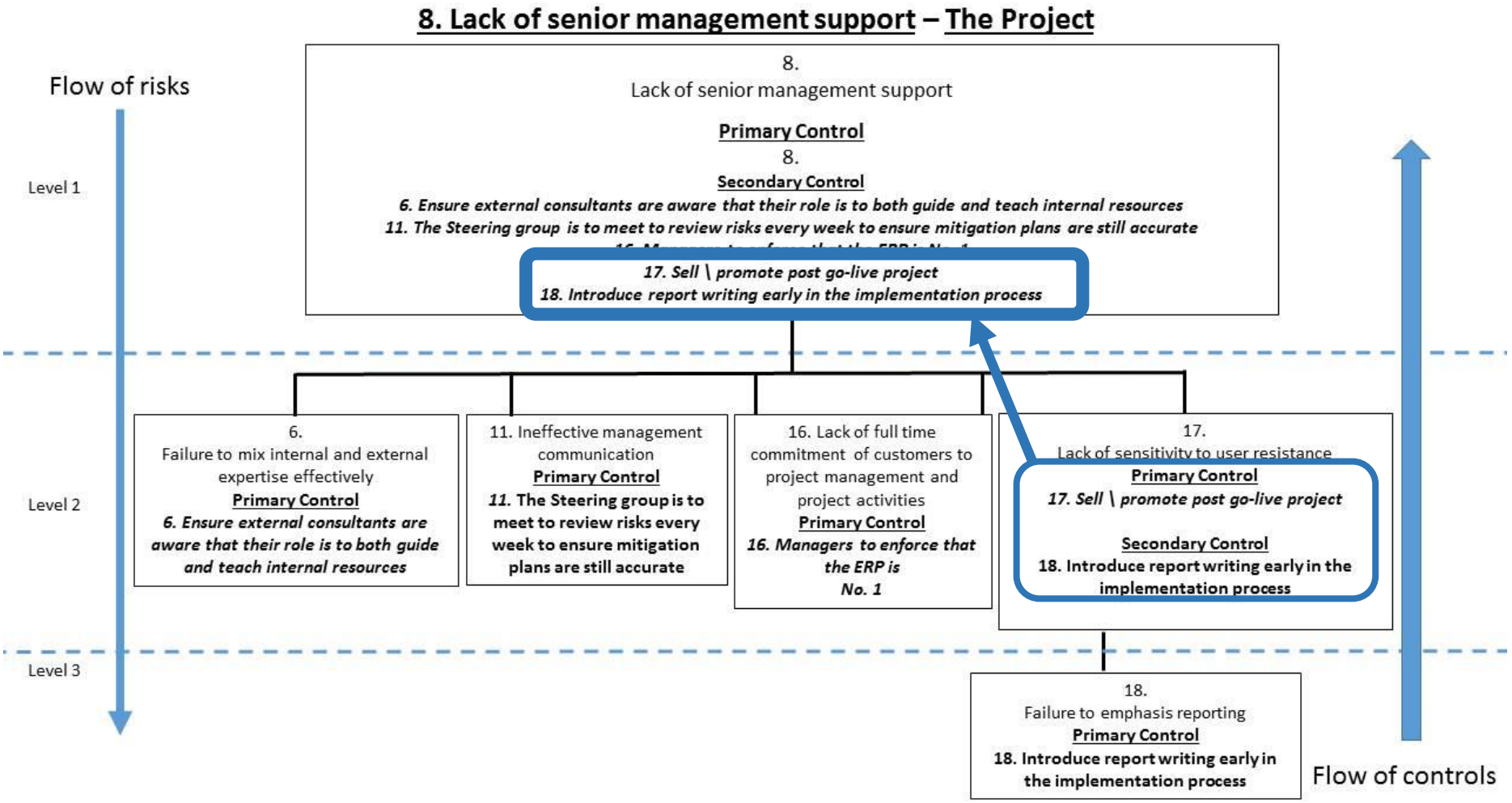

Figure 5.27: Hierarchical flow of risks vs. Hierarchical flow of controls

If we consider the hierarchical flow of risks from ’17. Lack of sensitivity to user resistance’ to ’18. Failure to emphasise reporting’, we see the primary and secondary control flows in action (Figure 5.28).

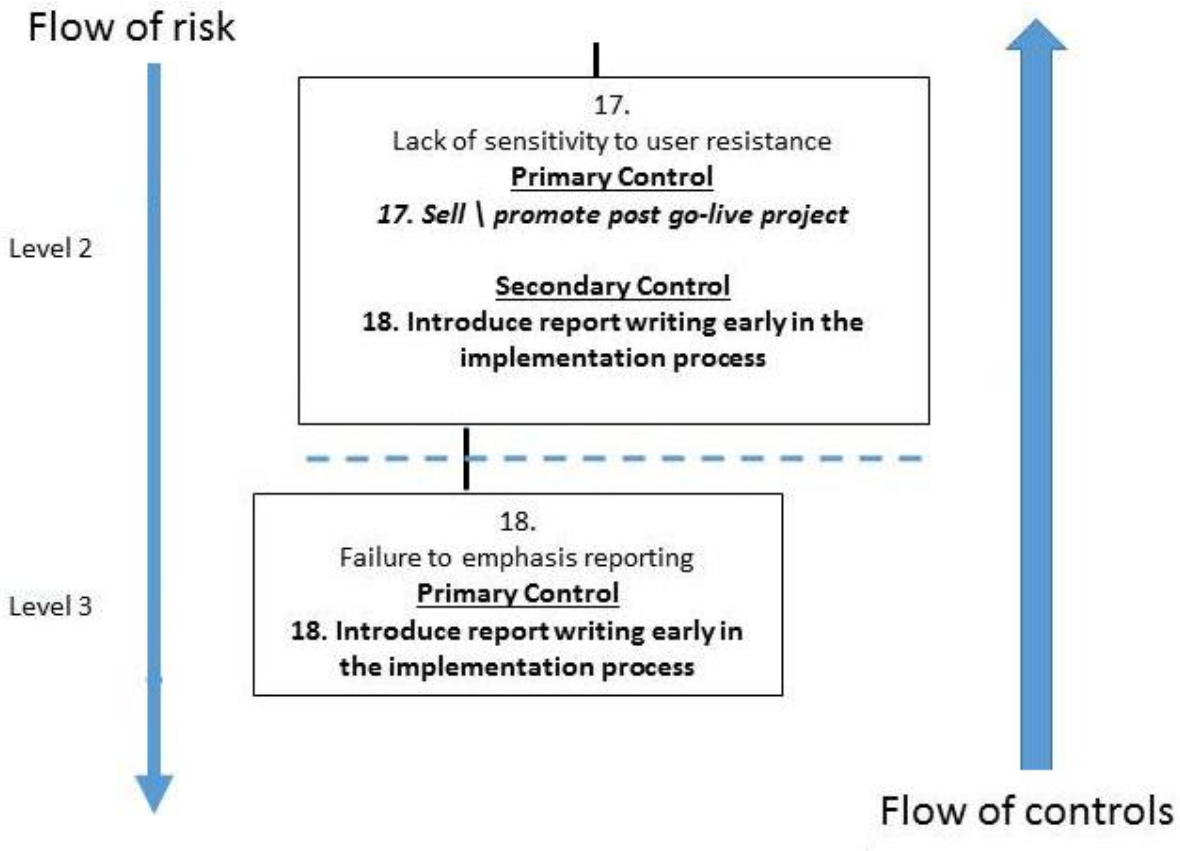

Figure 5.28: Focused view of the Hierarchical flow of risks vs. Hierarchical flow of controls

In this example, increases in user resistance were identified as a potential contributing factor to problems experienced with report writing. User resistance in this example was caused by the flow on effect of the financial controller not supporting the project and the end users in his department feeling empowered to neither commit nor participate in project activities. One of the side effects was that they did not commit time to analysing their reporting needs and this impacted negatively on the Project Manager being able to produce the correct reports.

If we apply the controls outlined in this example (Figure 5.28) to ensure that the reports were completed the users had to become involved with report writing at an earlier stage of the implementation process. (18. Failure to emphasise reporting).

To reduce user resistance, the benefits of the project needed to be sold to the end users to get buy-in and if report writing was introduced at an early stage then 'Failure to emphasise reporting' would no longer be a risk. (17. Lack of sensitivity to user resistance).

This logic can be carried through to senior management support, and by successfully selling and promoting the post go-live project, that could have increased senior management support. By successfully selling and promoting the post go-live project to end-users, there was the potential to increase end user support. If report writing was also introduced early by the senior management team then the manifestation of risks associated with report writing may also be controlled. In this example we see the flow on effects of controls moving in an upward direction and enabling the meaningful creation of a portfolio of controls for managers in The Project stage of an ERP implementation.

If we analyse the following 'User involvement and training' impact / control, we can see that the business has applied a hierarchical control structure in the assembly of a portfolio of controls for this risk (Table 5.12). They have linked 'Failure to emphasise reporting' with Failure to mix internal and external expertise effectively' and produced a set of controls to address multiple risks in a flow-on effect.

Table 5.12: Example of Hierarchy of controls from risk registry

• Unable to meet business requirements	• Introduce report writing early in the implementation process • Allocate report writing expertise	• Behavioural • Output

Although a relationship has been established from the empirical data gathered, the hierarchical model and its application in the building of portfolios of control for project managers is still exploratory, and further research is recommended to confirm and build on these findings.

5.5 Limitations

There were a number of limitations in this research due to the timeframe, the number of companies available for this study and the scope of the project which focused on the

interconnected nature of a number of different constructs. The exploratory nature of the research also had an impact on the limitations and the following list examines a number of limitations and outlines methods used to mitigate these where possible.

All project managers interviewed were involved with successful projects as their last projects so these findings may not be generalizable to projects prone to failure. Six of the 10 had however been involved with unsuccessful projects, or past projects which had suffered from serious problems during the project implementation and were explored during the interviews, but not to the depth of the successful projects.

Only project managers were interviewed, reducing the scope of the research as it does not include any other perspectives. Care was taken to validate the findings through multiple cases, internal documentation (e.g. risk registries), both semi-structure and structured interview components and publicly available information. Nonetheless, further cases involving different stakeholder groups will enable these findings to be strengthened.

When the PM's spoke of controls to identified risks, they usually only identified individual controls. These controls were frequently based on the controls they has been directly involved with (be it identification or implementation), yet literature and the supplied risk registries indicate that risks were and are effectively controlled by a number of different controls. While this was explored, frequently the reason given was that the controls identified were the major controls that mitigated the risk. This was identified as a subjective viewpoint and was not able to be confirmed by other stakeholders. The use of risk registries (where available) was used in an attempt to mitigate this by providing additional perspectives, but was deemed to be of limited success as in a majority of cases, the risk registries were maintained by the Project Manager.

The quality of the risk registries differed significantly between companies, with not only different usage and risks registered, but also differences on how the registries were structured, maintained and the information included. This made it very difficult to detect similarities in control measures used between different projects based on the information recorded, and consequently only basic analysis could be performed.

Although the risks and stages were identified as the most commonly occurring across the interviews, there were very few risks that manifested themselves in similar ways in different organisations. Determining causality is still some way off as further exploration is needed to both confirm current findings and to expand our understanding of how risks affect or are affected by other risks at different stages of ERP implementations.

While most of the projects finished pre-Christchurch earthquakes, all of the interviews took place within one year post-earthquakes, which may have influenced the way risks and controls were perceived to have been administered during the project. The method used to control this potential bias was to amalgamate the verbal responses with the risk registries in an attempt to identify inconsistencies using triangulating.
While this research explored a number of different implementations, the list of risks and controls used is limited and would need extensive

Chapter Six:

Conclusion

6.1 Conclusion

ERP systems are complex and risky to implement. If implemented successfully, ERP systems can provide real benefits for an organisation, including financial and business efficiencies. Successful implementations are not guaranteed with more implementations expected to fail than succeed. The aim of this research was to investigate factors identified in the theoretical discussion as contributing to these failure rates, which include the interconnected nature of ERP risks, and the control of risks at the tactical and operational levels. From this, the following research questions emerged.

1. *How does the relationship between different risks change during the different stages of an ERP implementation?*
2. *How can Project Managers (PMs) map risks to controls across different stages of ERP implementations?*

When addressing the first research question, it was found that certain risks appear to be interrelated, and formed different risk hierarchies at different project stages. Some risks had been identified as being more prone to failure at specific stages, and this research confirms those findings. It was also found that risks can influence, or be influenced by other risks dependent on the implementation stage. This relationship was found in all nine cases and consistently identified a flow-on effect of risks affecting other risks at different stages of the implementation. An example of this was 'Lack of Senior Management Support', as although senior management support had been identified as important within IS research, no specific identifiable patterns were found in risk literature should senior management support be lacking. From this research, it was found that senior management support influenced every other risk in the Project Chartering Stage. This relationship changed when the projects transitioned into The Project Stage, and senior management support was no longer as hierarchically inter-connected. This was consistently found across all risks discussed, and leads strongly towards the finding that the relationship between different risks changes during the different stages of an ERP implementation.

The second research question was addressed in two ways to ensure complete coverage. The first was through analysis of risk registries. In the analysis, no clear and direct relationship was found between ERP risks and controls. Rather it was the impacts to the business as a consequence of these risks, as opposed to the risks themselves, which were identified as a

means to bridge this gap. This finding suggests that controls can be linked back to risks heuristically when the selection is based on business impacts, rather than the specific risk factors themselves. While this addressed the second research question by identifying a method suitable for mapping risks to controls, its application as a means of identifying controls for risks across different stages of an ERP implementation was not as successful. An additional method was therefore used to examine this component of the research question and included augmenting one of the hierarchical risk models created with a selection of appropriate controls and analysing the results. What was found was an explanation and means of creating and reverse engineering portfolios of control. This finding was tested and confirmed with case data and goes some way towards explaining how Project Managers can map risks to controls across different stages of ERP implementations. Although this is new exploratory research, the use of multiple factors as interceding construct between risks and controls appears to be a novel approach to an ongoing problem and could produce real benefits for ERP implementation practitioners.

6.2 Further Research

The extent of the inter-relationship between impacts and risks and hierarchically between risks themselves is not yet fully known. Although this research is ERP-specific, the risks identified are not (Sumner, 2000). While the intention is to conduct further research using ERPs as the focus, it is hoped that these findings can be applied to a wider range of IS implementations in an effort to better understand the constructs and to strengthen the empirical basis for developing robust 'real-world' theory.

Chapter Seven:

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Chapter Eight:

Appendices

Appendix a: Interview Schedule

Although time indicators were established when the interview schedule was first created, during the interviews it became apparent that these were unrealistic as what was initially created as a 1 hour interview on average took 1.5-2 hours to cover. In all cases the interviewer was conscious of the time and commented when the time was reached. The interviewees were asked and were happy to continue.

Name of firm:

Telephone number:

Address:

Date of interview:

Contact:

Phases of the interview

Section 1: Introduction (Scheduled for 10 min – Averaged – 10 min)
Part 1: Setting the scene – *introductions and matters of confidentiality and right to review*
Part 2: The Firm – *establish type and size of organisation*
Part 3: The individual – *establish current position, project responsibilities and any previous experience*

Section 2: The interview (Scheduled for 20 min – Averaged – 60 min)
This section will be semi-structured to examine how the projects were broken up and risks and controls measures identified and utilised during these stages.

Section 3: The questionnaire (Scheduled for 20 min – Averaged – 45 min)
This section contains a structured interview featuring different ERP models, risk identification, risk evaluation and examples of controls available for different identified risks.
While there are set questions, the purpose of these questions is to prompt the interviewee to further elaborate on the specific risks identified in the literature and the control measures taken to counter these. This will allow further exploration of any points raised earlier and encourage new discussion.

Section 4: The conclusion (Scheduled for 10 min – Averaged – 5 min)
Part 1: Final comments - *Final comments or additional information arising from the questionnaire*
Part 2: **Future interviews** - *Ask if can call for additional information, also if there is anyone else within the organisation that it would be advisable and available to talk to.*
Part 3: Restate confidentiality and right to review - *Reconfirm that when the transcripts are completed they will be given to the interviewee for confirmation before being used for research***.**
Part 3: **Conclude** – *Thank you*

Section 1 – Introduction (10 min)

Part 1: Setting the scene (2 min)

1. Introduce interviewer (name, previous experience)
2. Research objectives (topic)
3. Explain
    a. confidentiality agreement
    b. right to opt out at any time
    c. repeat request to record the interview
    d. explain that any transcripts (when completed) of this interview will be provided to the interviewee for evaluation before use in the research, and any comments or information provided can be either removed or further clarified if required

Pg-1
Part 2: The firm (3 mins)

The aim of this section is to find out about the firm – what it does, how large and how long they have been in business. The optimum is for a large firm with multiple operating units.

Name of contact:
Job Title:

Number of Full time staff:

Firm type (e.g. manufacturing, service, retail etc):

Product and industry (e.g. software, accountancy):

How long has the firm been operating?

Years of operation	0-1	2-5	5-10	10 - 15	15-20	20-30	30-50	50+

Part 3: The individual (5 min)

The aim of this section is to establish what experience (if any) the respondent has had in the area of ERP implementations, risk analysis or risk control

Just a little about yourself – your roles and responsibilities

Please describe your role within the organisation. For example what are your major responsibilities?
Please describe your role within the ERP implementation. For example what are your major responsibilities?
Are you involved with the entire ERP installation or one of the modules in particular?
Has this organisation used ERP systems before?
Is this the first ERP installation you have been involved with?
What experience have you had with ERPs?

Section 2 - The interview (20 mins)
This section encompasses questions relating to all 3 constructs of this research paper - ERP systems, identifying risks and controls. Analysis of control measures is to take a majority of this time.

Part 1: ERP system (5 mins)

This section is to establish what ERP system has been selected and the stage of the implementation the firm is perceived to be at by the participant.

Which ERP system have you selected?

Is that a company initiative?

Do you know which modules you are using?

The following questions are to establish if there is a preferred method of viewing the stages of implementation in successful ERP projects.

How is your firm breaking the implementation up?

(Determine if the stages are based on tasks, technology or control)

Is this a personal preference or a business requirement (or both)?

Had you used this method prior to the project of this discussion?
Part 2: Determine Risks and Controls per implementation stage
Pg-2

May require an explanation of what is encompassed within control measures and will be determined by the answers given. If the interviewee enquires directly about a definition of control then a full explanation may be given or partial as a prompt (see end of section for full explanation). In the questions asked, the term "managing risks" is being used interchangeably for "control of risks".

In the first phase \ stage, can you describe a risk you identified?

After you identified this, how did you go about managing the risk?

Were the measures chosen (un)successful?

Who was it that implemented those controls?
May need to define the association between formal and informal controls and that formal controls are typically initiated at the management level and informal at the operational.

Definition
All methods and attempts to ensure individuals in organisations act in a manner that is consistent with meeting organisational goals and objectives
Methods
Controls:
Formal
Behavioural – how things are done (e.g. procedures)
Output – what things are achieved (e.g. bonuses on output)
Informal
Clan – peer expectations (can align expectations through socialisation and team building)

Section 3: Questionnaire

Allow interviewee to complete the questionnaire

Section 4: Conclusion

Ask for feedback from the questionnaire
Any additional points it may have raised
That concludes the interview
To ask:
If clarification needed can ask (email or call)
If there is anyone else within the organisation (stakeholder in charge of controls with a different project stage) that would be available to talk to
Reconfirm that when the transcripts are completed they will be given to the interviewee for confirmation before being used for research
Thank you and good bye

Pg3

Questionnaire

ERP implementation models
Which of the following models describe or closely resemble the implementation model/s you have used or are currently using? If none apply, please fill in the line at the bottom

Tick to indicate use	Model name (if known)	Stages					
	Implementation and Performance	Initiation	Adoption	Adaption	Acceptance	Routinization	Infusion
	Bancroft Model	Focus (Planning)	As is (analysis of current situation)	To be (system design – both high level and detailed)	Construction and Testing (development and testing)	Actual Implementation (implementing up to "go live")	
	Ross	Design	Implementation	Stabilisation (after "go live" when system problems are fixed)	Continuous improvement (steady improvement with added functionality)	Transformation	
	PPM	Planning (Selection of resources and personnel, scope and approach)	Project (module identification, installation and cut-over)	Enhancements (repair, extension and transformation of system)			
	Enterprise System Experience Cycle	Project Chartering (Inception to executive commitment)	The Project (Technical implementation to go live)	Shakedown (Testing and bug fixing)	Onwards and upwards (Accepted system, used to its maximum)		
	Spiral Model	Determine objectives	Identify and resolve risks	Development and test	Plan the next iteration		

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From the following list of identified risks, can you please indicate in which stage you think the risk can appear (pleas tick multiple stages if you think it is appropriate)?

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Failure to redesign business processes						
Failure to follow an enterprise-wide design which supports data integration						
Insufficient training and re-skilling of IT workforce						
Insufficient internal expertise						
Lack of business analysts with business and technology knowledge						
Failure to mix internal and external expertise effectively						
Lack of ability to recruit and retain qualified ERP systems developers						
Lack of senior management support						
Lack of proper management control structure						
Lack of a champion						
Ineffective management communication						
Failure to adhere to standardised specifications which the software supports						
Lack of integration						
Insufficient training of end users						
Ineffective end user communication						
Lack of full time commitment of customers to project management and project activities						
Lack of sensitivity to user resistance						
Failure to emphasis reporting						
Inability to avoid technical bottlenecks						
Attempting to build bridges to legacy equipment						

Did you see any of these risks appear in your last project, and if so, which stage (please tick multiple stages if appropriate)?

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Failure to redesign business processes						
Failure to follow an enterprise-wide design which supports data integration						
Insufficient training and re-skilling of IT workforce						
Insufficient internal expertise						
Lack of business analysts with business and technology knowledge						
Failure to mix internal and external expertise effectively						
Lack of ability to recruit and retain qualified ERP systems developers						
Lack of senior management support						
Lack of proper management control structure						
Lack of a champion						
Ineffective management communication						
Failure to adhere to standardised specifications which the software supports						
Lack of integration						
Insufficient training of end users						
Ineffective end user communication						
Lack of full time commitment of customers to project management and project activities						
Lack of sensitivity to user resistance						
Failure to emphasis reporting						
Inability to avoid technical bottlenecks						
Attempting to build bridges to legacy equipment						

Dependent on which of the staged models you choose, can you please tick the main stakeholders responsible for controlling identified risks within each of those stages?

Stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Stage Name					
Stakeholders	___CEO ___CIO ___Exec. Team __Steering Committee ___Project Manager __Operations Manager __Vendors __Consultants __IT Specialists (external) __Project team member __IT Specialists (internal) __Technical support __End users	___CEO ___CIO ___Exec. Team __Steering Committee ___Project Manager __Operations Manager __Vendors __Consultants __IT Specialists (external) __Project team member __IT Specialists (internal) __Technical support __End users	___CEO ___CIO ___Exec. Team __Steering Committee ___Project Manager __Operations Manager __Vendors __Consultants __IT Specialists (external) __Project team member __IT Specialists (internal) __Technical support __End users	___CEO ___CIO ___Exec. Team __Steering Committee ___Project Manager __Operations Manager __Vendors __Consultants __IT Specialists (external) __Project team member __IT Specialists (internal) __Technical support __End users	___CEO ___CIO ___Exec. Team __Steering Committee ___Project Manager __Operations Manager __Vendors __Consultants __IT Specialists (external) __Project team member __IT Specialists (internal) __Technical support __End users

Which of the following methods of control would be appropriate to manage each of the identified risks?
(You may tick more than 1 if appropriate)

Definition of Control
All methods and attempts to ensure individuals in organisations act in a manner that is consistent with meeting organisational goals and objectives

Methods
Controls:
Formal

Behavioural – measures to control how things are done (e.g. formal procedures, training)

Output – measures to control what things are achieved (e.g. bonuses on output, sales targets, numbers and levels of training achieved)

Informal

Clan – expected behaviour and outputs at the informal level - peer expectations (can align expectations through socialisation and team building)

	Formal		Informal
	Behavioural	Output	Clan
Failure to redesign business processes			
Failure to follow an enterprise-wide design which supports data integration			
Insufficient training and re-skilling of IT workforce			
Insufficient internal expertise			
Lack of business analysts with business and technology knowledge			
Failure to mix internal and external expertise effectively			
Lack of ability to recruit and retain qualified ERP systems developers			
Lack of senior management support			
Lack of proper management control structure			
Lack of a champion			
Ineffective management communication			
Failure to adhere to standardised specifications which the software supports			
Lack of integration			
Insufficient training of end users			
Ineffective end user communication			
Lack of full time commitment of customers to project management and project activities			
Lack of sensitivity to user resistance			
Failure to emphasis reporting			
Inability to avoid technical bottlenecks			
Attempting to build bridges to legacy equipment			

Appendix b: Summary of Risks ranked by Project Stage

Risks	Project Chartering		Project		Shakedown		Onwards and upwards
	Frequency	Case No	Frequency	Case No	Frequency	Case No	
21. Failure to redesign business processes	B	4, 8, 10, 11, 12	B	**5, 7, 8, 9, 10, 11**	D	4, 8	-
22. Failure to follow an Enterprise-wide design which supports data integration	D	7, 11	B	4, 5, 8, 9, 11	D	7, 8	-
23. Insufficient training and reskilling of IT workforce	C	8, 9, 11, 12	B	4, 5, 8, 9, 10, 11	C	4, 7, 8, 10	-
24. Insufficient 'internal' expertise	C	4, 8, 9, 12	**A**	**4, 5, 7, 8, 9, 10, 11**	D	8	-
25. Lack of business analysts with business and technical knowledge	B	4, 8, 9, 10, 11, 12	**A**	**4, 5, 7, 8, 9, 10, 11**	D	7, 8	-
26. Failure to mix internal and external expertise effectively	3	4, 7, 8, 9, 12	3	4, 5, 8, 9, 11	1	8	-
27. Lack of ability to recruit and retain qualified ERP systems developers	1	7, 9	3	4, 5, 10, 11, 12	2	4, 8, 10	-
28. Lack of senior management support	3	4, 7, 8, 9, 11, 12	3	4, 5, 8, 9, 11, 12	2	4, 8, 9	-
29. Lack of proper management control structure	3	4, 7, 8, 9, 11, 12	**4**	**4, 5, 8, 9, 10, 11, 12**	2	4, 8, 9, 10	-
30. Lack of champion	**4**	**4, 5, 7, 8, 9, 11, 12**	3	4, 5, 8, 9, 11, 12	2	4, 8, 9	-
31. Ineffective management communication	3	7, 8, 9, 11, 12	**4**	**4, 5, 7, 8, 9, 10, 11, 12**	2	4, 7, 8, 10	-
32. Failure to adhere to standardised specifications which the software supports	2	8, 9, 11, 12	**4**	**4, 5, 7, 8, 9, 10, 11, 12**	1	4, 8	-
33. Lack of integration	2	8, 11, 12	**4**	**4, 5, 7, 8, 9, 10, 11**	2	4, 8, 9	-
34. Insufficient training of end users	1	8	**4**	**4, 5, 8, 9, 10, 11, 12**	3	4, 7, 8, 9, 10	-
35. Ineffective end-user communication	2	4, 8, 11	**4**	**4, 5, 7, 8, 9, 10, 11, 12**	2	4, 7, 8, 9	-
36. Lack of full time commitment of customers to project management and project activities	2	4, 7, 11, 12	3	4, 5, 9, 11, 12	2	4, 9, 10	-
37. Lack of sensitivity to user resistance	2	4, 8, 12	**4**	**4, 5, 8, 9, 10, 11, 12**	3	4, 7, 8, 9, 10	-
38. Failure to emphasis reporting	3	8, 9, 10, 11, 12	**4**	**4, 5, 8, 9, 10, 11, 12**	3	4, 7, 8, 9, 10	-
39. Inability to avoid technological bottlenecks	1	4, 8	**4**	**4, 5, 8, 9, 10, 11, 12**	2	4, 7, 8, 9	-
40. Attempting to build bridges to legacy applications	2	8, 11, 12	3	4, 5, 8, 10, 11, 12	1	4, 8	-

Appendix c: Risks sorted by Risk Factor

1. Failure to redesign business processes

Case No	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 4 (ITM3) (I)	1. Failure to redesign business processes	Unable to work out which processes are needed by the business		Incorrect configuration of system	Work one-on-one with the users to get required information
Case 7 (ITM6) (I)	1. Failure to redesign business processes	Unable to work out which processes are needed by the business	Silo mentality within the organisational units means that staff do not have the necessary business knowledge to be able to accurately gage what processes are necessary and their impact on other business units. This can be further impacted by users resistant to change (ERP Terrorists)	Incorrect configuration of the system	Engage external contractors
Case 4 (ITM3) (I)	1. Failure to redesign business processes	Unable to work out which processes are needed by the business		Incorrect configuration of system	Work one-on-one with the users to get all required information
Case 5 (ITM4) (I)	1. Failure to redesign business processes	Unable to recreate current environment	The resources for their current environment are soon to be removed and they need to recreate the old environment. This has to be done using reverse engineering techniques as they will lose access to all of the previous company's support and systems.	Incorrect configuration of system	Work one-on-one with the users to get accurate information

3. Insufficient training and re-skilling of IT workforce

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 6 (ITM5) (R)	3. Insufficient training and re-skilling of IT workforce	IS team working extended hours over a long duration		· Risk of mistakes occurring	Ensure a work balance is achieved
				· Burn out of key members	Up-skill business people where appropriate

4. Insufficient "Internal" expertise

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 5 (ITM4) (I)	4. Insufficient "Internal" expertise	Lack of internal SAP developers	If the third property do not join then they may have insufficient internal SAP resources for the project	Loss of knowledge	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
Case 8 (ITM7) (I)	4. Insufficient "Internal" expertise	IT competence within the business is weak	There was only one IT person in an administrative role and the requirements of the new system dictated the need for more personnel with a variety of skill sets.	Incorrect configuration of the system	Engage external contractors
Case 9 (ITM8) (I)	4. Insufficient "Internal" expertise	External requirements cannot be met by internal resources	High levels of staff turnover had created a vacuum with new members of staff not required to have high levels of IT competency	Incorrect configuration of the system	Engage external contractors
Case 6 (ITM5) (I)	4. Insufficient "Internal" expertise	External requirements cannot be met by internal resources	The need to be Sarbanes Oxley compliant requires greater technical knowledge than is currently available within the organisation.	Incorrect configuration of the system	Engage external contractors
Case 7 (ITM6) (I)	4. Insufficient "Internal" expertise	External requirements cannot be met by internal resources	This was a identified as a not only a project problem, but also as a potential ongoing issue as internal IT resources are low and on-going system maintenance requirements are high	Incorrect configuration of the system	Engage external contractors

6. Failure to mix internal and external expertise effectively

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 6 (ITM5) (R)	6. Failure to mix internal and external expertise effectively	The team members business roles change whilst on the project	The team members business roles change whilst on the project causing possible integration issues when team members are transferred back to the business after the ERP project is complete	· Team members decide to leave the business (and project) assuming that there will be no future role	Proactively seek feedback from team leaders if any project team members are affected (change manager to attend weekly team leader meetings)
				· Lack of motivation in the project due to uncertainty with the future direction	One on one discussions with the project team member affected or perceived to be affected by the project
				· Final configuration and processes not optimised	Feedback discussions and action plans developed in conjunction with Human Resources, Functional Reporting Manager and Project Change Manager
				· Project team members may not “fit in” resulting in them leaving the business	Retention plans need to be draw up by the Project Manager in conjunction with the Project Champion and Executive team
				· Most knowledgeable staff in the new system may leave	Succession planning to be addressed by the project Manager
					Regular communication from the project to the business and vice versa

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 6 (ITM5) (R)	6. Failure to mix internal and external expertise effectively	Disconnect between BPR and ERP project	Disconnect between BPR and ERP project stemming from an inadequate knowledge transfer between consultants and the business \ project team members leading to incorrect configuration (The "as is" processes are not a realistic representation of the actual "as is "situation	· Incorrect benefits, configuration, quality, performance · Incorrect configuration	Communicate "no changes" approach to business
				· Potential failure of the system in "go live"	Cohesive approach, communication of change, link between project champion and CEO, ensure correct backfill and strong links between project team members and senior management with clear processes defined
				· Incorrect Assess stage output, with knock-on effects throughout	Steering team to ensure (at least) monthly confirmation from Project and Senior Management that the correct interface and protocols are in place
				· Confusion on "go live" as to which process should be used	Dual review of all documentation by all team members and overall review by entire team throughout project
					Control the integration process
					Middle managers to be made aware that they need to think about the ERP when making decisions
Case 5 (ITM4) (I)	6. Failure to mix internal and external expertise effectively	Unknown if more external SAP resources will be needed.	Without confirmation of what resources are available, they do not know what external resources they will need	Unable to get sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
					Wait until all decisions about project participation have been made
Case 9 (ITM8) (I)	6. Failure to mix internal and external expertise effectively	Consultants not understanding the industry	The reason this was emphasised was because this had not been the case in the past and it had caused long term problems which they did not wish to encounter again	Incorrect configuration of the system	Engage external contractors who understand the business
ITM7 (Case 6) (R)	6. Failure to mix internal and external expertise effectively	Loss of consultant impacts quality of project		Quality reduces and errors more likely as undocumented knowledge isn't present to aid decision making	Super users have to do more explaining than expected due to lacking background knowledge
					Avoid losing more

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case 6) (R)	6. Failure to mix internal and external expertise effectively	New SAP project Manager dismisses consultants and destabilises project		Replacing consultants with knowledge of our business increases risk of "unforeseen circumstances" happening with new consultants that could have been avoided	Don't replace consultants. Sort the issues another way Improve super users awareness that nothing can be taken for granted
Case 6 (ITM5) (I)	6. Failure to mix internal and external expertise effectively	Need to up skill current staff	While internal resources currently do not have the skill to implement an ERP system, future implementations would benefit from higher levels of internal ERP knowledge	External consultants perform all project functions without up skilling internal project team.	Ensure external consultants are aware that their role is to both guide and teach internal resources

7. Lack of ability to recruit and retain qualified ERP systems developers

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 6 (ITM5) (R)	7. Lack of ability to recruit and retain qualified ERP systems developers	Team members leave during the project		· Loss of knowledge	Sell \ promote post go live
				· Snowball effect	Change management role impact process in place & procedure well communicated
				· Irreplaceable team members	Focus groups and surveys of Project team members to monitor activities
				· Realisation of operational business	Business support strategy agreed and made public
Case 6 (ITM5) (R)	7. Lack of ability to recruit and retain qualified ERP systems developers	Project team members not retained after the implementation	Project team members not retained after the implementation	· Loss of knowledge	Sell \ promote post go-live project to carry over to team
				· Increased costs	Succession planning to be done during the project
				· Reliance on external parties	Executive team \ Project Managers to identify and assign IS support plan post go-live

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 5 (ITM4) (I)	7. Lack of ability to recruit and retain qualified ERP systems developers	Unknown if internal SAP resources will be retained and available for the project	Without confirmation of who will participate in the project, they do not know what internal resources they will have	Unable to retain sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
ITM7 (Case6) (R)	7. Lack of ability to recruit and retain qualified ERP systems developers	Super user leaves the project	For whatever reason a super-user leaves the project at a late stage possibly without knowledge transfer	If we lose any significant area expertise near go live date then we may not be able to go-live	Ensure all super-users have backup Create plan "B" and assess effectiveness

8 Lack of senior management support

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 5 (ITM4) (I)	8 Lack of senior management support	Without full support the entire project cannot go ahead	Without full support from all participating board of directors, the project scope will have to be changed	Project scope needs to be rewritten	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
Case 9 (ITM8) (I)	8 Lack of senior management support	Lack of buy-in by the senior management team	We are struggling to engage the senior management team. This is in part attributed to the overall lack of IT knowledge as a majority of those in senior management had extensive backgrounds in sales with very little IT knowledge.	Increase in user resistance as a consequence of the lack of visible support by the senior management team	Sell \ promote post go-live project.
Case 4 (ITM3) (I)	8 Lack of senior management support	Chart of accounts not supplied before go-live	The financial controller is busy and will not supply the chart of accounts necessary for configuration	Incorrect chart of accounts created which causes an incompatibility between the existing system and the new	Ensure chart of accounts is supplied
Case 6 (ITM5) (I)	8 Lack of senior management support	Senior management team lose contact with the ERP implementation	Without regular updates and meetings there is a risk that the senior management team will lose contact with the implementation and it will stop being their number 1 priority	Implementation no longer number 1 priority within the business	The Steering group is to meet to review risks every week to ensure mitigation plans are still accurate

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 8 (ITM7) (I)	8 Lack of senior management support	Lack of support from HR part of company	Change management was handled by the project steering team. There was an effort to move the responsibility to HR as many of the issues arising were personal related but that did not happen. The project may have suffered from lower levels of pain had HR been involved as the areas identified as being of concern were based around people and processes	ERP team does not have the HR skills to deal with personnel issues associated with change management	Move personnel related implementation issues to HR department

9. Lack of proper management control structure

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case 6) (R)	9. Lack of proper management control structure	Inexperienced internal change manager may compromise Change Management function	A new member of the executive team has just started with Change Management. A recent decision to take over the planning and execution - leaving SAP in a review Q/A role - does add a little risk that he could make mistakes or miss opportunities which could result in a poorer result	Project acceptance falls and users resist more than they should	Training. Easy access to experienced help Experienced assistance

11. Lack of proper management control structure

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case6) (R)	9. Lack of senior management communication	If communication	A new member of the executive team has just started with Change Management. A recent decision to take over the planning and execution - leaving SAP in a review Q/A role - does add a little risk that he could make mistakes or miss opportunities which could result in a poorer result	Project acceptance falls and users resist more than they should	Training. Easy access to experienced help Experienced assistance

12. Failure to adhere to standardised specifications which the software supports

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 5 (ITM4) (I)	12. Failure to adhere to standardised specifications which the software supports	New standard introduced makes established templates obsolete	The introduction of Unicode support has rendered the established company templates obsolete, so a decision needs to be made whether to include the new standard or to move to it after the implementation.	Cost overrun as new templates need to be created	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).

14. Insufficient training of end-users

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 4 (ITM3) (I)	14. Insufficient training of end-users	Training environment not stable enough to facilitate end user training	The training modules contain bugs and frequently break. This coupled with resistance to change led to higher levels of user resistance.	Increased levels of user resistance	Train only on stable modules
Case 9 (ITM8) (I)	14. Insufficient training of end-users	End-users not engaged	Training was a real issue for the business and stemmed in part from the lack of senior management commitment. Without that support staff did not feel the need to commit either and this resulted in widespread reluctance.	· Poor usage of ERP	Project Manager to define guidelines and strategies ensuring the reduction of reliance on disparate systems by selling the benefits of the new ERP system
Case 6 (ITM5) (R)	14. Insufficient training of end-users	Poor data quality impacts on system and processes		· Incorrect production schedule · Delay in purchasing messages	Repair data issues
				· Team members unable to complete work	Perform stock-take to correct inventory
				· Misunderstanding of systems outputs	Educate users as to the results of incorrect data entry
Case 6 (ITM5) (R)	14. Insufficient training of end-users	Team members don't understand new system		· Negative perception of system · Blame system for everything	Setup training sessions (dependent on which key units go live)
Case 6 (ITM5) (R)	14. Insufficient training of end-users	Regression to legacy systems post implementation	Regression to legacy systems post implementation	· Poor usage of ERP	A cohesive approach from the Business Integration unit
				· Disparate information	Project Manager to define guidelines and strategies ensuring the reduction of reliance on disparate systems by selling the benefits of the new ERP system
				· No reliance on data	Post Go-Live support strategy
Case 8 (ITM7) (I)	14. Insufficient training of end-users	Staff not confident using the new system at go-live	Although training was viewed as a success, Even with this success however there were still problems at go live with using the new system.	Staff using workarounds as they do not feel comfortable with the new system	Users just need to use the new system and get used to it

16. Lack of full time commitment of customers to project management and project activities

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case6) (R)	16. Lack of full time commitment of customers to project management and project activities	Absent blueprint auditor derails projects at late stage	(A super user) not present at the blueprint may result in larger problems later in the project than if they were known and resolved during the blueprint	Finding defects at a late stage will require greater re-work and increased costs compared to if found at the early stages of blueprint	Getting any audit appear at the latter stages of blueprint and gets involved Get auditor asap. Engage external auditor. Have SAP audit consultant review plans
ITM7 (Case6) (R)	16. Lack of full time commitment of customers to project management and project activities	Gaps in configuration due to super user under representation	Gaps in configuration due to super user under representation	If a super user with unique knowledge is not present during a relevant realisation session then the realisation solution may be deficient in functionality relevant to the super user. Costs to remedy later could be high	Optimise communication Improve communication
Case 5 (ITM4) (I)	16. Lack of full time commitment of customers to project management and project activities	Unable to release staff from day to day activities to participate in the project	High compliancy requirements result in high administrative overheads. This means that managers are unwilling to release staff for the project with upcoming deadlines including month end, financial planning and budgeting.	Incorrect configuration	Managers to enforce that the ERP is No.1
Case 6 (ITM5) (R)	16. Lack of full time commitment of customers to project management and project activities	Wellbeing of team members affected by workload (particularly those part-time at “peak-times” of the project)		· Team members leave rather than hang around to suffer · Stress levels lead to incorrect configuration, or final solution not achieving optimized outcome	Peer review and coaching sessions to be undertaken Business support for stress to be offered Realistic resource assessment performed by Project Management (and approved by Steering committee) prior to each stage to ensure that appropriate resource levels are put in place (backfill increase if necessary) Have some fun

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case 6) (R)	16. Lack of full time commitment of customers to project management and project activities	Super-users have too much work (to be quantified as super-users probably have more tasks than can be delivered within project deadlines)		If the super user has too much work then any combination of	Add resource
				Won't be completed on time	Extend the project
				Quality will suffer	Additional resources will help mitigate super-users leaving project
				Stress related issues will happen	
Case 6 (ITM5) (R)	16. Lack of full time commitment of customers to project management and project activities	Ongoing changes from within the business resulting in key team members being unavailable for the project		· Delays could occur	Work closely to ensure there is an effective communication link between the business and the project.
				· Team members leaving	Document “easy wins” and positive feedback back into the business
				· New ERP system fails to enable world class performance objectives	Ensure the project is seen to be “in the business”
				· Temptation to develop subsidiary systems to meet strategic objectives	Ensure management buy-in and share operational pressure via the Project Manager – Project Champion link
				· Incorrect configuration	The business strategy is to be made available to all within the ERP team
				· Resistance to change	Document business impacts, resolution processes and change management impact assessments
				· Timeline slippage and undermines implementation, increases costs and risk of failure	Ensure there are clear and concise communications as soon as any changes within the plan occur, with daily updates if necessary
				· Unable to complete business or project activities	Project Managers to “ring fence” the project team and push back on the business demands
				· Failure to achieve timeline	Managers to enforce that the ERP is No.1

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case 6) (R)	16. Lack of full time commitment of customers to project management and project activities	Key staff unavailable due to ill health		Missing key staff could delay and / or reduce quality for the project	Look after staff Plan cover
ITM7 (Case 6) (R)	16. Lack of full time commitment of customers to project management and project activities	Super user performance not spending optimal % of time on the project. Old jobs beckons. "Effort" required to communicate with consultants which means some things get left that may cause issues later		More things get left to the last minute which causes last minute panic threatening quality and go-live itself	Relocate super users permanently in Project room
Case 6 (ITM5) (I)	16. Lack of full time commitment of customers to project management and project activities	Ongoing changes from within the business resulting in key team members being unavailable for the project		· Delays could occur	Work closely to ensure there is an effective communication link between the business and the project.
Case 7 (ITM6) (I)	16. Lack of full time commitment of customers to project management and project activities	Project team members not available to work on the project		Unable to complete business or project activities	Project Managers to “ring fence” the project team and push back on the business demands
Case 9 (ITM8) (I)	16. Lack of full time commitment of customers to project management and project activities	No resources allocated to the project	This included not only staff allocations, but also those running the implementation. The project manager was required to complete the project as well as all normal daily duties	Unable to get sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).

17. Lack of sensitivity to user resistance

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 7 (ITM6) (I)	17. Lack of sensitivity to user resistance	ERP Terrorists' resisting the project and influencing others to resist	Personnel within the business who resist the project and who are able to influence others to their way of thinking	Increased levels of user resistance	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).
Case 4 (ITM3) (I)	17. Lack of sensitivity to user resistance	Unable to engage staff due to unstable training environment	The training modules contain bugs and frequently break. This coupled with resistance to change led to higher levels of user resistance.	Users think training is a waste of time Users don’t think the new system will work	Train only on stable modules
Case 8 (ITM7) (I)	17. Lack of sensitivity to user resistance	New system not performing	It was being blamed for constraining the business and was a very difficult problem to diagnose. As a consequence of the noise being generated this became a high priority problem.	Blame system for everything	Engage independent auditors to audit the system to identify the source of the problems

18. Failure to emphasise reporting

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
Case 6 (ITM5) (R)	18. Failure to emphasize reporting	Report writing strategy not defined adequately		· Unable to meet business requirements	Define strategy more clearly
Case 6 (ITM5) (R)	18. Failure to emphasize reporting	No allocation of training in the report writing strategy		· Unable to meet business requirements	Introduce report writing early in the implementation process
					Allocate report writing expertise

20. Attempting to build bridges to legacy systems

	Identified Risk Factor	Risk	Description	Business Impacts	Controls used
ITM7 (Case 6) (R)	20. Attempting to build bridges to legacy systems	WT initiatives alter scope after blueprint	WT has concurrent projects running with legacy systems to fulfil new business needs. Changes to these will need to be reflected in the SAP project	Large cost and possible time impact.	Prevent scope changes to parallel projects after blueprint completes. Plan ahead
					Ensure any blueprint changes are minor and SAP impact is signed off by the SAP team prior to agreeing to them

Appendix d: Risks sorted by Project Stage and Risk Category

Project Chartering

	Risk Category	Identified Risk Factor	Risk	Description	Stage risk was addressed	Business Impacts	Controls used	Control mode
Case 4 (ITM3) (I)	Organisational fit	Failure to redesign business processes	Unable to work out which processes are needed by the business		Project Chartering	Incorrect configuration of system	Work one-on-one with the users to get required information	
Case 7 (ITM6) (I)	Organisational fit	Failure to redesign business processes	Unable to work out which processes are needed by the business	Silo mentality within the organisational units means that staff do not have the necessary business knowledge to be able to accurately gage what processes are necessary and their impact on other business units. This can be further impacted by users resistant to change (ERP Terrorists)	Project Chartering	Incorrect configuration of the system	Engage external contractors	
Case 7 (ITM6) (I)	Organisational fit	Lack of sensitivity to user resistance	ERP Terrorists' resisting the project and influencing others to resist	Personnel within the business who resist the project and who are able to influence others to their way of thinking	Project Chartering	Increased levels of user resistance	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
Case 6 (ITM5) (R)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Team members leave during the project		Project Chartering	· Loss of knowledge	Sell \ promote post go live	Behavioural
						· Snowball effect	Change management role impact process in place & procedure well communicated	
						· Irreplaceable team members	Focus groups and surveys of Project team members to monitor activities	
						· Realisation of operational business	Business support strategy agreed and made public	
Case 6 (ITM5) (R)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Project team members not retained after the implementation	Project team members not retained after the implementation	Project Chartering	· Loss of knowledge	Sell \ promote post go-live project to carry over to team	
						· Increased costs	Succession planning to be done during the project	
						· Reliance on external parties	Executive team \ Project Managers to identify and assign IS support plan post go-live	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was**	**Business Impacts**	**Controls used**	**Control mode**

					addressed			
Case 6 (ITM5) (R)	Skill mix	Failure to mix internal and external expertise effectively	The team members business roles change whilst on the project causing possible integration issues when team members are transferred back to the business after the ERP project is complete	The team members business roles change whilst on the project causing possible integration issues when team members are transferred back to the business after the ERP project is complete	Project Chartering	· Team members decide to leave the business (and project) assuming that there will be no future role	Proactively seek feedback from team leaders if any project team members are affected (change manager to attend weekly team leader meetings)	
						· Lack of motivation in the project due to uncertainty with the future direction	One on one discussions with the project team member affected or perceived to be affected by the project	
						· Final configuration and processes not optimised	Feedback discussions and action plans developed in conjunction with Human Resources, Functional Reporting Manager and Project Change Manager	
						· Project team members may not "fit in" resulting in them leaving the business	Retention plans need to be draw up by the Project Manager in conjunction with the Project Champion and Executive team	
						· Most knowledgeable staff in the new system may leave	Succession planning to be addressed by the project Manager	
							Regular communication from the project to the business and vice versa	
Case 6 (ITM5) (R)	Skill mix	Failure to mix internal and external expertise effectively	Disconnect between BPR and ERP project stemming from an inadequate knowledge transfer between consultants and the business \ project team members leading to incorrect configuration (The "as is" processes are not a realistic representation of the actual "as is "situation	Disconnect between BPR and ERP project stemming from an inadequate knowledge transfer between consultants and the business \ project team members leading to incorrect configuration (The "as is" processes are not a realistic representation of the actual "as is "situation	Project Chartering	· Incorrect benefits, configuration, quality, performance · Incorrect configuration	Communicate "no changes" approach to business	
						· Potential failure of the system in "go live"	Cohesive approach, communication of change, link between project champion and CEO, ensure correct backfill and strong links between project team members and senior management with clear processes defined	
						· Incorrect Assess stage output, with knock-on effects throughout	Steering team to ensure (at least) monthly confirmation from Project and Senior Management that the correct interface and protocols are in place	
						· Confusion on "go live" as to which process should be used	Dual review of all documentation by all team members and overall review by entire team throughout project	
							Control the integration process	
							Middle managers to be made aware that they need to think about the ERP when making decisions	

	Risk Category	Identified Risk Factor	Risk	Description	Stage risk was addressed	Business Impacts	Controls used	Control mode
Case 5 (ITM4) (I)	Skill mix	Insufficient "Internal" expertise	Lack of internal SAP developers	If the third property do not join then they may have insufficient internal SAP resources for the project	Project Chartering	Loss of knowledge	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
Case 5 (ITM4) (I)	Skill mix	Failure to mix internal and external expertise effectively	Unknown if more external SAP resources will be needed.	Without confirmation of what resources are available, they do not know what external resources they will need	Project Chartering	Unable to get sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
							Wait until all decisions about project participation have been made	
Case 5 (ITM4) (I)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Unknown if internal SAP resources will be retained and available for the project	Without confirmation of who will participate in the project, they do not know what internal resources they will have	Project Chartering	Unable to retain sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
Case 8 (ITM7) (I)	Skill mix	Insufficient internal expertise	IT competence within the business is weak	There was only one IT person in an administrative role and the requirements of the new system dictated the need for more personnel with a variety of skill sets.	Project Chartering	Incorrect configuration of the system	Engage external contractors	
Case 9 (ITM8) (I)	Skill Mix	Insufficient internal IT expertise	External requirements cannot be met by internal resources	High levels of staff turnover had created a vacuum with new members of staff not required to have high levels of IT competency	Project Chartering	Incorrect configuration of the system	Engage external contractors	

	Risk Category	Identified Risk Factor	Risk	Description	Stage risk was addressed	Business Impacts	Controls used	Control mode
Case 9 (ITM8) (I)	Skill Mix	Failure to mix internal and external expertise effectively	Consultants not understanding the industry	The reason this was emphasised was because this had not been the case in the past and it had caused long term problems which they did not wish to encounter again	Project Chartering	Incorrect configuration of the system	Engage external contractors who understand the business	
Case 5 (ITM4) (I)	Management structure and strategy	Lack of senior management support	Without full support the entire project cannot go ahead	Without full support from all participating board of directors, the project scope will have to be changed	Project Chartering	Project scope needs to be rewritten	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
Case 9 (ITM8) (I)	Management structure and strategy	Lack of senior management support	Lack of buy-in by the senior management team	We are struggling to engage the senior management team. This is in part attributed to the overall lack of IT knowledge as a majority of those in senior management had extensive backgrounds in sales with very little IT knowledge.	Project Chartering	Increase in user resistance as a consequence of the lack of visible support by the senior management team	Sell \ promote post go-live project.	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was**	**Business Impacts**	**Controls used**	**Control mode**

					addressed			
Case 5 (ITM4) (I)	Software systems and design	Failure to adhere to standardised specifications which the software supports	New standard introduced makes established templates obsolete	The introduction of Unicode support has rendered the established company templates obsolete, so a decision needs to be made whether to include the new standard or to move to it after the implementation.	Project Chartering	Cost overrun as new templates need to be created	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
Case 6 (ITM7) (R)	User involvement and training	Lack of full time commitment from of customers to project management activities	Absent blueprint auditor derails projects at late stage	(A super user) not present at the blueprint may result in larger problems later in the project than if they were known and resolved during the blueprint	Project Chartering	Finding defects at a late stage will require greater re-work and increased costs compared to if found at the early stages of blueprint	Getting any audit appear at the latter stages of blueprint and gets involved	
							Get auditor asap. Engage external auditor. Have SAP audit consultant review plans	
Case 6 (ITM7) (R)	User involvement and training	Lack of full time commitment from of customers to project management activities	Gaps in configuration due to super user under representation	Gaps in configuration due to super user under representation	Project Chartering	If a super user with unique knowledge is not present during a relevant realisation session then the realisation solution may be deficient in functionality relevant to the super user. Costs to remedy later could be high	Optimise communication	
							Improve communication	
Case 5 (ITM4) (I)	User involvement and training	Ineffective end-user communication	Lack of communication leading to misinformation being spread	Gaps left in communication are being filled with unsubstantiated rumour, which is promoting end user resistance as staff are unsure of the business direction or the security of their jobs.	Project Chartering	Lack of end user buy-in	Set up central strategic and messaging unit	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 5 (ITM4) (I)	User involvement and training	Lack of full time commitment of customers to project management activities	Unable to release staff from day to day activities to participate in the project	High compliancy requirements result in high administrative overheads. This means that managers are unwilling to release staff for the project with upcoming deadlines including month end, financial planning and budgeting.	Project Chartering	Incorrect configuration	Managers to enforce that the ERP is No.1	

The Project

	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**
Case 6 (ITM5) (R)	Organisational fit	Insufficient training and re-skilling	IS team working extended hours over a long duration		The Project	· Risk of mistakes occurring	Ensure a work balance is achieved	
						· Burn out of key members	Up-skill business people where appropriate	
Case 4 (ITM3) (I)	Organisational fit	Failure to redesign business processes	Unable to work out which processes are needed by the business		The Project	Incorrect configuration of system	Work one-on-one with the users to get all required information	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 5 (ITM4) (I)	Organisational fit	Failure to redesign business processes	Unable to recreate current environment	The resources for their current environment are soon to be removed and they need to recreate the old environment. This has to be done using reverse engineering techniques as they will lose access to all of the previous company's support and systems.	The Project	Incorrect configuration of system	Work one-on-one with the users to get accurate information	
Case 6 (ITM5) (R)	Skill mix	Lack of ability to recruit and retain qualified ERP systems developers	Super user leaves the project	For whatever reason a super-user leaves the project at a late stage possibly without knowledge transfer	The Project	If we lose any significant area expertise near go live date then we may not be able to go-live	Ensure all super-users have backup	
							Create plan "B" and assess effectiveness	
Case 6 (ITM5) (R)	Skill mix	Failure to mix internal and external expertise effectively	Loss of consultant impacts quality of project		The Project	Quality reduces and errors more likely as undocumented knowledge isn't present to aid decision making	Super users have to do more explaining than expected due to lacking background knowledge	
							Avoid losing more	
Case 6 (ITM5) (R)	Skill mix	Failure to mix internal and external expertise effectively	New SAP project Manager dismisses consultants and destabilises project		The Project	Replacing consultants with knowledge of our business increases risk of "unforeseen circumstances" happening with new consultants that could have been avoided	Don't replace consultants. Sort the issues another way	
							Improve super users awareness that nothing can be taken for granted	
Case 6 (ITM5) (I)	Skill mix	Insufficient internal expertise	External requirements cannot be met by internal resources	The need to be Sarbanes Oxley compliant requires greater technical knowledge than is currently available within the organisation.	The Project	Incorrect configuration of the system	Engage external contractors	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 6 (ITM5) (I)	Skill mix	Failure to mix internal and external expertise effectively	Need to up skill current staff	While internal resources currently do not have the skill to implement an ERP system, future implementations would benefit from higher levels of internal ERP knowledge	The Project	External consultants perform all project functions without up skilling internal project team.	Ensure external consultants are aware that their role is to both guide and teach internal resources	
Case 7 (ITM6) (I)	Skill mix	Insufficient internal "IT" expertise	External requirements cannot be met by internal resources	This was a identified as a not only a project problem, but also as a potential ongoing issue as internal IT resources are low and on-going system maintenance requirements are high	The Project	Incorrect configuration of the system	Engage external contractors	
Case 6 (ITM7) (R)	Management structure and strategy	Lack of proper management control structure	Inexperienced internal change manager may compromise Change Management function	A new member of the executive team has just started with Change Management. A recent decision to take over the planning and execution - leaving SAP in a review Q/A role - does add a little risk that he could make mistakes or miss opportunities which could result in a poorer result	The Project	Project acceptance falls and users resist more than they should	Training. Easy access to experienced help	
							Experienced assistance	
Case 4 (ITM3) (I)	Management structure and strategy	Lack of senior management support	Chart of accounts not supplied before go-live	The financial controller is busy and will not supply the chart of accounts necessary for configuration	The Project	Incorrect chart of accounts created which causes an incompatibility between the existing system and the new	Ensure full management team buy-in Ensure chart of accounts is supplied	
Case 6 (ITM5) (I)	Management structure and strategy	Lack of senior management support	Senior management team lose contact with the ERP implementation	Without regular updates and meetings there is a risk that the senior management team will lose contact with the implementation and it will stop being their number 1 priority	The Project	Implementation no longer number 1 priority within the business	The Steering group is to meet to review risks every week to ensure mitigation plans are still accurate	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 8 (ITM7) (I)	Management structure and strategy	Lack of senior management support	Lack of support from HR part of company	Change management was handled by the project steering team. There was an effort to move the responsibility to HR as many of the issues arising were personal related but that did not happen. The project may have suffered from lower levels of pain had HR been involved as the areas identified as being of concern were based around people and processes	The Project	ERP team does not have the HR skills to deal with personnel issues associated with change management	Ensure full management team buy-in Move personnel related implementation issues to HR department	
Case 5 (ITM4) (I)	Management structure and strategy	11. Ineffective management communication	Unable to establish effective communication channels	With a project this size, everyone works on different things and it is just a matter of ensuing that communication channels stay open	The Project	Increases the risk of disengaged senior managers	The steering group is to meet to review risks every week to ensure mitigation plans are still accurate	
Case 6 (ITM5) (R)	User involvement and training	Lack of full-time commitment of "customers" to project management and project activities	Wellbeing of team members affected by workload (particularly those part-time at "peak-times" of the project)		The Project	· Team members leave rather than hang around to suffer	Peer review and coaching sessions to be undertaken	
						· Stress levels lead to incorrect configuration, or final solution not achieving optimized outcome	Business support for stress to be offered	
							Realistic resource assessment performed by Project Management (and approved by Steering committee) prior to each stage to ensure that appropriate resource levels are put in place (backfill increase if necessary)	
							Have some fun	
ITM7 (Case6) (R)	User involvement and training	Lack of full-time commitment of "customers" to project management and project activities	Super-users have too much work (to be quantified as super-users probably have more tasks than can be delivered within project deadlines)		The Project	If the super user has too much work then any combination of	Add resource	
						Won't be completed on time	Extend the project	
						Quality will suffer	Additional resources will help mitigate super-users leaving project	
						Stress related issues will happen		
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 6 (ITM5) (R)	User involvement and training	Lack of full time commitment of customers to project management and project activities	Ongoing changes from within the business resulting in key team members being unavailable for the project		The Project	· Delays could occur	Work closely to ensure there is an effective communication link between the business and the project.	
						· Team members leaving	Document “easy wins” and positive feedback back into the business	
						· New ERP system fails to enable world class performance objectives	Ensure the project is seen to be “in the business”	
						· Temptation to develop subsidiary systems to meet strategic objectives	Ensure management buy-in and share operational pressure via the Project Manager – Project Champion link	
						· Incorrect configuration	The business strategy is to be made available to all within the ERP team	
						· Resistance to change	Document business impacts, resolution processes and change management impact assessments	
						· Timeline slippage and undermines implementation, increases costs and risk of failure	Ensure there are clear and concise communications as soon as any changes within the plan occur, with daily updates if necessary	
						· Unable to complete business or project activities	Project Managers to “ring fence” the project team and push back on the business demands	
						· Failure to achieve timeline	Managers to enforce that the ERP is No.1	
ITM7 (Case 6) (R)	User involvement and training	Lack of full time commitment of customers to project management and project activities	Key staff unavailable due to ill health		The Project	Missing key staff could delay and / or reduce quality for the project	Look after staff	
							Plan cover	
ITM7 (Case 6) (R)	User involvement and training	Lack of full time commitment of customers to project management and project activities	Super user performance not spending optimal % of time on the project. Old jobs beckons. "Effort" required to communicate with consultants which means some things get left that may cause issues later		The Project	More things get left to the last minute which causes last minute panic threatening quality and go-live itself	Relocate super users permanently in Project room	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 6 (ITM5) (R)	User involvement and training	Failure to emphasize reporting	Report writing strategy not defined adequately		The Project	· Unable to meet business requirements	Define strategy more clearly	
Case 6 (ITM5) (R)	User involvement and training	Failure to emphasize reporting	No allocation of training in the report writing strategy		The Project	· Unable to meet business requirements	Introduce report writing early in the implementation process	
							Allocate report writing expertise	
ITM7 (Case 6) (R)	User involvement and training	Ineffective end-user communication	Inconsistent project communications throughout company	Some departments have internal meetings involving their super users giving an update to the project and answering questions. Other don't	The Project	Some staff less accepting of the project, spread negative comments and reduce acceptance and quality of the final result	Standardise communications mediums and expect compliance	
							Improve other forms of communication to compensate	
Case 4 (ITM3) (I)	User involvement and training	Insufficient training of end-users	Training environment not stable enough to facilitate end user training	The training modules contain bugs and frequently break. This coupled with resistance to change led to higher levels of user resistance.	The Project	Increased levels of user resistance	Train only on stable modules	
Case 4 (ITM3) (I)	User involvement and training	Lack of sensitivity to user resistance	Unable to engage staff due to unstable training environment	The training modules contain bugs and frequently break. This coupled with resistance to change led to higher levels of user resistance.	The Project	Increased levels of user resistance	Train only on stable modules	
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 6 (ITM5) (I)	User involvement and training	Lack of full time commitment of customers to project management and project activities	Ongoing changes from within the business resulting in key team members being unavailable for the project		The Project	· Delays could occur	Work closely to ensure there is an effective communication link between the business and the project.	
Case 7 (ITM6) (I)	User involvement and training	Lack of full time commitment of customers to the project	Project team members not available to work on the project		The Project	Unable to complete business or project activities	Project Managers to "ring fence" the project team and push back on the business demands	
Case 9 (ITM8) (I)	User involvement and training	Insufficient training of end users	End-users not engaged	Training was a real issue for the business and stemmed in part from the lack of senior management commitment. Without that support staff did not feel the need to commit either and this resulted in widespread reluctance.	The Project	· Poor usage of ERP	Project Manager to define guidelines and strategies ensuring the reduction of reliance on disparate systems by selling the benefits of the new ERP system	
Case 9 (ITM8) (I)	User involvement and training	Ineffective end-user communication	No feedback received from users about the new system and any problems.	Staff refused to use the system and without the push from above felt this was justified as there was a chance the project wasn't going to work anyway.	The Project	· Poor usage of ERP	Project Manager to define guidelines and strategies ensuring the reduction of reliance on disparate systems by selling the benefits of the new ERP system	
Case 9 (ITM8) (I)	User involvement and training	Lack of full time commitment of customers to project management and project activities	No resources allocated to the project	This included not only staff allocations, but also those running the implementation. The project manager was required to complete the project as well as all normal daily duties	The Project	Unable to get sufficient resources for project	Sell \ promote post go-live project (stating both benefits and disadvantages to non-participation).	
ITM7 (Case 6) (R)	Technology planning and integration	Attempting to build bridges to legacy systems	WT initiatives alter scope after blueprint	WT has concurrent projects running with legacy systems to fulfil new business needs. Changes to these will need to be reflected in the SAP project	The Project	Large cost and possible time impact.	Prevent scope changes to parallel projects after blueprint completes. Plan ahead	
							Ensure any blueprint changes are minor and SAP impact is signed off by the SAP team prior to agreeing to them	

	Risk Category	Identified Risk Factor	Risk	Description	Stage risk was addressed	Business Impacts	Controls used	Control mode
Case 6 (ITM5) (R)	User involvement and training	Ineffective end user communication	Ad hoc communication to customers whilst sorting the system out		Shakedown	· Misinformation leading to a perception that the ERP implementation is a failure. This would result in a lack of confidence, creating increased "reassurance" communication or potential loss of business	Customer services to attend ERP daily brief	
							Project Champion, Project Manager and Marketing Manager to discuss ongoing messages as events develop	
							Project Champion, Project Manager and Marketing Manager to meet and agree on a communication strategy post go-live	
							Strategy involving 2 levels of communication.	
							1. To account managers keeping them fully informed of issues and actions \ likely impacts	
							2. A Customer suitable communication that confirms that the ERP is working as expected and indications as to progress and increased levels of service experienced	
Case 6 (ITM5) (R)	User involvement and training	Insufficient training of end users	Poor data quality impacts on system and processes		Shakedown	· Incorrect production schedule	Repair data issues	
						· Delay in purchasing messages		
						· Team members unable to complete work	Perform stock-take to correct inventory	
						· Misunderstanding of systems outputs	Educate users as to the results of incorrect data entry	
Case 6 (ITM5) (R)	User involvement and training	Insufficient training of end users	Team members don't understand new system		Shakedown	· Negative perception of system	Setup training sessions (dependent on which key units go live)	
						· Blame system for everything		
	Risk Category	**Identified Risk Factor**	**Risk**	**Description**	**Stage risk was addressed**	**Business Impacts**	**Controls used**	**Control mode**

Case 6 (ITM5) (R)	User involvement and training	Insufficient training of end users	Regression to legacy systems post implementation	Regression to legacy systems post implementation	Shakedown	· Poor usage of ERP	A cohesive approach from the Business Integration unit	
						· Disparate information	Project Manager to define guidelines and strategies ensuring the reduction of reliance on disparate systems by selling the benefits of the new ERP system	
						· No reliance on data	Post Go-Live support strategy	
Case 8 (ITM7) (I)	User involvement and training	Insufficient training of end users	Staff not confident using the new system at go-live	Although training was viewed as a success, Even with this success however there were still problems at go live with using the new system.	Shakedown	Staff using workarounds as they do not feel comfortable with the new system	Users just need to use the new system and get used to it	
Case 8 (ITM7) (I)	User involvement and training	Lack of sensitivity to user resistance	New system not performing	It was being blamed for constraining the business and was a very difficult problem to diagnose. As a consequence of the noise being generated this became a high priority problem.	Shakedown	· Blame system for everything	Engage independent auditors to audit the system to identify the source of the problems	

Appendix e: Risk factors in ERP projects (Sumner, 2000)

Risk category	Risk factor	Unique to ERP
Organizational fit	Failure to redesign business processes Failure to follow an enterprise-wide design which supports data integration	Yes Yes
Skill mix	Insufficient training and re-skilling Insufficient internal expertise Lack of business analysts with business and technology knowledge Failure to mix internal and external expertise effectively Lack of ability to recruit and retain qualified ERP systems developers	Yes Yes Yes Yes
Management structure and strategy	Lack of senior management support Lack of proper management control structure Lack of a champion Ineffective communications	
Software systems design	Failure to adhere to standardized specifications which the software supports Lack of integration	Yes Yes
User involvement and training	Insufficient training of end-users Ineffective communications Lack of full-time commitment of customers to project management and project activities Lack of sensitivity to user resistance Failure to emphasize reporting	
Technology planning/integration	Inability to avoid technological bottlenecks Attempting to build bridges to legacy applications	Yes

Appendix f: Different Classifications used in CSF research (Dezdar & Sulaiman, 2009)

Critical Success Factor	Different Classifications within each CSF
Top management support and commitment	Top management/executive involvement Top management/ executive commitment Top management/executive awareness Top management/executive participation Company-wide support Company-wide commitment Dedicated resources Employee recognition and incentive Funds support
Project management and evaluation	Effective project management Project planning project schedule and plan Project scope Work time schedule Detailed schedule Project completion time Project cost; auditing and control Project management of consultants and suppliers
Business process reengineering and minimum customization	BPR Business process reengineering Business process change Business process improvement, optimization, and reengineering Alignment of the business with the new system Process adaptation level Process standards Business process skills Job redesign Worked with ERP functionality maintained scope Minimum customization
ERP team composition, competence and compensation	Composition of project team member Balanced implementation team Project team The best and brightest Project team empowerment Steering committee Project team competence The domain knowledge of the ERP project team Teamwork participation Attitude of the ERP project team Professional personnel Constitution of project team ERP team compensation
Change management program	Change management plan Managing changes Managing conflicts Argument for change Management of expectations Organizational resistance to change Change readiness Understanding changing requirements Change in business goals during the project

	Conflicts between user departments Reasonable expectation with definite target
User training and education	Training employee Education on new business processes Adequate training and instruction Training of project team and end-user Effective training Hands-on training
Business plan and vision	Business plan-vision-goals-justification Vision statement and adequate business plan Feasibility-evaluation of ERP project Effective strategic thinking and planning strategic Competitive pressure Clear goals and objectives Clear desired outcomes Strategic IT planning Link to business strategy ERP strategy and implementation methodology Consensus on organizational objectives Clear ERP strategy-vision
Enterprise-wide communication and cooperation	Effective enterprise-wide communication Interdepartmental communication Interdepartmental collaboration Interdepartmental cooperation Open and honest communication among the stakeholders Cross-functional coordination Free flow of information in project team communicating ERP benefits Communication with ERP project team
Organizational culture	Cultural and business change Cultural differences Cultural readiness Change culture Cultural fit Cultural issues Shared beliefs Centralization of decision making Commitment to learning National culture Trust Unfocused information seeking Deal with organizational diversity Human resources commitment
Vendor support	Vendor-customer cooperation Vendor-customer partnership Usage of vendor's tools Technical competence of supplies Effective communications with users Domain knowledge of supplier Implementation team members Connectedness with user department Effective communications with users Service of the supplier of ERP
Software analysis, testing and troubleshooting	System development Stabilization of ERP

	Adequate testing Data accuracy Data analysis and conversion Data management Data fit Data migration Accurate and prompt data acquisition Trouble shooting Tests and problem solutions Country-related functional requirement Technical issues
Project champion	Project manager Project leader expertise Strong and committed leadership ERP project manager leadership
Careful selection of ERP Software	Adequate ERP selection System selection process Suitability of software Package standards Completeness of software Selection of ERP vendor ERP vendor quality ERP vendor reputation Related experience of supplier ERP supplier option and service Technical competence of supplier Domain knowledge of supplier
Use of consultant	Consultant-customer partnership Consultant involvement Consultant support Usage of consultant's tools Consultant selection Consulting services Technical competence of consultants Domain knowledge of consultant Consultant competence Consultant implementation team Connectedness with user department Effective communications with users
Appropriate business and IT legacy systems	Legacy systems and IT infrastructure IT infrastructure skills Pre-existing data and systems Suitability of hardware and software Technological context Technology or infrastructure in place Integration and communication between legacy system and ERP
System quality	System reliability System integrity System stability Compatibility of software Timeliness ERP adaptation level ERP software features Competency and flexibility of the ERP Ease of use

	Perceived complexity User fit Fit between ERP and business process
User involvement	User participation User support Feeling of user involvement Willingness to participate Employee cooperation Involving individuals and groups Key user involvement

Appendix g: Critical Success Factors (Somers & Nelson, 2001)

1	Top management support
2	Project team competence
3	Interdepartmental cooperation
4	Clear goals and objectives
5	Project management
6	Interdepartmental communication
7	Management of expectations
8	Project champion
9	Vendor support
10	Careful package selection
11	Data analysis and conversion
12	Dedicated resources
13	Use of steering committee
14	User training on software
15	Education on new business processes
16	Business process reengineering
17	Minimal customisation
18	Architecture choices
19	Change management
20	Partnership with vendor
21	Use of vendor's tools
22	Use of consultants

Appendix h: CSF categories (Finney & Corbett, 2007)

Top management commitment and support
Change management
BPR and software configuration
Training and job redesign
Project team: the best and brightest
Implementation strategy and timeframe
Consultant selection and relationship
Visioning and planning
Balanced team
Project champion
Communication plan
IT infrastructure
Managing cultural change
Post-implementation evaluation
Selection of ERP
Team morale and motivation
Vanilla ERP
Project management
Troubleshooting/crises management
Legacy system consideration
Data conversion and integrity
System testing
Client consultation
Project cost planning and management
Build a business case
Empowered decision makers

Appendix i: Critical Success Factor analysis (Nah et al., 2003)

While the CSF used in the article by Nah et al. 2003 were not listed in importance, the order has been changed to reflect the ranking given within the article itself.

Ranking	CSF
1	Factor 11: Top management support 1. Approval and support from top management 2. Top management publicly and explicitly identified project as a top priority 3. Allocate resources
2	Factor 8. Project champion 1. Existence of project champion 2. High level executive sponsor as champion 3. Project sponsor commitment
3	Factor 6: ERP teamwork and composition 1. Best people on team 2. Balanced or cross-functional team 3. Full-time team members 4. Partnership, trust, risk-sharing, and incentives 5. Empowered decision makers 6. Business and technical knowledge of team members and consultants
4	Factor 9: Project management 1. Assign responsibility 2. Clearly establish project scope 3. Control project scope 4. Evaluate any proposed change 5. Control and assess scope expansion requests 6. Define project milestones 7. Set realistic milestones and end dates 8. Enforce project timeliness 9. Coordinate project activities across all affected parties

5 Factor 4: Change management culture and program

1. Recognizing the need for change
2. Enterprise-wide culture and structure management
3. User education and training
4. User support organization and involvement
5. IT workforce re-skilling
6. Commitment to change—perseverance and determination

6 Factor 5: Communication

1. Targeted and effective communication
2. Communication among stakeholders
3. Expectations communicated at all levels
4. Project progress communication
5. User input

7 Factor 2: Business plan and vision

1. Business plan or vision
2. Project mission or goals
3. Justification for investment in ERP

8 Factor 3: Business process reengineering (BPR)

1. BPR
2. Minimum customization

9 Factor 10: Software development, testing, and troubleshooting

1. Configuration of overall ERP architecture Wee, 2000
2. Appropriate modelling methods/techniques
3. Vigorous and sophisticated testing
4. Troubleshooting
5. Integration

10 Factor 7: Monitoring and evaluation of performance

1. Track milestones and targets
2. Performance tied to compensation

3. Analysis of user feedback

11 Factor 1: Appropriate business and information technology legacy systems

1. Business setting
2. Legacy system

Appendix j: Critical Success Factor analysis (Akkermans & van Helden, 2002)

Critical success factor
(1) *Top management support*
(2) *Project team competence*
(3) *Interdepartmental co-operation*
(4) *Clear goals and objectives*
(5) *Project management*
(6) *Interdepartmental communication*
(7) *Management of expectations*
(8) *Project champion*
(9) *Vendor support*
(10) *Careful package selection*
(11) Data analysis and conversion
(12) Dedicated resources
(13) Steering committee
(14) User training
(15) Education on new business processes
(16) BPR
(17) Minimal customisation
(18) Architecture choices
(19) Change management
(20) Vendor partnership
(21) Vendor's tools
(22) Use of consultants

Appendix k: ACIS article (2010)

Vanderklei, M., Remus, U., Nesbit, T., & Wiener, M. (2010). Controls for managing risks across different stages of ERP projects. 21st Australasian Conference on Information Systems, 1-3 Dec, Brisbane, Australia.

Controls for managing risks across different stages of ERP projects

Mark Vanderklei, Ulrich Remus, Trevor Nesbit
University of Canterbury, New Zealand

Email: ulrich.remus@canterbury.ac.nz

Martin Wiener
University of Erlangen-Nuremberg, Germany
Email: martin.wiener@wiso.uni-erlangen.de

Abstract

Enterprise Resource Planning (ERP) implementations can be highly risky, posing numerous challenges to companies that implement them. Prior research has mainly focussed on identifying and assessing risks in ERP projects. Still little is known on mitigating risks by means of managerial control. Thus, this ongoing research aims to address these gaps by exploring how organisations exercise control in regards to identified risks during different stages of an ERP project. By using a case study approach this study particularly seeks to answer if and why control choices for risks change across different project stages. The preliminary results indicate that there is support for both, the need to collate the learnt experiences of ERP participants for these risks and their relative controls to be evaluated at all stages of the ERP project as the importance of risks and controls differ for each phase of the implementation project.

Keywords

ERP implementation, control, risk

INTRODUCTION

Enterprise Resource Planning (ERP) systems represent the concept of an integrated system designed to increase efficiency by integrating business processes and sharing common resources across an organisation (Hanseth et al., 2001; Jones et al., 2006; Markus and Tanis 2000). As such, projects associated with the implementation of ERP systems are complex, time-consuming and costly (Klaus et al., 2000; Robey et al., 2002), posing numerous risks to companies that implement. Often this results in high levels of failure. Prior studies have examined many different factors noted as attributing to ERP implementation failure including the implications of inappropriate modifications (Brehm et al., 2001), negative end user reactions (Shepherd et al., 2009), wrong cost estimation (Daneva and Wieringa 2008), poor financial performance, and lack of risk identification (Hunton et al., 2004; Sumner 2000). Despite the large number of risks associated with ERPs, demand for these systems continues to increase. The revenue from ERP projects reportedly grew to $28.8 billion in 2006 and is projected to be in excess of $47 billion by 2011 (Longinidis and Gotzamani 2009). While there has been a dramatic decrease in the percentage of failures (down to 33% in 2004), businesses are still losing billions of dollars annually in the implementation of software designed to reduce costs and increase profitability (Zhang et al., 2005).

This paper is adopting the concept of IT-related risk to ERP implementations (Markus 2000). Here risk is defined as a problem that has not yet happened but is the likelihood that an organization will

experience a significant negative effect (e.g., technical, financial, human, operational, or business loss) in the course of the implementation of an ERP system either internally or externally. As such the concept of risk is closely related to the concept of critical success factors (CSF), which has already reached significant importance in the field of ERP research (e.g., Kuang 2001; Somers & Nelson 2004; Sumner 1999). However, the use of CSF as a prescriptive means of avoiding risks is limited. Indeed, this fragmented view on risks has been noted as a missed opportunity and an area of pressing business need (Markus 2000). In addition, prior research addressing risks in ERP projects has been mainly focussing around risk identification and assessment and lacks prescriptive means on the actual mitigation of these risks.

One powerful approach for mitigating risks is exercising control (Du et al., 2007); where control refers to any attempt to motivate individuals to behave in a manner consistent with organizational objectives (Ouchi 1978). With this in mind, risk and control have been likened to the two sides of a coin and analysis of one without the other fails to fully address risk mitigation within ERP projects. Indeed the purpose of controls is to mitigate and reduce risks so that they are within acceptable limits (Albadri & Jordan 2003; Gallivan 2001). So far, research addressing risks and controls has focussed on IS development teams (Henderson and Lee 1992) and individual software development projects (Choudhury & Sabherwal 2003; Ropponen & Lyytinen 2000). All of these studies identified a common link between risk assessment, control of those risks and the effects on organisational performance. However, there is little on risk and control within the context of ERP projects with its specific characteristics as outlined above. Investigating risk controls is further complicated by the fact that during IT projects risks do not remain static, but changes as a function of prior decisions and behaviour (Markus 2000). The dynamic nature of risks also doesn't easily lead to a stable risk pattern, as in particular second-order consequences of human problem-solving behaviour might lead people to misdiagnose the causes of problems and apply attempted (control) solutions that actually make the situation worse (Markus and Tanis 2000).

To summarize, while prior research addressing risks in ERP projects has gained significant importance, so far research has mainly focussed on risk identification and assessment, leaving large gaps in mitigation risks by means of control. Furthermore, there is still little known on control in response to risks identified during different stages of ERP implementation projects. Thus, this paper tries to address these gaps by exploring how control is exercised in ERP projects in regards to identified risks. By using a case study approach this study particularly seeks to answer if and why control choices for risks change across different project stages.

THEORETICAL BACKGROUND

Risks in ERP implementations

Extending the definition of risk provided in the introduction, risk is seen from a behavioural perspective, where risk is not treated as rational choice and probability concept, but associated with the threat of a bad outcome. It suggests that decision makers tend to act in a loss-aversive manner instead of a rational one (Lyytinen et al., 1998). Risk is a necessity for continuous business improvement and the purpose of risk management is not to eliminate all risks but to help managers make sense of their situations, by identifying the risk, assess its impact, exclude bad choices and intervene to reduce, or avoid the risks (Bancroft et al., 1998; Lyytinen et al., 1998). Table 1: Risk factors in ERP projects according to Sumner (2000)

Risk category	Risk factor	Unique to ERP
Organizational fit	• Failure to redesign business processes	Yes
	• Failure to follow an enterprise-wide design which supports	Yes
	• data integration	
Skill mix	• Insufficient training and re-skilling	Yes
	• Insufficient internal expertise	Yes
	• Lack of business analysts with business and technology knowledge	Yes
	• Failure to mix internal and external expertise effectively Lack of ability to recruit and retain qualified ERP systems developers	Yes
Management structure and strategy	• Lack of senior management support	
	• Lack of proper management control structure	
	• Lack of a champion Ineffective communications	
Software systems design	• Failure to adhere to standardized specifications which the	Yes
	• software supports	Yes
	• Lack of integration	
User involvement and training	• Insufficient training of end-users	
	• Ineffective communications	
	• Lack of full-time commitment of customers to project	
	• management and project activities	
	• Lack of sensitivity to user resistance Failure to emphasize reporting	
Technology planning/integration	• Inability to avoid technological bottlenecks	Yes
	• Attempting to build bridges to legacy applications	

Risk management comprises an attention shaping component, including risk identification and analysis and an intervention planning component, including interventions and risk resolution techniques (Lyytinen et al., 1998). Identified risks are then linked to potential managerial interventions with the help of heuristics (see fig. 1). All of these components have been addressed at different levels and in a number of different ways within research pertaining to ERP implementation. Based on a comprehensive literature review and an empirical investigation of multiple case studies Sumner (2000) identified risk factors, associated to ERP projects (Table 1), thus refining the general concept of IT-related risks towards ERP-related risks. These include factors associated to organisational fit, skill mix, management structure and strategy, software systems design, user involvement and training, technology planning, project management and social commitment. These risk factors can also be broadly mapped to different core implementation stages (see below). As indicated in the introduction IT related risks are highly dynamic in the sense that they vary throughout a project as a function of prior decisions and behaviour, which might lead to unintended behaviour and consequences (Markus, 2000). In particular in ERP implementations residual risk might increase over time (contrary to conventional IT projects) as ERP systems tend to be continuously enhanced and

further integrated with other systems, increasing complexity, which in turn increases their failure-proneness (Markus, 2000).

Risks across the stages of ERP implementation

The process view of ERP implementation sees implementation as a sequence of stages where the outcome of each stage can be examined, as well as the cumulative outcome across all of the stages (Markus and Tanis 2000) (Somers & Nelson 2004). Many different ERP implementation models have been created (see Parr & Shanks, 2000). This research is using the enterprise systems experience cycle by Markus and Tanis (2000), which includes a planning phase as well as a post-implementation phase (see Figure 1). The purpose of this framework was to explain ERP success, which would make it also very useful in trying to understand actions and effects related to ERP failure and associated risks in each stage.

Project Chartering: This stage details the activities performed prior to project approval. Typical risk factors comprise the lack of top management support and championship and the lack of a proper management structure for the project (Sumner 2000). This is also confirmed by Nah and Delgado (2006) and Parr and Shanks (2000), who found that top management support and championship was the most important activity during this phase.

The Project (Configure and Rollout): This stage is focused with getting the system and end users up and running (Markus and Tanis 2000). Parr and Shanks (2000) found that it was crucial to have a balanced project team and the best people available in this phase. This stage is marked by its focus on the hard, technical tasks of installing the system rather than softer social tasks such as change management. Typical risk factors to be addressed are failure to redesign business processes, failure to follow an enterprise-wide data design, lack of business analysts, failure to adhere to standardized specifications and the lack of data integration (Sumner 2000).

Shakedown: The shakedown phase includes all those activities associated to the system going live in an organisation until all initial problems have been resolved. It ends when normal operations resume and control is passed from the project team to the respective operational managers (Markus & Tanis, 2000). In this phase any control issues unresolved from earlier phases would appear, typically taking the form of performance issues and disruptions in productivity (Muscatello & Parente, 2006). Typical risk factors include insufficient training and re-skilling of the IT workforce in new technology, insufficient internal expertise and failure to mix internal and external expertise effectively (Sumner 2000).

Onwards and upwards: This has been identified as the phase in which the benefits of an ERP system implementation will be felt within an organisation. This phase takes the organisation from the commencement of normal operations to eventual replacement – be that with an upgrade or different product. Typical activities during this phase include continuous business improvement, additional user skill building and assessments of the post implementation benefits.

Control in ERP projects

Similar to risks a behavioural view of control is adopted. This view implies that when a controller exercises control over a controlee, the controller is taking some action in order to regulate or adjust the behaviour of the controlee (Kirsch 1996). The behavioural view further presumes that the controller uses certain control mechanisms to exercise four modes of control, which may broadly be divided into formal and informal controls (Kirsch 1997). Each control mode can itself be implemented through multiple control mechanisms and combined into a portfolio of control. Please note that the same general control mechanism can support more than one control mode (Table 2). Formal controls are comprised of two modes, output and behavioural based controls. Output controls are mechanisms in place that define appropriate output targets (e.g. sales targets) and are concerned with what has been done as opposed to how it is done. Behavioural controls are different in that the outcome is of secondary importance to the method in which it was achieved and details an approach or set of instructions which are designed to result in a standard set of outcomes (e.g. procedures and

instructions) (Choudhury & Sabherwal 2003; Eisenhardt 1985; Elofson 1994). Informal controls consist of clan and self-control. Clan control is likened to the cohesive practices of a group and is typified by the degree to which all members of a group are committed to achieving group goals. Self-control is solely reliant on an individual's ability to monitor and control their own behaviours, with appropriate rewards and sanctions as required (Albadri & Jordan 2003; Harris et al., 2009).

The concept of control is an established area of research and has featured in a number of studies examining outsourcing and software development (e.g., Choudhury & Sabherwal 2003; Dibbern et al., 2008; Eisenhardt 1985; Harris et al., 2009; Liu et al., 2008). However, methods of resolving identified risks in ERP projects by exercising control is still in the formative stages with studies having concentrated on either risk mitigation at the strategic level or risk identification and prioritisation thus far (Sumner 2000). Within risk management, control has been described as a stage following risk assessment (Du et al., 2007). In general, the types of control potentially useful in managing IT-related risk are as varied as the risks themselves (Markus 2000). This is further complicated by the fact that control attempts are not invariably successful as they vary greatly according to the context, what type and to what extent control has been used. Nevertheless, perceived control should be seen as a powerful factor influencing both risk perception and decision-making (Du et al., 2007).

Table 2: Control mechanisms (adapted from Kirsch (1997) and Choudhury & Sabherwal (2003))

Control mode	***Control mechanism***	***Examples of control mechanism***
Outcome control	• Mechanisms to explicitly specify desired outcomes that were assessed later • Mechanisms (including IS) to evaluate the quality and timing of outputs delivered by the vendor	• Development methodology • Job description • Supervisor-subordinate hierarchy • Work assignment • Rules & procedures
Behavior control	• Mechanisms by which the controller explicitly specified rules, procedures, or processes for the controlee to follow • Mechanisms to facilitate direct observation of the controlees behaviour • IS designed to help the controller monitor behaviour of the controlee	• Defined target implementation date and/or budget • Expected level of performance • Defined project milestones
Clan control	• To promote shared goals • To promote and assess adherence to shared beliefs and values	• Coalitions of individuals with shared ideologies • Socialization • Hiring & training practices • Implemented rituals and ceremonies
Self control	• To encourage or motivate the controlee to exercise greater self-control	• Individual empowerment • Self-management • Work autonomy (who / how) • Self-set goals, self monitoring, and self rewarding

While there is a gap in identifying and selecting control modes for mitigating risks within ERP projects, prior literature on control in IS development, such as Choudhury & Sabherwal (2003) and Elofson (1994) can assist in selecting appropriate controls. While these individual control modes have specific characteristics with regards to the properties of the risks they address, the use of multiple controls or portfolio of controls has been identified as an important concept (Kirsch 1997). Control portfolios are the use of multiple controls at the same time to control risks, and can include the use of formal and informal control mechanisms simultaneously (Gopal & Gosain 2009). Furthermore, Kirsch (2004) explored the dynamics of control during large IS projects and found that control is exercised differently for each phase following certain patterns, such as "collective sense making", "technical winnowing" and "collaborative coordinating". More importantly, some factors trigger changes in control choices from one project phase to another and emerging issues in one phase trigger changes to controls in other phases. Even though this research was based on custom-developed applications,

these findings may have important implications for this research, in particular the scope of large IS projects and that some of these factors (e.g. performance problems) are often perceived as risks.

Summary

The literature review on risk, control and ERP implementation projects shows that in each single field there is already a significant amount of work, which could frame the underlying research question of this study and help explaining the findings. In particular, Markus and Tanis (2000) Enterprise System Experience Cycle could be used to frame the investigation of risk controls according to different phases and changes across phases, the conceptualization of risk management by Lyytinen (1998), the comprehensive list of risk factors compiled by Sumner (2000) together with the identified control modes (including the concept of portfolios of control) by Kirsch (1997) can be used to examine pre-identified risk control constructs, and finally the theory of control dynamics (Kirsch 2004) could be used to further explain how risk control is exercised in each phase, and why control changes across phases.

RESEARCH DESIGN AND METHODOLOGY

From the literature review the following model has been developed to describe the constructs of ERP implementation stages, their associated risks and means of controlling/resolving that risk (Figure 1). This model combines stage transition and iteration when examining risks and controls in relation to the stages of an ERP implementation. The stage transitions are illustrated in the progressive steps going from phase 1 "project chartering" through to phase 4 "onwards and upwards" and include unidentified risks. Iteration is used to step through risk identification at each of the different ERP implementation stages and when a risk is discovered, either an appropriate control measure is found to counter this risk or in certain circumstances it is left uncontrolled and is addressed at a later stage. The inclusion of unidentified and uncontrolled risks in stage transition is based on Sumner (2000) where it was found that unidentified or unaddressed risks had a cumulative effect on successive stages in an ERP installation.

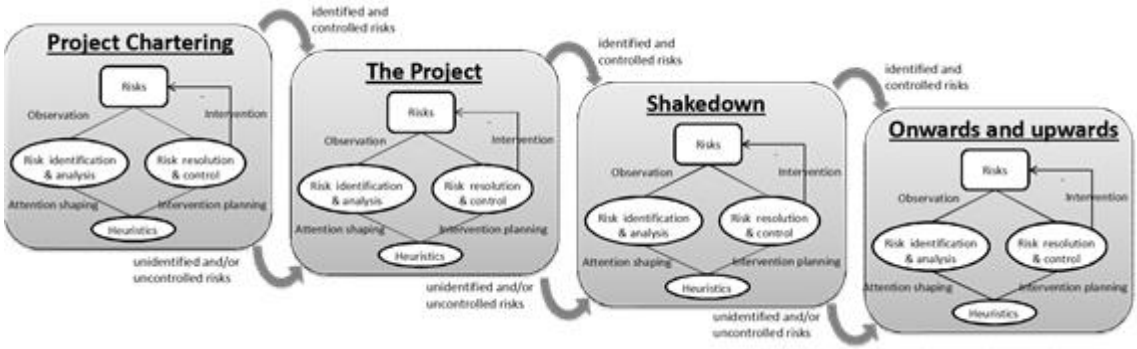

Figure 1: Proposed research model

A qualitative research design is applied by answering questions about how and why organisations exercise control in regards to identified risks during different stages of an ERP project. This approach is in line with previous research in this area (Kirsch 2004; Sumner 2000) and will draw upon the processes described in Eisenhardt (1989). In line with Kirsch (2004) this approach can be characterized as "soft positivism" described as a means of revealing both "*pre-existing phenomena and relationships*" as well as the ability to "*surface other constructs..., in the manner of interpretivists or grounded theorists*" (pp. 378). As this research is designed to investigate pre-existing phenomena drawing from risk and control theory whilst retaining the ability to explore additional constructs, this approach was deemed the most appropriate. The research was conducted in two stages. First, an exploratory pilot study comprising three interviews with senior IT personnel. staff members of ERP

projects and the analysis of relevant project documentation aims at clarifying the set of research questions and refining the scope of our research. The second stage is building on these results and is conducting two single indepth case studies, guided by the principles proposed by Langley (1999) and Yin (1994). Currently, the pilot study has been completed and the first case study has started.

CASE STUDY

This case follows an ERP implementation and resource amalgamation of three satellite offices of a multinational company in the building industry, Building Supplies Ltd [not real name]. These companies are all currently using SAP and are configured and supported in the following manner: Company B is located in Brisbane Australia, are 100% owned by Building Suppliers Ltd and host their own SAP resources. Company A is located in New Zealand and is also 100% owned but have their SAP resources hosted by company C. Company C is the new acquisition and is only 75% owned. While they currently host the SAP resources of Company A, they in turn are being hosted by their previous owners in America – a situation that will change in the near future as the links with their previous owners are severed and they are required to host their own resources (Figure 2). Although there is a business need to consolidate resources between companies A and B, the impetus to proceed was created by the acquisition of Company C from a competitor. With the acquisition of Company C comes the loss of access to their current SAP resources and hence the need to find an alternative solution. While the core ERP implementation is set to be completed on Company C, the proposed solution is to integrate all three companies into a data centre located in Brisbane Australia as shown in figure 2 "Desired Outcome". This will include finding an existing data centre to host their equipment, moving SAP resources for companies A and B into that Data centre and recreating a SAP environment for Company C (as they lose intellectual rights to their previous environment). SAP personnel will be sourced from Company C to administer the environment with business processes examined and redesigned over the 3 companies to enable systems integration.

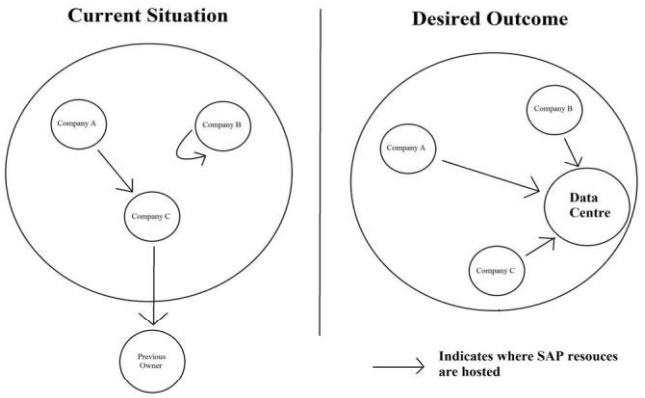

Figure 2: Current Situation and desire outcome of the analysed ERP implementation

The default implementation model used is the Bancroft Model (1996) and is the Building Supplies Ltd standard for ERP implementations. The project is currently in the transition between the planning (project chartering) and the As Is analysis (project) phase and has included input from the steering committee, CIO advisory team and the Board of Directors from all three companies involved. The project is scheduled to be completed by October, 2011 with the first stage encompassing the data centre setup and migration scheduled to cut over in April, 2011.

Data collection

The main sources of data collection are in-depth face-to-face interviews, brainstorming and a review of published and internal documentation, such as meeting protocols, process documentation and risk mitigation plans. Although the project manager may remain on the project over a number of stages, the four different stages involve separate groups of stakeholders as control is passed from one stage to the next (Markus & Tanis, 2000). The aim is to interview stakeholders from all ERP stages. This would also cover multiple perspectives (controller and controlee). Audio recordings will be made, which are then transcribed and uploaded into NVivo in preparation for coding. In parallel, memos are written to capture important thoughts and ideas, which evolve during the interviews. The first part of the interview is devoted to gaining an in-depth understanding of the implementation process. The next set of questions will focus on the key issues associated with risks and controls in each of the project phases. Specific attention is paid to conditions and interactions clarifying the relationship between risks and control in different project stages. Using the predefined constructs of control, ERP stages and identified risks topic and analytical coding is used to confirm already established constructs but also to identify new codes and concepts.

PRELIMINARY CASE FINDINGS

As this is ongoing research it is only possible to report from interviewing the ERP project manager of the first case study according to the project chartering and the project phase. Coding the first set of interviews has resulted in a number of identified risks and their proposed solutions, which had been mapped to the risk categories and risk factors identified by Sumner (2000).

Lack of executive commitment of Company 3 to the project

Company C is only one of the companies to be less that 100% owned (75% owned with the other 25% owned by a rival company). Originally company C were owned by three separate entities until a major share was bought out by Building Supplies Ltd. While this provides them with a controlling influence over how things are done, agreement to the expenditure required for an ERP consolidation requires more than a majority vote. Resistance to commit to the project has been noted as a major risk to the scope of the project. "...they have to have a unanimous agreement in order to sign these sorts of propositions..."As the implications of their decision will affect and potentially increase risks in other areas, agreement is being pursued aggressively in two ways. An incentive has been given in that the new implementation will involve the current SAP and hardware resources resulting in a centralised sharing of resource and minimal capital outlay with increased disaster protection.

> *"...the big cherry is if they come in it's not going to cost them anything operationally, because it's all tied up in the budget of the project..."*

As an added incentive they have highlighted possible risks Company C will be exposed to if they don't join and their potential ramifications.

> *"...we are going to go with these guys [company B], ... you are going to lose that million dollars we pay you, ... so you... are going to have to sort out your budget and you're going to...lose some of your staff because you won't need as many anymore, so it's a big risk for you and ... you really should come and join us.".*

The risk of Company C deciding to delay their decision to join a later date has been explored and it has been eliminated by Building Supplies Ltd as a feasible option. To dissuade this they have explained that this decision would result in high levels of expenditure as hardware and skilled personal would have to be found resulting in double ups of resources. Any resources found would be retained and will result in skilled SAP personnel at Company C no longer being needed. "...it's no good them coming along in a year or two's time and saying, *"Yeah, we're in now" and we're going,*

"Well, guess what boys, we got all these SAP people now and you're got all these SAP people. If we bring you in play, guess what, there are a whole lot of redundancies and it ain't going to be in here." To mitigate this Building Supplies Ltd have a proposed deadline for agreement. If no agreement is reached then that part of the project will be excluded.

Lack of Project Champion

A lack of project champion at Company C has been identified as a major risk. This is addressed in their proposal process as a major risk and if no project champion is found then the project will be terminated. *"If we can't name who the person's going to be who is the champion, we don't go ahead... we need someone because they are the one who has to sign off to say that's what they want".* Currently they are working through this issue and if not resolved then this may cause the project to be cancelled.*"...we are having big arguments at the moment, ...[over]... a lack of a champion.* The specified deadline will determine whether the project proceeds or is cancelled.

Lack of access to intellectual property associated with system design

Company C was bought from another company and as part of that agreement, Company C will lose their rights to the support and system infrastructure that is in place. An additional problem is that the SAP environment used to run the business cannot be recreated from backups or copies of the system in place as that is included in the intellectual property agreement of the original company.

> *"...they are trying to recreate the environment from what's in people's heads and what's on their notes to match what... needs to be [known]..."*

The risks associated with this are high as if the system is recreated incorrectly, this could result in the system becoming unusable. The mitigation plan is based on a combination of company standards with regards to ERP implementations, existing documentation and personal familiarity with the current system. The company stance with ERP implementations is to adhere to a number of best practices with ERP implementations, namely sufficient levels of business process redesign, minimal customisation.

> *"... so now we have to integrate them and we've got to work out their business process and our business process and does it make sense and which ones are we going to use going forward.".*

Measures have been put in place to facilitate this process. In particular addressing the issue by introducing business analysts at an early stage of the project to determine levels and where business process redesign needs to occur.

> *"...because ... it could be a critical path... [and]... reporting always seems to take the longest ... they are saying, "Let's get it in early"..."*

Lack of technical expertise

One of the potential problems identified if company C decides to go alone is that they currently house all available technical support for the products involved and this may result in the need to source additional skills.

> *"...if they are not in the picture we have to resource a whole lot of SAP consultants... the market over there is really, really tight and they have will have no expertise about ... [our] standards ..."*

As this project has yet to be signed off, the current plan at the moment is to wait and see what happens.

Incompatibility of hardware and operating systems

While the company standard is IBM, the current configuration at the Australian environment that works is the use of HP-UX machines. The risk is that adhering to the standard could

introduce unknown errors into a working system so a decision to stay with the current configuration has been made to avoid trouble shooting issues relating to OS at a later stage.

> *"Forget the standard, let's just get what we have got - use that and keep the system as it is and then we don't have to go back and test to see if some of the bugs were getting in. , so that's minimising risk and one of those things is you just cut out all of those things that we don't need to do".*

Table 3: Identified risks and associated control mechanisms in the case study

Risk category	***Risks***	***Corresponding control mechanisms***
Managerial structure and strategy	Lack of executive commitment of Company 3 to the project	Clan control – all members of the board are bought together or socialised to establish and ensure that there is no incongruence between individuals.
		Output control – if no commitment is registered by the cut-off date then company 3 will be excluded from the project.
	Lack of Project Champion	Output control – if no project champion is found by the cut-off date then the project will be on hold until a champion is found.
		Clan control – All members of the steering committee are aware of the need for a project champion and there is an expectation that one of them will take the lead
Software System Design	Lack of access to intellectual property associated with system design	Output control – business analysts have been introduced early into the project to map out the processes currently used, and from this to determine the required outputs.
		Output control – creation of a development site to test and ensure all SAP resources and required database structures are in place.
		Behavioural control – Internal project management procedures are being followed detailing the steps taken in an ERP installation to ensure that everything is covered.
Technology planning	Possible lack of technical expertise	Although this risk has been identified no control measures will been implemented until the next stage as this will involve sourcing and employing additional staff, an unnecessary step if company 3 agree to participate. Additionally these staff will not be required in the short term so timeframes allow for this to happen at a later stage if needed.
	Incompatible hardware and operating systems	Output control – although the company standard is to use IBM, HP-UX is currently being used and tests have confirmed its suitability so will be used instead.

Summary

When examining the types of controls used, previous literature is suggesting that clan control is a control type synonymous with operational level staff and administered by a controller as a means of achieving goal congruence though the identification and alignment of business goals (Harris et al., 2009). Although a number of different methods exist, one of the identified methods of encouraging clan type behaviour exhibited in this case is through socialisation where individuals are bought together to eliminate "...goal incongruence between individuals" (Ouchi 1979). What has been observed in this organisation is that clan control is a typical form of control used at the executive level with the project team being bought together with an expectation that all members participate in both the formulation and observation of the project goals. The implications within this case are that the controller and controlee of clan controls can in fact be the same people, and indeed this process is deemed highly important as the timeframes involved with an ERP implementation mean that success is reliant on all members of the team observing and striving to achieve the defined goals.

CONCLUSION AND NEXT STEPS

So far, the preliminary results indicate that identified risks and exercised controls are tied together and may have an important impact on ERP implementation success and further analysis should identify how these risk controls further influence risk mitigation and the 'residual risk' (Markus 2000) in the remaining project phases, in particular how these risk controls 'flow' across the different project phases, and how heuristics combine risk factors

and risk resolution techniques (Lyytinen et al., 1998). The preliminary results also demonstrate the usefulness of our theoretical framework, including Sumner's risk factors and categories as well as Kirsch's classification of controls. Further, the preliminary findings already indicated some interesting findings, for example that in the first case clan control might also plays an important role at the executive level. Further interviews with other stakeholders, in particular controlees will further investigate this proposition and other control mechanisms might emerge. The next steps for this research are to complete the remaining interviews of the first case study as the project moves along, proceeding in a similar way for data collection and analysis as presented above. In parallel, it is intended to conduct a second case study in order to strengthen the empirical basis for developing theory.

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Appendix l: ECIS article (2013)

Vanderklei, M. (2013). Risk factors in ERP implementations: Hierarchical and linear relationships. 21st European Conference on Information Systems. 6-8 June, Utrecht, Netherlands.

RISK FACTORS IN ERP IMPLEMENTATIONS: HIERARCHICAL AND LINEAR RELATIONSHIPS

Vanderklei, Mark, University of Canterbury, Christchurch 8140, New Zealand, mark.vanderklei@canterbury.ac.nz

Abstract

Enterprise Resource Planning (ERP) systems have been in existence for over 2 decades yet businesses are still losing billions of dollars annually due to the implementation of software designed to reduce costs and increase profitability. Risk Management is an area that contributes to these losses, specifically due to uncertain outcomes when dealing with an interconnected construct such as risk, and a research gap at the tactical and operational levels between risks and controls.

A comparative case study approach, encompassing 13 different organisations, was adopted to explore emerging patterns at the project implementation level, and from this two contributions emerged. After observing risks behaving in a hierarchical fashion with predictable results, an exploratory Hierarchy of Risks model was constructed. Although this model is still in its formative stage, it may prove useful in furthering our understanding of the close inter-relationship of risks in ERP implementations and the implications of managerial choice when determining risk prioritisation. A second finding is that no direct linear relationship appears to exist between risks and controls. Rather, this counterintuitive finding suggests that it is impacts as a consequence of risk, rather than the risks which cause the impacts, which allows these constructs to be bridged.

Keywords: risk, control, impacts, heuristics, hierarchy of risk

1. Introduction

Enterprise Resource Planning (ERP) implementations are some of the most complex and risky Information Systems (IS) projects available as they involve the entire organisation in a protracted process of business change. While the main reason for implementing these systems is "...to enhance control over processes within an organisation" (Hanseth et al., 2001, pp. 35), additional technical and business reasons include improvements in efficiency (Jones et al., 2006) and increases in rationalisation (Hanseth et al., 2001). Although these systems appear to offer compelling advantages, the results are often less desirable and include high cost, long installation time-frames and high levels of failure. In 2011, projections of $47 billion of annual revenue yielded disappointing results: 61.1% of projects took longer than expected, 74.1% went over budget and 48% failed to realise at least 50% of the original desired benefits (Panorama Consulting Group, 2011).

The aim of this research is to examine the control of risks at the project implementation level, as this has been identified as an ongoing reason for ERP implementation failures (Aloini et al., 2007). This paper adopts the definition of risk as a problem that has not yet happened but may cause an organisation to experience significant negative impacts (e.g. technical, financial, human, operational, or business loss) in the course of implementing an ERP system (Aloini et al., 2007; Sumner, 2000). One powerful approach to risk mitigation is exercising control (Du et al., 2007); where 'control' refers to any attempt to motivate individuals to behave in a manner consistent with organisational objectives (Ouchi, 1978). Methods of controlling risks in ERP implementations are still in the formative stages with studies having concentrated on either risk mitigation at the strategic level (Finney & Corbett, 2007) or risk identification and prioritisation at the tactical and operational levels (Aloini et al., 2012; Sumner, 2000). Part of this can be attributed to the complex interconnected nature of ERP risk factors, where risks occurring early in an implementation have the potential to influence different risks later in that same implementation (Aloini et al., 2012). In addition, contrary findings about how risks can be controlled have contributed to the formative state of theory-based research examining the relationship between risks and controls at the project implementation level (Gopal & Gosain, 2009).

The following research questions arise:

- Is there a direct relationship between different risks in ERP implementations, and, if so, how?
- How can Project Managers (PMs) map risks to controls in ERP implementations at the tactical and operational levels?

In the next section we will define ERPs and review the literature examining risk, control and risk management models. This is followed by an explanation of the criteria used in the selection of organisations and personnel to interview, and the methods used in the collection and codification of data. The two research questions will then be examined, followed by conclusions drawn from these findings and the identification of areas requiring future research.

2. Theoretical Background

ERP systems are neither company nor technology-specific. Rather, ERP is a descriptor assigned to integrated computer software systems designed to connect multiple parts of a business together and enable data gathered in one area to be accessible to other business units, enabling finer degrees of analysis (Markus & Tanis, 2000). In essence, ERPs act as activity based control systems where input into the system will result in statistical outputs allowing control to be exercised. During the implementation of an ERP, this formal structure is not in place and therefore an activity view of control is neither appropriate nor possible at this time. Rather, a behavioural view of control is most appropriate (Soh et al., 2010). This implies that when a controller exercises control over a controllee, they are taking some action in order to regulate or adjust the behaviour of the controllee (Kirsch, 1996). The behavioural view further presumes that the controller uses certain control mechanisms to exercise control within given situations (e.g. implementation dates, procedures) (Soh et al., 2010).

Although the concept of control is established and has been used to examine outsourcing (Gopal & Gosain, 2009) and software development (Harris et al., 2009), methods of controlling risks in ERP implementations are still in the formative stages (Aloini et al., 2012; Sumner 2000). While control modes can be categorised as Formal (Behavioural and Output) and Informal (Clan and Self) (Kirsch, 2004), specific controls that are useful in managing IT-related risks are as varied as the risks themselves (Markus & Tanis, 2000).

Aloini et al., (2012) and Lyytinen et al., (1998) examined a variety of risk management models and theories (e.g. PRINCE2, PMBOK, The Australian Standard, SAFE and Boehm's Software Risk Approach, and others) and concluded that despite great variations and drastic differences, managerial risk strategies share a standardised format. These include "how to inquire and observe, how to organise and interpret observations, and how to subsequently launch managerial action" (Lyytinen et al., 1998, pp. 236). The Lyytinen et al., Risk Management Approaches Model (Figure 1) was constructed using this standardised format and is a control-centric model with the ability to foster decision-making in situations where complete information is not always available (1998). This model depicts one event or state (risk) and three ideas and principles (risk identification and analysis, heuristics and risk resolution and control) which collectively make up the risk control process:

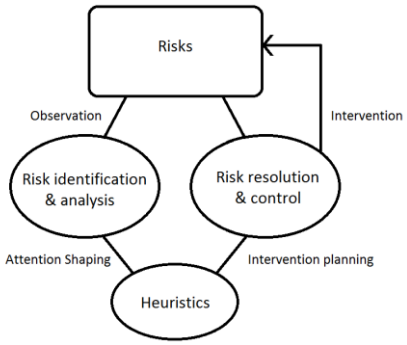

Figure 1: Risk Management Approaches Model (Lyytinen et al., 1998, pp. 236)

The first principle of risk identification and analysis in the Risk Management Approaches Model has received extensive coverage (Aloini et al., 2012). ERP implementations represent an excellent context for examining the interplay between different risk factors, because they cross departmental boundaries (Vandaie, 2008), and are prone to risks (Aloini et al., 2012). Sumner created a list of risk factors base on a combination of literature reviews and empirical findings, and is used to define risks factors in this research (Sumner, 2000). One alternative form of analysis draws on the interconnected nature of risks and proposes a hierarchy of risks, where a risk appearing early in an ERP implementation can have a direct effect on risks at later stages. The Hierarchy of Risks structure was tested against a single case and delivered promising results with further research proposed (Aloini et al., 2012).

Heuristics is introduced as the intervening principle, and can roughly be defined as a 'rule of thumb' (Lyytinen et al., 1998). The term denotes a solution to a situation where all required information may not be available, and fits well with this research because ERP implementations will seldom provide all the necessary information due to their complexity (Markus & Tanis, 2000). Where similarities to other resolved situations are discernible, aspects of that solution can be used instead of a logarithmic approach which requires all conditions to be met. Lyytinen et al., further describe the process as both objective and subjective (1998). Objective analysis describes the process of acting upon what can be seen (Wolf, 1978), and is the trigger mechanism in the idea or principle of observation. Subjective analysis is based on continuous learning and experience (Wolf, 1978), and describes the process of matching risks to risk resolution and control techniques using heuristics as a lens to focus personal experience or interpretation (Lyytinen et al., 1998). A review of risk management literature in ERP implementations by Aloini et al., compiled a list of types of project failures and noted an intermediary of 'effect' in the correlation between risks and why they fail (2012). 'Effect' is used as an identifier for factors which could impact an implementation (e.g. budget exceeded) (Aloini et al., 2012), and is similar in definition to the Lyytinen et al., use of 'impact' (1998). These two terms are used interchangeably and denote a many-to-one relationship in which each risk may have many impacts on

a business and these will lead to specific types of project failure (Aloini et al., 2012). Impact is also used in risk registries in the calculation of risk severity by the assignment of a numerical value (Patterson and Neailey, 2002). Impact was chosen in this study as a descriptor of the interceding construct to avoid ambiguity through consistent use, and because PMs were already familiar with it and had used this analysis in their implementations. While no connection is made between risks, impacts and controls, the use of heuristics as a lens is an area where further research may increase our understanding and bridge the gap between risk identification and risk control. It is for this reason that the concept of heuristics marries so well with risk management encompassing risk control (Lyytinen et al., 1998), and is the reason why this model was chosen to examine the relationship of risks and controls in this research.

3. Method

In examining the control of risks within ERP implementations, a qualitative research design in line with previous research examining large IS implementations was selected (Kirsch, 2004; Sumner, 2000) and will draw upon the processes described in Eisenhardt (1989). A commonality between the studies of Kirsch (2004) and Eisenhardt (1989) is the use of 'soft-positivism' as their epistemological framework. Soft-positivism was defined by Kirsch as a means of revealing both "pre-existing phenomena and relationships..." as well as the ability to "...surface other constructs..., in the manner of interpretivists or grounded theorists" (2004, pp. 378). As this research is designed to investigate pre-existing phenomena (e.g. ERP risks and controls) whilst retaining the ability to explore additional constructs (e.g. how risks and controls relate), this approach was deemed most appropriate. A comparative case study strategy, as used by Robey et al., was adopted because of the difficulty found with identifying the boundaries between ERPs and their implementation contexts, and the enhanced ability to examine phenomena across different cases (2002).

The main criteria used to identify suitable organisations and the applicable personnel was that the organisation had to have either completed (after 2007), or still be in the process of implementing a tier one or tier two ERP system, and the personnel had to have been involved in the risk control process at the tactical or operational levels. In total, 16 face-to-face interviews were conducted comprising 13 different personnel from 13 different organisations, and these interviews were divided into two groups. Three exploratory interviews were conducted in the development of the interview protocol and were used to clarify the research questions, refine the scope of the research and remove any disconnect between the many different academic definitions used and those used in practice. An example of this was the need to include more definitions (e.g. control and risk) and the preference of 'impact' as opposed to 'effect' when describing how risks can influence the business. The remaining 13 interviews were conducted with either the IT Managers or external consultants who had assumed the PM role during the implementation, and incorporated Sumner's risk categories (2000) and the Risk Management Approaches Model (Lyytinen et al., 1998). The developed protocol was used to gather data about the individual, the organisation, previous experiences and how risks were controlled in their last ERP implementation. Each interview averaged two hours in duration and together with the internal documentation and transcriptions, were imported into NVivo. Subsequent coding of risks, impacts, heuristics and controls was done and revealed a direct relationship between impacts and controls. Axial coding was then used to further refine the relationship between codes and concepts (Strauss and Corban, 1990), and the hierarchy of risks finding emerged.

4. The Preliminary Findings

As this is on-going research, these findings are derived from preliminary analysis of data gathered and compiled using the Lyytinen et al., Risk Management Approaches Model as a coding framework.

Let us address the first research question:

Is there a direct relationship between different risks in ERP implementations, and, if so, how?

While using the first idea or principle of the Lyytinen et al., Risk Management Approaches Model (risk identification and analysis) as an initial framework when performing axial coding on risks, it was found that certain risks appear to be interrelated, and formed a hierarchy of risks (Figure 1). This relationship was found in 11 of the 13 cases and consistently identified the flow-on effect to be the same risks. The importance of senior management support features prominently in ERP risk analysis (Aloini et al., 2007; Sumner, 2000), but no specific identifiable pattern was found in risk literature should senior management support be lacking. In 6 of the 11 cases, 'Lack of Senior Management Support' (Level 1) resulted in the manifestation of other risks later in the implementations, and reflected a direct relationship between risks as identified by Aloini et al., (2012). While the ERP implementation in one of the 11 cases was only in the initial planning stage, 'Lack of Senior Management Support' (Level 1) was identified as contributing to the manifestation of risks associated with negotiations to free staff for project activities, staff training, appointing a project champion, and determining how change would be managed (Level 2). 'Ineffective communication' (Level 2) was an additional by-product and resulted in high levels of misinformation (and lowered staff morale) regarding the organisations future structure and staffing level requirements. In two of the 11 cases, organisations experienced problems with their accounting departments which stemmed from the lack of project support from their senior accountant (a member of their senior management team). In one of those two companies, the continual effort required by the PM due to lack of senior management support was given as the reason why a third implementation within the business (after two successful implementations) failed. The effort required in the two successful implementations resulted in the PM burning-out and no longer being able to commit full time to the implementation. It was also found that when risks dealing with lack of full time commitment, insufficient training and ineffective communication were not addressed, user resistance increased (Level 3). Only two of 13 cases did not report experiencing any Level 2 risks, and felt strongly that they had achieved positive user acceptance (Level 3).

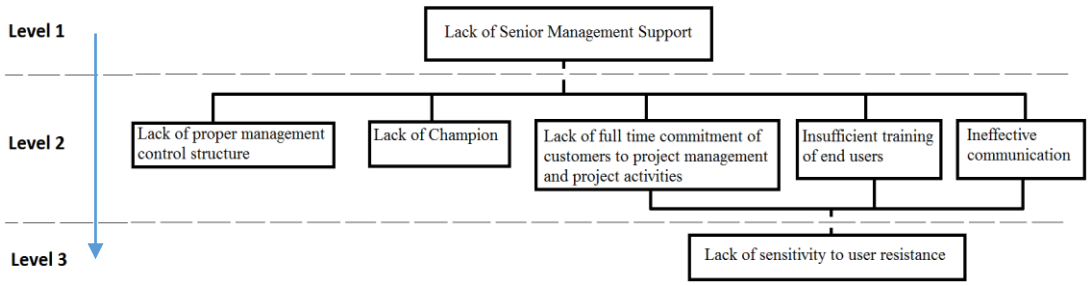

Figure 1: Hierarchy of Risks model

This preliminary analysis shows risks behaving hierarchically, where risks are able to influence other risks in lower nodes (flow-on effect) if not dealt with sufficiently.

Question two asks

How can PMs map risks to controls in ERP implementations at the tactical and operational levels?

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From the findings there appears to be no direct, observable relationship between risks and controls. What has emerged is the successful use of impact analysis as an intermediary construct to bridge this gap. While impacts as a consequence of risk have been noted (Aloini et al., 2012), the connection between impacts and controls has not. All PMs were questioned about their use of impact analysis, and all stated that it was conducted in some form. Of the 13 cases, three did not record any details and 8 used this analysis as a numerical tool only, a practise in line with the literature review findings (Patterson and Neailey, 2002). The remaining two cases detailed impact analysis and successful controls used, but this was only as an internal reference document for future internal implementations. The relationship between impacts and controls can be seen when examining the following excerpts from the compiled risk registries (Table 1). In this table we have three different risks, Risks One and Two identify risks associated with lack of full time commitment, and Risk Three identifying

ineffective end-user communication. While Risks One and Two fall within the same risk factor, the impacts and subsequent applied controls are different. Risks Two and Three are different risk factors but have matching impacts, and subsequent matching applied controls.

Risk Factor	Risk	Impact	Control Applied
1. Lack of full-time commitment of "customers" to PM and project activities	Well-being of team members affected by workload	Team members leave rather than hang around to suffer Stress levels lead to incorrect configuration.	Realistic resource assessment performed prior to each phase to ensure that appropriate resource levels are put in place
			Have some fun
2. Lack of full-time commitment of "customers" to PM and project activities	Ongoing changes from within the business resulting in key team members being unavailable	New ERP system fails to enable world class performance objectives **Negative perception of the system** **Delays could occur**	Work closely to ensure effective communication between the business and the project.
			Document "easy wins" and positive feedback back into the business
			Ensure the project is seen to be "in the business"
3. Ineffective end-user communication	Ad hoc communication to customers whilst sorting the system out	**Negative perception of the system** **Delays could occur** Misinformation leading to a perception that the ERP implementation is a failure.	**Document "easy wins" and positive feedback back into the business**
			Ensure the project is seen to be "in the business"
			Project Champion, PM and Marketing Manager to discuss ongoing messages as events develop

Table 1: Sample data from compiled risk registries

When applying these findings to the Lyytinen et al., Risk Management Approaches Model, a link can be seen between impacts relating to negative perceptions and delays, and the imposition of controls requiring the project team to portray themselves as a positive part of the business. Heuristically, these controls could now be applied to an ERP implementation should the impact to the business comprise negative perceptions or delays.

5. Conclusion and next step

Thus far the preliminary results suggest that a hierarchical relationship exists between different risks in ERP implementations. Although further research into these phenomena is required, the initial findings empirically confirm the importance of managing specific risks such as 'Lack of Senior Management Support' as identified in existing literature. Additionally, while there appears to be no clear and direct relationship detectable between ERP risks and controls, impacts derived from risks have been identified as a means to bridge this gap. This finding suggests that controls can be linked back to risks heuristically when the selection is based on impacts to the business, rather than the risk factors which cause the impacts. The extent of the inter-relationship between impacts and risks and hierarchically between risks themselves is not yet fully known. Although this research is ERP-specific, the risks identified are not (Sumner, 2000). While the intention is to conduct further research using ERPs as the focus, it is hoped that these findings can be applied to a wider range of IS implementations in an effort to better understand the constructs and to strengthen the empirical basis for developing robust 'real-world' theory.

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